

Bluetooth Serial Adapter WCS-232V4

User Manual

Version 4.0

1. Introduction

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

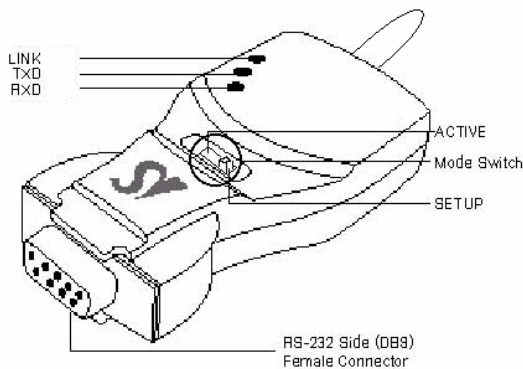
- Product box contains
 - RS232 to RF Converter 2EA - User Manual
 - USB Power cable 2EA

2. Specifications

Model Name	WCS-232V4
Type	Bluetooth Serial Adapter
Distance	Nom.100m up to 500m using dipole antenna
Voltage	5V ~ 12V/DC
Wireless interface	Bluetooth Specification Version 2.0+EDR Class1
Frequency bandwidth	2402 ~ 2480 MHz
Radio mode	Frequency hopping
Channels	79
Modulation	GFSK, $\pi/4$ DQPSK, 8DPSK
Current	Max 200 mA (5V DC)
Temperature	-20 ~ 55 °C
Antenna	+1dBi Stub Antenna +3dBi Dipole Antenna(optional) +5dBi Dipole Antenna(optional)
Serial communication	1200 BPS – 115.2 KBPS 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

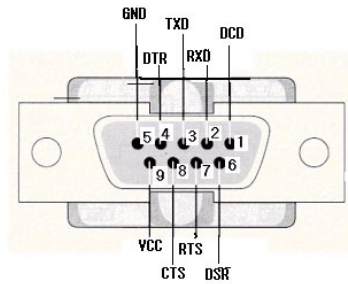
Setup Active : Active Mode

Setup Active : Setup Mode

3) LED

- LINK : Turns red when power is supplied
Turns green when remotely linked with the other party
- TxD : Turns green when data is transmitting (turns on faintly only if linked)
- RxD : Turns red 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 WCS-232. Connect the WCS-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.

WCS-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 WCS-232 is automatically established when both WCS-232 are powered on. After that, LINK LED turns red and you are free to use the WCS-232

2) Environment Setting

Since WCS-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 WCS-232 or change the initial setting.

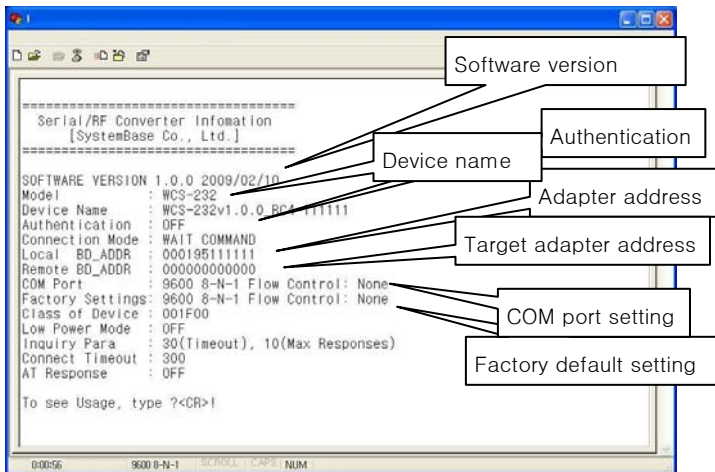
For environment setting, please use "Hyper terminal" included in your Windows' operating system.

5. Operating Environment Setting

1) Procedures

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

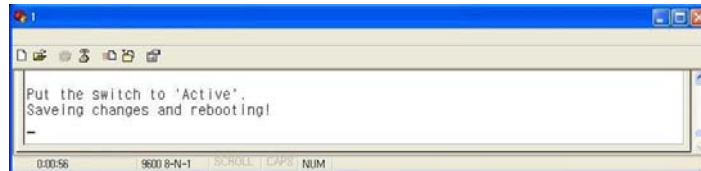
- ①. Connect one WCS-232 to the PC serial port and power it on.
- ②. Run Windows' Hyper Terminal program.
- ③. Whenever you change environment setting, you must Set baud rate, data bits, parity and stop bit to 9600-8-NONE-1 (Initial Factory Setting) at Hyper Terminal.
- ④. Select setup mode at the WCS-232 mode switch. Then software version information will be displayed



⑥. Set up serial port.

