

# RF/Serial(RS232) Converter BT-232

## User Manual

Version 1.1

(Software version 2.1)

### 1. Introduction

BT-232 converts RS-232 serial signals to Bluetooth RF signals.

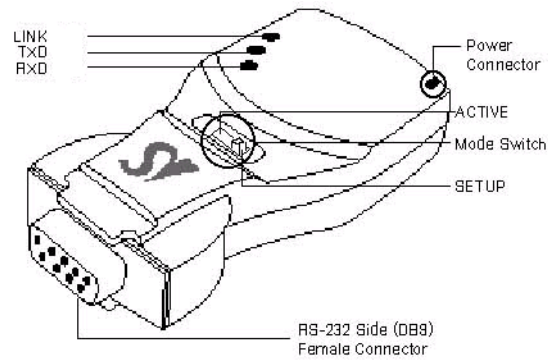
- Product box contains
  - RS232 to RF Converter 2EA – User Manual
  - A/C power supply(110/220V AC to DC) – USB cable

### 2. Specifications

Model Name	BT-232 (Software version 2.1)
Type	RS232 to RF Converter
Distance	100 M
Voltage	5V ~ 12V/DC
Wireless interface	Bluetooth Specification Version 1.1
Frequency bandwidth	2402 ~ 2480 MHz
Radio mode	Frequency hopping
Channels	7
Modulation	GFSK
Current	Max 200 mA (5V DC)
Temperature	-20 ~ 70 °C
Antenna	Internal Chip Antenna
Antenna gain	Max 1.5 dBi
Antenna directivity	Non-directional
Antenna polarization characteristics	None
Serial communication	1200 BPS – 115200 BPS Full Duplex 8 Data bits/Odd, Even, No Parity/1,2 Stop bits
Flow Control	RTS/CTS ON/Off possible, DTR/DSR/DCD Loop back connected

### 3. Architecture

#### 1) External View



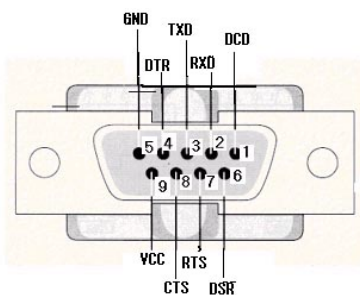
#### 2) Mode Switch

- Setup  Active : Active Mode
- Setup  Active : Setup Mode

#### 3) LED

- LINK : Turns green when remotely linked with the other party
- TxD : Turns on when data is transmitting (turns on faintly only if linked)
- RxD : Turns on when data is receiving

#### 4) Connector



DB-9 Connector Pin-out

### 4. Installation Procedures

#### 1) Connection

There is no need to install additional programs in your computer or communication devices to use the BT-232.

Connect the BT-232 to a serial port at your computer or communication device and supply it with power. Then you can easily access it as if you were using the existing serial port.

BT-232 can be powered by the following methods: DC power supply, PC USB port through USB cable or DB9 pin connector (available only if special serial ports are used).

A Bluetooth connection between two devices using the BT-232 is automatically established when both BT-232 are powered on. After that, you are free to use the serial port.

#### 2) Environment Setting

Since BT-232s are connected onto the serial port of your PC or communication device, you should specify the serial port environment information (Baud rate, data bits, parity bit, stop bit, flow control, etc.) and the RF connection (device name, operating mode, target address, etc.) for mutual communication.

RF connection setting is required only if you communicate with other manufacturer's Bluetooth devices instead of the BT-232 or change the initial setting.

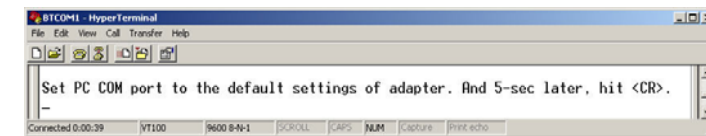
For environment setting, please use "Hyper terminal" included in your Windows' operating system.

