Rikaline GPS-6036

Bluetooth GPS

SiRF Star III

User's   Guide

Feb. 15, 2006

Rikaline   International   Corp.

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0. Quick Use

Please read this instruction carefully before use.

0.0 Standard Package
GPS Unit + Lithium-ION Rechargeable Battery + Cigarette Adapter + Travel Charger + Document CD + Warranty Card + Cradle + Quick Use.

0.1 Fully charge the battery for at least 10 hours before using.
A fully charged battery can last for 8 hours continuously operation facilitating the low power consumption design at 75mA. Please put the switch at "OFF" position if you will not use the device.

0.2 Activate the Bluetooth function in your PDA or PC
Before activating the Bluetooth function in your PDA/PC, please Switch ON GPS-6036 Receiver for paring and check if your device is equipped with Bluetooth function. If not, you may need to acquire an optional CF (PD-3005) or SD Bluetooth card.
NOTE: The pairing procedure is required for the first time only.

0.3 Automatically create a shortcut in Bluetooth Manager window
After the pairing complete, the system will automatically create a quick connect device, Rikaline in Bluetooth Manager. In further use, you just need to click this device to connect our Bluetooth Receiver.

0.4 Check the Serial Port in Bluetooth Setting
After pairing with the Receiver complete, please click "Serial Port" to confirm the COM port. If you use PDA/PC to pair the Receiver, please select "Outbound COM port".

0.5 Set correct Serial Port in your map software
Activate your map function and select the correct serial port.

0.6 Switch off the Bluetooth function
Switch off the Bluetooth function before you turn off your PDA/PC, and Switch off Receiver will disconnect the GPS function. If the BT GPS is on "AUTO" position, you do not need to take extra action.

0.7 Turn off your PDA or PC
0.8 Others
0.8.1 LED Indicator

	LED Status	Flash	ON	OFF
1	Power (Red)	Low Power	Recharging / System on	Sufficient Power
2	Bluetooth (Blue)	Paring or Power on	Transmitting Mode	System Off
3	GPS (Green)	Position not fix	Position Fix	GPS not Powered

0.8.2 Pass Word The pass word for paring is **"0000".**
0.8.3 Manufacturing Setting
Datum: WGS84
Sentence: GGA, GLL, GSA, GSV, RMC, VTG
Baud Rate: 9600
0.8.4 GPS features
SiRF III single chip with sensitivity at -159dBm (-189dBw)
20-channel acquisition parallel
0.8.5 BT Feature
Sensitivity: -85
SPP profile

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1. Introduction

1.1 Overview

The *Rikaline* **GPS-6036 Bluetooth GPS Receiver** is a total solution GPS receiver, designed based on **SiRF Star III** SOC single chip architecture. It provides you unbelievable sensitivity and wireless transmitting ability. This positioning application meets strict needs such as car navigation, mapping, surveying, security, agriculture and so on. Only clear view of sky and certain power supply are necessary to the unit. It communicates with other electronic utilities via compatible dual-channel through RS-232 or TTL and saves critical satellite data by built–in backup memory. With low power consumption, the **GPS-6036** tracks up to 12 satellites at a time, re-acquires satellite signals in 100 ms and updates position data every second. Trickle-Power (optional function) allows the unit operates a fraction of the time and Push-to-Fix (optional function) permits user to have a quick position fix even though the receiver usually stays off.

1.2 Features

The GPS-6036 provides a host of features that make it easy for integration and use.

1) Fast acquisition: 20 parallel satellites acquisition
2) Advanced GPS chip: SiRF Star III SOC
3) Fast TTFF: 200,000 effective correlators for fast TTFF at low signal levels
4) Built-in WAAS/EGNOS (Optional model for WAAS/EGNOS covered area) and DGPS for accurate positioning result.
5) Quick Host start: Built-in rechargeable Lithium battery for backup ephemeris for quick hot start.
6) Support MNEA 0183V2.2 data protocol.
7) Enhanced algorithms provide superior navigation performance in urban, canyon and foliage Environments.
8) User initialization is not required.
9) LED display status: The LED provides users visible positioning status. LED "BLINKING" when power connected and stays "ON" when GPS-6036 position identified. No more extra device needed.
10) Built-in Magnets for using on top of the car.
11) Updated Bluetooth profile V2.0

1.3 Technology specifications

1.3.1 Physical Dimension
1) Bluetooth GPS unit
   Size: 77.7(W) x 41.0(D) x 13.7(H) (mm)
       3.06"(W) x 1.61"(D) x 0.54"(H).
   Weight: 50g

2) Cradle unit
   Size: 56.0(W) x 47.0(D) x 31.2(H) (mm)
       2.20"(W) x 1.85"(D) x 1.23"(H).
   Weight: 25g

1.3.2 Environmental Characteristics
1)   Operating temperature: -20°C to +85°C(internal temperature).
2)   Storage temperature: -55°C to +100°C.

