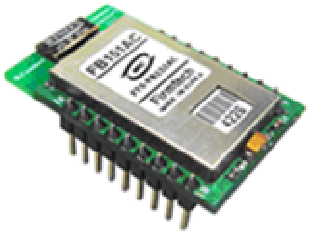
Embedded Bluetooth Module - FB151AX



Firmtech

ABOUT FB151AX version 3.0

Class 1, BT 2.0 Support

18PINs Header type

Dipole or Chip Antenna

AT Command provided

FIRMTECH Co., Ltd.

Room 720, C Unit of Sigma Officetel, 18,
Kumi Dong, Bundang Ku,
Sungnam City, Kyonggi Do.

Homepage : www.firmtech.co.kr
Marketing Inquiry : contact@firmtech.co.kr
Technical Support Inquiry : techsupport@firmtech.co.kr
Tel : +82-31-719-4812
Fax : +82-31-719-4834

What is Bluetooth?

1. Features of Bluetooth

1) Objectives of Bluetooth : To Realize Wireless Communication for Short Distance with Low Power Consumption, High Reliability, and Low Cost.

2) 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)

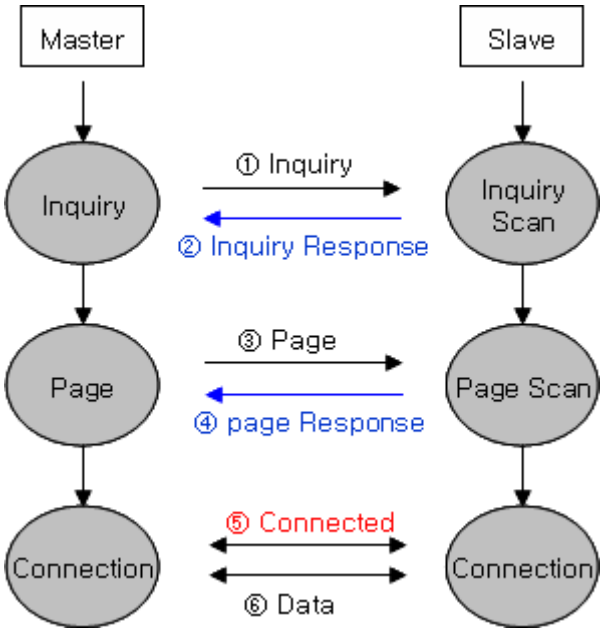
3) Transmission Rate : 1Mbps ~ 3Mbps

4) Transmission Output : 1mW(10m, Class2), 100mW(100m Class1)

5) Network Configuration : Configured with Master and Slave relation. A Bluetooth unit shall allow simultaneous connections up to 7 devices (in case of ACL).

6) Reliability : To Guarantee stable wireless communication even under severe noisy environment through adopting the technique of FHSS (Frequency Hopping Spread Spectrum).

2. Operation of Bluetooth



<Figure 0-1 Operation of Bluetooth>

1) Once the Master will inquire the Slave, the Slave will respond to the inquiry to the Master.

2) When the information of Slave will agree with that of the Master, the interconnection will be achieved to transmit the data.

Products Overview

FB151AX has been developed to replace the previous RS232 Cable system with wireless communication system to use.

Major Features of FB151AX

1. Bluetooth Specification 2.0 Support

3. Easily applicable to the Product with 18Pins Header type

4. Support AT Command, and capable to control FB151AX by using AT Command.

5. Easy to connect to use with Bluetooth PDA, Bluetooth USB Dongle, etc.

6. Stable Data Transmission / Receipt

※ We request the new users of FB151AX to read the information on this description carefully before they start to use the products.

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1 PRELIMINARY USAGE OF PRODUCT

1-1 PRODUCT COMPONENTS

1-1-1 FB151AC

- FB151AC module
- On-board chip antenna

1-1-2 FB151AS

- FB151AS module
- Stub antenna
- Antenna extension cable

1-1-3 PC Interface Kit

- PC Interface board(Jig board)
- Serial extension cable
- DC Power Adapter
- USB Cable
- CD

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

2 PERFORMANCE OF PRODUCTS

Part		Specification
Bluetooth Spec.		Bluetooth Specification 2.0 Support
Communication distance		100 M
Frequency Range		2.4 GHz ISM Band
Sensitivity		-83dBm (Typical)
Transmit Power		16dBm (Typical)
Size	FB151AC	23 x 37.2 mm
	FB151AS	23 x 36.2 mm
Support Bluetooth Profile		GAP, SPP
Input Power		3.3V
Current Consumption		100 mA (Max)
Operating Temperature		-10℃ - 50℃
Communication Speed		1,200bps – 230,400bps
Antenna	FB151AC	Chip Antenna
	FB151AS	Dipole Antenna
Interface		UART (TTL Level)
Flow Control		RTS, CTS, DTR, DSR support

<Table 2-1 FB151AS & FB151AC Performance>

3 CURRENT CONSUMPTION

Status		Current Consumption (mA)		
		MAX	MIN	AVG
Standby		3	0	**1**
Inquiry scan & Page scan (Slave)		72	0	**30**
Page scan (Slave)		15	0	**1**
Inquiry (Master)		81	78	**79**
Connected	Slave	30	24	**28**
	Master	15	3	**6**
Data Transmission	Slave	36	30	**33**
	Master	33	21	**28**
Data Reception	Slave	39	27	**32**
	Master	30	15	**24**
Data Transmission/Reception	Slave	39	30	**34**
	Master	36	27	**34**
Power save	Slave	6	0	**1**
	Master	9	0	**2**

