GPS Time Synchro Receiver with simultaneous tracking of up to 22 channels

Overview

The Global Positioning System (GPS) is a satellite based navigation system operated and maintained by the U.S. Department of Defense. The GPS consists of a constellation of 24 satellites providing world-wide, 24 hour and three dimensional (3D) signal coverage.

Although originally conceived for military needs, GPS has a broad array of civilian applications, including surveying, timing, marine, land, aviation and vehicle navigation. GPS is the most accurate technology available for vehicle navigation.

By computing the distance to GPS satellites orbiting the earth, a GPS receiver can calculate an accurate position. GPS receivers can also provide precise UTC time, speed, and course measurements which are beneficial for vehicle navigation.

The GTS9000 receiver is a complete 20 channels parallel tracking GPS receiver designed to operate with the L1 frequency, Standard Position Service, Coarse Acquisition code. Based on Condor C2626 GPS™ core of Trimble Navigation Ltd, the receiver features a RS422 serial communication port and an open-collector pulse-per-second (PPS) output for timing applications or as a general purpose synchronization signal.
Two independent serial channels can be selected on the serial port: selection is accomplished through an internal jumper or a digital input.

The GTS9000 receiver operates using three different protocols: Trimble Standard Interface Protocol (TSIP™ 1), Trimble ASCII Interface Protocol (TAIP™ 1), and NMEA 0183. The module also supports RTCM SC-104 for DGPS (differential GPS).

User settings, including port parameters and receiver processing options, are stored in a non-volatile electrically erasable ROM (EEROM) that does not require backup power.

For further information on Condor receiver protocols, please refer to:

Trimble Navigation Limited - Software and Component Technologies
645 North Mary Avenue
Post Office Box 3642
Sunnyvale, CA 94088-3642
U.S.A.
www.trimble.com