1.3.3 Electrical Characteristics
1)   Input voltage: + 5.5 ± 0.5VDC.
2)   Backup power: 3V Rechargeable Lithium cell battery, up to 230 hours (9.5 days) discharge.

1.3.4 Performance
1.3.4.1 LED functions
We built 3 LEDs in the GPS-6036 Bluetooth GPS with functions as follows:

	LED Status	Flash	ON	OFF
1	Power (Red)	Low Power	Recharging / System on	Sufficient Power
2	Bluetooth (Blue)	Paring or Power on	Transmitting Mode	System Off
3	GPS (Green)	Position not fix	Position Fix	GPS not Powered

1.3.4.2 GPS
1) Acquisition: 20 channel parallel
2) Tracking: up to 12 satellites
3) Update rate: 1 second
4) Acquisition time
   Reacquisition   0.1 sec., averaged
   Snap start   3 sec, averaged
   Hot start   6 sec, averaged
   Warm start   38 sec., averaged
   Cold start   42 sec., averaged
5) Position accuracy:
   A) Non DGPS (Differential GPS)
      Position   <10 M at 2D RMS
      Velocity   0.1   meters/second, with SA off
      Time   1   microsecond synchronized GPS time
   B) DGPS (Differential GPS) or WAAS / EGNOS **ON** (Built by demand)
      Position   1 ~ 5 meter, typical
      Velocity   0.05   meters/second, typical
6) Dynamic Conditions:
   Altitude   18,000 meters (60,000 feet) max
   Velocity   515   meters / second (1000 knots) max
   Acceleration   4 G,   max
   Jerk   20   meters/second, max

1.3.4.3 Bluetooth
1) Transmits up to 10 meters.
2) Details specifications please refer to appendix D at page 19.
3) SPP Profile, V2.0

1.3.4.4 Battery
1) Capacity: 740mAh.
2) Type: Li-ion rechargeable.

1.3.5 Interfaces
1) RS-232 compatible level, with baud rate at **9600**.
2) NMEA 0183 Version 2.2 ASCII output (GPGGA, GPGLL, GPGSA, GPGSV, GPRMC, GPVTG).
3) Real-time Differential Correction input (RTCM SC-104 message types 1, 5 and 9). (Optional model)
4) SiRF protocol. (optional)

2. Operational characteristics

2.1 Initialization

As soon as the initial self-test is complete, the GPS-6036 begins the process of satellite acquisition and tracking automatically. Under normal circumstances, it takes approximately 45 seconds to achieve a position fix, 38 seconds if ephemeris data is known. After a position fix has been calculated, information about valid position, velocity and time is transmitted over the output channel.

1) The GPS-6036 utilizes initial data, such as last stored position, date, time and satellite orbital data, to achieve maximum acquisition performance. If significant inaccuracy exists in the initial data, or the orbital data is obsolete, it may take more time to achieve a navigation solution. The GPS-6036 Auto-locate feature is capable of automatically determining a navigation solution without intervention from the host system.

2.2 Navigation

After the acquisition process is complete, the GPS-6036 sends valid navigation information over output channels. These data include:

1) Latitude/longitude/altitude
2) Velocity
3) Date/time
4) Error estimates
5) Satellite and receiver status

The GPS-6036 sets the default of auto-searching for real-time differential corrections in RTCM SC-104 standard format, with the message types 1, 5, or 9. It accomplishes the satellite data to generate a differential (DGPS) solution. The host system, at its option, may also command the GPS-6036 to output a position whenever a differential solution is available.

