andrewL▲BS

GPS-TS-485

GPS RS485 Time Source Module

(RS485 NMEA/1PPS output)

Information and Installation Guide

OVERVIEW

The GPS-TS-485 is a GPS-based time source module designed for time and clock applications requiring high accuracy. The exact UTC time is available through NMEA sentences, and precise synchronisation is achieved through the 1PPS (1 pulse-per-second) output. The NMEA sentences and 1PPS pulse are provided through two individual RS485 outputs. This allows the application requiring time input to be located at a distance away from the module.

Supply power and the two RS485 outputs are connected through a RJ45 connector. The module includes a built-in GPS antenna. An external active antenna may be connected using the SMA connector if higher signal availability or outdoor environment IP-rating is required.

ORDERING INFORMATION

Model	NMEA Output	1PPS Output
GPS-TS-485	Yes, RS485	Yes, RS485

MODULE INFORMATION

Dimensions	L82mm W40mm H20mm
Supply Voltage	9 - 24 VDC ±10%
Power Consumption (max.)	4 W
Working Temperature	-40 to +85 °C
IP Rating	IP50
GPS Frequency	L1, 1575.41 MHz
GPS Chipset	MTK3339
GPS Update Rate	1 Hz
GPS Positional Accuracy	3.0m (50% CEP)
GPS Velocity Accuracy	0.1 m/s
GPS Altitude (max.)	10,000 m
GPS Velocity (max.)	515 m/s
GPS Hot Start TTFF	1 s typical
GPS Warm Start TTFF	33 s typical
GPS Cold Start TTFF	35 s typical
GPS Acquisition Sensitivity	-148 dBm
GPS Tracking Sensitivity	-165 dBm
GPS Internal Antenna	Yes
GPS External Antenna	Optional, female SMA
GPS External Antenna Type	GPS 4–20 mA 3.3 V 50 Ω
NMEA Output	Yes, RS485
NMEA Serial Configuration	9600,8,N,1
NMEA Sentences	GPGGA, GPGSA, GPGSV, GPRMC, GPVTG
NMEA Proprietary Sentences	PMTKLSC (leap second change information)
1PPS Output	Yes, RS485
1PPS Accuracy	±10 ns RMS

OPERATION

The GPS-TS-485 provides NMEA sentences bearing the UTC time, position and velocity information, as well as a 1PPS synchronisation pulse through two individual RS485 outputs.

The GPGGA, GPGSA, GPRMC and GPVTG sentences are transmitted every second. The GPGSV sentences bearing information on GPS satellites in view are transmitted once every 5 seconds.

The 1PPS (1 pulse per second) signal is available when the unit has a current 3D position fix. The pulse is 100ms in duration and the rising edge marks the start of the UTC second. When the 1PPS

2

pulse is available, NMEA sentences with information about position and time for the marked second are transmitted after the rising edge of the pulse.

The current difference between GPS time and UTC, and any upcoming changes between those two times, are available through the PMTKLSC proprietary sentence. The PMTKLSC sentence is transmitted once every second. For more information see the Leap Second Change Notification section below.

The ACT LED on the RJ45 socket indicates NMEA transmission activity, and the 1PPS LED indicates when the 1PPS pulse is active.
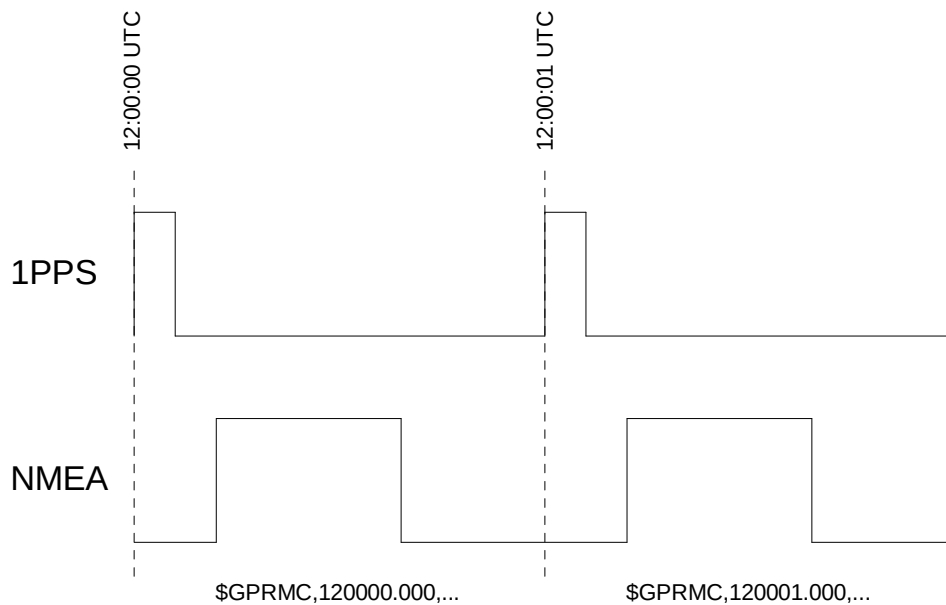