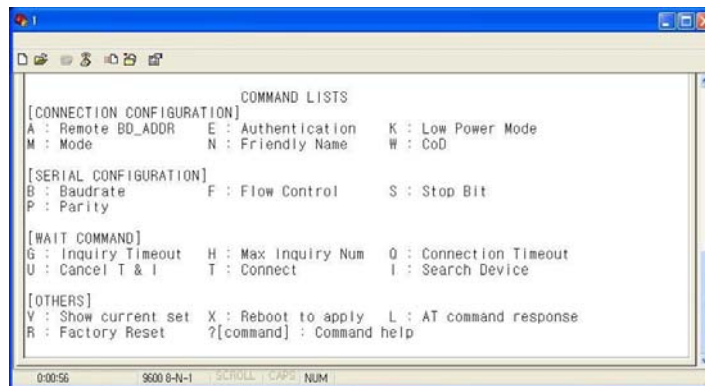
⑦. Setup RF connection.

⑧. 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)

① Type 'B'.

```

Device Name      : WCS-232v1.0.0_RC4-111111
Authentication   : OFF
Connection Mode  : WAIT COMMAND
Local_BD_ADDR    : 000195111111
Remote_BD_ADDR   : 000000000000
COM Port        : 8600 8-N-1 Flow Control: None
Factory Settings: 8600 8-N-1 Flow Control: None
Class of Device  : 001F00
Low Power Mode   : OFF
Inquiry Para    : 30(Timeout), 10(Max Responses)
Connect Timeout  : 300
AT Response     : OFF

Type bps
0:1200
1:2400
2:4800
3:9600
4:19200
5:38400
6:57600
7:115200
followed by <CR>.

```

②. Type '4' to select 19200 bps.

```

SOFTWARE VERSION 1.0.0 2009/02/10
Model           : WCS-232
Device Name     : WCS-232v1.0.0_RC4-111111
Authentication  : OFF
Connection Mode : WAIT COMMAND
Local_BD_ADDR   : 000195111111
Remote_BD_ADDR  : 000000000000
COM Port       : 19200 8-N-1 Flow Control: None
Factory Settings: 9600 8-N-1 Flow Control: None
Class of Device : 001F00
Low Power Mode  : OFF
Inquiry Para   : 30(Timeout), 10(Max Responses)
Connect Timeout : 300
AT Response    : OFF

Type X to complete setting.
Or type <command> to continue.

```

③. The set value is shown on the screen again. (All the same in the next procedures)

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

① Type 'F'.

```

SOFTWARE VERSION 1.0.0 2009/02/10
Model           : WCS-232
Device Name     : WCS-232v1.0.0_RC4-111111
Authentication  : OFF
Connection Mode : WAIT COMMAND
Local_BD_ADDR   : 000195111111
Remote_BD_ADDR  : 000000000000
COM Port       : 19200 8-N-1 Flow Control: None
Factory Settings: 9600 8-N-1 Flow Control: None
Class of Device : 001F00
Low Power Mode  : OFF
Inquiry Para   : 30(Timeout), 10(Max Responses)
Connect Timeout : 300
AT Response    : OFF

Type Flow Control(0=None/1=Hardware/2=DTR/DSR) followed by <CR>.

```

②. Type '1' to use hardware flow control.

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

① Type 'S'.

```

SOFTWARE VERSION 1.0.0 2009/02/10
Model       : WCS-232
Device Name : WCS-232v1.0.0_RC4-111111
Authentication : OFF
Connection Mode : WAIT COMMAND
Local BD_ADDR : 000195111111
Remote BD_ADDR : 000000000000
COM Port     : 19200 8-N-1 Flow Control: Hardware
Factory Settings: 9600 8-N-1 Flow Control: None
Class of Device : 001F00
Low Power Mode : OFF
Inquiry Para  : 30(Timeout), 10(Max Responses)
Connect Timeout : 300
AT Response   : OFF

Type Stop Bit(0-ONE/1-TWO) followed by <CR>

```

- ②. Type '1' to change a stop bit to 2 bits..
- Example of Parity bit setting (None -> Even)
- ①. Type 'P'.

```

SOFTWARE VERSION 1.0.0 2009/02/10
Model       : WCS-232
Device Name : WCS-232v1.0.0_RC4-111111
Authentication : OFF
Connection Mode : WAIT COMMAND
Local BD_ADDR : 000195111111
Remote BD_ADDR : 000000000000
COM Port     : 19200 8-N-2 Flow Control: Hardware
Factory Settings: 9600 8-N-1 Flow Control: None
Class of Device : 001F00
Low Power Mode : OFF
Inquiry Para  : 30(Timeout), 10(Max Responses)
Connect Timeout : 300
AT Response   : OFF

Type Parity(0-NONE/1-ODD/2-EVEN) followed by <CR>.