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3. Hardware interface

3.1 Dimension

1) Bluetooth GPS unit
Size: 77.7(W) x 41.0(D) x 13.7(H) (mm)
3.06"(W) x 1.61"(D) x 0.54"(H).
Weight: 50g

2) Cradle unit
Size: 56.0(W) x 47.0(D) x 31.2(H) (mm)
2.20"(W) x 1.85"(D) x 1.23"(H).
Weight: 25g

3.2 Hardware Interface

The GPS-6036 includes a new generation low power GPS module, a Bluetooth module and a Li-ION rechargeable battery in a unique style gadget. Simply place it into the cradle (enclosed in the package) then stick it on the dashboard of the car or any place which is not deeply covered by metal or other heavy material for transmitting GPS signal to your notebook PC, PDA or other devices, which facilitated with Bluetooth functions.

3.3 Connector

Battery recharging connector: mini USB female

3.4 Accessories

Standard:
80026: **Easy-Place,** 35mm round pad sticking on the dashboard or other place for hold GPS-6036
A-6003-E: Travel adapter, with 120V, 230V adapter
A-9007: Lithium-ION, rechargeable battery, 740mAh
A-6024-MU: Cigarette Adapter, mini USB male, 850mA, 1 meter

3.5 Switch Function

Switch	Function	
OFF	Off	System power Off
ON	On	For paring and operating of Bluetooth GPS.

3.6 LED Indicator

There are 3 LEDs indicating the status of the BT GPS

	LED Status	Flash	ON	OFF
1	Power (Red)	Low Power	Recharging / System on	Sufficient Power
2	Bluetooth (Blue)	Paring or Power on	Transmitting Mode	System Off
3	GPS (Green)	Position not fix	Position Fix	GPS not Powered

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4. Bluetooth Connection

Please follow below instructions step by step: **The pass word is "0000"**

4.1 Browse Devices

Firstly, you need to find the device with which you want to establish connection.

Open "Bluetooth Manager" on your pocket PC.
Click "New"
Click "Connect"

Search Bluetooth device "Rikaline 6033"
Select "Explore a Bluetooth device"
Click "Next"

To find the Bluetooth device
Double click "Rikaline"

Click this refresh button to find the device if the device is not in the device window.
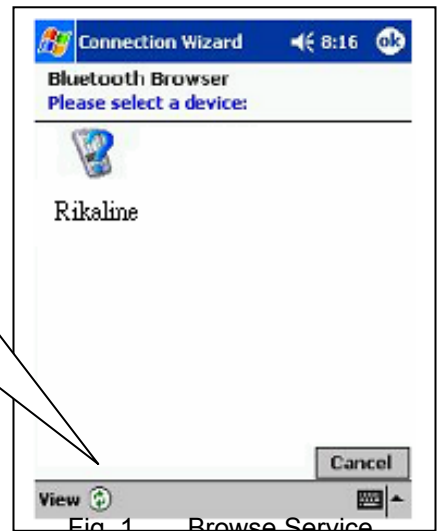
Fig. 1   Browse Service

Found the Bluetooth device
Tap "Rikaline"

4.2 Browse Services

Double click the device with which you want to establish SPP connection to browse its service as Fig. 2 & Fig. 3.

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Connect to SPP Slave
Select SPP slave
Click "Next"
Click "Finish"

<table>
<tr>
<td>Fig. 2   Browse Service</td>
<td>Fig. 3   Browse Service</td>
</tr>
</table>
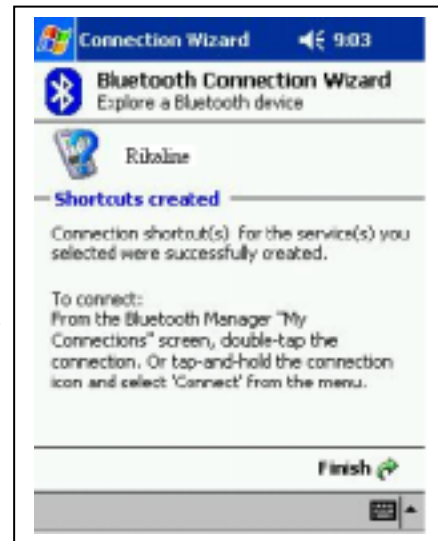
Finish Bluetooth Manager Setup
Tap and Hold "Rikaline: SPP slave"
Click "Connect"
Finish Bluetooth setup