### 5. Operating Environment Setting

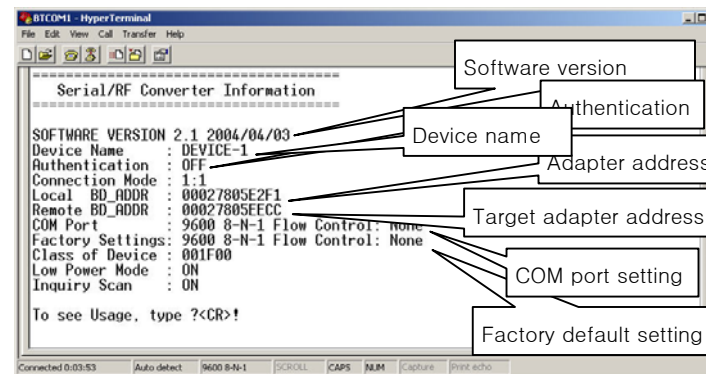
#### 1) Procedures

BT-232 can set baud rate, parity, stop bit, device name, target adapter and operating mode using Hyper Terminal.

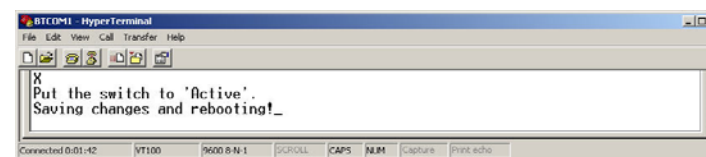
- Connect one BT-232 to the PC serial port and power it on.
- Run Windows' Hyper Terminal program.
- Set baud rate, data bits, parity and stop bit to 9600-8-NONE-1 at Hyper Terminal.
- Select setup mode at the BT-232 mode switch.



- If you press <Enter>key after 5 seconds, software version information will be displayed.

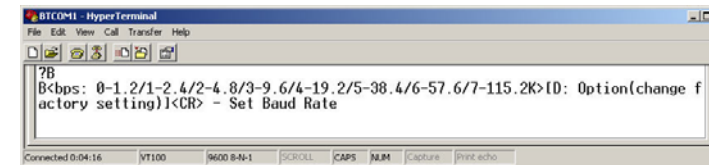
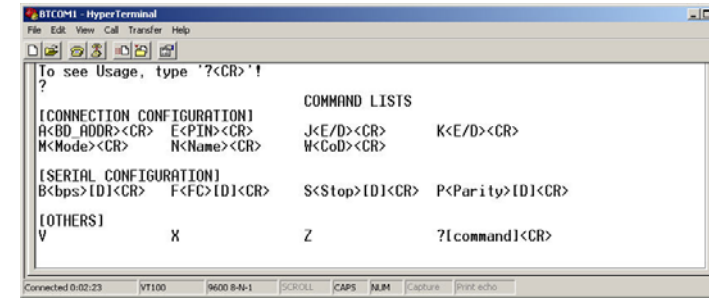


- Set up serial port.
- Setup RF connection.
- After completing the setting, be sure to execute 'X' command and save, and then the Mode Switch to 'Active'.



#### Reference:

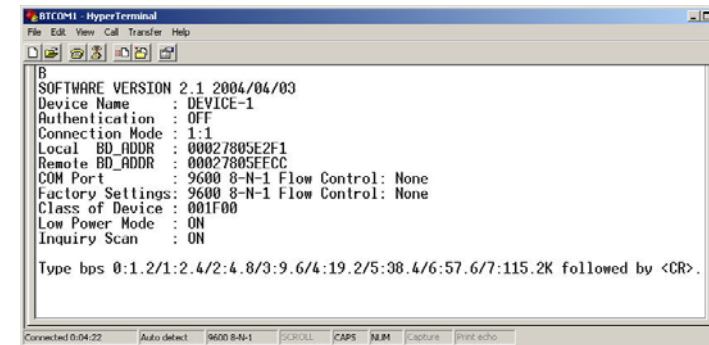
If you enter '?', the list for all commands is displayed, and if '?<command>', how to use the requested command is displayed. All commands should be typed with capital letter. All commands and setting values are case-sensitive.