<Table 3-1 CURRENT CONSUMPTION>

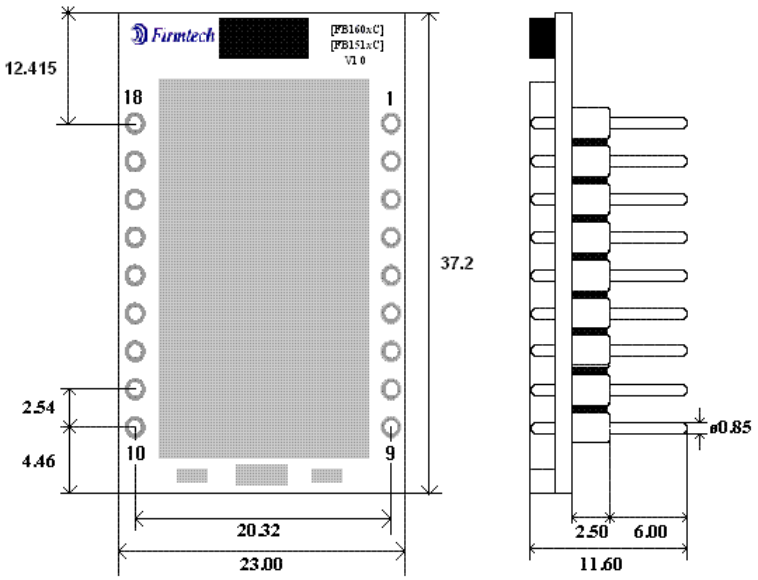
- TEST CONDITIONS

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

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

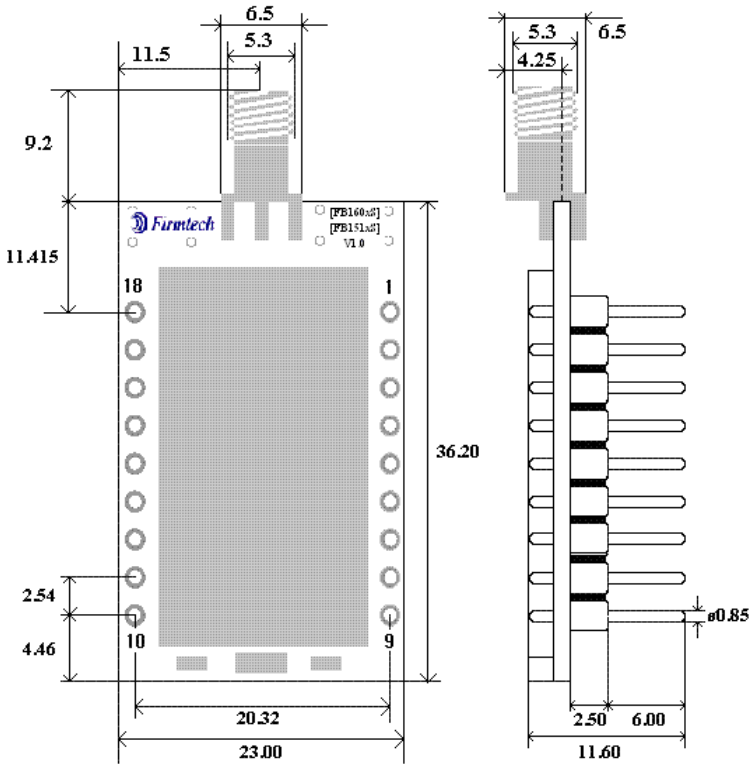
4 PRODUCT APPEARANCE

4-1 FB151AC Dimension



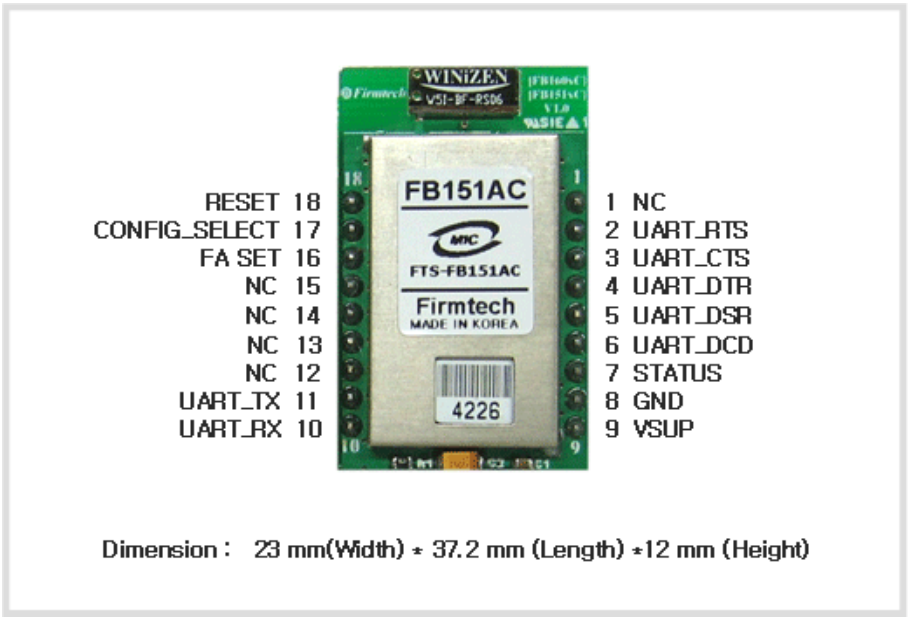
<Figure 4-1 FB151AC Dimension>

4-2 FB151AS Dimension



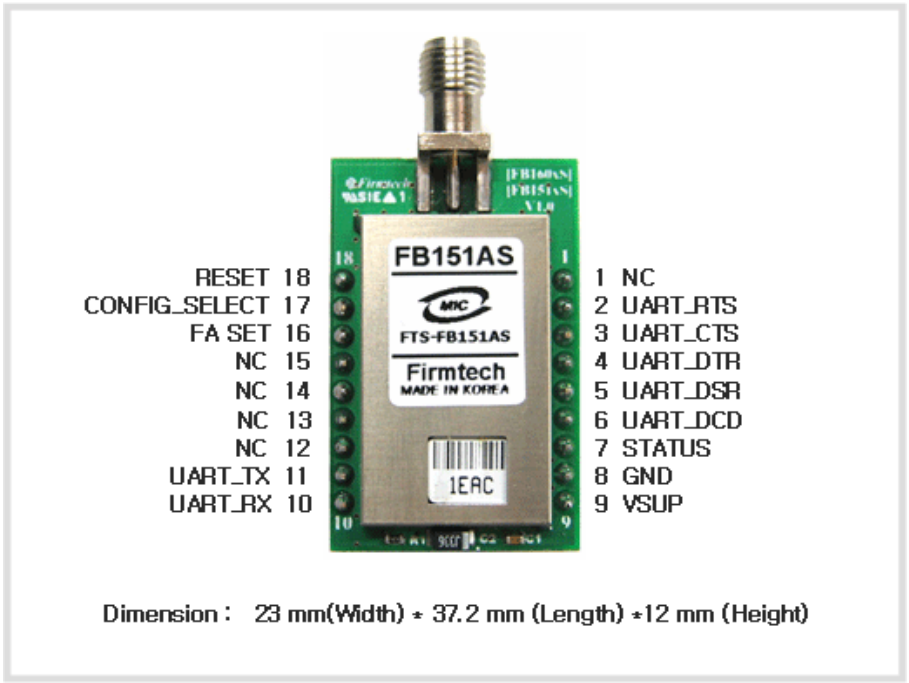
<Figure 4-2 FB151AS Dimension>

4-3 FB151AC PIN Assign



<Figure 4-3 FB151AC PIN Assign>

4-4 FB151AS PIN Assign



<Figure 4-4 FB151AS PIN Assign>

PIN NO.	NAME OF SIGNAL	FEATURES	INPUT/OUTPUT	SIGNAL LEVEL
1	NC	Don't use		
2	UART_RTS	UART Ready To Send	Output	TTL
3	UART_CTS	UART Clear To Send	Input	TTL
4	UART_DTR	UART Data Terminal Ready	Output	TTL
5	UART_DSR	UART Date Set Ready	Input	TTL
6	UART_DCD	UART Data Carrier Detect	Output	TTL
7	STATUS	STATUS LED	Output	TTL
8	GND	Ground		
9	VSUP	3.3V DC	Input	
10	RXD	Data Input	Input	TTL
11	TXD	Data Output	Output	TTL
12	NC	Don't use		
13	NC	Don't use		