After you click the SPP service, it will show as Fig. 4:
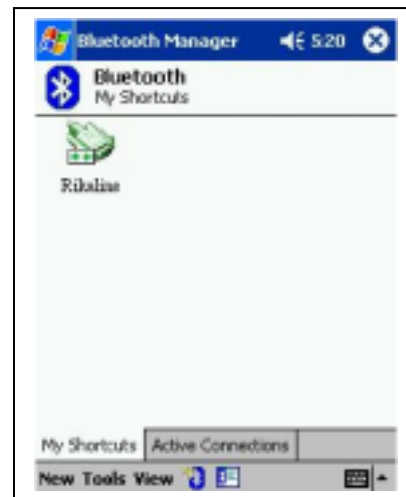
<table>
<tr>
<td>Fig. 4   Connect to SPP</td>
<td>Fig. 5 Connection Complete</td>
</tr>
</table>

After connect successfully, it will show as Fig. 5

4.3 Application
Now you can use any Navigation system through Bluetooth SPP Profile.

4.4 Disconnect
There are 3 different ways to disconnect the operation

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**4.4.1 Double click the SPP shortcut,
and click Disconnect on popup Menu.**

Fig. 6   Disconnect from pop menu   Figure 7   Disconnect from Status Window

4.4.2 In the Status window, select the SPP connection, and then click Disconnect button.

In most navigation system when you select disable GPS icon, the SPP connection will be disconnected automatically. If you want to use the navigation again, you need to establish the Bluetooth SPP connection first.

4.4.3 Use Shortcut

After a new connection was established successfully, a shortcut for the connection will be generated. Users may also double click the particular shortcut icon (represented by the Connection Name) and click the connect on the Pop_Menu to re-establish the connection.

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5. Safety Statement

5.1 R&TTE / CE
This device complies with ETSI EN 300 328-1, ETSI EN 301 489-1 / 17, EN60950.

5.2 BQB
In SIG listing.

5.3 FCC
This device complies with Part 15C, Part 15B and ID Application of the FCC rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference.

2. This device must accept any interference received, including interference that may cause undesired operation.

The radiated output power is far below the FCC Radio frequency exposure limits. Nevertheless, this device should be used in such a manner that the potential for human contact during normal operation is minimized.

Warning: Changes or modifications made to this equipment not expressly approved by Rikaline International Corp. May void the FCC authorization to operate this equipment.

Important

This equipment has been tested and found to comply with the limits for a Class B digital device, which 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.

6. Warranty

The GPS-6036 is warranted to be free from defects in material and functions for one year from the date of purchase. Any failure of this product within this period under normal conditions will be replaced at no charge to the customers.

Appendix A Software Interface

The GPS-6036 interface protocol is based on the National Marine Electronics Association's NMEA 0183 ASC interface specification, which is defined in NMEA 0183, Version 2.2 and the Radio Technical Commission for Maritime Services (RTCM Recommended Standards For Differential Navstar GPS Service, Version 2.1, RTCM Special Committee No.104).

A.1 NMEA Transmitted Messages

The GPS-6036 supported by SiRF Technology Inc. also outputs data in NMEA-0183 format as defined by the National Marine Electronics Association (NMEA), Standard.

The default communication parameters for NMEA output are 4800 baud, 8 data bits, stop bit, and no parity.

Table A-1 NMEA-0183 Output Messages

NMEA Sentence	Description
GPGGA	Global positioning system fixed data
GPGLL	Geographic position latitude \ longitude
GPGSA	GNSS DOP and active satellites
GPGSV	GNSS satellites in view.
GPRMC	Recommended minimum specific GNSS data
GPVTG	Course over ground and ground speed

A.1.1 Global Positioning System Fix Data (GGA)

Table A-2 contains the values for the following example:

$GPGGA,161229.487,3723.2475,N,12158.3416,W,1,07,1.0,9.0,M, , , ,0000*18

Table A-2 GGA Data Format

Name	Example	Units	Description
Message ID	$GPGGA		GGA protocol header
UTC Time	161229.487		Hhmmss.sss
Latitude	3723.2475		ddmm.mmmm
N/S Indicator	N		N=north or S=south
Longitude	12158.3416		dddmm.mmmm
E/W Indicator	W		E=east or W=west
Position Fix Indicator	1		See Table 5-3
Satellites Used	07		Range 0 to 12
HDOP	1.0		Horizontal Dilution of Precision
MSL Altitude	9.0	Meters	
Units	M	Meters	
Geoid Separation		Meters	
Units	M	Meters	
Age of Diff. Corr.		second	Null fields when DGPS is not used
Diff. Ref. Station ID	0000		
Checksum	*18		
<CR> <LF>			End of message termination

