Bluetooth Serial Adapter

FB100AS-F User Guide

Version 1.0

Firmtech

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Revision History

Revision	Date	Change Descriptions
Ver 1.0	01-04-2009	- Write a draft

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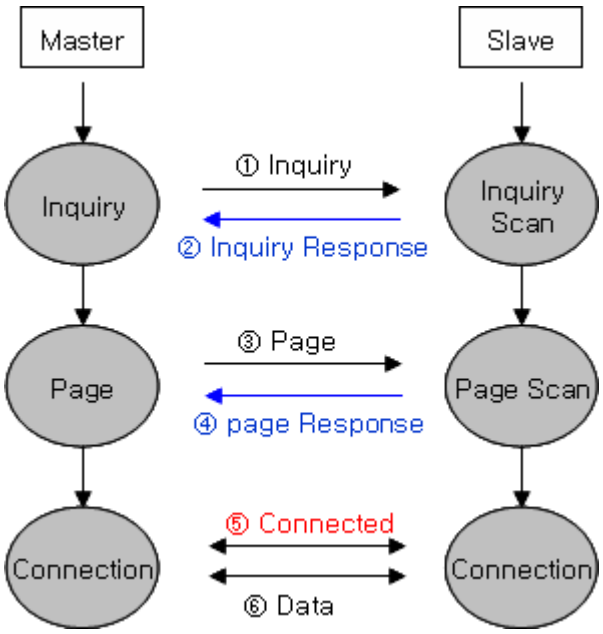
1 What is Bluetooth?

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 Products Overview

FB100AS-F has been developed to replace the previous RS232 Cable system with wireless communication system to use.

Major Features of FB100AS-F

1. Bluetooth Specification 2.0 Support
2. Bluetooth Piconets (Point to Multipoint) are configurable up to (max. 1:7).
3. Easy to control communication speed by using DIP Switch. (2400 bps – 230400bps)
4. Support AT Command, and capable to control FB100AS-F by using AT Command.
5. Easy to connect to use with Bluetooth PDA, Bluetooth USB Dongle, etc.
6. Selectable Power Supply between D-Sub 9 pin Connector and USB Connector
7. Stable Data Transmission / Receipt
8. Simply support the function of Bluetooth Firmware Update

※ We request the new users of FB100AS-F to read the information on this description carefully before they start to use the products.

3 PRODUCT COMPONENTS

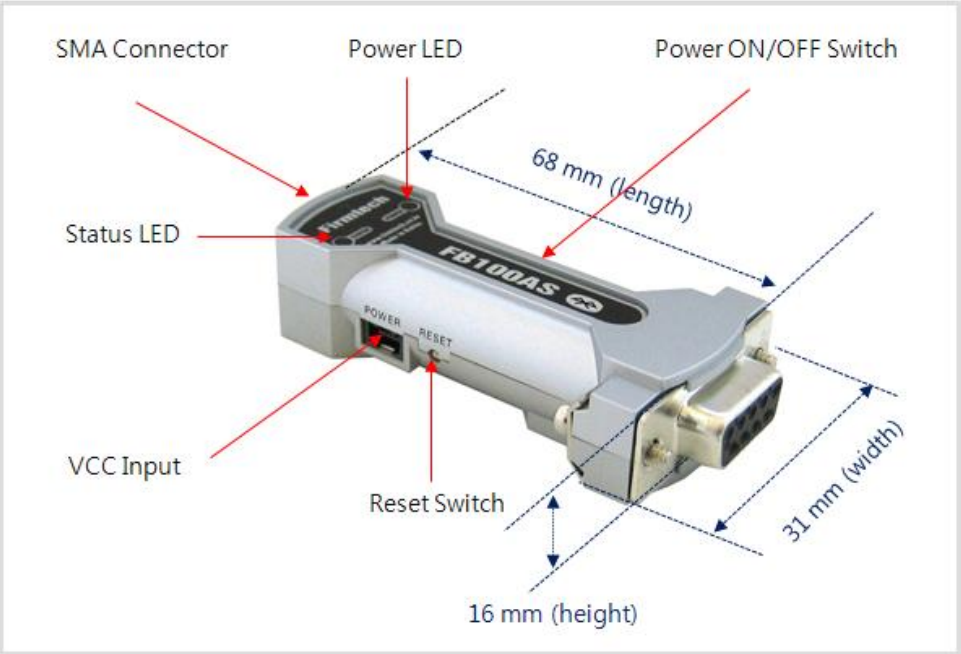
3.1 Basic Components of FB100AS-F

MODEL	PICTURE	Q'TY (EA)
FB100AS-F (RS-232 Serial Adapter)		1
FCA100UC (USB Power Cable)		1
FCA004DA (4.966dBi Dipole Antenna)		1
CD (Operation Manual and Test Program)		1