14	NC	Don't use		
15	NC	Don't use		
16	FA_SET	Factory Reset Go back default setting	Input	TTL Pull-up
17	CONFIG_SELECT	PC Configuration Select	Input	TTL Pull-down
18	RESET	Reset if HIGH	Input	TTL Pull-down

<Table 4-1 Pin Description>

- Hard Reset(Factory Reset)

When the CONFIG_SELECT (No 17 PIN) is HIGH (Pull-up condition), turn the power ON (PC-Configuration Mode). And then input LOW signal (0 Volt) to FA_SET (No 16 PIN) for more then 2 seconds for the factory reset.

- Soft Reset(RESET)

The same effect as though the power of this module is re-authorized.

If there is HIGH signal in Pin #18 (RESET) for 4 milliseconds, the device would be restarted.

However, we do not recommend to use RESET(Pin #18) if you do not use it often.

- STATUS port

To be used to monitor the status of FB151AX.

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

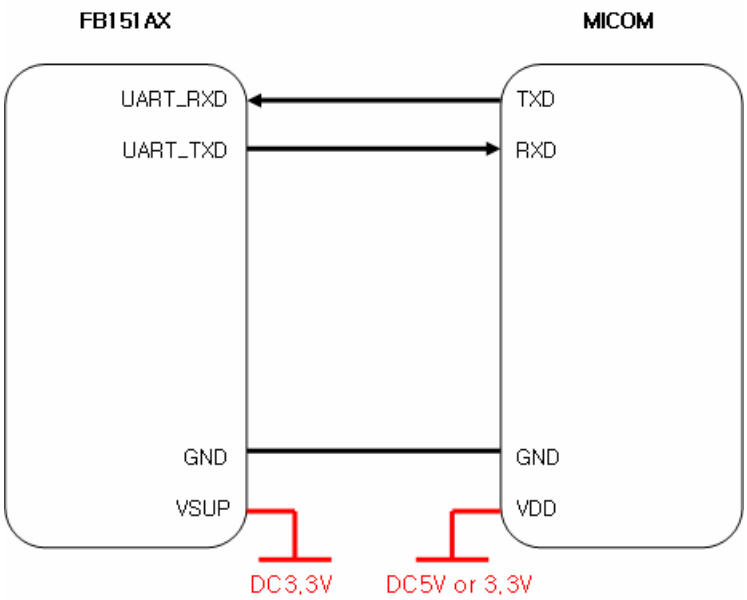
In standby mode for connection with Bluetooth, or connection trial, or searching for around Bluetooth device will repeat LOW and HIGH.

