

TWIG **SOLUTIONS**

TS-GPM004 & TS-GUM004 Micro GPS RECEIVER

With SiRF Star III Chipset



User Guide

V3.0



Contents

Introduction	2
Operation Overview	2
Caring For Your GPS	2
Features	3
Applications	3
USB Driver Installation.....	4
Additional Steps For WinXP	5
Vista & Windows 7 Driver Installation	7
User Help Forum.....	7
GPS Receiver Specifications.....	8
TS-GPM004 Pinout.....	8
Verifying GPS NMEA Operation	9
Warnings and Precautions.....	10
General GPS Information.....	12

Introduction

Thank you for your purchase of our micro mouse-style GPS receiver. As you can see, this is an incredible little device. With its tiny size (about that of a normal external antenna for other GPS units), it offers excellent sensitivity and high tracking performance with very low power consumption.

Utilising the latest SiRFstarIII GPS chipset and an internal patch antenna to achieve full navigation accuracy provided by the Standard Positioning Service (SPS). Tracking satellites using its 20 channels coupled with its high sensitivity, tracking weak signal satellites is even possible in dense foliage or urban canyons. An integrated powerful ARM CPU and base band hardware design reduces the space and power consumption to state of the art levels. Both devices are WAAS and EGNOS ready.

Operation Overview

Upon power-up and after the initial self-test completes, the GPS receiver begins the process of satellite acquisition. During this time the GPS LED indicator will be solidly lit. Under normal circumstances, it takes approximately 50 seconds to achieve a position fix, or approx 35 seconds if ephemeris data is known and accurate. If the unit is powered up for the first time after a long power down period, or it is > 500km from where it was last used, it may take up to 3 mins to acquire a positional fix. This is due to the unit needing to download the whole ephemeris and almanac data from the GPS satellites.

Once a position fix is calculated, information about position, velocity and time are transmitted over the output channel once per second in standard NMEA sentences, and the LED indicator will flash to indicate a positional fix.

Where possible, the GPS receiver utilises its stored position, date, time and satellite orbital data, to achieve faster acquisition track and lock performance. If significant inaccuracy exists, (as advised above if it is greater than 500 Km from where it was last used), or the orbital data is otherwise obsolete, it could take longer to complete the localisation process.

The unit has a backup battery to sustain the internal clock and satellite orbital data for short periods to facilitate faster Time-To-First-Fix (TTFF).

The GPS Receiver has an elegant look and unique streamlined design, which is different from many other GPS mouse brands.

Caring For Your GPS

To care for your new GPS, please use a damp cloth to just wipe it over to keep it clean. If your connectors become wet, or dirty, we recommend a silicone based spray, not WD-40 style products to repel the water. Do not allow the water to corrode the pins, as water damage is not covered by your warranty.

Features

- Low power consumption
- Future proof with WAAS/EGNOS enabled.
- Small light weight size (42 x 37 x 16mm)
- Low cost yet incredible high performance
- Rigorous Quality Control performed at each manufacturing step
- 12 Months warranty on the GPS receiver
- IP-X7 Waterproof rating (head end only)
- Built on the SiRFstarIII SC3f low power single chip chipset.

Applications

The applications this unit can be used for are varied, as it is easy to transport the device from host to host anywhere you travel. It is not only useful for navigation, but also can be used in other outdoor activities such as:

- Marine and Boating applications.
- Car navigation
- Hiking
- Biking
- Travelling
- Mapping
- Surveying
- APRS (Automatic Position Reporting Service)
- Farm & Property Management
- Geocaching
- War Driving