<Table 3-1 Basic Components of FB100AS-F>

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

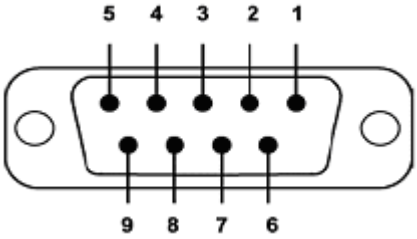
4 Product Appearance



<Figure 4-1 Details and Dimension of FB100AS-F>

5 Interface

5.1 FB100AS-F Interface



<Figure 5-1 D-SUB 9 Pin Connector>

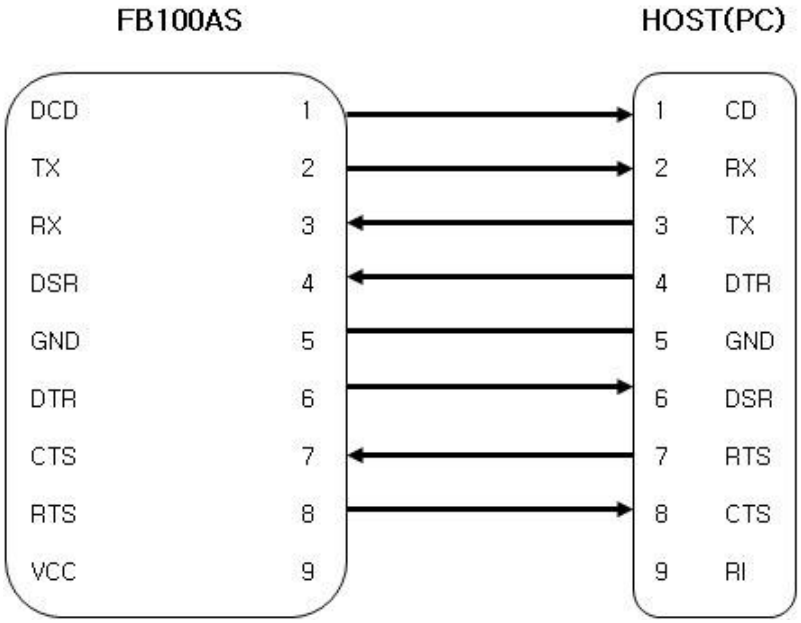
PIN NO.	NAME OF SIGNAL	FUNTION	INPUT/OUTPUT DIRECTION
1	CONNECT_CHECK DCD	1:N - Connect Check 1:1 - Data Carrier Detect	Output
2	TX	Transfer Data Data output	Output
3	RX	Received Data Data Input	Input
4	STREAM_CONTROL DSR	1:N - Stream Control 1:1 - Data Set Ready	Input
5	GND	Ground	
6	STREAM_STATUS DTR	1:N - Stream Status 1:1 - Data Terminal Ready	Output
7	MESSAGE_CONTROL CTS	1:N - Message Control 1:1 - Clear To Send	Input
8	MESSAGE_STATUS RTS	1:N - Message Status 1:1 - UART Ready To Send	Output
9	VCC	Power (DC 4 ~ 12V)	Input

<Table 5-1 Features of D-SUB 9 Signals>

※ The power can be supplied through pin number 9.

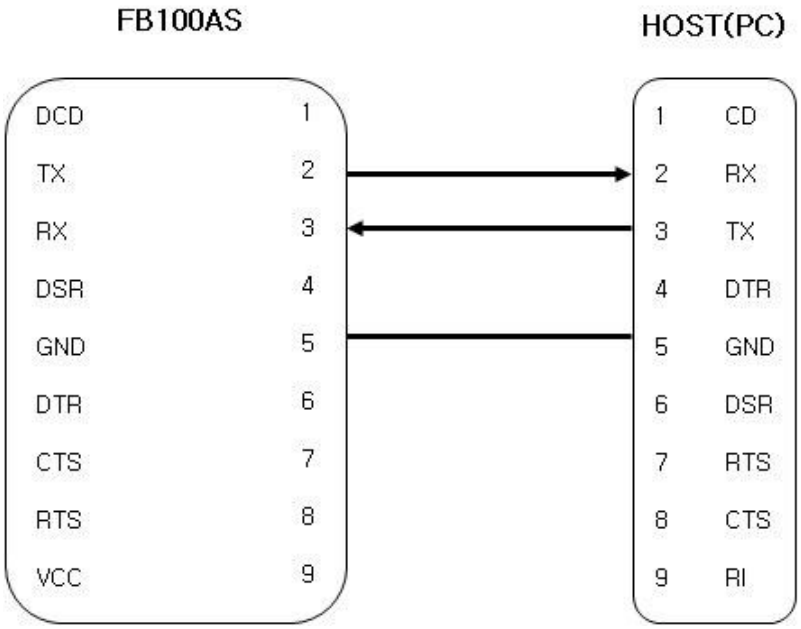
5.2 Pin Connection

5.2.1 Connection Diagram with Flow Control



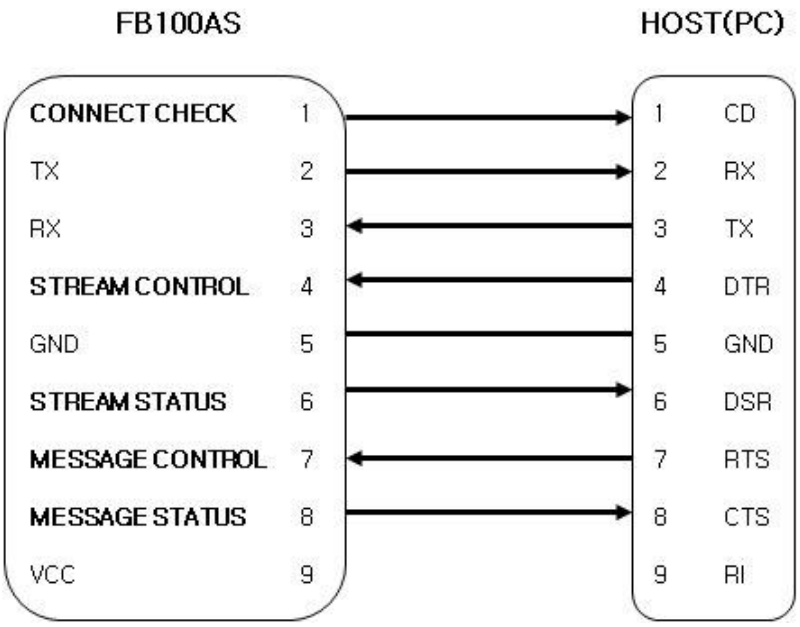
<Figure 5-2 FB100AS-F Connection Diagram with Flow Control>

5.2.2 Connection Diagram without Flow Control



<Figure 5-3 FB100AS-F Connection Diagram without Flow Control>

5.2.3 Connection Diagram with 1:N Function



<Figure 5-4 Connection Diagram with 1:N Function>

Note :

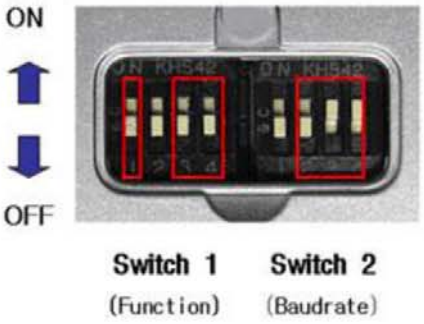
If Flow Control is not required, communication can be achieved with only RX, TX, and GND connected to the Host.

For 1:N communication, connection of STREAM CONTROL(DSR) and STREAM STATUS(DTR) are necessarily required. MESSAGE CONTROL(CTS) and MESSAGE STATUS(RTS) is used for the confirmation of the accurate information.