```

- ②. Type '2' to change to even parity.

3) RF Connection setting

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

- Example of Target Address setting
(00:00:00:00:00:00 -> 00:02:78:01:EF:BC)
- ①. Type 'A'.

```

SOFTWARE VERSION 1.0.0 2009/02/10
Model       : WCS-232
Device Name : WCS-232v1.0.0_RC4-111111
Authentication : OFF
Connection Mode : WAIT COMMAND
Local BD_ADDR : 000195111111
Remote BD_ADDR : 000000000000
COM Port     : 19200 8-E-2 Flow Control: Hardware
Factory Settings: 9600 8-N-1 Flow Control: None
Class of Device : 001F00
Low Power Mode : OFF
Inquiry Para  : 30(Timeout), 10(Max Responses)
Connect Timeout : 300
AT Response   : OFF

Type new address(12-hex) followed by <CR>.

```

- ②. 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 (WAIT COMMAND -> 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 '0'.

② Type 'M'.

```
SOFTWARE VERSION 1.0.0 2009/02/10
Model       : WCS-232
Device Name : WCS-232v1.0.0_RC4-111111
Authentication : OFF
Connection Mode : WAIT COMMAND
Local_BD_ADDR : 000195111111
Remote_BD_ADDR : 000000000000
COM Port     : 19200 8-E-2 Flow Control: Hardware
Factory Settings: 9600 8-N-1 Flow Control: None
Class of Device : 001F00
Low Power Mode : OFF
Inquiry Para : 30(Timeout), 10(Max Responses)
Connect Timeout : 300
AT Response  : OFF

Type Mode(0-1:1/1-WAIT/2-WAIT COMMAND) followed by <CR>.

0:00:56 9600 8-N-1 SCROLL CAPS NUM
```

③. Type '1'.

■ Example of device name setting

①. Type 'N'.

```
Type X to complete setting.
Or type <command> to continue.

SOFTWARE VERSION 1.0.0 2009/02/10
Model       : WCS-232
Device Name : WCS-232v1.0.0_RC4-111111
Authentication : OFF
Connection Mode : WAIT
Local_BD_ADDR : 000195111111
COM Port     : 19200 8-E-2 Flow Control: Hardware
Factory Settings: 9600 8-N-1 Flow Control: None
Class of Device : 001F00
Low Power Mode : OFF
AT Response  : OFF

Type up to 30-character followed by <CR>.

0:00:56 9600 8-N-1 SCROLL CAPS NUM
```

②. Enter the desire device name and press 'Enter' key (however, up to 30 alphanumeric characters possible).

■ Example of setting PIN

①. Type 'E'.

```
SOFTWARE VERSION 1.0.0 2009/02/10
Model       : WCS-232
Device Name : WCS-232
Authentication : OFF
Connection Mode : WAIT
Local_BD_ADDR : 000195111111
COM Port     : 19200 8-E-2 Flow Control: Hardware
Factory Settings: 9600 8-N-1 Flow Control: None
Class of Device : 001F00
Low Power Mode : OFF
AT Response  : OFF

Enable: type up to 16-character followed by <CR>/Disable: hit <CR>|

0:00:56 9600 8-N-1 SCROLL CAPS NUM
```

② Enter the desire PIN value and press 'Enter' key. (However, up to 16 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'.

```

SOFTWARE VERSION 1.0.0 2009/02/10
Model : WCS-232
Device Name : WCS-232
Authentication : ON ( PIN: 1234 )
Connection Mode : WAIT
Local_BD_ADDR : 000195111111
COM Port : 19200 8-E-2 Flow Control: Hardware
Factory Settings: 9600 8-N-1 Flow Control: None
Class of Device : 001F00
Low Power Mode : OFF
AT Response : OFF

Type <E(enable)/D(disable)><CR> - Enable/Disable Low Power Mode

```

■ Display Device Information

- ①. Type 'V'.

```

SOFTWARE VERSION 1.0.0 2009/02/10
Model : WCS-232
Device Name : WCS-232
Authentication : ON ( PIN: 1234 )
Connection Mode : WAIT
Local_BD_ADDR : 000195111111
COM Port : 19200 8-E-2 Flow Control: Hardware
Factory Settings: 9600 8-N-1 Flow Control: None
Class of Device : 001F00
Low Power Mode : OFF
AT Response : OFF

```

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

■ WCS-232 Pair Setting

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

The following example showing how to set up the destination WCS-232 address.