Table A-3 Position Fix Indicator

Value	Description
0	0 Fix not available or invalid
1	GPS SPS Mode, fix valid
2	Differential GPS, SPS Mode, fix valid
3	GPS PPS Mode, fix valid

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A.1.2 Geographic Position with Latitude/Longitude (GLL)

Table A-4 contains the values for the following example:

$GPGLL,3723.2475,N,12158.3416,W,161229.487,A*2C

Table A-4 GLL Data Format

Name	Example	Units	Description
Message ID	$GPGLL		GLL protocol header
Latitude	3723.2475		ddmm.mmmm
N/S Indicator	N		N=north or S=south
Longitude	12158.3416		dddmm.mmmm
E/W Indicator	W		E=east or W=west
UTC Position	161229.487		hhmmss.sss
Status	A		A=data valid or V=data not valid
Checksum	*2C		
<CR> <LF>			End of message termination

A.1.3 GNSS DOP and Active Satellites (GSA)

Table A-5 contains the values for the following example:

$GPGSA,A,3,07,02,26,27,09,04,15, , , , , ,1.8,1.0,1.5*33

Table A-5 GSA Data Format

Name	Example	Units	Description
Message ID	$GPGSA		GSA protocol header
Mode 1	A		See Table 5-6
Mode 2	3		See Table 5-7
Satellite Used (1)	07		Sv on Channel 1
Satellite Used (1)	02		Sv on Channel 2
……			….
Satellite Used			Sv on Channel 12
PDOP	1.8		Position Dilution of Precision
HDOP	1.0		Horizontal Dilution of Precision
VDOP	1.5		Vertical Dilution of Precision
Checksum	*33		
<CR> <LF>			End of message termination

 (1) Satellite used in solution.

Table A-6 Mode 1

Value	Description
M	Manual—forced to operate in 2D or 3D mode
A	2D Automatic—allowed to automatically switch 2D/3D

Table A-7 Mode 2

Value	Description
1	Fix Not Available
2	2D
3	3D

A.1.4 GNSS Satellites in View (GSV)

Table A-8 contains the values for the following example:

$GPGSV,2,1,07,07,79,048,42,02,51,062,43,26,36,256,42,27,27,138,42*71
$GPGSV,2,2,07,09,23,313,42,04,19,159,41,15,12,041,42*41

Table A-8 GSV Data Format

Name	Example	Units	Description
Message ID	$GPGSV		GSV protocol header
Number of Messages	2		Range 1 to 3
Message Number	1		Range 1 to 3
Satellites in View	07		Range 1 to 12
Satellite ID	07		Channel 1 (Range 1 to 32)
Elevation	79	degrees	Channel 1 (Maximum 90)
Azimuth	048	degrees	Channel 1 (True, Range 0 to 359)
SNR (C/No)	42	dBHz	Range 0 to 99, null when not tracking
....	....		
Satellite ID	27		Channel 4 (Range 1 to 32)
Elevation	27	degrees	Channel 4 (Maximum 90)
Azimuth	138	degrees	Channel 4 (True, Range 0 to 359)
SNR (C/No)	42	dBHz	Range 0 to 99, null when not tracking
Checksum	*71		
<CR> <LF>			End of message termination

NOTE: Items <4>,<5>,<6> and <7> repeat for each satellite in view to a maximum of four (4) satellites per sentence. Additional satellites in view information must be sent in subsequent sentences. These fields will be null if unused.

A.1.5 Recommended Minimum Specific GNSS Data (RMC)

Table A-9 contains the values for the following example:

$GPRMC,161229.487,A,3723.2475,N,12158.3416,W,0.13,309.62,120598, ,*10

Table A-9 RMC Data Format

Name	Example	Units	Description
Message ID	$GPRMC		RMC protocol header
UTC Time	161229.487		hhmmss.sss
Status	A		A=data valid or V=data not valid
Latitude	3723.2475		ddmm.mmmm
N/S Indicator	N		N=north or S=south
Longitude	12158.3416		dddmm.mmmm
E/W Indicator	W		E=east or W=west
Speed Over Ground	0.13	Knots	
Course Over Ground	309.62	Degrees	True
Date	120598		ddmmyy
Magnetic Variation (1)		Degrees	E=east or W=west
Checksum	*10		
<CR> <LF>			End of message termination

(1) SiRF Technology Inc. does not support magnetic declination. All "course over ground" data are geodetic WGS84 directions.