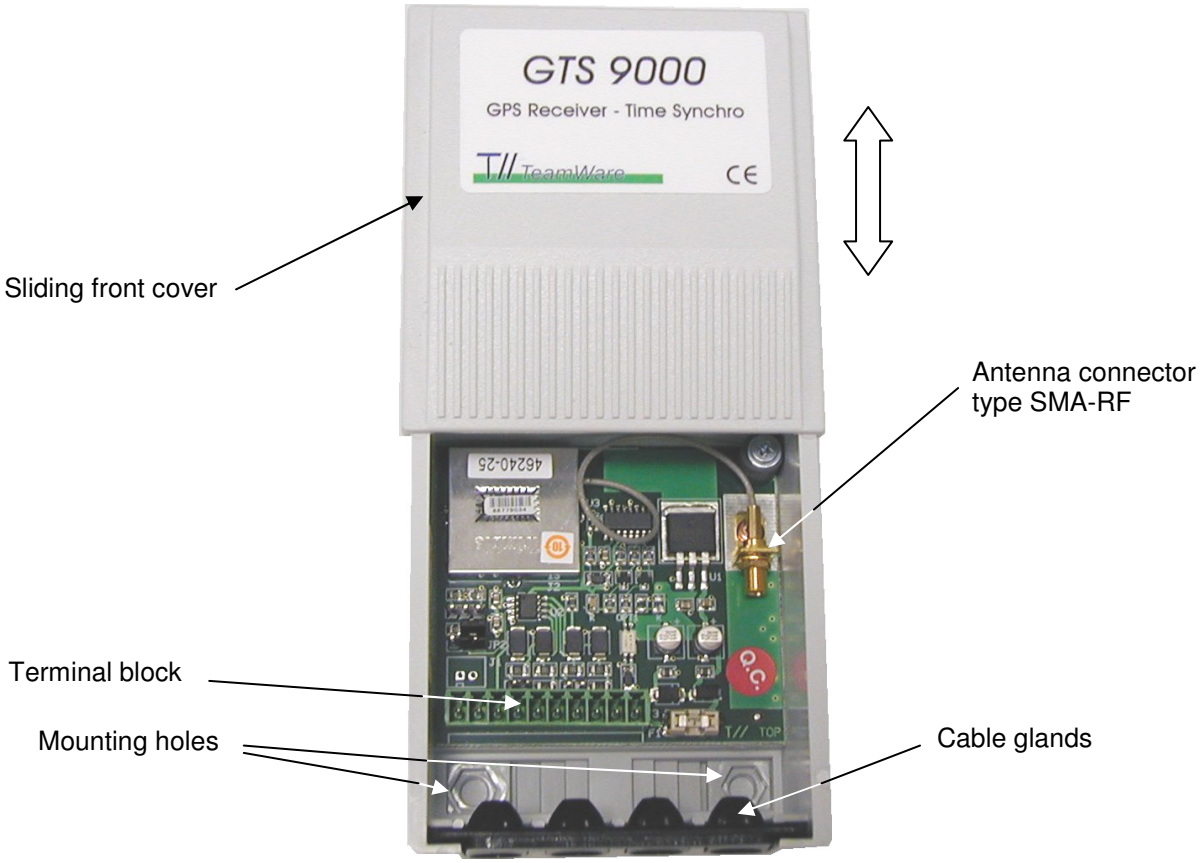
GTS9000 kit components

- GTS9000 Receiver
- Female 10 pins terminal block
- Magnetic Mount GPS Antenna with 5 m long cable
- Pole mounting plate with screws

Using the GTS9000 receiver

How to open the case

The antenna connector, the settings jumpers and the terminal block are located inside the housing of GTS9000 receiver. To open the case, slide up the front cover and remove it. To close the case, put the cover on top side of the enclosure and shift it down.



Antenna

The GPS antenna receives the GPS satellite signals and passes them to the receiver. Because the GPS signals are spread spectrum signals in the 1575 MHz range and do not penetrate conductive or opaque surfaces, the GPS antenna must be located outdoors in direct sky view. The GTS9000 requires an active antenna. The received GPS signals are very low power, approximately -140 dB, at the surface of the earth. The supplied active antenna includes a preamplifier that filters and amplifies the GPS signals before delivery to the receiver.

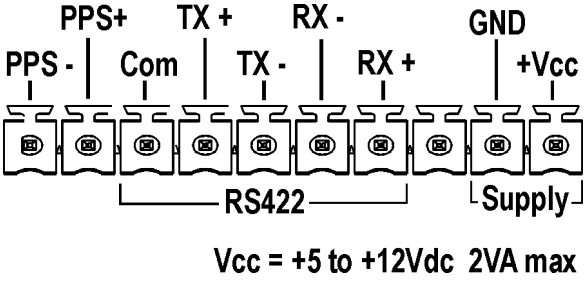
Antenna mounting

Pass the antenna cable through the cable gland and push it on the SMA-RF connector (see figure).

Cables wiring procedure

- Break through the cable gland (see figure), using a sharpen tool,
- Pass the cables through the cable gland holes, connect them to the female terminal block and insert it into the connector on the board.

Power and signal terminal block



Terminal block 10 pins (3”81)	
Pin	**Description**
1	PPS-
2	PPS+
3	RS422 COM
4	RS422 TX+
5	RS422 TX-
6	RS422 RX-
7	RS422 RX+
8	NC
9	Power GND
10	Power +Vcc (from +5 to +12 Vdc)

Line termination impedance

The GTS9000 receiver can be equipped with two internal 120 Ohm termination impedances for both the RS422 Tx and Rx data lines. As default factory setting, the two impedances are not connected.

To insert the two line termination impedances, two jumpers (not included) must be shorted on the board (see figure).

Set both the jumpers as follows:

- Without termination impedance (default): no jumper (open)
- With termination impedance: jumper closed

Channel selection

The device is factory set to direct the channel 2 (NMEA 0183) output stream of Lassen iQ receiver to the RS422 serial line. Instead of channel 2, it is possible to redirect the channel 1 by way of two jumpers on the board.