USB Driver Installation

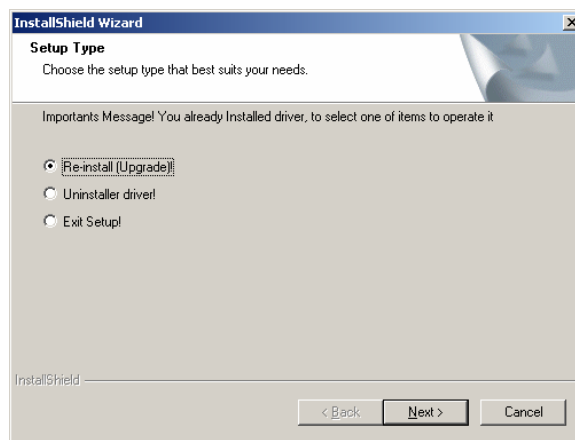
Note, drivers are only required if you purchased a TS-GUM004 or the optional USB interface adapter for the TS-GPM004.
No drivers are needed for RS-232 operation.

Download the drivers from the following URL; <http://www.twig.com.au/store/drivers.php>
Drivers may be provided for Windows, Mac and Linux. Please ensure you install the correct driver for your OS. For Windows 7, both 32 and 64 bit are in the same single driver installer.

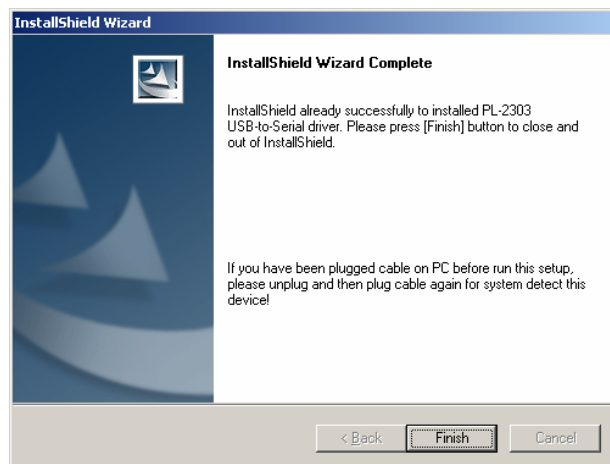
After downloading the driver, run the file and install as per normal.

Do Not plug the GPS in prior to installing the driver.

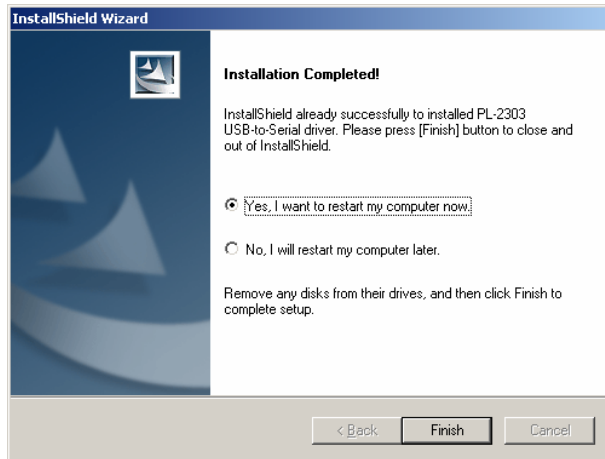
1. If you have a previous version of the driver installed, the following window may appear.



Select the “Re-install (Upgrade)” option.



2. Press “**Finish**”. Your driver is now installed. Proceed to Step 5.

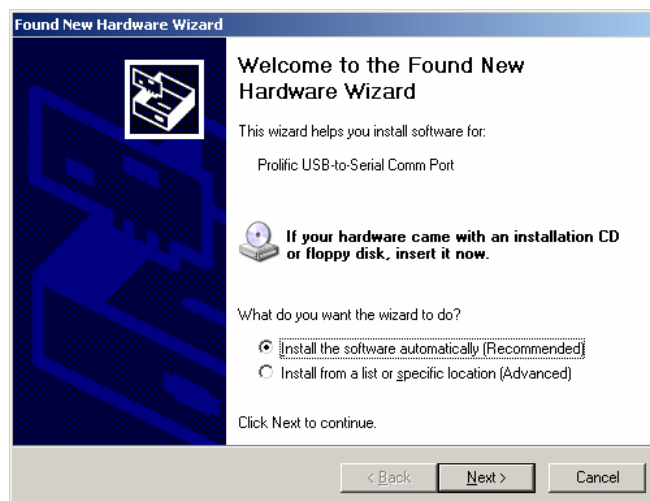


3. If you selected “Re-Install”, you may be prompted with this window, in which case select Yes, to allow your PC to restart.