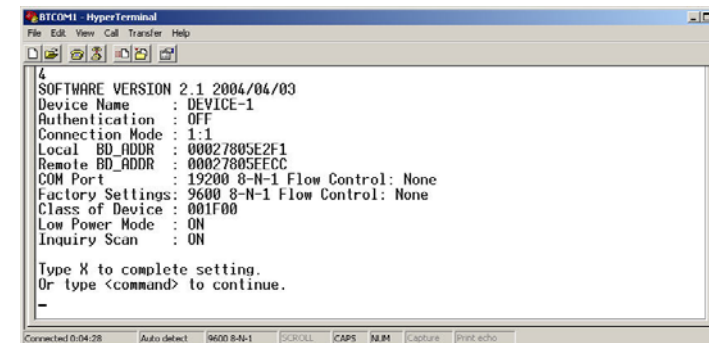
#### 2) Serial settings

- Example of Baud Rate setting (9600 bps -> 19200 bps)

- First, enter '?B' to display the way to use the requested command. To set the baud rate at 19200bps, the input value shall be '4.' (Refer to the above figure)
- Type 'B'.



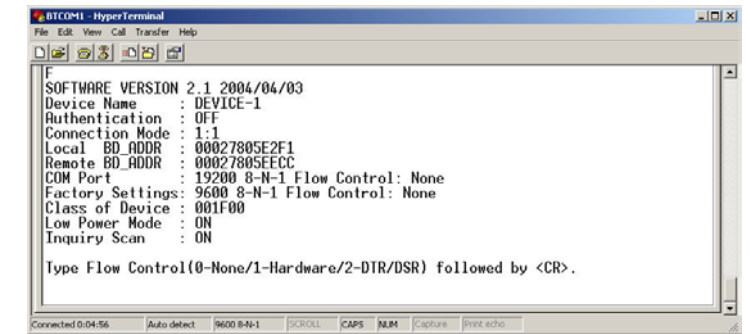
- Type '4'.



- The set value is shown on the screen again. (All the same in the next procedures)

- Example of Flow control setting (None -> Hardware)

- First, enter '?F' to display the way to use the requested command. To set the flow control at Hardware, the input value shall be '1'.
- Type 'F'.

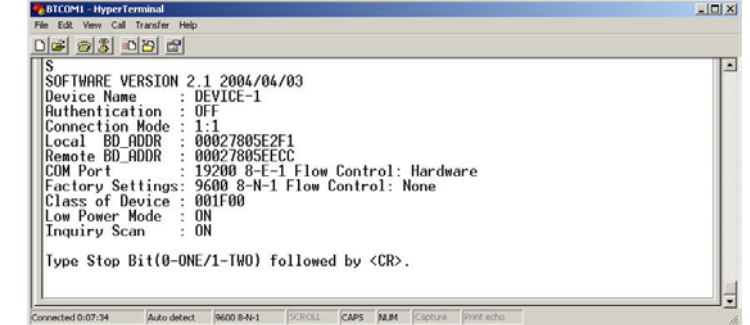


- Type '1'.

- Example of Stop bit setting (1 bit -> 2 bits)

- First, enter '?S' to display the way to use the requested command. To set the stop bit at 2bit, the input value shall be '1'.

- Type 'S'.

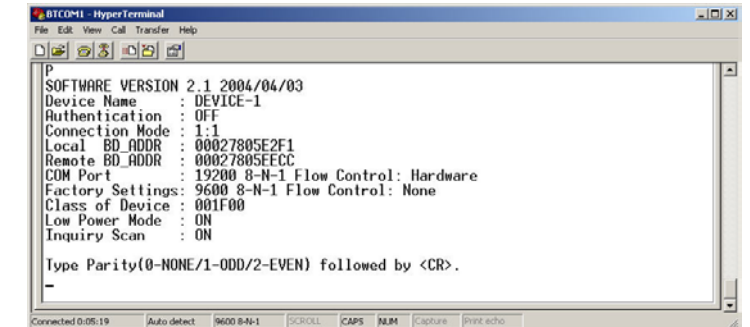


- Type '1'.

- Example of Parity bit setting (None -> Even)

- First, enter '?P' to display the way to use the requested command. To set the parity bit at Even, the input value shall be '2'.

- Type 'P'.



- Type '2'.

