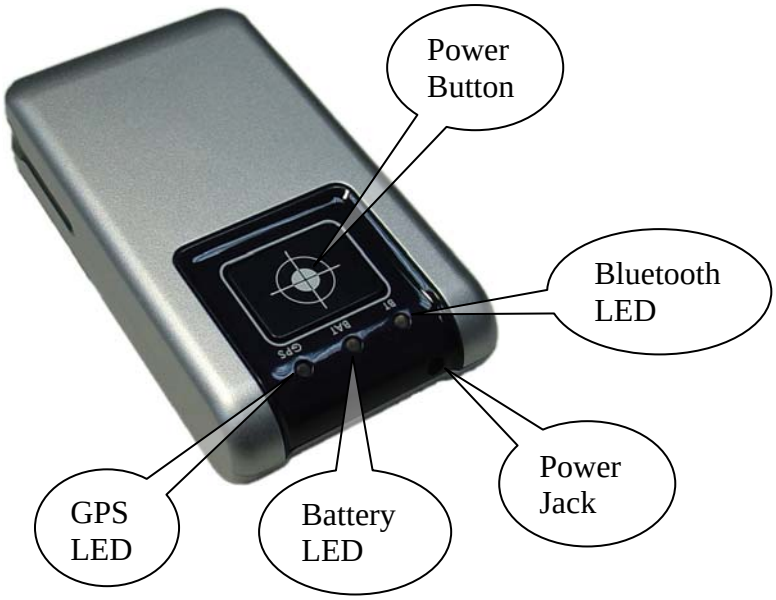
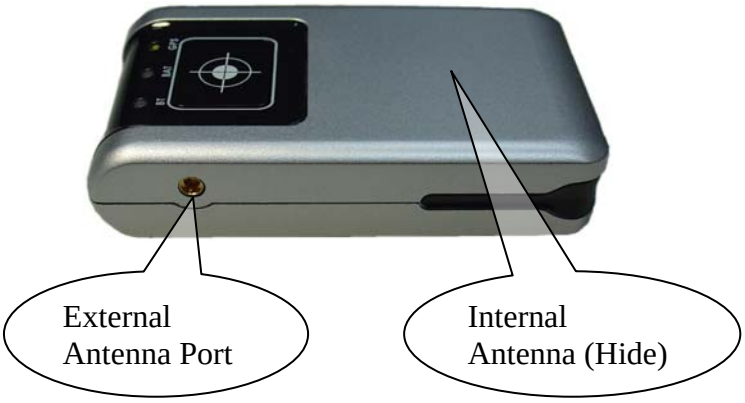
Bluetooth GPS Receiver

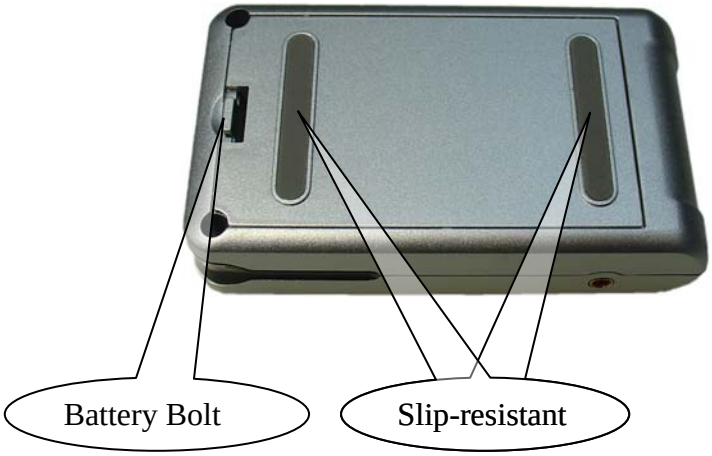
User's Guide

Sep 6, 2005 V 1.1

Quick Tips


Power
Button
Bluetooth
LED
Power
Jack
GPS
LED
Battery
LED


External
Antenna Port
Internal
Antenna (Hide)


Battery Bolt
Slip-resistant

Introduction

BG-200 is the NEMERIX chip set Bluetooth GPS receiver with compact size, light weight and ultra low power consumption making an idea solution to carry every where. The GPS receiver combines with Bluetooth wireless technologies that give your computing device really mobile.