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

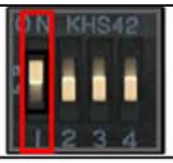
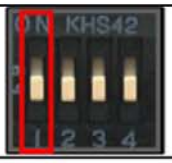
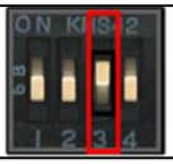
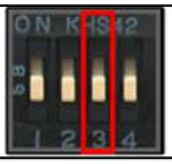
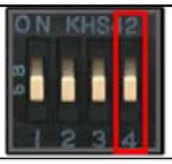
6 Features of Dip Switch

<Figure 6-1 FB100AS-F Dip Switch View>



<Figure 6-2 Features of Dip Switch>

6.1 Dip Switch 1 (FUNCTION Switch)

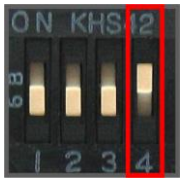
SW	FEATURES	ON	OFF	BASIC SET
1	Selectable Power Supply			ON
		D-SUB Power Supply or USB Power Supply	USB Power Supply	
2	None	-	-	OFF
3	ROLE			OFF
		MASTER	SLAVE	
4	Environment Setting (PC Configuration Select)			OFF
		PC Configuration Mode	Operation Mode	

<Table 6-1 Features of FUNCTION Switch>

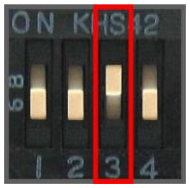
Note :

If you push a Reset Switch when a Dip Switch is turned ON in a PC Configuration Mode, the products return to the status of FATORY RESET.

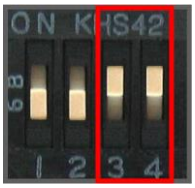
6.2 Dip Switch 2 (Baud Rate Switch)



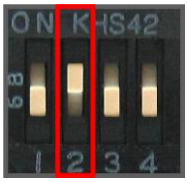
2400bps



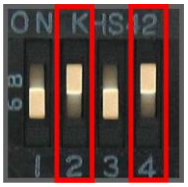
4800bps



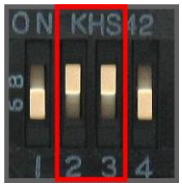
9600bps



19200bps

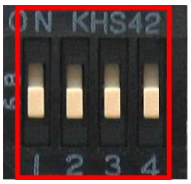


38400bps



57600bps

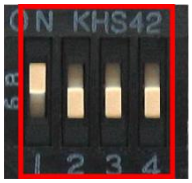
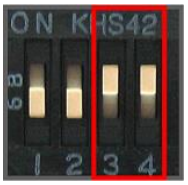
115200bps



230400bps

<Figure 6-3 Transmission Rate>

6.3 Initial Set Value of Dip Switch

TYPE	Function Switch	Baud Rate Switch
FB100AS-F		

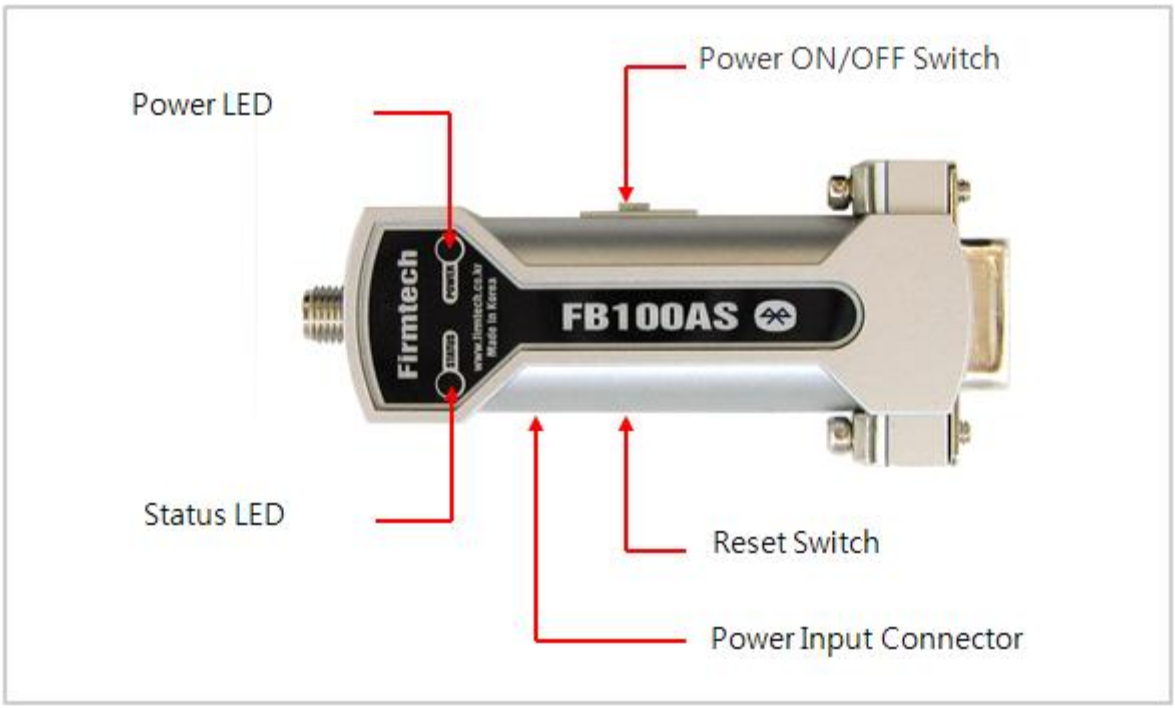
<Table 6-2 Initial Set Value of Dip Switch>

If the initial value is not consistent with <Figure 6-3>, please contact the seller you purchased the product.

Note :

If the CONNECTION MODE of PC Configuration is MODE4 (AT command MODE), it shall operate based on the Baud rate and at the value of Role established in PC configuration, regardless of setting of Baud rate and Role of Dip Switch.

7 Power Indicator LED / Status LED



<Figure 7-1 Appearance of FB100AS-F>

FB100AS-F has a red Power LED and green and red Status LED. Please, refer to the following description.

LED TYPE	STATUS	DESCRIPTION
Power Indicator LED (Power LED)	Power Input	The Red Light Turns on
Status Indicator LED (Status LED)	Connecting to Bluetooth	Green LED is Flickering
	Connected to Bluetooth	Green LED turned on
	PC Configuration	Red LED is Flickering

<Table 7-1 Operation Check by LED Status>

Note :

If you a Reset Switch when a red Status LED flickers in a PC configuration Mode, the products return to the status of FACTORY RESET.