A.1.6 Course Over Ground and Ground Speed

Table A-10 contains the values for the following example:

$GPVTG, 309.62, T, M, 0.13, N, 0.2, K*6E

Table A-10 VTG Data Format

Name	Example	Units	Description
Message ID	$GPVTG		VTG protocol header
Course	309.62	Degrees	Measured heading
Reference	T		True
Course		Degrees	Measured heading
Reference	M		Magnetic (1)

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Speed	0.13	Knots	Measured horizontal speed
Units	N		Knots
Speed	0.2	Km/hr	Measured horizontal speed
Units	K		Kilometers per hour
Checksum	*6E		
<CR> <LF>			End of message termination

(1) SiRF Technology Inc. does not support magnetic declination. All "course over ground" data are geodetic WGS84 directions.

A.2 RTCM Received Data

The default communication parameters for DGPS Input are 9600 baud, 8 data bits, stop bit, and no parity. Position accuracy of less than 5 meters can be achieved with the GPS-6036 by using Differential GPS (DGPS) real-time pseudo-range correction data in RTCM SC-104 format, with message types 1, 5, or 9.   As using DGPS receiver with different communication parameters, GPS-6036 may decode the data correctly to generate accurate messages and save them in battery-back SRAM for later computing.

Appendix   B   Earth Datums & Output Setting

B.1 Earth Datums
The GPS-6036 is built in earth datum with WGS84.

B.2 Setting
B.2.1 Manufacturing Default
Datum: WGS84.
Baud Rate: 9600.
Output: GGA, GSA, GSV, RMC, VTG.
WAAS/EGNOS: OFF (Optional ON is for the area covered by WAAS/EGNOS)

B.2.2 Baud Rate and Output Sentences Setting
Not allowed by user

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Appendix C   Detailed Specifications

C.1 Bluetooth Specifications
C.1.1 Major Specification

	Specifications
Wireless Interface	Compliant with Bluetooth Spec. Version 1.2
Bluetooth Protocol Stack Supported	All + Extended SCO
Bluetooth Profiles Supported	SPP
Frequency	2.4 GHz license-free ISM band
Range (Open Environment)	Up to 10 meters Range (30ft)
Radio Receiver Sensitivity	<-85

C.2 LED status

NO.	Function	Description
1	PWD	ON: Recharging ON: Power On Blinking: Battery Low
2	BT	OFF: Data Transmitting ON: Standby ON.: Pairing
3	GPS	ON: Position is fixed OFF: Not Powered Flash: Position is not fixed

C.3 Battery
C.3.1 General Specification

	ITEM	SPECIFICATION
1	Type	Li-ION Rechargeable Battery
2	Model	A-9007
3	Typical Capacity	740 mAh
4	Nominal Voltage	3.7 V
5	Internal Resistance (packed)	30 – 70mΩ
6	Weight	Approx 19 g
7	Maximum Charge Current	1.0 C (1000 mA)
8	Charge Voltage	4.20 ± 0.05 V
9	Maximum Discharge Current	1.0 C
10	Charge method	CC/CV
11	Temperature For Recharge For Discharge	 0 ~ 45 °C -20 ~ +60 °C
12	Storage Temperature Within 1 month Within 3 months Within 1 year	 -20~+65 °C* -20~+45 °C* -20~+25 °C*

C.3.2 Testing Data

C.3.2.1 Electrical Characteristics

NO	ITEM	TESTING INSTRUCTION	REQUIREMENTS
1	Complete Charge	Charge the battery with 1c of constant current and 4.2V constant voltage for 2.5 hours.	
2	Nominal	Measure discharge capacity with discharge current 0.2C to 2.75V	703mAh

	Capacity	cut-off within 1 hour after complete charge.	
3	Cycle Life	Measure the capacity after 300 cycles of complete charge and discharge at 1C current to 2.75V cut-off	80% of initial Capacity
4	Storage	Capacity after 30days storage at 25 from complete charge	Retention capacity 90%
		Capacity after 7days storage at 60 ffom complete charge	Recovery capacity 90%