Features

- NEMERIX chip set.
- 16 parallel Channel.
- High sensitivity up to -152dBm.
- Compact design with light weight.
- Ultra long working time up to 24 hours.
- Integrated Bluetooth transceiver.
- Band rat 38400bps,Data bit 8,n,1
- External antenna port for MMCX antenna.

Application

- PC, PDA and smart phone navigation
- Fleet management
- Automotive vehicle tracking.
- Sports and recreation.
- Geographic surveying.

Getting Started

1. **Fully charge battery**.
   Install battery. Charge battery for at least eight hours before first use.

Battery low	**Battery LED** flashes red light. Battery power is critically low. Connect **Power Jack** to a power source for continue operation and recharge simultaneously.
Charging	**Battery LED** keep red light when battery is being charged. **Battery LED** turns off when the battery has been fully charged.

2. **Turn on Receiver.**
   Press the **Power Button** for 3 second or until **GPS LED** turns into green light, and the **Bluetooth LED** turns to blue flashing light.

3. **Connect to Bluetooth-Enabled Device.**
   From your Bluetooth-Enable execute Bluetooth application software to search "**BT GPS**" and then connect it to device. If connection is successful, the Bluetooth LED will blink twice every 3 seconds.
   (Pin code may require during configuration. Code=0000)

4. **Connect to your Navigation Software.**
   Start the application. Make sure the application is set for the COM port that your Bluetooth-Enable device will use for serial communication. Now you should be ready to use your Navigation software. Refer to user documents that came with software. More configurations may be necessary.

5. **About LED signals**

GPS LED	a.	Green light, blinking with long dark indicates GPS is tracking. Not fix the position.
	b.	Green light, blinking with short dark indicates GPS fix the position .
Power LED		Flashes red light. Battery power is critically low.
Bluetooth LED	a.	Blue light, flashing once every 3 seconds. Bluetooth not connected
	b.	Blue light, flashing twice every 3 seconds. Bluetooth connected

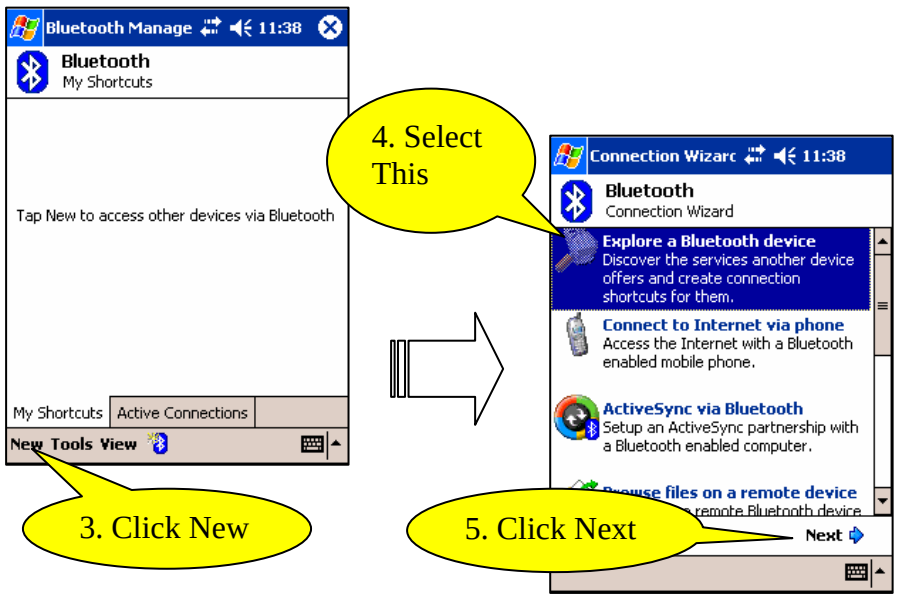
6. **Turn off Receiver**
   Press power button for 3 seconds or until **GPS LED** turns off. At the point, power will be automatically shut off.
   (Note: Suggest Navigation Software be turned off before GPS Receiver, to avoid possible PDA /PC freeze.)