INSTALLATION

- Position the module indoors (near a window with a clear view of the sky if using the internal antenna, the module is not rated for outdoor use).
- (optional) Attach external active GPS antenna.
- Insert RJ45 plug wired according to the RJ45 socket pinout diagram in the section below.
- Terminate the ends of the RJ45 to the supply power and RS485 receivers as shown in the schematic below.

RJ45 SOCKET PINOUT
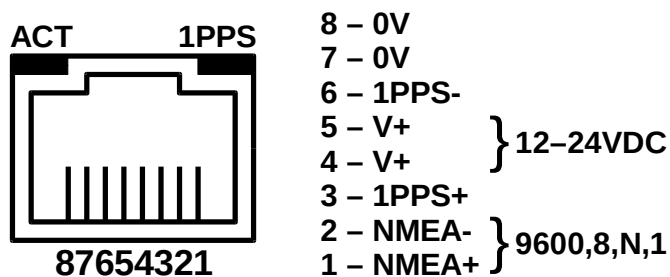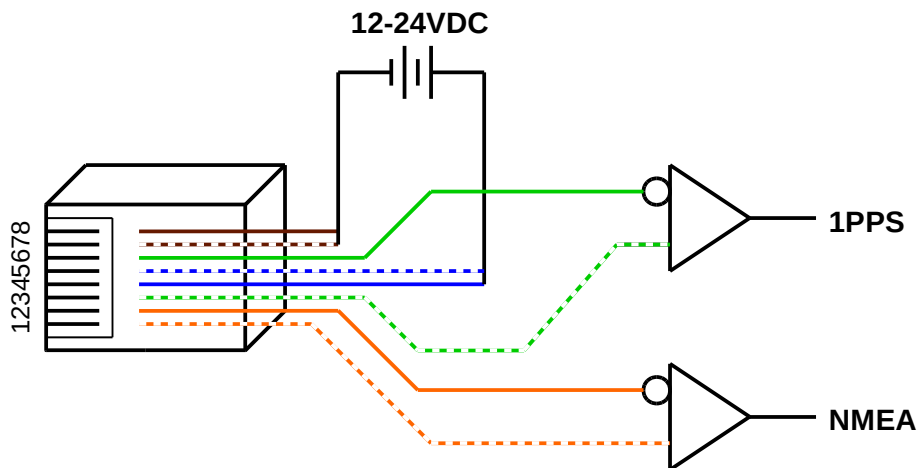
EXTERNAL ANTENNA

An external active antenna may be used if higher signal availability or outdoor environment IP-rating is required. A female SMA screw-on connector is provided for attaching the external active antenna.

The module automatically switches over to the external antenna when one is connected. The external antenna input is short circuit protected.

LEAP SECOND CHANGE NOTIFICATION

The module provides an indication of an impending change in leap second by means of the PMTKLSC proprietary sentence. The sentence format is:

$PMTKLSC,Parameter1,Parameter2,Parameter3*CS

Where,
Parameter1 is the current leap second.
Parameter2 is the leap indicator, 1 means information was updated from the GPS network.
Parameter3 is the next leap second.
CS = Checksum.

Example: $PMTKLSC,17,1,17*43<CF><LF>

Changes in leap seconds only take effect in the last second of the months of December or June.

The following is the sequence transmitted during the leap second change on the last second of 31 December 2016:

$GPRMC,235958.000,...,311216,...
$PMTKLSC,17,1,17*43
$GPRMC,235959.000,...,311216,...
$PMTKLSC,17,1,18*4C
$GPRMC,235959.000,...,311216,...
$PMTKLSC,18,1,18*43
$GPRMC,000000.000,...,010117,...
$PMTKLSC,18,1,18*43