8 Performance of Product

No.	Part		Specification
1	Bluetooth Spec.		Bluetooth Specification 2.0 Support
2	Communication distance		100 M
3	Frequency Range		2402 ~ 2480MHz ISM Band
4	Sensitivity		-83dBm (Typical)
5	Transmit Power		8dBm (Typical)
6	Size		66 x 31 mm
7	Support Bluetooth Profile		SPP (Serial Port Profile)
8	Input Power		DC 5V
9	Current Consumption		100 mA (Max)
10	Temperature	Operating	-20℃ ~ 50℃
		Limit Operating	-30℃ ~ 80℃
11	Communication Speed		2,400bps – 230,400bps
12	Antenna		4.966dBi Dipole Antenna
13	Interface		9 pin D-SUB Female (RS232)
14	Flow Control		RTS, CTS, DTR, DSR support

<Table 8-1 Performance of FB100AS-F>

9 Current Consumption

STATUS		Current Consumption (mA)		
		MIN	MAX	AVG
Standby		24	30	**27**
Inquiry scan & page scan (Slave)		24	66	**46**
Page scan (Slave)		24	33	**28**
Inquiry (Master)		77	86	**82**
Connected	**Slave**	39	45	**43**
	Master	27	33	**29**
Data transmission	**Slave**	51	57	**54**
	Master	48	57	**52**
Data reception	**Slave**	48	54	**50**
	Master	45	54	**49**
Data transmission / reception	**Slave**	51	57	**54**
	Master	51	60	**55**
Power save	**Slave**	24	33	**25**
	Master	21	33	**27**

<Table 9-1 Current Consumption of FB100AS-F>

TEST CONDITIONS

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

The power consumption is subject to change depending on the transmission rate and volume of data.

10 Initial Set Value of Products

The product has the initial Set Value as shown on the <Table 10-1>.
Please be sure to identify the initial Set Value, before you begin to use.

TYPE	Set Values
Device Name	FB100v1.0
Pin Code (Pass key)	BTWIN
Uart (baud rate-data bit-parity bit-stop bit)	9600-8-N-1
ROLE	SLAVE
Connection Mode	MODE3
Operation Mode	MODE0 (1:1 communication)
Debug Char	0x02

<Table 10-1 Initial Set Values of FB100AS-F>

The Operating Set Values of Products is changeable by using Dip Switch or PC software (Window Hyper Terminal, or FIRMTECH PC Configuration Program.)

Note :

Please refer to 12 PC Configuration for details on changing the setting.

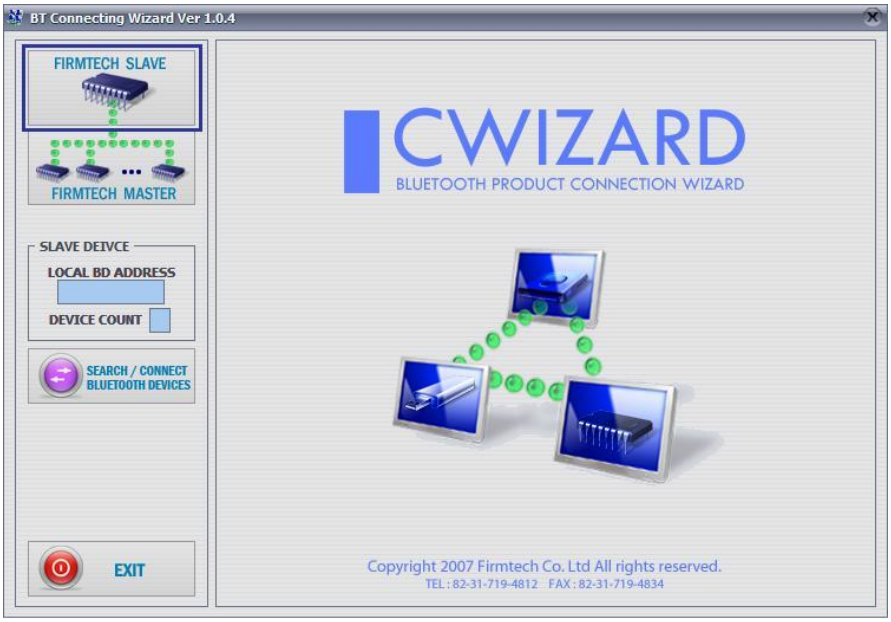
11 Connecting the wireless section of Bluetooth

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.
How to connect the wireless section of FB100AS-F can be performed with 2 significant ways.

※ We will use 2 FB100AS-F and MS Windows in describing procedures.

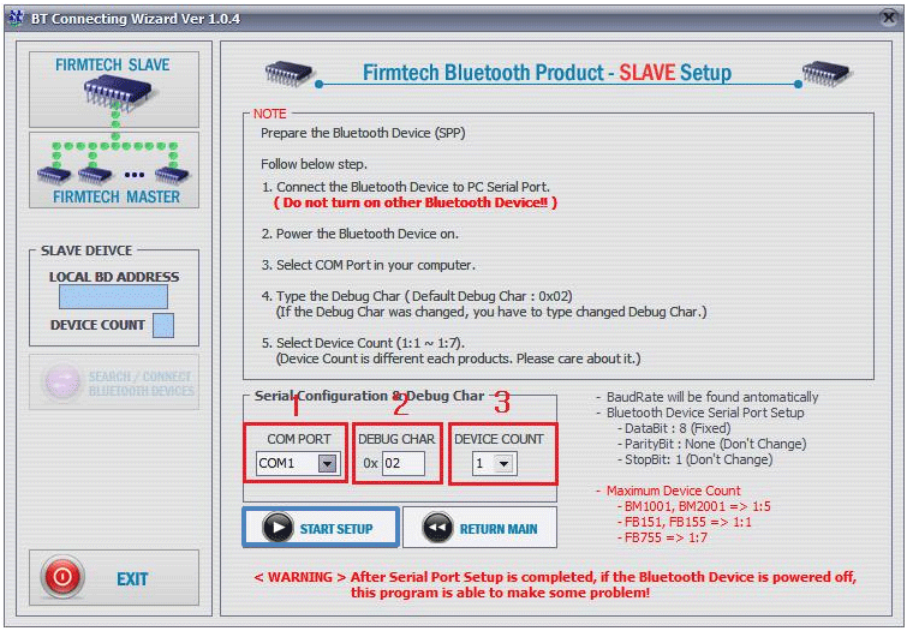
11.1 Connecting with Connection WIZARD

(1) Connect FB100AS-F(1) to a Serial port of PC, and turn the power on.
(2) Execute C-Wizard Program.