- UART_CTS/UART_RTS, UART_DTR/UART_DSR

When the flow control is not used, non connection will not affect the operation of FB151AX.

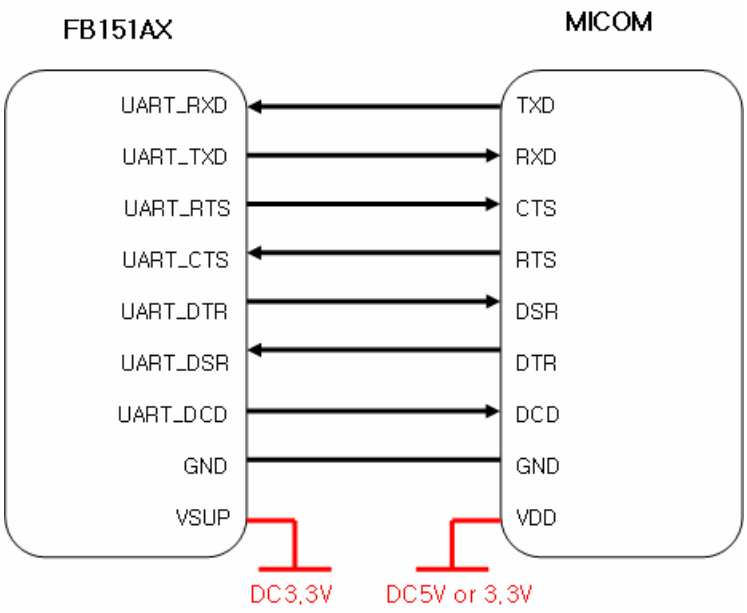
5 INTERFACE (PIN CONNECTION)

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 >

6 PRELIMINARY PRODUCT COMPONENTS

The preliminary value of product is set as on the <Table 6-1>.
Please be sure of basic set value and so on before using the product.

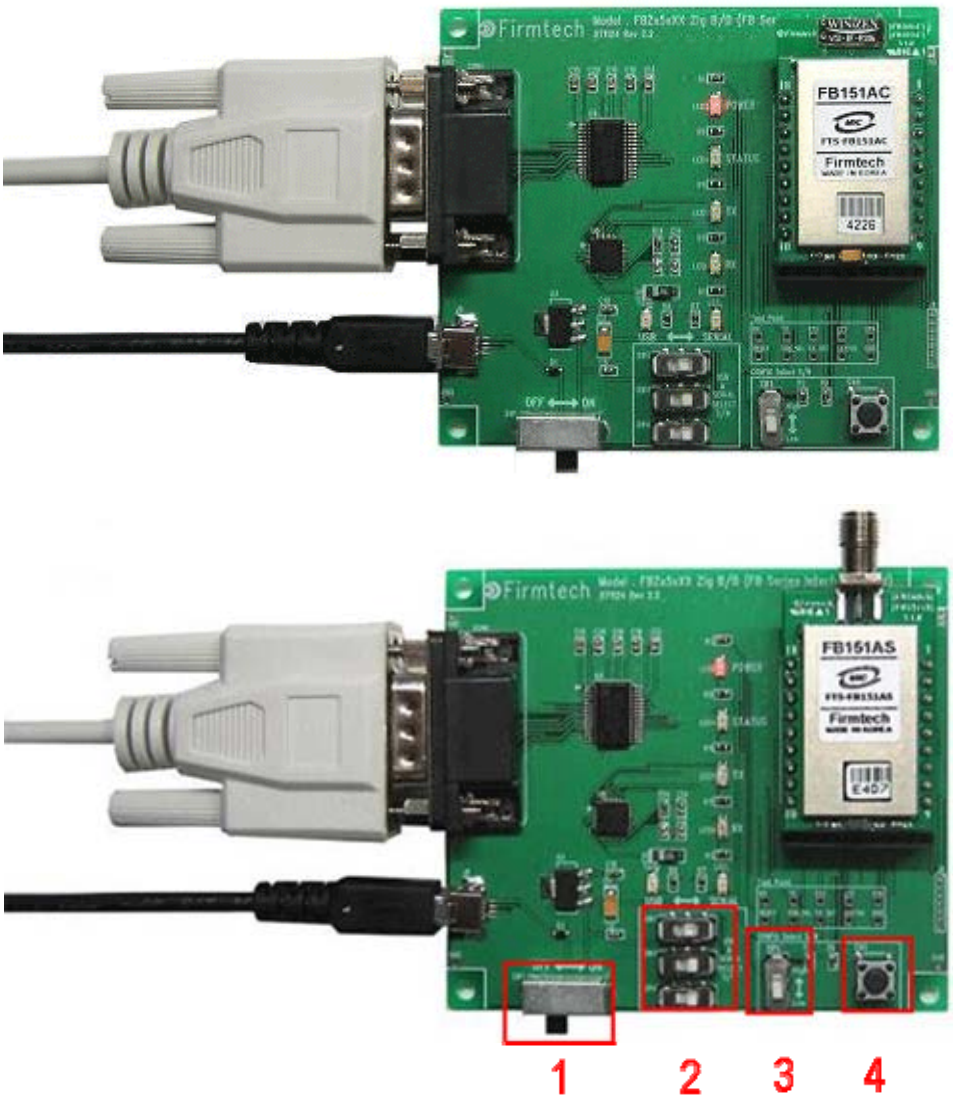
TYPE	SET VALUE
Device Name	FB151v.x.x.x
Pin Code(Pass key)	BTWIN
Uart(baud rate-data bit-parity bit-stop bit)	9600-8-N-1
ROLE	SLAVE
Connection Mode	MODE4 (AT command)
Debug char	0x02