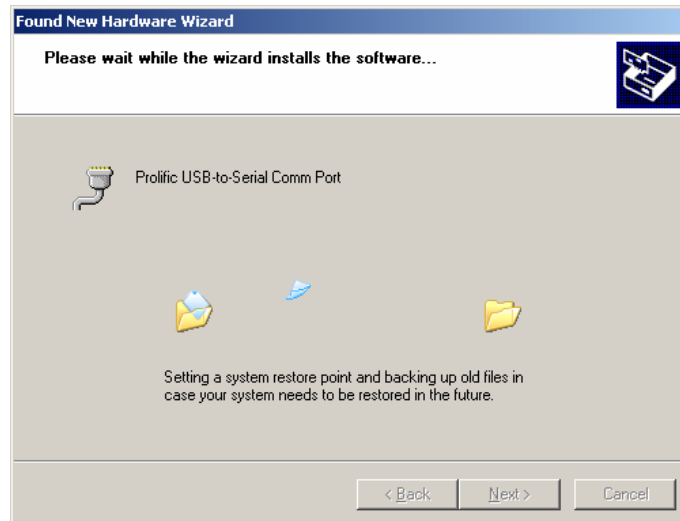
Additional Steps For WinXP



4. Insert the USB cable (shown above) into a free USB port on your PC or Laptop.



5. The “Found New Hardware” window will be shown, select “**Install the software automatically**” and press “**Next**”.



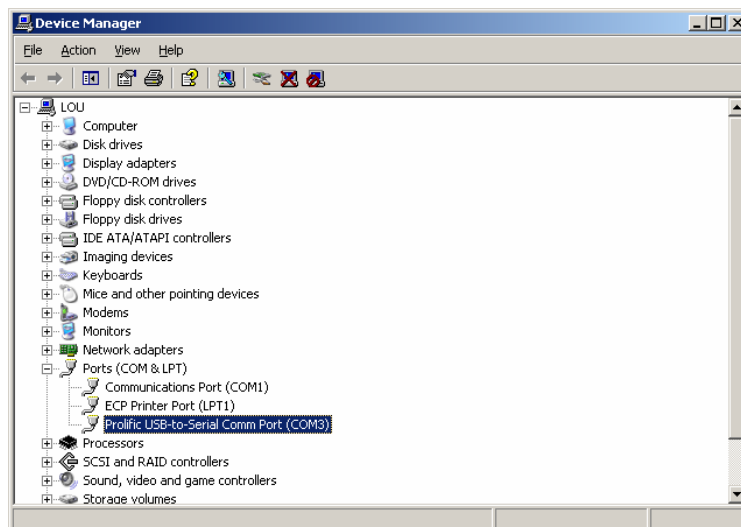
At this stage you will see the driver being copied.

6. Click **“Finish”**. At this point the driver for the GPS mouse is fully installed, and the following alert will appear above the XP Task Bar;



To verify if the GPS driver was properly installed:

- Click on START, and then click on CONTROL PANEL
- Double click on the System icon
- Click on the Hardware and then click on the Device Manager tabs
- Click on PORTS and verify that you now have a **Prolific USB-to-Serial COM Port (COM x)** entry in the port list.



The COM port number shown may be different.

Note: If you plug the USB cable into a different USB port, steps 5 to 7 will have to be repeated for each USB port. This will allow Windows-XP to allocate a unique COM port for each USB port. Make note of the indicated COM port as you will need this number for your navigation software.

If the installation failed, you can remove every possible COM port driver installed earlier by running **Driver_v130.exe** and selecting the “**Uninstall Driver**” option. After it has completed, re-start computer, repeat installation procedures as described above.