<Figure 11-1 Connection Wizard Step 1>

(3) Click FIRMTECH SLAVE Set-up button (<Figure 11-1> Blue borders)



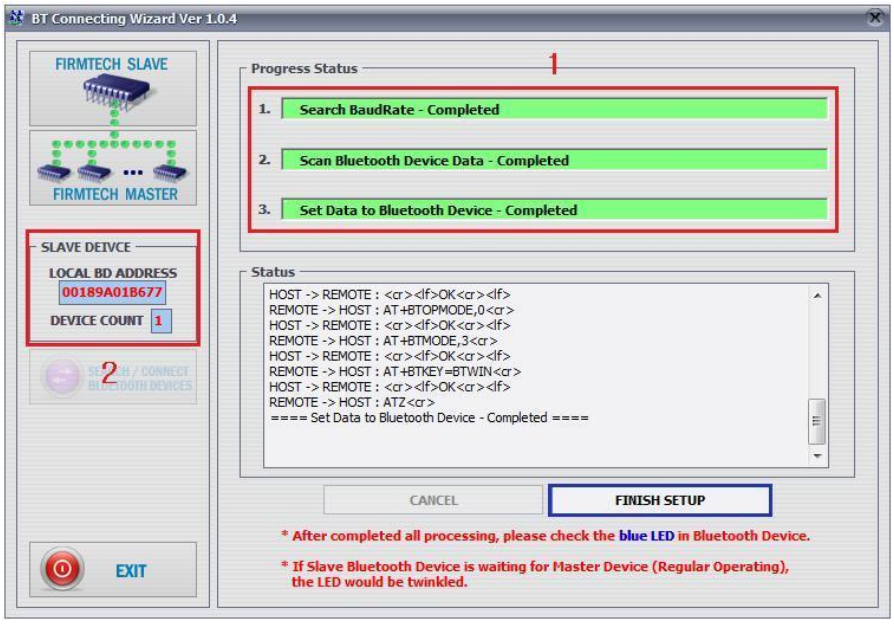
1 COM PORT : Select Serial port of PC connected a product.

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 11-2 Connection Wizard Step 2>

(4) Click the Set-up Start Button(<Figure 11-2> Blue borders) after setting each values in blanks (<Figure 11-2> Red borders **N.1 - Com Port connected to FB100AS-F**, **N.2 - 0x02**, **N.3 - 1**)



1 Procedures: procedures of Device Set-up.

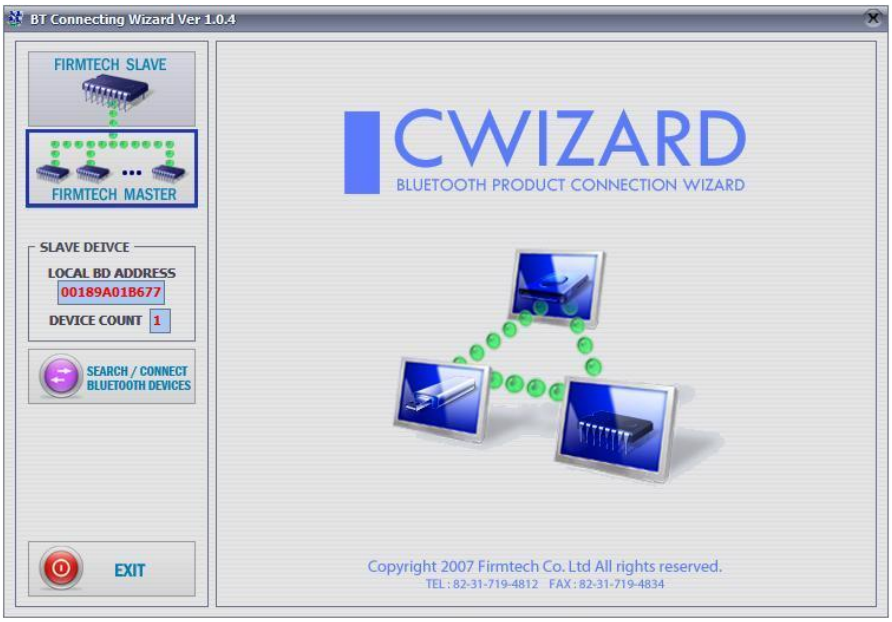
2 SLAVE Device value: It shows values if the SLAVE Set-up is completed (optional)

<Figure 11-3 Connection Wizard Step 3>

(5) Status Display of Procedures(<Figure 11-3>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 11-3>N. 2 red borders)

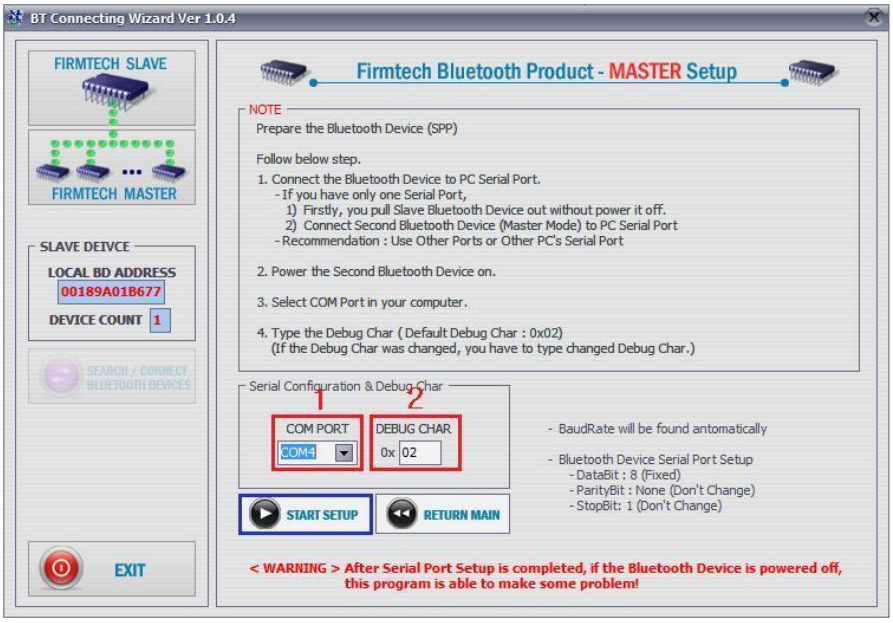
(6) Remove FB100AS-F(1) from the Serial port of PC. (the power should be turned on)

(7) Connect FB100AS-F(2) to the Serial port, and turn the power on.