<Table 6-1 : Preliminary Configuration Setting Value for FB151AX >

To change the configuration set value of FB151AX, connect FB151AX 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 8 How to complete PC Configuration.

7 PC Interface Board (Jig Board)



1 Power ON/OFF Switch

2 USB / RS232 Interface Select Switch

3 PC Configuration Menu Select Switch

4 FA Set Button

<Figure 7-1 : FB151AX Interface Board(Jig Board)>

8 How to Complete PC Configuration

The following PC Configuration shall be explained on the assumption that FB151AX 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
- FB151AX module
- PC Interface Kit

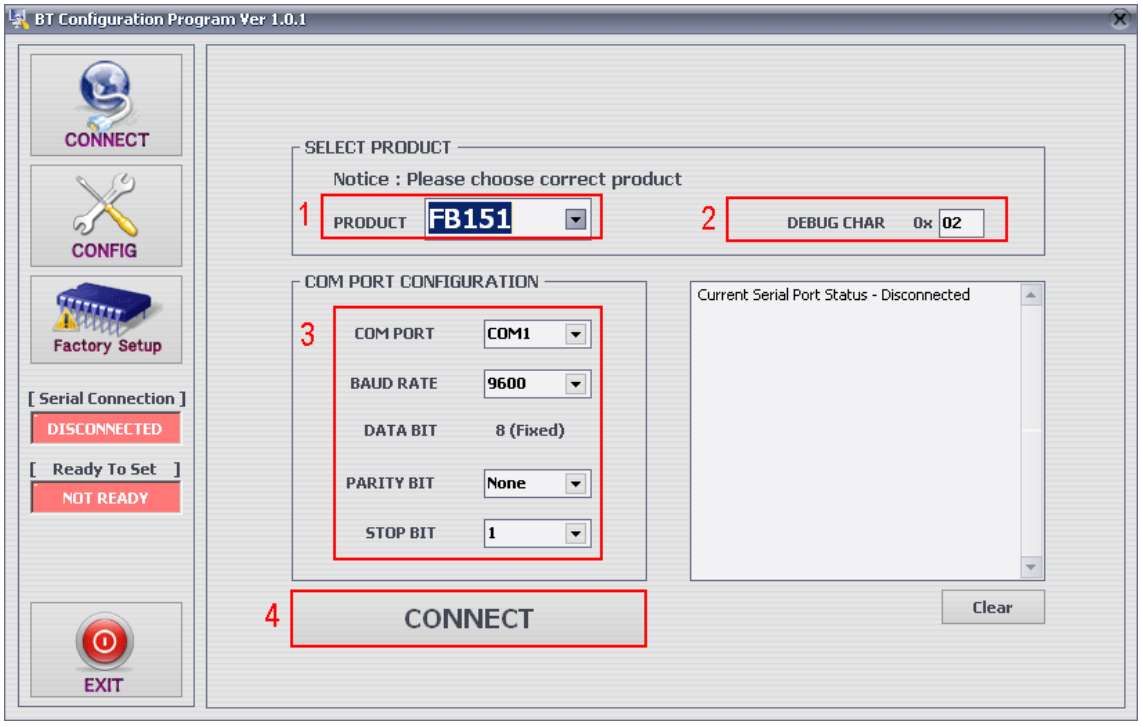
The PC Configuration could be processed with two significant ways.
First one is to use Config tool provided by FIRMTECH Co., Ltd.
Second one is to use serial communication program (Hyper Terminal, minicom) providing OS.
The respective way of setting is as follows.

8-1 PC Configuration using Congfig tool

(1) Connect FB151AX to PC Interface Board, then connect to COM port(Serial port) of PC.
(2) Set Config Select Switch of PC Interface Board OFF and then turn the power ON.
(3) Execute Config tool.

<Figure 8-1 : config tool main Display>

(4) Select **"CONNECT"**(<Figure 8-1> Blue Lined) on the main display.