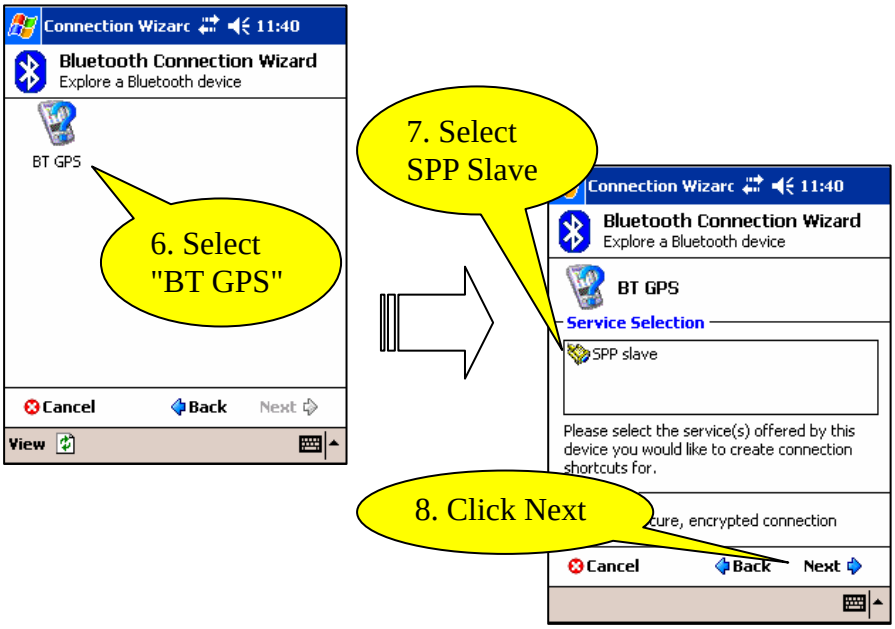
(Note: Bluetooth GPS operates on OS with Bluetooth function that supports SPP, Band rat 38400,Data bit 8,n,1)

PDA Configuration

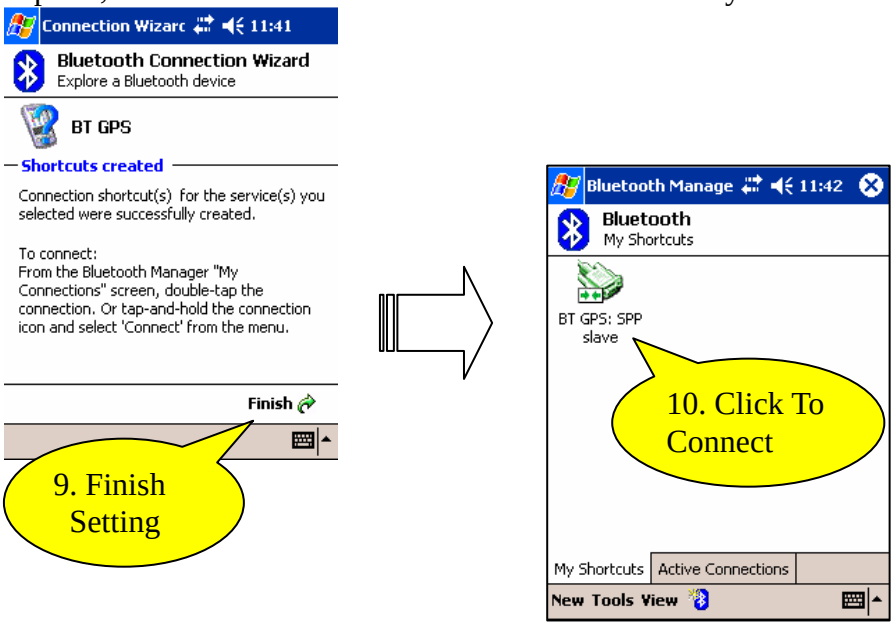
1. Activate Bluetooth function of your PDA
   Prior to activating the Bluetooth function of your PDA, make sure the device is equipped with Bluetooth function, and the driver software has been installed.

2. Activate Bluetooth Manager & Established New Connections
   Illustrations using HP iPaq 4150 PDA as follows:
   First, find the device with which you wish to establish connection.
   Open "**Bluetooth Manager**" on your pocket pc.