C.3.2.2 Environmental Characteristic

NO	ITEM	TESTING INSTRUCTION	REQUIREMENTS
1	Temperature testing	Measure capacity with constant discharge current 1C to 2.75V cut-off at each temperature after complete charge at 25 . Percentage as an index of the capacity compared with 100% at 25 .	25% at -20 60% at 0 100% at 25 96% at 60
2	Constant temperature /humidity	Keep the battery at 40 and 90%RH for 96hrs	Recovery capacity 85%
3	Vibration	The battery will be vibrated 10 times in three mutually perpendicular directions with amplitude of 0.35mm and changing frequency between 10 and 55Hz. The rate of scanning frequency is from 10Hz to 55Hz with the rate of 1Hz per min.	The battery shall not rupture, smoke, catch fire, vent or leak.
4	Impacting Testing	The battery will be impacted 1000±10 times with the acceleration of 100m/s^2 and pulse lasting time 16ms.	
5	Free fall	The battery will be dropped free five times in three mutually perpendicular directions from the height of 1.0m onto a hard board with the thickness of 20mm	

C.3.2.3 Safe Characteristic

NO	ITEM	TESTING INSTRUCTION	REQUIREMENTS
1	Short Circuit	The battery is to be short-circuited by connecting the positive and negative terminals of the battery with an external load of less than 50mΩ	The battery shall not rupture, smoke, catch fire, vent or leak.
2	Over charge testing	According to the method of UL	
3	Over discharge testing	After complete charge, the battery will be discharged to end voltage. Then Connect with external load of 30Ω for 24hrs.	

C.3.3 Cautions

1) The best operating performance is between -20 ~ +60 °C. Higher or lower temperature could cause damage to the battery.
2) Operated with external power supply will not hurt battery life since battery does not discharge. Therefore, it operating temperature range is -40 ~ +85°C.
3) Recharge the battery for 10 hours before use.

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Appendix D   Trouble Shooting

D.1 Trouble Shooting

Problems	Reasons	Methods
No position output but timer is counting	Weak or no GPS signal can be received at the place of GPS-6036	Find an open space for your GPS-6036
Execute fail	Bluetooth function unstable	Re-Start PDA or PC or re-install software
Can not turn on the COM port	Install GPS-6036 incompletely or The COM port of the device is being used	Install GPS-6036 completely or stop other device that is being used.
Can not find out GPS-6036	Poor connection	Re-Start PDA or PC and re-install software.
No Signal	No action for few minutes may cause the Pocket PC entry power saving mode. It will close the COM port at the same time.	Close the application and execute it again to re-open the COM port.
No Signal	Weak or no GPS signal when using GPS-6036 indoor	Go outdoors to improve the poor GPS signal.

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Appendix E   Ordering Information

E.1 Product Options
E.1.1 Standard Package
GPS-6036 (Bluetooth GPS Receiver) + Lithium-ION Rechargeable Battery + Cradle + Travel Charger + Cigarette Adapter + Documents CD + Warranty Card + Quick Installation Reference

E.2 Accessories
E.2.1 Color Cover Series
A-3001-C Chinese painting, 10 pieces
A-3001-W European painting, 10 pieces
A-3001-HK Hello Kitty series, 10 pieces

E.2.2 Power Adapter
A-6024-40 Cigarette Adapter, 850mA, with input 6-30Vdc, DC jack 4.0mm
A-6003   Travel Charger, 110V, 4.0mm DC Jack
A-6003-EU Travel Charger, 230V, 4.0mm DC Jack, EU
A-6003-UK Travel Charger, 240V, 4.0mm DC Jack, UK
A-6003-AU Travel Charger, 240V, 4.0mm DC Jack, Au / NZ

E.2.3 Battery
A-9007: Battery, Li-ION, 740mAh

E.2.4 Cradle
A-2016: Cradle, GPS-6036

E.2.5 PDA Holder

1	A-2002-B	PDA Holder, Suction Cup, 150mm, Short Arm, Magnetic Pad
2	A-2002-BL	PDA Holder, Suction Cup, 320mm, Long Arm, Magnetic Pad
3	A-2011-A	Talk Holder, Adj. Volume, GPS cable, Cig. Adapter, 220mm
4	A-2012	PDA Holder, Suction Cup, 220mm
5 (1)	A-2501-xx	PDA Connector with Earphone Cable, A-6011

Remarks: (1) Details please find at www.rikaline.com.tw