TBGPS1 GPS RECEIVER

The TBGPS1 is a universal GPS Receiver providing NMEA data over a USB Virtual COM Port. It was designed primarily to be used for RF coverage measurements together with a Spectrum Analyzer and the EMCview software of Tekbox.

TBGPS1 GPS Receiver

Features

- Autonomous / assisted GPS receiver
- Built in LNA for high sensitivity
- 32 channel acquisition,
- 12 channel tracking
- 2 channel capable SBAS
- -161 dBm sensitivity in acquisition under hot start mode and in tracking mode
- Fast time to first fix Hot start outdoor: <1 sec @ -130 dBm, indoor: 6 sec @ -150 dBm. Warm Start -33 sec @ -130 dBm, Cold Start: 33 sec typ @ -130 dBm
- Accuracy of 1.3m outdoor (CEP 50%) and 12.5m (CEP 50%) indoor
- Operating Temperature Range:

  -40°C … + 85°C; 5% to 85% RH

Application

- General purpose GPS receiver
- RF coverage measurement with EMCview

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1 Introduction

ATS2825 / OPUS *III* ezRide is a high-sensitivity, GPS receiver module that combines a hardware measurement platform with eRide's powerful navigation software integrated onto ARM7 microprocessor. It delivers fast, accurate positioning data in challenging locations like deep urban canyons. It is capable of working indoors by acquiring and tracking signals down to -161 dBm. It is a complete GPS solution with only an external GPS antenna and power supply via USB required.

TBGPS1 is based on eRide's Opus III technology and includes:

- ePV3600 / Opus *III* eZ BB IC
  - Opus *III* high performance GPS engine with 44,000 effective correlators
  - ARM7TDMI-based MCU, with on-chip ROM and SRAM memories
- Battery backed-up 32Khz crystal oscillator, Real Time Counter, GPS Data SRAM
- Embedded power management
- STA5620 RF Receiver IC
  - Low IF (4.092MHz) single conversion architecture, SAW Band-pass filter
- MAX2659 high performance LNA
  - Low current consumption, low noise figure, high gain
- 27.456 MHz TXCO
- FTDI USB interface chip, FT230XS-R
- interfacing with USB via Virtual COM Port; Mini USB-B connector
- GPS antenna matching net
- SMA connector for passive GPS antennas
- 5V supply voltage via USB, 40 mA consumption during tracking outdoors, 62 mA during acquisition
- Operating temperature range: -40 …. +85°C, 5% to 85% RH no condensation

2 Product features

- Supports GPS L-band C/A code. 32 channel acquisition, 12 channel tracking, and 2 channel capable SBAS (EGNOS, WAAS and MSAS) for enhanced accuracy
- High indoor sensitivity of -161 dBm, achieved utilizing 44,000 effective correlators, both in acquisition under Hot Start conditions and in tracking mode. -146 dBm sensitivity in acquisition under Warm start condition, -145dBm in Cold Start condition
- Works in both autonomous mode and assisted-GPs mode (a-GPs)
- Fast Time To First Fix. Hot start outdoor: <1 sec @ -130 dBm, indoor: 6 sec @ -150 dBm. Warm Start -33 sec @ -130 dBm, Cold Start: 33 sec typ @ -130 dBm

- Accuracy of 1.3m outdoor (CEP 50%) and 12.5m (CEP 50%) indoor
- Typical current consumption when tracking outdoor is 40 mA, 58 mA when tracking indoor and 62 mA during acquisition
- User interface via a simple bidirectional serial port (USB virtual COM Port), 1 Hz update rate. Supports the industry standard NMEA 0183 v3.0 and the eRide's Serial Interface Protocol (eSIP). Communications over a programmable UART
- Supply voltage 5 V
- Battery backed-up Real Time Clock and GPS Data RAM to allow fast time to first fix in autonomous mode

When the attenuator/limiter switch is in "ON" position, a 10dB attenuator and a Schottky diode limiter offer additional protection. Furthermore, the attenuator/limiter path contains a 150kHz high pass filter.

3 Usage modes

The TBGPS1 receiver can operate both in autonomous and assisted GPS (A-GPS) mode.

3.1 Autonomous mode

If no network/server connection is provided, TBGPS1 will run as a stand alone autonomous GPS receiver. In this mode it is able to achieve fast "hot-start" performances and high sensitivity by storing previously collected information in battery backed-up memory and maintaining time information with its real time clock (RTC).

When starting in autonomous mode, TBGPS1 will optimally utilize any previously stored information available in back-up memory and RTC time if available. The type and age of this information will determine the module's initial "aiding configuration" as shown in Table 1.

Aiding Configuration	Approximate Time	Approximate Position	Current Ephemeris	Recent Almanac	ROM Almanac
Hot	☑	☑	☑	☑	☑
Warm	☑	☑	☐	☑	☑
Cold	☐	☐	☐	☑	☑
Factory Cold	☐	☐	☐	☐	☑
Simulator Cold	☐	☐	☐	☐	☐

Table 1 – Initial aiding configuration in autonomous mode

3.2 Assisted mode

If a communications link is provided which allows the TBGPS1 to communicate with eRide's Symphony Aiding Server, it can then operate in assisted mode (A-GPS).

In this mode, TBGPS1 will receive the following information from the server:

- approximate current time
- current Low Accuracy- and High Accuracy Satellite Models for all satellites
- Long Term Satellite Models (LTSM) for all satellites

This information will enable the receiver to achieve near hot-start performance. After a session with successful server communication, TBGPS1 could be used in autonomous mode without having to collect ephemeris from the satellites for up to 7 days with the LTSM support.

4 Installation

Download a Virtual COM Port driver for your operating system from http://www.ftdichip.com/Drivers/VCP.htm

Install the driver and connect the TBGPS1 to the USB port of your PC. In Windows HW manager, note the Virtual COM Port number, which will be assigned to the TBGPS1.

The default communication parameters are 9600 baud, 1 Stop Bit, No Parity.

You then can use any universal GPS viewer or Eride GPS Conductor to view the NMEA data output of the TBGPS1. If used to provide location data for EMCview in RF coverage measurement mode, connect the TBGPS1 to the USB port of your PC and follow the instructions in the EMCview manual.

4.1 “Crazy mouse” problem

Depending on the configuration of your operating system, it may happen that the NMEA data are interpreted as data from a mouse and consequently the pointer will move erratically over the screen. If you encounter this issue, disconnect TBGPS1 and google for “disable serial mouse Windows xx registry” to find suitable instructions for your operating system on how to disable a serial mouse via registry settings.

5 Ordering Information

Part Number	**Description**
TBGPS1	GPS receiver with passive, magnetic patch antenna and USB cable

Table 2 – Ordering Information

6 History

Version	Date	Author	Changes
V1.0	6.05.2018	Mayerhofer	Creation of the document

Table 3 – History