At this point, Bluetooth GPS connection has been successfully established



When Bluetooth LED flashes twice every 3 seconds, it's indicating Bluetooth GPS and the PDA connection are in progress.

Specifications

GPS Receiver

GPS chip	NEMERIX
Frequency	L1, 1575.42Mhz
C/A code	1.023MHz
Channel	16 parallel channel
Sensitivity	-152dBm
Cold start	60 seconds
Warm start	38 seconds
Hot start	12 seconds
Reacquisition	1 second

Bluetooth

Chip	CSR
Frequency	2.4GHz
Output Power	+4dBm
Input Sensitivity	-80dBm
Cover age	10m
Band Rad	38400bps
Data bit	8,n,1
Device ID	BT GPS
Pass Key	0000

Power

Battery type	Li-ion 3.7V 1000mAh
Operation Current	40mA
Operation Time	24 hours
Charging Time	3.5 hours
Power Jack	5.1V DC input with 500mA

Environmental

Operation Temperature	-20°C to +60°C
Relative Humidity	5% to 90%

Outline

Body Size	77(L)x44(W)x17.5(H)mm
Weight	85g
Power Jack	2.5mm diameter
External Antenna Port	Active MMCX antenna port
Power Button	Power on/off
GPS LED	GPS status.
BAT LED	Battery power status.
BT LED	Bluetooth connection status.

NMEA Protocol

The receiver is capable of supporting the following NMEA message formats

NMEA Message Prefix	Format	Direction
$GPGGA(1)*	GPS fix data.	Out
$GPGLL	Geographic position Latitude / Longitude.	Out
$GPGSA(3)*	GNSS DOP and actives satellites	Out
$GPGSV(3)*	Satellites in view.	Out
$GPRMC(1)*	Recommended minimum specific GNSS data.	Out
$GPVTG(1)*	Velocity and track over ground.	Out
$GPZDA	Date and time.	Out

*: (1): 1sec output 1msg , (3): 3sec output 1msg , 38400 baud rate (Standard output)

NMEA Extensions

The receiver is capable of supporting the following NMEA extensions:

NMEA Message Prefix	Format	Direction
$PNMRX100	Set serial port parameters.	In
$PNMRX101	Navigation initialization	In
$PNMRX103	NMEA message rate control	In
$PNMRX104	LLA navigation initialization	In
$PNMRX106	Set Datum.	In
$PNMRX107	NemeriX messages rate control	In
$PNMRX108	NMEA message sequence control	In
$PNMRX110	Fix Settings	In
$PNMRX111	Software Reset	In
$PNMRX112	Operating Mode Control	In
$PNMRX113	Fix and Extraction control	In
$PNMRX300	Almanac data transfer	In / Out
$PNMRX301	Ephemeris data transfer.	Out
$PNMRX302	Ionospheric correction	Out
$PNMRX303	UTC Time	Out
$PNMRX304	GPS Constellation Health Status	Out
$PNMRX600	SW Version report	Out
$PNMRX601	ISP mode	In
$PNMRX602	Flash content version report	Out
$PNMRX603	Settings Report	Out

General NMEA Format

The general NMEA format consists of an ASCII string commencing with a ‘$’ character and terminating with a <CR><LF> sequence. NMEA standard messages commence with ‘GP’ then a 3-letter message identifier. NemeriX specific messages commence with $PNMRX followed by a 3 digit number. The message header is followed by a comma delimited list of fields optionally terminated with a checksum consisting of an asterix ‘*’ and a 2 digit hex value representing the checksum. There is no comma preceding the checksum field. When present, the checksum is calculated as a byte wise exclusive of the characters between the ‘$’ and ‘*’. As an ASCII representation, the number of digits in each number will vary depending on the number and precision, hence the record length will vary. Certain fields may be omitted if they are not used, in which case the field position is reserved using commas to ensure correct interpretation of subsequent fields.

The tables below indicate the maximum and minimum widths of the fields to allow for buffer size allocation.