1 Select Product : Name of Product in Use

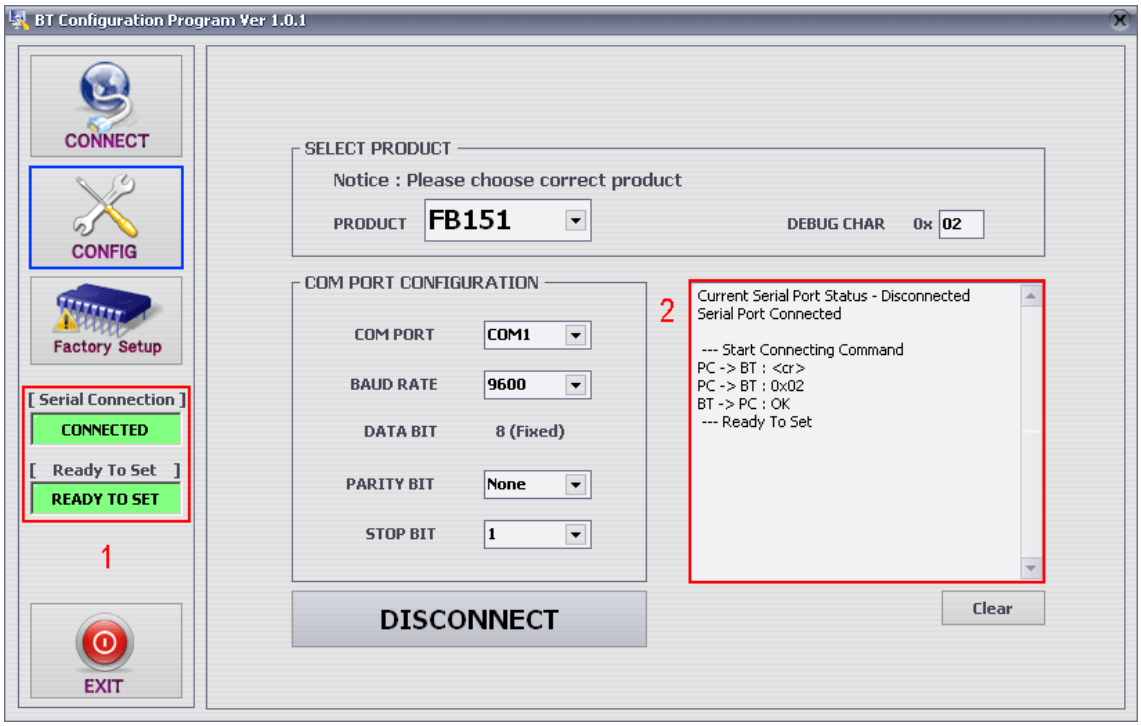
2 DEBUG CHAR : Default is **0x02**. (Appendix : Refer to details of PC Configuration)

3 Set Serial Port : Default is BAUD RATE : **9600**, PARITY BIT : **None**, STOP BIT : **1**

<Figure 8-2 : config tool CONNECT Display>

(5) When the <Figure 8-2> appears, select each selective item of red lines box 1~3, then press connect (red box line 4) which will change Serial connection, Ready To Set (red lined box 1) into Green as shown on <Figure 8-3>.**(The selected value will be certified at the preliminary setting of product.)**

If the color does not change into green, please make sure of the Baud rate of product and re-execute the config tool.

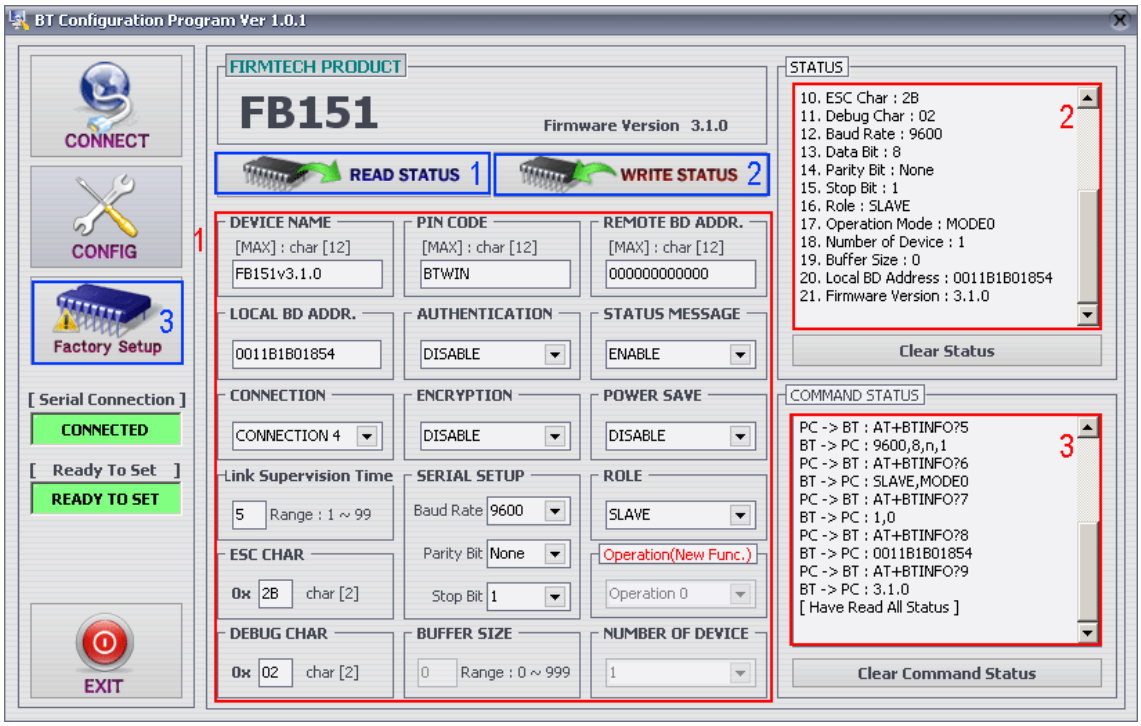


1 Serial Connection, Ready To Set : Show the connection status of Config tool and products

2 Status Message : Display the status of command language in progress

<Figure 8-3 : config tool connection display>

(6) After the product and config tool is connected properly, select CONFIG button(blue lined box) on Figure<8-3>, display like <Figure 8-4> will comes up to allow to configure the environment.