Note: If a window appears at any stage of the installation advising that the driver is not certified, press “**Continue Anyway**”, this will not affect your system.



Note: Before using navigation software, please make note of the COM Port number created by your driver installation is correctly configured in your navigation software. Otherwise, the navigation software won't receive the GPS data because of the mismatch in COM Port setting.

You are now ready to use you new GPS receiver!

Vista & Windows 7 Driver Installation

To install the drivers for Windows7 or Vista;

- Run the Driver Installer, wait for the install to complete
- Plug in the GPS
- Unplug the GPS and plug it back in.
- Now you should have an instance of Prolific PL-2303 driver in Device Manager>>Ports.

You are now ready to use you new GPS receiver!

User Help Forum

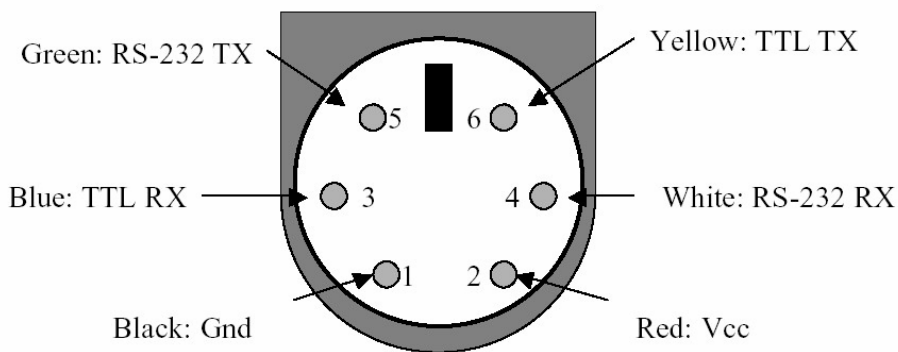
If you have any problems installing your drivers, or configuring your software to use your GPS, try visiting our User Forum (<http://www.twig.com.au/forum3>) as there may be a resolution there for your problem.

GPS Receiver Specifications

Receiver	SiRFstarIII Chipset
Accuracy	Position: 2D RMS <5m, WAAS support Velocity: 0.1m/sec without SA imposed
Acquisition Time	Cold start: 42 sec (Average)* Warm start: 35 sec (Average) Hot start: 1 sec (Typically)
Sensitivity	Tracking: -157 to -159 dBm, Acquisition: -142 to -149 dBm
Dynamics	Altitude: 18.000m, 60,000 feet (Max.) Velocity 1852 K/Hr (Max.) Acceleration +-4g (Max.)
Navigation update rate	Once per second
Serial Port	TTL (3.3v) and RS-232
Baud Rate	48000 bps
Output Message	NMEA013 V3.0 GGA, GSV, GSA, RMC & VTG. (optional GLL)
Datum	WGS84
Power supply	DC 3.3 - 5.5V
Power Consumption	Typically <50mA@5V
LED Function	Power on/off and Navigation Status
Operating Temp	-20 ~ +70 °C
Storage Temp	-20 ~ +70 °C
Humidity	5% ~ 95%
Antenna Type	Built-in High Sensitivity Active Patch Antenna

TS-GPM004 Pinout

Mini Din 6 Pin Male Plug
(PS/2 Male Plug)



Verifying GPS NMEA Operation

You can test the unit by using any map software, or you can also use the HyperTerm or any other Terminal program, such as TeraTerm to verify the receiver is working. The following is a quick guide to setup HyperTerm to perform this testing. For other software please see its supporting documentation.

Depending on your OS version, the following steps may differ slightly.

- Select “Start” in the desktop toolbar.
- Select “Programs”.
- Select “Accessories”.
- Select “Communications”.
- Select “Hyper Terminal”
- Select the COM port to which the GPS is connected.
- Change the communications settings to 4800, 8,N,1
- Click the “Connect” button.