$GPGGA

This message transfers global positioning system fix data. The $GPGGA message structure is shown below:

Field	Format	Min chars	Max chars	Notes
Message ID	$GPGGA	6	6	GGA protocol header.
UTC Time	hhmmss.sss	2,2,2.3	2,2,2.3	Fix time to 1ms accuracy.
Latitude	float	3,2.4	3,2.4	Degrees * 100 + minutes.
N/S Indicator	char	1	1	N=north or S=south
Longitude	float	3,2.4	3,2.4	Degree * 100 + minutes.
E/W indicator	Char	1	1	E=east or W=west
Position Fix Indictor	Int	1	1	0: Fix not available or invalid. 1: GPS SPS mode. Fix available.
Satellites Used	Int	2	2	Number of satellites used to calculate fix.
HDOP	Float	1.1	3.1	Horizontal Dilution of Precision.
MSL Altitude	Float	1.1	5.1	Altitude above mean seal level
Units	Char	1	1	M Stands for “meters”.
Geoid Separation	Int	(0) 1	4	Separation from Geoid, can be blank.
Units	Char	1	1	M Stands for “meters”.
Age of Differential Corrections	int	(0) 1	5	Age in seconds Blank (Null) fields when DGPS is not used.
Diff Reference Corrections	int	4	4	0000.
Checksum	*xx	(0) 3	3	2 digits.
Message terminator	<CR> <LF>	2	2	ASCII 13, ASCII 10.

$GPGLL

This message transfers Geographic position, Latitude, Longitude, and time. The $GPGLL message structure is shown below:

Field	Format	Min chars	Max chars	Notes
Message ID	$GPGLL	6	6	GLL protocol header.
Latitude	Float	1,2.1	3,2.4	Degree * 100 + minutes.
N/S Indicator	Char	1	1	N=north or S=south.
Longitude	Float	1,2.1	3,2.4	Degree * 100 + minutes.
E/W indicator	Character	1	1	E=east or W=west.
UTC Time	hhmmss.sss	1,2,2.1	2,2,2.3	Fix time to 1ms accuracy.
Status	Char	1	1	A Data Valid. V Data invalid.
Mode Indicator	Char	1	1	A Autonomous
Checksum	*xx	(0) 3	3	2 digits.
Message terminator	<CR><LF>	2	2	ASCII 13, ASCII 10.

$GPGSA

This message transfers DOP and active satellites information. The $GPGSA message structure is shown below:

Field	Format	Min chars	Max chars	Notes
Message ID	$GPGSA	6	6	GSA protocol header.
Mode	Char	1	1	M Manual, forced to operate in selected mode. A Automatic switching between modes.
Mode	Int	1	1	1 Fix not available. 2 2D position fix. 3 3D position fix.
Satellites Used	Int	2	2	SV on channel 1.
Satellites Used	Int	2	2	SV on channel 2.
…	.	..	..	..
Satellites Used	Int	2	2	SV on channel 12.
PDOP	Float	1.1	3.1	
HDOP	Float	1.1	3.1	
VDOP	Float	1.1	3.1	
Checksum	*xx	0	3	2 digits
Message terminator	<CR> <LF>	2	2	ASCII 13, ASCII 10

$GPGSV

This message transfers information about satellites in view. The $GPGSV message structure is shown below. Each record contains the information for up to 4 channels, allowing up to 12 satellites in view. In the final record of the sequence the unused channel fields are left blank with commas to indicate that a field has been omitted.

Field	Format	Min chars	Max chars	Notes
Message ID	$GPGSV	6	6	GSA protocol header.
Number of messages	Int	1	1	Number of messages in the message sequence from 1 to 3.
Message number	Int	1	1	Sequence number of this message in current sequence, form 1 to 3.
Satellites in view	Int	1	2	Number of satellites currently in view.
Satellite Id	Int	2	2	Satellite vehicle 1.
Elevation	Int	1	3	Elevation of satellite in degrees.
Azimuth	Int	1	3	Azimuth of satellite in degrees.
SNR	Int	(0) 1	2	Signal to noise ration in dBHz, null if the sv is not in tracking.
Satellite Id	Int	2	2	Satellite vehicle 2.
Elevation	Int	1	3	Elevation of satellite in degrees.
Azimuth	Int	1	3	Azimuth of satellite in degrees.
SNR	Int	(0) 1	2	Signal to noise ration in dBHz, null if the sv is not in tracking.
Satellite Id	Int	2	2	Satellite vehicle 3.
Elevation	Int	1	3	Elevation of satellite in degrees.
Azimuth	Int	1	3	Azimuth of satellite in degrees.
SNR	Int	(0) 1	2	Signal to noise ration in dBHz, null if the sv is not in tracking.
Satellite Id	Int	2	2	Satellite vehicle 4.
Elevation	Int	1	3	Elevation of satellite in degrees.
Azimuth	Int	1	3	Azimuth of satellite in degrees.
SNR	Int	(0) 1	2	Signal to noise ration in dBHz, null if the sv is not in tracking.
Checksum	*xx	(0) 3	3	2 digits.
Message terminator	<CR> <LF>	2	2	ASCII 13, ASCII 10.