<Figure 11-4 Connection Wizard Step 4>

(8) Click the FIRMTECH MASTER Set-up (<Figure 11-4> Blue borders) Button

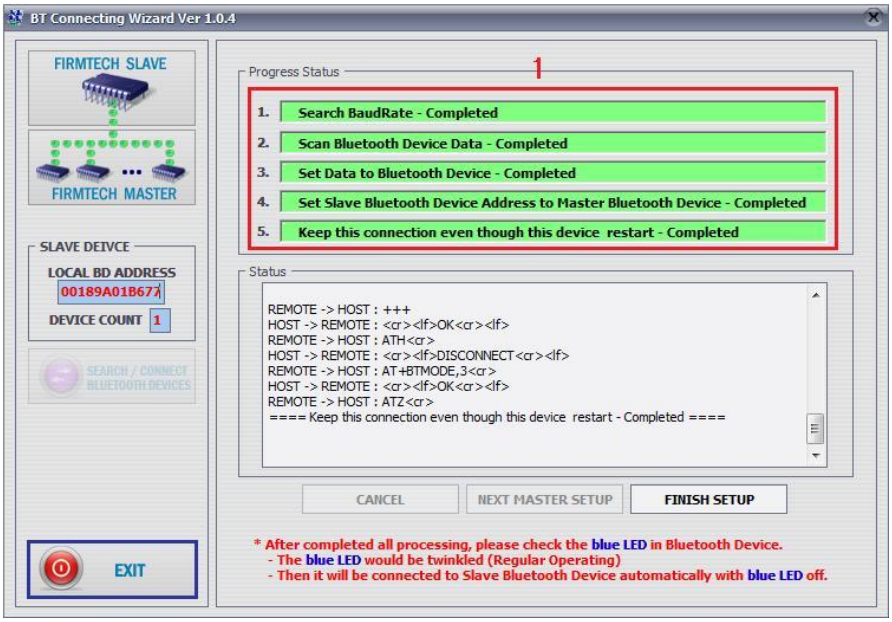


1 COM PORT : Select the Serial port of PC connected to a product

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

<Figure 11-5 Connection Wizard Step 5>

(9) Click Set-up Start (<Figure 11-5> blue borders) button after setting each value (<Figure 11-5> red borders **N.1 - Com Port connected to FB100AS-F**, **N.2 - 0x02**) in blanks.



<Figure 11-6 Connection Wizard Step 6>

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

(11) Set Function Dip Switch #3 to MASTER after turn off the power of FB100AS-F(2)'s power off.

(12) Turn ON the FB100AS-F(2) and check status LED of FB100AS-F(2) is turns ON in 1~10seconds. If LED is ON, the section of Bluetooth is connected properly and Data Transmission is usable

11.2 How to connect with Dip Switch Set-up

FB100AS-F can perform data communication once you change the Dip Switch Set-up.

The following is the method of setting the Dip Switch.

(1) Set Baud rate Dip Switch of FB100AS-F(1) to the proper speed for communication

(2) Set FUNCTION Dip Switch #3 of FB100AS-F(1) to **SLAVE**.

(3) Turn the power of FB100AS-F(1) on.

(4) Set Baud rate Dip Switch of FB100AS-F(2) to the proper speed for communication.

(5) Set FUNCTION Dip Switch #3 of FB100AS-F(2) to **MASTER**.

(6) Turn the power of FB100AS-F(2) ON.

(7) If Status LED of FB100AS-F is turned on shortly, it means the wireless section of Bluetooth is properly connected, so Data transmission can be performed.

12 How to complete PC Configuration?

The Baud rate or Role is selectable using Dip Switch. (In case, CONNECTION MODE is not MODE4.)
For other setting values, you can establish the setting using PC Configuration.
PC Configuration can be performed with two significant ways.
First way is to use Configuration tool provided by FIRMTECH Co., Ltd.
Second is to use the serial communication programs such as Hyper Terminal or Mincom provided by OS.
To set these are shown below.

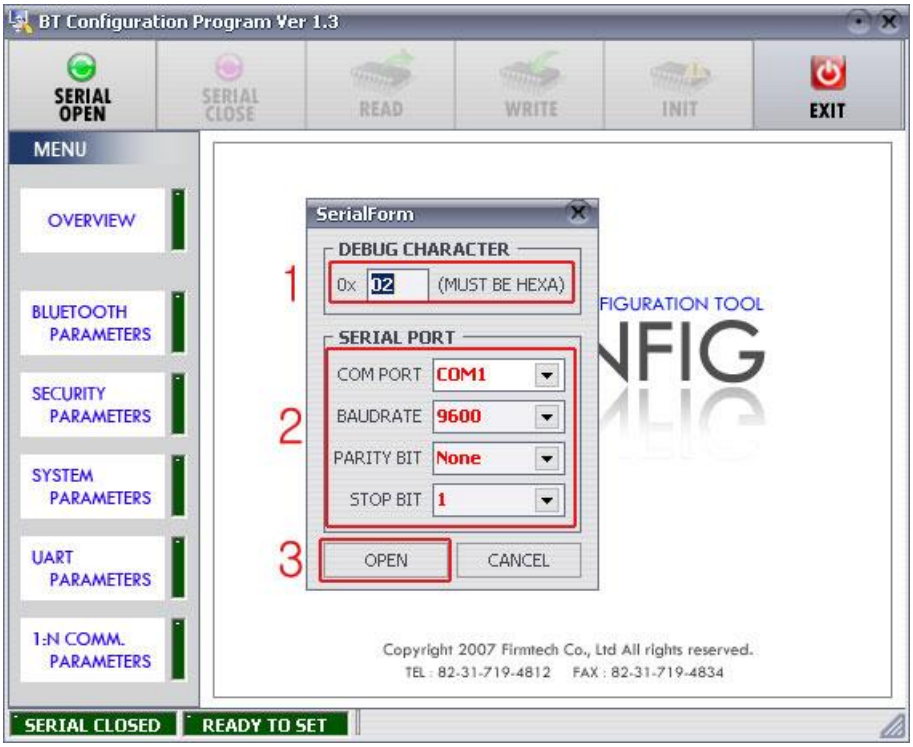
12.1 PC Configuration using BTConfig tool

(1) After setting 4th Switch (PC Configuration Switch) of Function Dip Switch FB100AS-F ON and connect the power. Check if red LED is flickers on Status LED.