At this point you should see strings such as those shown below;

```
$GPGSA,A,1,,,,,,,,,,,,,*1E  
$GPGSV,3,1,12,04,04,007,00,07,60,330,00,08,60,075,00,11,21,113,00*72  
$GPGSV,3,2,12,17,62,337,00,24,20,043,00,26,36,241,00,27,27,054,00*7A  
$GPGSV,3,3,12,28,59,158,29,29,44,262,34,31,83,078,00,47,,,00*44  
$GPRMC,153941,V,3000.9087,S,15551.3999,E,000.0,344.1,151005,,,N*77  
$GPGGA,153942,3000.9087,S,15551.3999,E,0,00,,00079.7,M,019.3,M,,*41
```

Warnings and Precautions

If the product has been stored for a few weeks and the displayed date is incorrect, or you have travelled a long distance (greater than 500km) from where the unit was last used or you use the unit in the poor satellite visibility, the unit may be looking for the wrong group of satellites, and a lock may take some time. This is normal behaviour and is not a fault with the unit. You may have to wait for 5 or more minutes until the unit forces a reset on itself.

This product does not contain any user serviceable parts. Repairs should only be made by an authorized service centre. Unauthorized repairs or modifications could result in permanent damage to the unit, and will void your warranty.

TWIG Solutions offers one-year warranty on the GPS receiver, and 3 months on all accessories and cables.

Use this product at your own risk. This product is designed to be used only as a navigational aid and must not be used as sole means navigator for aircraft or for any purpose requiring precise measurement of location, direction or distance.

The Global Positioning System (GPS) is operated by the United States government, which is solely responsible for its accuracy and maintenance. The system is subjected to changes which could affect the accuracy and performance of all GPS equipment.

If this product is used in combination with 3rd party mapping software installed on a PDA, it is very important that you understand the operation of your PDA prior to using this product. Please notice that all the mapping data may be virtually inaccurate or may be incompatible with your PDA, which might cause error or malfunctions.

Please consult your navigation software or PDA vendor first to resolve the problem before returning this product to us for service. If no fault is found, we will charge for the time taken to test the unit.

When you use this product in vehicles, it's the sole responsibility of the driver to install this product and/or PDA in a secure place so that it will not interfere with vehicle operating controls or obstruct the driver's view, or cause personal injury in an event of an accident.

It is also the sole responsibility of the driver to operate the vehicle in a safe manner. Do not operate PDA while you are driving.



Warranty, Return and Refund Conditions

Refund Information

We do not normally give refunds if you;

- change your mind, or
- make a wrong decision.

You can choose between a refund, exchange or credit where goods:

- are faulty,
- have been wrongly described,
- are different from a sample shown to you, or
- do not do what they are supposed to.

Unless otherwise stated, TWIG Solutions warrants this product free from defects in material and workmanship for a period of one (1) year from the date of purchase (here after called "warranty period"). Cables, batteries, adapters and other accessories, such as car chargers are covered for a period of three (3) months.

If a product proves to be defective in material or workmanship during the warranty period, TWIG Solutions will, at its sole option, repair or replace the product with a same or similar product, or offer a pro-rata refund. Replacement product or parts may include remanufactured or refurbished parts or components.

This warranty does not apply:

- (1) To damage caused by accident, misuse, neglect, fire, water, lightning, or other acts of nature, unauthorized product modification.
- (2) To damage caused by service (including upgrades and expansions), repair or attempted repair by anyone.
- (3) To a product or part which is consumable or expendable.
- (4) If any serial number or seal has been removed, modified or defaced.
- (5) Any damage of the product due to shipment.
- (6) Software or data loss occurring during repair or replacement.
- (7) Use of supplies or parts not meeting TWIG Solutions' specifications.
- (8) Any other cause which does not relate to a product manufacture defect.

TWIG Solutions' liability is limited to the cost of repair or replacement of the product only.