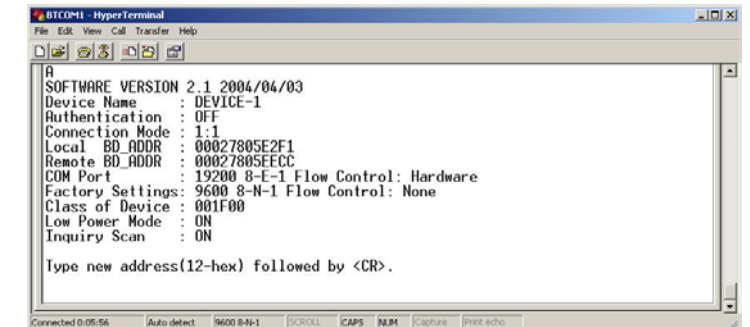
#### 3) RF Connection setting

This is necessary only if you communicate with other manufacturer's Bluetooth devices instead of the BT-232 or change the initial settings.

- Example of Target Address setting

(00:02:78:01:EF:BB -> 00:02:78:01:EF:BC)

- Type 'A'.

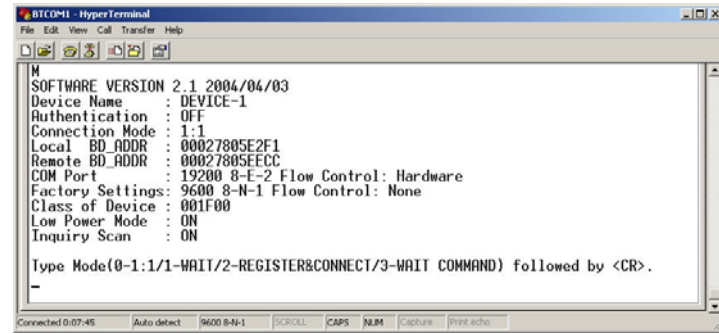


- Type the target address to be changed. You have to enter the 12-digit hexadecimal address. After typing "00027801EFBC", press 'Enter' key.

- Example of connection mode setting (1:1 -> Wait)

①. First, enter 'M' to display the way to use the requested command. To set the connection mode at Wait mode, the input value shall be '1'.

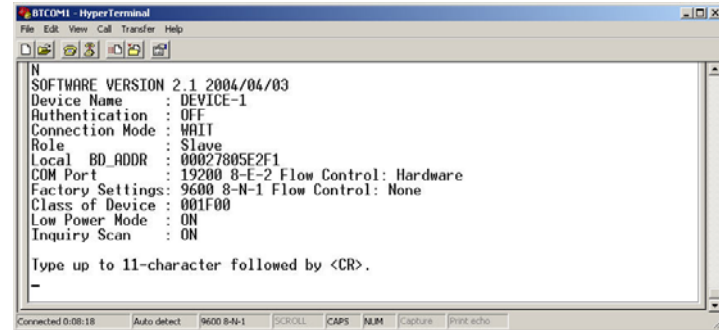
②. Type 'M'.



③. Type '1'.

■ Example of device name setting

①. Type 'N'.



②. Enter the desire device name and press 'Enter' key (however, up to 11 alphanumeric characters possible).

■ Example of setting PIN

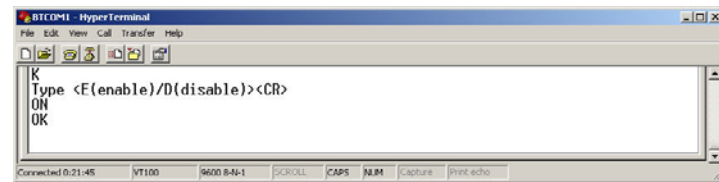
①. Type 'E'.



②. Enter the desire PIN value and press 'Enter' key. (however, up to 11 alphanumeric characters possible)

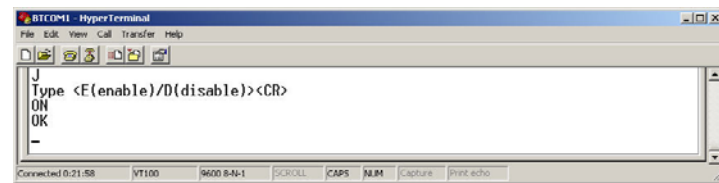
■ Example of setting low power mode

①. Enter 'K.' If you want to set up a low power mode, enter 'E', or if not, enter 'D'.