(2) Execute BTConfig tool after connect FB100AS-F to serial port of PC.

<Figure 12-1 BTConfig tool initialization>

(3) Click "SERIAL OPEN" button. (<Figure 12-1> 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**

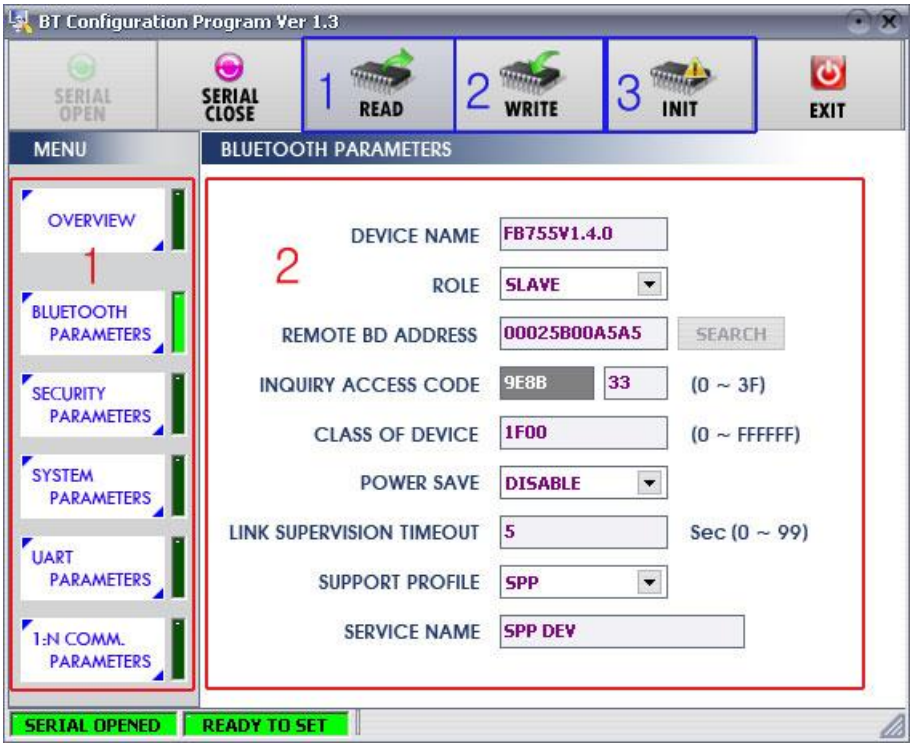
<Figure 12-2 BTConfig tool Serial connection>

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

<Figure 12-3 BTconfig tool connection>

(4) If the <Figure 12-2> comes up, set each blank (Red borders N.1~2) to (COM PORT – **Port connected to FB100AS-F**, 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) lights become green as shown on <Figure 12-3> .
If the lights doesn't change into green, check the COM PORT and execute BTConfig tool once again.

(5) If READ button (blue borders) is clicked after BTConfig tool is connected to products as shown on <Figure 12-3>, MENU Buttons (<Figure 12-4> 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. (During first initialization, value should be READ after BTConfig tools are connected to products)

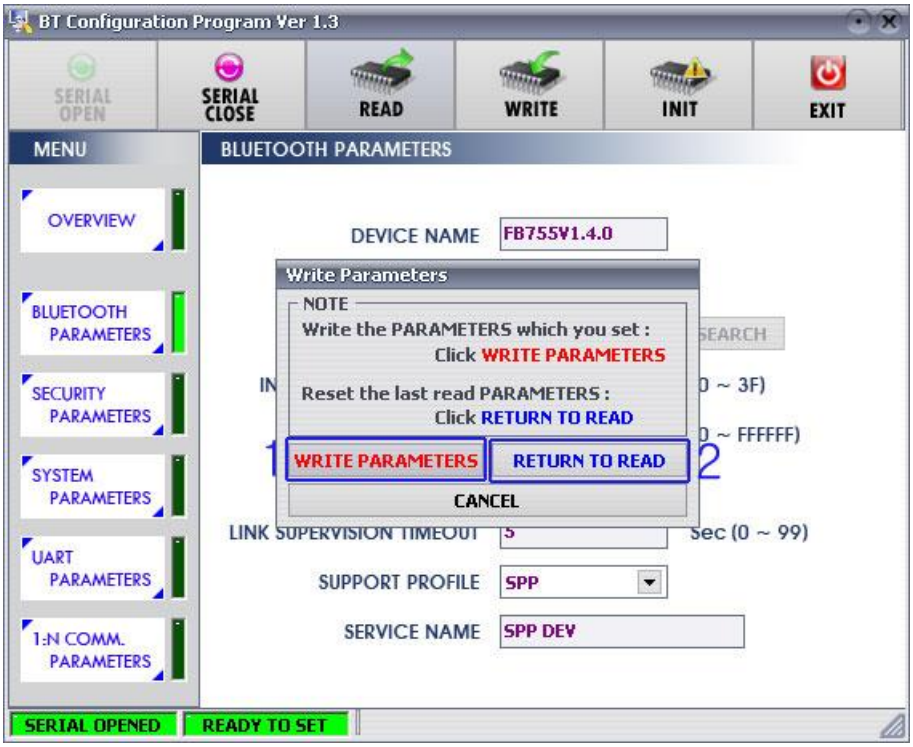
2 WRITE button: Save set values. (Serial port is automatically off after saving is completely.)

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

<Figure 12-4 BTConfig tool Set-up>

(6) If you select any PARAMETERS(<Figure 12-4> red borders N.1), the window for Value Check and Set-up comes up on the right

(7) 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 12-5 BTConfig tool WRITE>

Note:

Please refer to the *appendix A* of PC Configuration for the further descriptions.

12.2 PC Configuration using Serial Communication (Hyper Terminal) Program

12.2.1 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 FB100AS-F 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.