TWIG Solutions shall not be liable for:

- (1) damage to other property caused by any defects in the product, damages based upon inconvenience, loss of use of the product, loss of time, loss of profits, loss of business opportunity, loss of goodwill, interference with business relationship, or other commercial loss, even if advised of the possibility of such damages.
- (2) any other special, indirect or consequential damages.
- (3) any claim against a customer by any other third party.

Except as warranted in the above, TWIG Solutions hereby disclaims all warranties with regard to the products, including all warranties of merchantability, fitness for a particular purpose and new infringement, whether express or implied.

General GPS Information

What is GPS?	GPS (Global Positioning System) is a navigation technology that provides precise time and location anywhere, anytime and under any atmospheric conditions, by using the NAVSTAR satellites.
How does GPS work?	<p>GPS is a satellite-based navigation system that works by receiving navigation messages from satellites and calculating locations. GPS receivers locate the satellites incoming signals and use CDMA (Code Division Multi Access) method to identify individual codes. This means GPS system is able to identify each satellite's unique ID to calculate precise location and navigational data. Here are the steps:</p> <ul style="list-style-type: none"> - All the satellites have clocks set to exactly the same time - All satellites know their exact position from data sent to them from the systems controllers - Each satellite transmits its position and a time signal - The signals travel to the receiver delayed by distance travelled - The differences in distance travelled make each satellite appear to have a different time - The receiver calculates its own position.
What is NMEA 0183?	NMEA stands for National Marine Electronics Association, a US standards committee that defines data message structure, contents and protocols to allow the GPS receiver to communicate with other pieces of electronic equipment. NMEA 0183 is a standard data communication protocol used by GPS receivers.
What affects GPS accuracy?	Many factors affect how accurate your GPS is. The atmosphere, the ionosphere and the position of your receiver could all affect GPS accuracy. Any buildings, natural structures or heavy foliage that obstructs the GPS' view of the sky may decrease the position accuracy. Your GPS accuracy will also depend on your level of clearance with the US DOD. There are two available radio signals that receivers can use: the Standard Positioning Service (SPS) for civilians and the Precise Positioning Service (PPS) for military and authorized personnel. The DOD occasionally jams the GPS signals for civilians on a short-term basis.
What is Acquisition Time?	The time it takes for a GPS receiver to acquire satellite signals and determine the initial position.
How many GPS Satellites are there?	There are nearly 30 navigational satellites orbit the Earth and more might be added. Each satellite makes one Earth orbits every 12 hours. The satellite orbits repeat almost the same ground track (as the earth turns beneath them) once each day. The orbit altitude is such that the satellites repeat the same track and configuration over any point approximately each 24 hours (4 minutes earlier each day). There are six orbital planes (with nominally four Space Vehicles in each), equally spaced (60 degrees apart), and inclined at about fifty-five degrees with respect to the equatorial plane. This constellation provides the user with between five and eight Space Vehicles visible from any point on the earth.
What is Time-To-First-Fix (TTFF)	The actual time required by a GPS receiver to achieve a position solution. It's affected by factors like the last position fix, the location of the last fix. Three relevant terms, Hot Start, Warm Start and Cold Start are the terminologies defining TTFF.
Cold Start	Powering up a unit after it has been turned off for an extended period of time and no longer contains current ephemeris data. In Cold Start Scenario, the receiver has no knowledge on last position, approximate time or satellite constellation. The receiver starts to search for signals blindly. This is normal behaviour, if no backup battery is connected. Cold Start time is the longest start-up time for GPS receivers and can be several minutes.
Warm Start	Start mode of a GPS receiver when current position, clock offset and approximate GPS time are known. Almanac data is retained, but the ephemeris data is cleared. In Warm Start Scenario, the receiver knows - due to a backup battery or by other techniques - his last position, approximate time and almanac. Thanks to this, it can quickly acquire satellites and get a position fix faster than in cold start mode.
Hot Start	Start mode of the GPS receiver when current position, clock offset, approximate GPS time and current ephemeris data are all available. In Hot Start Scenario, the receiver was off for less than 2 hours. It uses its last Ephemeris data to calculate a position fix.