- ①. Set baud rate, data bits, parity and stop bit to 9600-8-NONE-1 at Hyper Terminal.
- ②. Connect one of WCS-232s to your PC serial port and put 'Mode Switch' to Setup Mode. and Record displayed BD_ADDR.

```

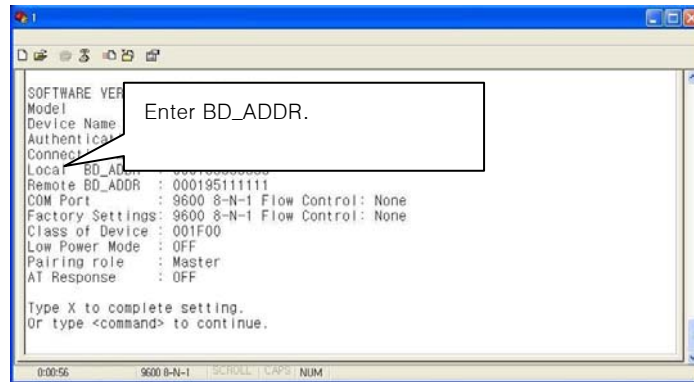
SOFTWARE VERSION 1.0.0 2009/02/10
Model : WCS-232
Device Name : WCS-232
Authentication : OFF
Connection Mode : 1:1
Local_BD_ADDR : 000195111111
Remote_BD_ADDR : 000195999999
COM Port : 9600 8-N-1 Flow Control: None
Factory Settings: 9600 8-N-1 Flow Control: None
Class of Device : 001F00
Low Power Mode : OFF
Pairing role : Slave
AT Response : OFF

Type X to complete setting.
Or type <command> to continue.

```

Record BD_ADDR.

- ③. Remove WCS-232(Used at stage ②) from your PC serial port, and connect the target WCS-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'.

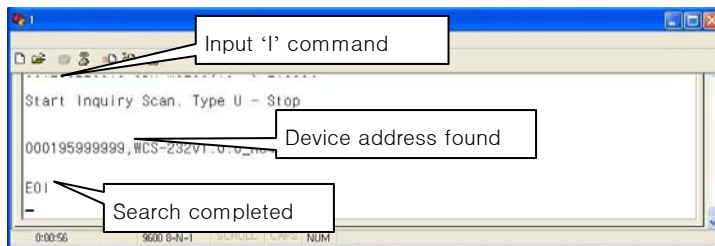
⑥. Apply stage ②~④ procedures to the target WCS-232, and set the opposite BD_ADDR of two WCS-232 devices to TARGET_ADDR.

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

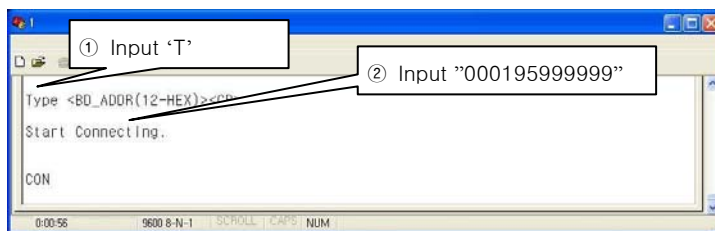
It searches Bluetooth devices connected and serviced in the same coverage.



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

■ Connect

Connection to a specific device



After execution of the command, the ready of communication is ended and the communication is enabled in Active Mode.