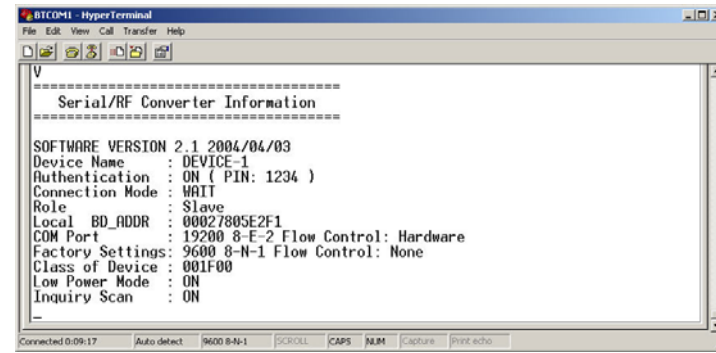
■ Example of setting inquiry scan

①. Enter 'J.' If you want to activate the search response for an adapter, enter 'E', or if not, enter 'D'.



■ Display Device Information

①. Type 'V'.



②. All current information is displayed. At this time, verify that the values are identical to the ones you have once set.

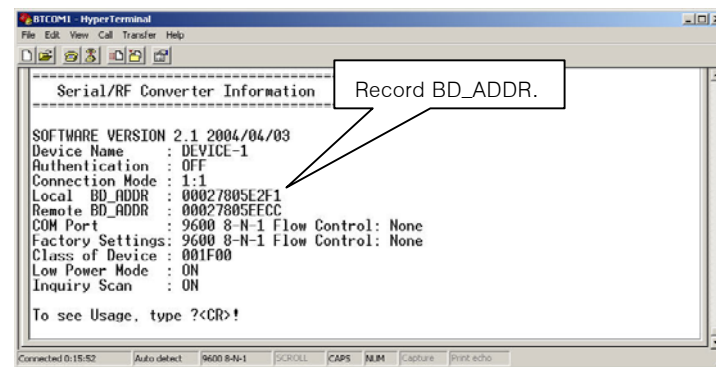
■ BT-232 Pair Setting

BT-232 always perform 1:1 communication in pairs.

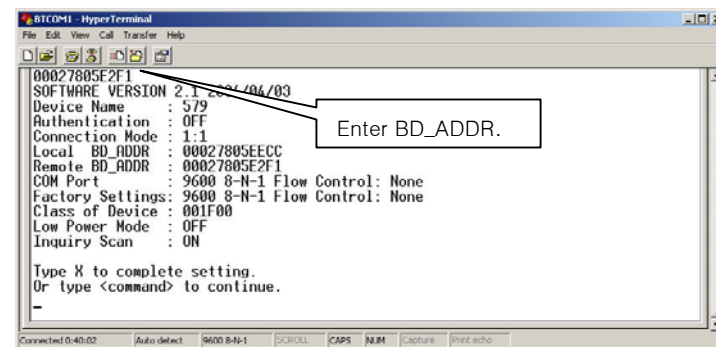
The following example shown how to set up the destination BT-232 address.

①. Set baud rate, data bits, parity and stop bit to 9600-8-NONE-1 at Hyper Terminal.

②. Connect one of BT-232s to your PC serial port and put 'Mode Switch' to Setup Mode. and Record displayed BD\_ADDR.



③. Remove BT-232(Used at stage ②) from your PC serial port, and connect the target BT-232 and then set the registered BD\_ADDR using 'A' command.



④. Save the setting using 'X' command and then put the 'Mode Switch' to 'Active'.

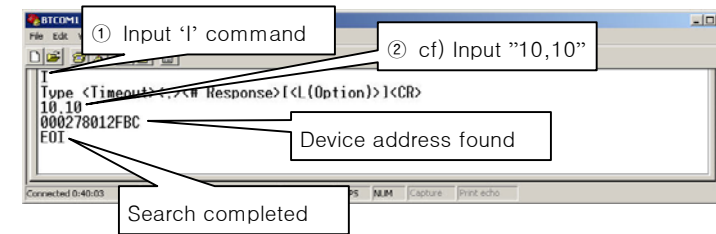
⑤. Apply stage ②~④ procedures to the target BT-232, and set the opposite BD\_ADDR of two BT-232 devices to TARGET\_ADDR.

Appendix-A : Wait for user command mode

The Wait mode that waits for a command by a user performs search and connection of accessories. The correspondent adapter shall be set up in Wait mode.