Set the jumpers as follows:

- Channel 1: both jumpers shorted between center and left pins (bi-directional TSIP or TAIP protocols)
- Channel 2 (default): both jumpers shorted between center and right pins (NMEA 0183 output protocol and RTCM SC-104 V2.1 input protocol).

Note: as factory setting, only the bottom jumper is installed, to enable the Channel 2 NMEA 0183 protocol on TX line.
Install the top jumper (Rx line) only if you need one of the input protocols.

Default serial port features

Canale	Input protocol	Default Setup	Output language	Default Setup
1	TAIP	Baud Rate: 4800 Data Bits: 8 Parity: None Stop Bits: 1 No Flow Control	TAIP	Baud Rate: 4800 Data Bits: 8 Parity: None Stop Bits: 1 No Flow Control
1	TSIP	Baud Rate: 9600 Data Bits: 8 Parity: Odd Stop Bits: 1 No Flow Control	TSIP	Baud Rate: 9600 Data Bits: 8 Parity: Odd Stop Bits: 1 No Flow Control
2 (default)	RTCM	Baud Rate: 4800 Data Bits: 8 Parity: None Stop Bits: 1 No Flow Control	NMEA 0183	Baud Rate: 4800 Data Bits: 8 Parity: None Stop Bits: 1 No Flow Control

Default NMEA 0183 ASCII output messages

The receiver is shipped from factory with NMEA output on channel 2, with the following ASCII messages issued every 1 second:

- **GGA - GPS Fix Data**
  The GGA message includes time, position and fix related data for the GPS receiver.
- **VTG - Track Made Good and Ground Speed**
  The VTG message provides information about course on the ground and speed.

The following example shows some NMEA 0183 output datagrams issued from the GTS9000 receiver:

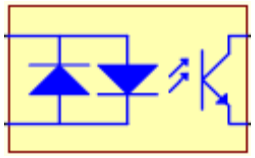
```
$GPGGA,093648.0,4531.030,N,00913.721,E,
1,03,3.43,00138,M,048,M,,*52
$GPVTG,188.36,T,,M,0.820,N,1.519,K,A*3F
```

Power supply

The GTS9000 receiver requires a power supply voltage between 5 and 12 Vdc, with 2 VA max consumption.
The power supply voltage must be applied on pins 9 and 10 of the terminal block.

Pulse per Second (PPS)

A 0.5 second wide open-collector pulse is available on Pin 1 and 2 of terminal block. This pulse is issued once per second with the rising edge, synchronized with UTC. The rising edge is typically less than 20 nanoseconds. The falling edge should not be used for synchronization.
PPS timing accuracy is ± 100 nanoseconds and is available only when valid position fixes are being reported. After power on, the typical time to first fix is less than 2 minutes. Before the first fix, neither is pulse per second emitted nor is time information available.



PPS+ (pin 2)

(Vmax = 24 Vdc - Imax = 5 mA)

Technical specifications

- Channels: 22 parallel
- Protocols: TSIP™ 1, TAIP™ 1, NMEA (default), RTCM
- Operating modules: GPS, DGPS
- PPS accuracy: ±100 ns
- PPS width: 0.5 secondi
- PPS output: Vmax=24Vdc; Imax=5mA
- Antenna: 26dB, 5 m long cable, magnetic mounting
- Serial interface: RS422 with terminal block
- Serial port signals: TX+, TX-,RX+, RX-, COM
- Power supply voltage: 5-12 Vdc, 2 VA max
- Size: 90 x 80 x 60 mm
- Case: plastic IP53
- Weight: 100 g
- Operating temperature: -10 °C +50 °C
- Storage temperature: -20°C +70 °C
- Standard compliance: EN 61010 /1, IEC 801 - 2/3/4

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