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	
2. Baud Rate Setting	B(BR)	Setting for baud rate. BR(Baudrate): 0 ~ 7	0: 1200, 1: 2400 2: 4800, 3: 9600 4: 19200, 5: 38400 6: 57600, 7: 115200
3. PIN Number Setting	E(PIN /Enter)	Setting for authentication / ciphering. PIN: 16 letters (max) Enter: deactivated	After authentication and ciphering, two adapters are to be connected if their PIN numbers are the same.
4. Flow Control Setting	F(FC)	Setting for flow control FC: 0 ~ 1	0: None 1: Hardware
5. Search Timeout Setting	G(TO)	Setting for search timeout TO(timeout): 0 ~ 999	Effective in connection mode 2. Default: 10 seconds
6. Maximum Search Setting	H(NO)	Setting for the maximum number of devices to be searched NO(Respondents): 0 ~ 999	Effective in connection mode 2. Default: 10
7. Search Execution	I(TO,NO)	Search for Bluetooth devices connected TO(timeout): 0 ~ 999 NO(correspondents): 0 ~ 999	Effective in connection mode 2. Search will be completed when it reaches either timeout or the maximum number of correspondents.
8. Search Response Setting	J(E/D)	Setting whether to respond to search request E: Enabled D: Disabled	Effective in connection mode 1.
9. Power save setting	K(E/D)	Setting for power save mode E: Enabled D: Disabled	
10. Connection Mode Setting	M(mode)	Setting for connection mode The default setting for WCS-232 is connection mode 0, and connection modes 1,2 are used for the connection with other Bluetooth devices. Mode: 0 ~ 2	0: 1:1 connection 1: connection waiting 2: wait for user command
11. Name Setting	N(name)	Setting for friendly name. Name: 30 letters (max.)	Along with the address, it is available for ID.
12. Parity Bit Setting	P(PA)	Setting for parity bit. PA: 0 ~ 2	0: None 1: Odd 2: Even
13. Connection Timeout Setting	Q(TO)	Setting for timeout connection. TO(timeout): 0 ~ 999	Effective in connection mode 2
14. Stop Bit Setting	S(ST)	Setting for stop bit. ST: 0 ~ 1	0: 1 Stop 1: 2 Stop
15. Connection Execution	T(addr,TO)	Connection to a specific device. addr: 12 numbers in Hex [TO](timeout): 0 ~ 999	Effective in connection mode 2
16. Execution Cancellation	U	Cancellation of device search and connection command.	Effective in connection mode 2
17. Setting Confirmation	V	Displays current setting.	Software version information included
18. CoD	W(CoD)	Setting for class of device.	Default: "001F00"

Setting		CoD: 6 numbers in Hex	Critical factor for search
19. Setting Change Save	X	Applies edited settings.	After command, WCS-232 shall be rebooted.
20. Status Display	Z	Displays the status of WCS-232.	S: Idle P: Pairing C: Connecting A: RF on I: Inquiring
21. Help	?([command])	Displays command list and help.	Commands shown are depending on the Current Mode.
22. AT Command Response	L(E/D)	Setting whether to respond to AT command	AT command can be used in mode 2
23. Factory Reset	R	Setting for factory reset	

※ 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.

Appendix-C: Trouble Shooting

D.1. No Data Transmission

D.1.1. COM Port Settings

Check whether the Baud rate of WCS-232 matches that of its host equipment.

Check whether the host equipment has a Data bit setting of 8. WCS-232 supports only 8 Data bit settings. If your host equipment uses 7 Data bit and even or odd parity, it may work with a 8 Data bit and No parity setting. This is valid only when both DCE devices are the WCS-232. In this case, set both WCS-232s] to 8 Data bit and No parity. If one of DCE devices is another Bluetooth device such as Bluetooth USB dongle, 7 bit data configurations will not work.

Check whether the Parity and Stop bit of WCS-232 match those of your host equipment. WCS-232 supports No parity, Even parity and Odd parity, 1 and 2 Stop bit configurations.

Check whether the host equipment of WCS-232 uses Hardware Flow Control. WCS-232 is initially set to Use of Hardware Flow Control. If your host equipment does not use Hardware Flow Control, please disable the Hardware flow control option by referring to '5.Operating environment setting'.

WCS-232 does not support RS-232 break signal.

D.1.2. Pin Assignment

WCS-232 is a DCE device. If your host equipment is DTE, plug WCS-232 directly to the host equipment or use straight RS-232 cable. If your host equipment is DCE, use will need to use a cross over RS-232 cable (Null modem cable) or a Male to Male DB9 Null Modem adapter.

D.2. Data Loss or Malfunctioning

D.2.1. Hardware Flow Control

When transmitting large amounts of data with No Hardware Flow Control, WCS-232 may clear the data buffer unexpectedly. The possibility becomes greater as the RF transmission environment becomes worse.

D.2.2. Response Message

AT response messages from the WCS-232 may affect the host system unexpectedly. Do not use WCS-232 if your applications cannot allow for this wireless time delay.

D.3. Transmission Delay

D.3.1. RF Processing Delay

It takes 30msec approximately for a WCS-232 to complete a data transmission to the other Bluetooth device. This time delay cannot be reduced and may enlarge as the RF transmission environment becomes worse. Do not use WCS-232 if your applications cannot allow for this time delay.

D.3.2. RF Transmission Environment

If there are many Bluetooth devices working in a small area and/or the RF communication distance is too great and/or there are some obstacles affecting RF performance, the WCS-232 repeats the transmission packet by packet due to interferences and/or low RF performance. This may lead to increased data transmission time delays.

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:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer 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

RF Exposure Statement :

The equipment complies with FCC RF radiation exposure limits set forth for an uncontrolled environment. This device and its antenna must not be co-located or operation in conjunction with any other antenna or transmitter.