■ Search

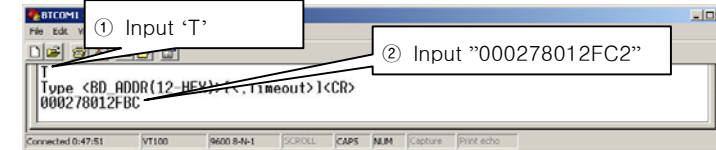
It searches Bluetooth devices connected and serviced in the same coverage.



After execution of the command, the adapter address searched is displayed

■ Connect

Connection to a specific device



After execution of the command, the Setup mode is ended and the communication state is ready.

Appendix-B: Command

Items	Commands	Descriptions	Remarks
1. Connection Setting	A(addr)	Setting for the address of device to be connected addr: 12 numbers in Hex	Effective in connection mode 0 and 2.
2. Baud Rate Setting	B(BRID)	Setting for baud rate. BR(Baudrate): 0 ~ 7 D: Factory default setting	0: 1200, 1: 2400 2: 4800, 3: 9600 4: 19200, 5: 38400 6: 57600, 7: 115200
3. COM Port Assignment	C(COM port)	Assigning the priority of a COM port requested for the connection. COM port: 1 ~ 7	Effective in connection mode 2.
4. PIN Number Setting	E(PIN /Enter)	Setting for authentication / ciphering. PIN: 11 letters (max) Enter: deactivated	After authentication and ciphering, two adapters are to be connected if their PIN numbers are the same.
5. Flow Control Setting	F(FCID)	Setting for flow control FC: 0 ~ 2 D: Factory default setting	0: None 1: Hardware 2: DTR/DSR
6. Search Timeout Setting	G(TO)	Setting for search timeout TO(timeout): 0 ~ 999	Effective in connection mode 3. Default: 10 seconds
7. Maximum Search Setting	H(NO)	Setting for the maximum number of devices to be searched NO(Respondents): 0 ~ 999	Effective in connection mode 3. Default: 10
8. Search Execution	I(TO,NO)	Search for Bluetooth devices connected TO(timeout): 0 ~ 999 NO(correspondents): 0 ~ 999	Effective in connection mode 3. Search will be completed when it reaches either timeout or the maximum number of correspondents.
9. Search Response Setting	J(E/D)	Setting whether to respond to search request E: Enabled D: Disenabled	Effective in connection mode 1.
10. Power save setting	K(E/D)	Setting for power save mode E: Enabled D: Disenabled	
11. Connection Mode Setting	M(mode)	Setting for connection mode The default setting for BT-232 is connection mode 0, and connection modes 1,2,3 are used for the connection with other Bluetooth devices. Mode: 0 ~ 3	0: 1:1 connection 1: connection waiting 2: automatic connection after registration 3: wait for user command
12. Name Setting	N(name)	Setting for friendly name. Name: 11 letters (max.)	Along with the address, it is available for ID.
13. Parity Bit Setting	P(PAID)	Setting for parity bit. PA: 0 ~ 2 D: Factory default setting	0: None 1: Odd 2: Even

14. Connection Timeout Setting	Q(TO)	Setting for timeout connection. TO(timeout): 0 ~ 999	Effective in connection mode 3
15. Stop Bit Setting	S(STID)	Setting for stop bit. ST: 0 ~ 1 D: Factory default setting	0: 1 Stop 1: 2 Stop
16. Connection Execution	T(addr,TO)	Connection to a specific device. addr: 12 numbers in Hex [TO](timeout): 0 ~ 999	Effective in connection mode 3
17. Execution Cancellation	U	Cancellation of device search and connection command.	Effective in connection mode 3
18. Setting Confirmation	V	Displays current setting.	Software version information included
19. CoD Setting	W(CoD)	Setting for class of device. CoD: 6 numbers in Hex	Default: "001F00" Critical factor for search
20. Setting Change Save	X	Applies edited settings.	After command, BT-232 shall be rebooted.
21. Status Display	Z	Displays the status of BT-232.	S: Idle P: Pairing C: Connecting A: RF on I: Inquiring
22. Help	?([command])	Displays command list and help.	

※ User should change hyper terminal setting value as like Baud rate, Parity bit, Stop bit to assigned factory default value in the Set-up mode, If user has changed factory default's setting value.