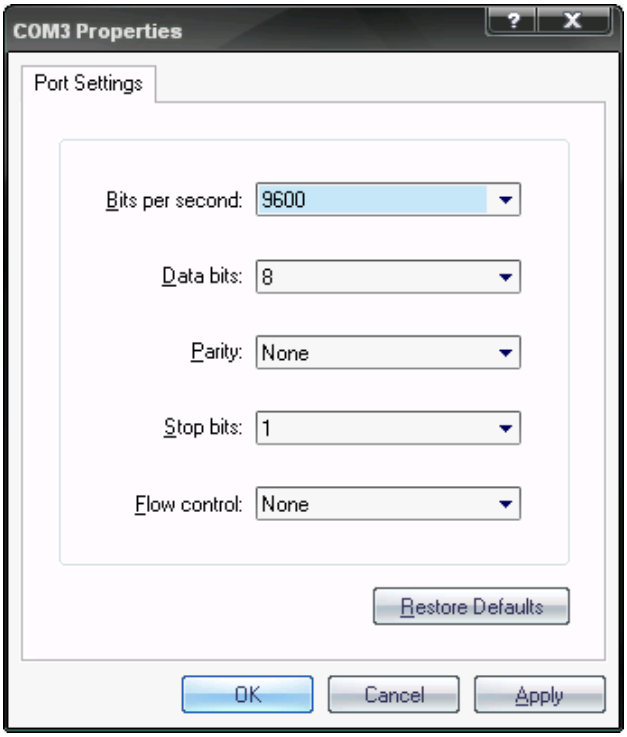
(1) Fix the number 4 switch of Function Dip Switch at ON.

<Figure 12-6 Hyper Terminal Set up Window 1>

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

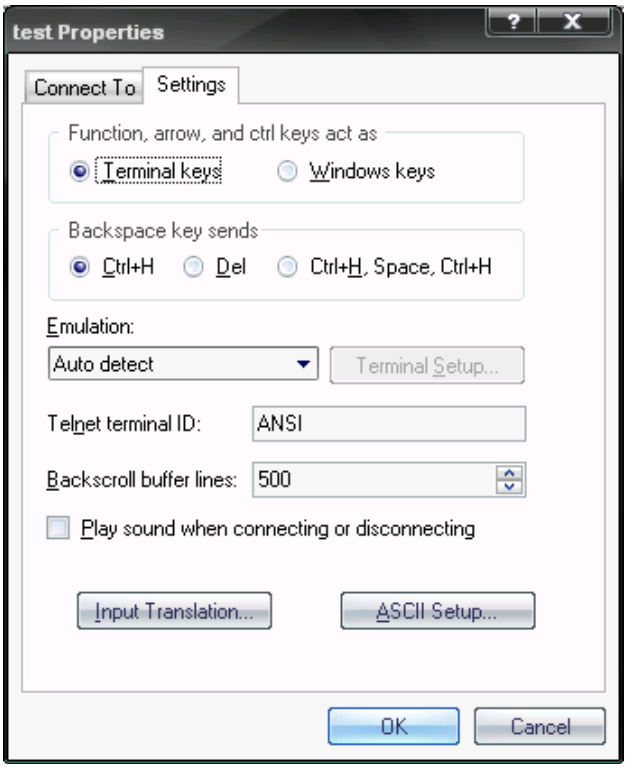
<Figure 12-7 Hyper Terminal Set up Window 2>

(3) When the <Figure 12-7> comes up, select the COM port connected to FB100AS-F, and clicks the OK button.



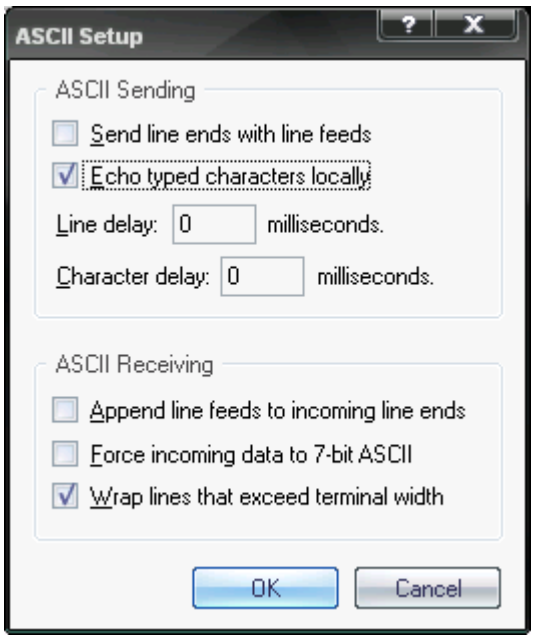
<Figure 12-8 Hyper Terminal Set up Window 3>

(4) When Registration Information Window comes up as on <Figure 12-8>, select **Bit per second** : **9600**, **Data bit** : **8**, **Parity** : **none**, **Stop bit** : **1**, **Flow control** : **none**, which will execute Hyper Terminal.



<Figure 12-9 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 12-10 Hyper Terminal Set Up Window 5>

(6) As shown on <Figure 12-10>, 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 approved for FB100AS-F, the menu such as <Figure 12-11> will appear on the Hyper Terminal.

```
|=================================|
|  Model name     : FBxOO         |
|  S/W Version    : 1.0.0         |
|  Bluetooth Spec : 2.0           |
|  Local BD Addr  : OO189A2FBCOB  |
|=================================|

==================== 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 12-11 Pc Configuration Menu>

12.2.2 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 "DEVICE NAME", enter : **[1]→[Enter]**

Note :

When Reset Button is pressed at <Figure 12-11>, all the set up value shall be reset to the initial set up status (factory fix point).

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 PC Configuration setting up, turn off the FB100AS-F, and change the Function Dip Switch #4 (PC configuration) to OFF position and turn the power ON, which will start the Bluetooth to operate normally.

Note :

Please refer to the Appendix A, details of PC Configuration for detailed value description of PC Configuration.

13 Approval Information

13.1 KCC

13.2 FCC compliance Information

13.3 CE

13.4 TELEC

13.5 SIG

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:

• Reori nt or relocate the receiving antenna.
• Incre se the separation between the equipment and receiver.
• Conn ct the equipment into an outlet on a circuit different from that to which the receiver is connected.
• Consult the deal r 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