1 PC Configuration Window : Allow to select the PC configuration value of the product.

2 Status Value : Output the status value with the form of message.

3 Status of Command Language : Since the preliminary operation method is to use AT command, the progressed AT command language will output in the form of message.

1 READ STATUS Button : To read in the PC configuration set in the product.

2 WRITE STATUS Button : To store the value set in the PC configuration window into the product

3 Factory Setup Button : To reset all the PC configuration value to the factory set value.

<Figure 8-4 : config tool Device Configuration >

(7) To summarize the setting up the config tool, follow the procedures as under.

- To strore the set value upon completion, please be sure to click WRITE STATUS button.
- Click READ STATUS to read in the stored configuration value to certify the they are correct or not.
- If you want to set as the status first received, click Factory Setup to reset the first received value.
- Since the config tool was made based on AT command of the product, it is possible to represent the ongoing command language and its status at the form of status value and message window.

Note : Please refer to Appendix PC Configuration for detailed explanation.

8-2 PC Configuration using Serial Communication(Hyper Terminal) Program

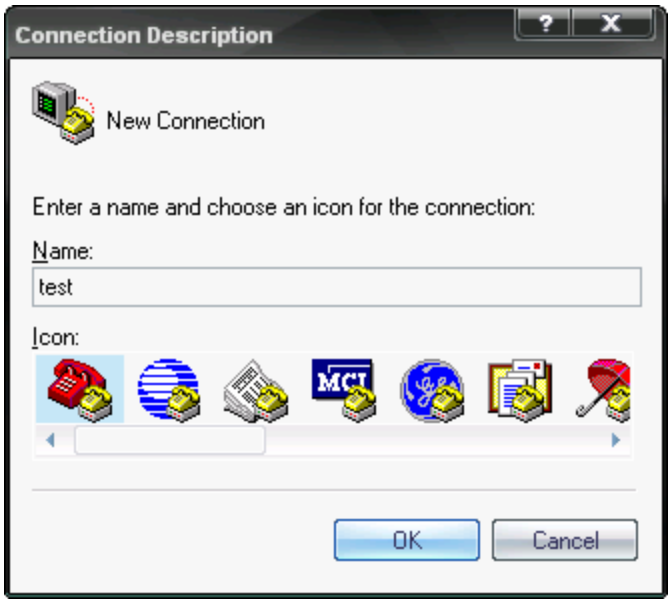
8-2-1 To execute Hyper Terminal

To set up PC configuration using Hyper Terminal, following works will have to be done before power is authorized to the PC connected with the product.

To accomplish the PC configuration, serial communication program is required. Here Hyper Terminal will be used for explanation.

(1) Set the Config Select on the PC Interface Board (Jig Board) ON.

(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.

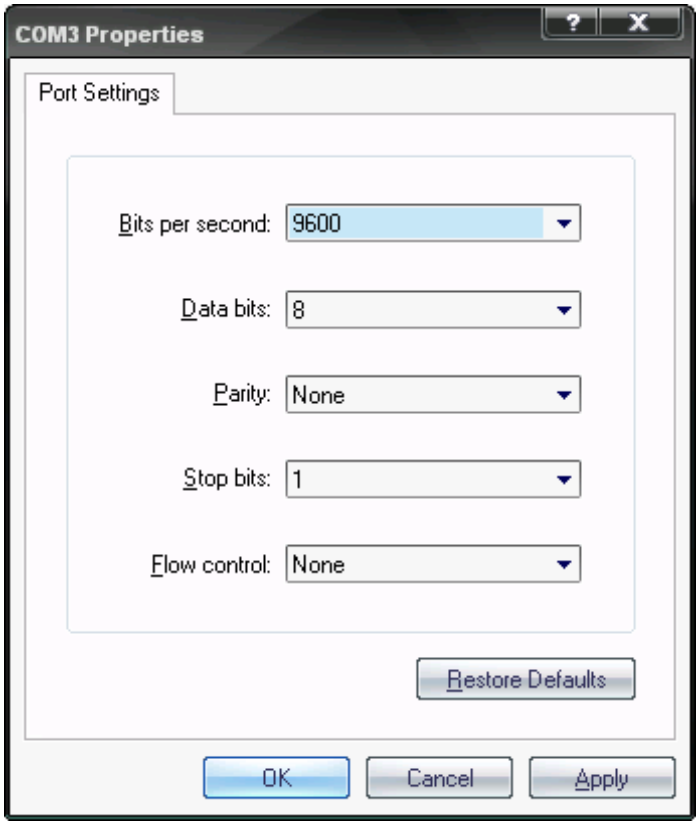


<Figure 8-5 Set Up Window 1 of Hyper Terminal>

(3) When the <Figure 8-6> comes up, select the COM port connected to FB151AX, and clicks the Acknowledge button.