$GPRMC

This message transfers recommended minimum specific GNSS data. The $GPRMC message format is shown below.

Field	Format	Min chars	Max chars	Notes
Message ID	$GPRMC	6	6	RMC protocol header.
UTC Time	hhmmss.sss	1,2,2.1	2,2,2.3	Fix time to 1ms accuracy.
Status	char	1	1	A Data Valid. V Data invalid.
Latitude	Float	1,2.1	3,2.4	Degrees * 100 + minutes.
N/S Indicator	Char	1	1	N=north or S=south.
Longitude	Float	1,2.1	3,2.4	Degrees * 100 + minutes.
E/W indicator	Char	1	1	E=east or W=west.
Speed over ground	Float	1,1	5.3	Speed over ground in knots.
Course over ground	Float	1.1	3.2	Course over ground in degrees.
Date	ddmmyy	2,2,2	2,2,2	Current date.
Magnetic variation	Blank	(0)	(0)	Not used.
E/W indicator	Blank	(0)	(0)	Not used.
Mode	Char	1	1	A Autonomous
Checksum	*xx	(0) 3	3	2 digits.
Message terminator	<CR> <LF>	2	2	ASCII 13, ASCII 10.

$GPVTG

This message transfers Velocity, course over ground, and ground speed. The $GPVTG message format is shown below.

Field	Format	Min chars	Max chars	Notes
Message ID	$GPVTG	6	6	VTG protocol header.
Course (true)	Float	1.1	3.2	Measured heading in degrees.
Reference	Char	1	1	T = true heading.
Course (magnetic)	Float	1.1	3.2	Measured heading (blank).
Reference	Char	1	1	M = magnetic heading.
Speed	Float	1.1	4.2	Speed in knots.
Units	Char	1	1	N = knots.
Speed	Float	1.1	4.2	Speed
units	Char	1	1	K = Km/h.
Mode	Char	1	1	A Autonomous
Checksum	*xx	(0) 3	3	2 digits.
Message terminator	<CR> <LF>	2	2	ASCII 13, ASCII 10.

$GPZDA

This message transfers UTC Time and Date. Since the latency of preparing and transferring the

message is variable, and the time does not refer to a particular position fix, the seconds precision is

reduced to 2 decimal places. The $GPZGA message format is shown below.

Field	Format	Min chars	Max chars	Notes
Message ID	$GPZDA	6	6	ZDA protocol header.
UTC time	hhmmss.SS	2,2,2.2	2,2,2.2	00000000.00 to 235959.99
UTC day	dd	2	2	01 to 31, day of month.
UTC month	mm	2	2	01 to 12.
UTC Year	yyyy	4	4	1989-9999.
Local zone hours	Int	(-)2	(-)2	Offset of local time zone (-13) to 13.
Local zone minutes	Unsigned	2	2	
Checksum	*xx	(0) 3	3	2 digits.
Message terminator	<CR> <LF>	2	2	ASCII 13, ASCII 10.

Federal Communications Commission (FCC) Statement

15.21
You are cautioned that changes or modifications not expressly approved by the part responsible for compliance could void the user's authority to operate the equipment.

15.105(b)
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 or more 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.

Operation is subject to the following two conditions:

1) this device may not cause interference and

2) this device must accept any interference, including interference that may cause undesired operation of the device.

FCC RF Radiation Exposure Statement:
This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. End users must follow the specific operating instructions for satisfying RF exposure compliance. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Note: The end product shall has the words "Contains Transmitter Module FCC ID: SMW56AZBT or Contains FCC ID: SMW56AZBT" on the ID label