<Figure 8-6 Hyper Terminal Set Up Window 2>

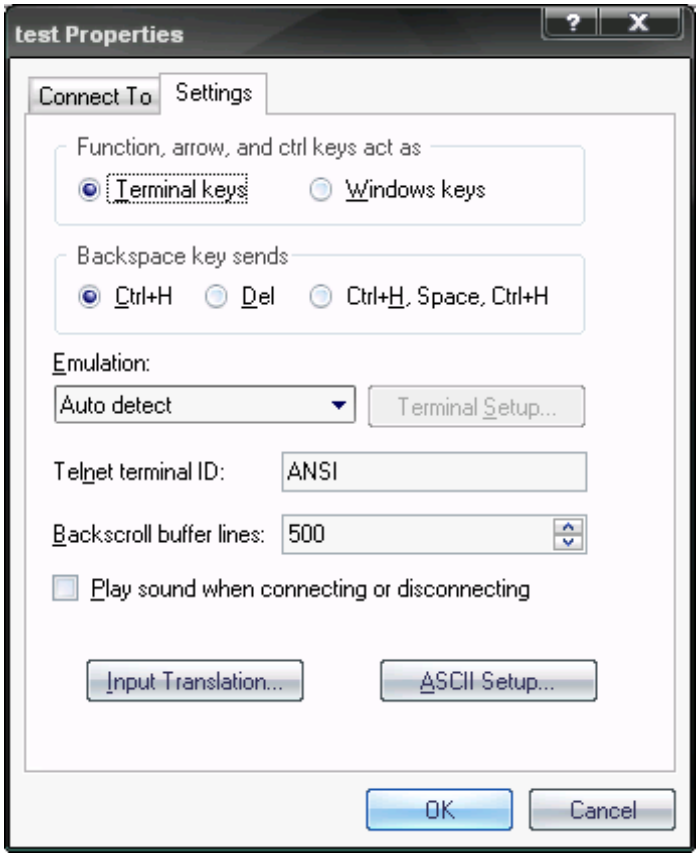
(4) When Registration Information Window comes up as on <Figure 8-7>, select **Bit per second : 9600, Data bit : 8, Parity : none, Stop bit : 1, Flow control : none,** which will execute Hyper Terminal.



<Figure 8-7 Hyper Terminal Set Up Window 3>

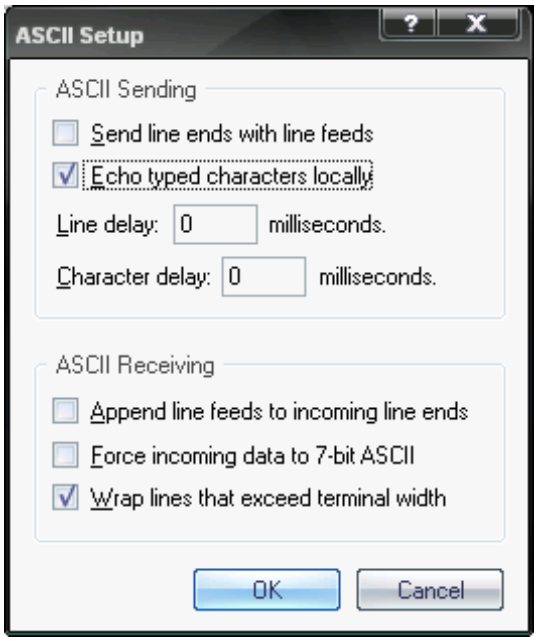
(5) Basically, the Hyper Terminal does not show the entered character. To make sure of the

entered character, select **[File]→[Properties]** on the Menu, then registration information window will appear shown as on <Figure 8-8>, click the **ASCII Setup** button.



<Figure 8-8 Hyper Terminal Set Up Window 4>

(6) As shown on <Figure 8-9>, "**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.



<Figure 8-9 : Hyper Terminal Setting Up Window5>

(7) If power is authorized on the Interface Board, the menu as shown on <Figure 8-10> will be output on the Hyper Terminal.

```
|====================================|
|        Model name : FB151          |
|        Version    : 3.1.0          |
|====================================|

==================== TOP MENU ==========================
0 => DEVICE NAME          : FB151v3.1.0
1 => AUTHENTICATION       : DISABLE PINCODE[BTWIN]
2 => REMOTE BD ADDRESS    : 000000000000
     LOCAL BD ADDRESS     : 0011B1B01854
3 => CONNECTION MODE      : CNT_MODE4
4 => OTHER PARAMETER      : E,D,5,2B,2
5 => UART CONFIG          : 9600,8,n,1
6 => ROLE                 : SLAVE
=========================================================
[ Back Spcae : Input data Cancel                        ]
[ t : Move top menu                                     ]
=========================================================
Select(0 ~ 6) >
```

<Figure 8-10 : PC Configuration Menu>

8-2-2 How to Use PC Configuration Menu

The user will select the menu want to change. To select the menu, you may just select the number given on the left side.
For example : To change “DEVICE NAME”, enter : **[“0”]→[Enter]**

Note : At <Figure 8-10> condition, Pressing **FA Set** 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 Config Select 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.