# GPS10e5: GPS Disciplined Frequency Standard


## Key Features

- **LCD Display and Keyboard**
- **10 MHz Sine & Square Outputs**
- **1 pps Output aligned to UTC**
- **All outputs locked to GNSS / GPS Satellites**
- **Accuracy to parts in $10^{-12}$ (1 week)**
- **Never needs calibration**
- **19" Rack Mount Case or bench mount**
- **Supplied with small GNSS antenna**
- **Low Price and High-Quality Construction**
- **1, 5, 10 or 15 sinewave outputs**
- **Locking to GPS, external 1 pps or 10 MHz**
- **GPS, GLONASS, Galileo or Beidou systems**
- **Free windows software included**
- **USB and Ethernet ports as standard**
- **Many Options Available**

## General Description

The GPS10e5 is a low cost 10 MHz, GNSS disciplined, frequency standard. It is supplied in a 19" rack mount case or a bench mount unit. The GPS10e5 uses the Global Navigate Satellite System (GNSS) to discipline an OXCO crystal oscillator. Long-term frequency accuracy of parts in $10^{-13}$ is achieved. The user can select what satellite service to use. 1, 2 or 3 systems can be simultaneously used from GPS (USA), GLONOSS (Russian), Galileo (Europe) or Beidou (China) systems.

## Applications

- Calibration of Frequency Counters and other test equipment
- Frequency Reference for DTV, DAB, VHF, UHF, CDMA, Tetra etc.
- Production frequency reference
- Network Time Protocol in Banks, Financial companies, utilities, 2-way radio workshops, TV studios.

## Outputs

There is a 10 MHz, sinewave output, a 10 MHz TTL squarewave output, a 1 pps (pulse per second) output derived from either the GNSS receiver or the internal OXCO. The 1 pps from the GNSS receiver is aligned to UTC time within ± 20 ns

(typical). Options to increase the number of outputs is available together with squarewave outputs or time code outputs (IRIG-B, NTP, SMPTE etc.).

## USB and Ethernet Interfaces

There is a USB or Ethernet interface allowing interrogation of the GPS10e5. The GPS10e5 also have an embedded software page allowing the status of the unit to be monitored on a PC using a standard browser. Alternatively, windows software is supplied along with optional Telnet commands can be used to monitor and control the GPS10e5.

## External Locking

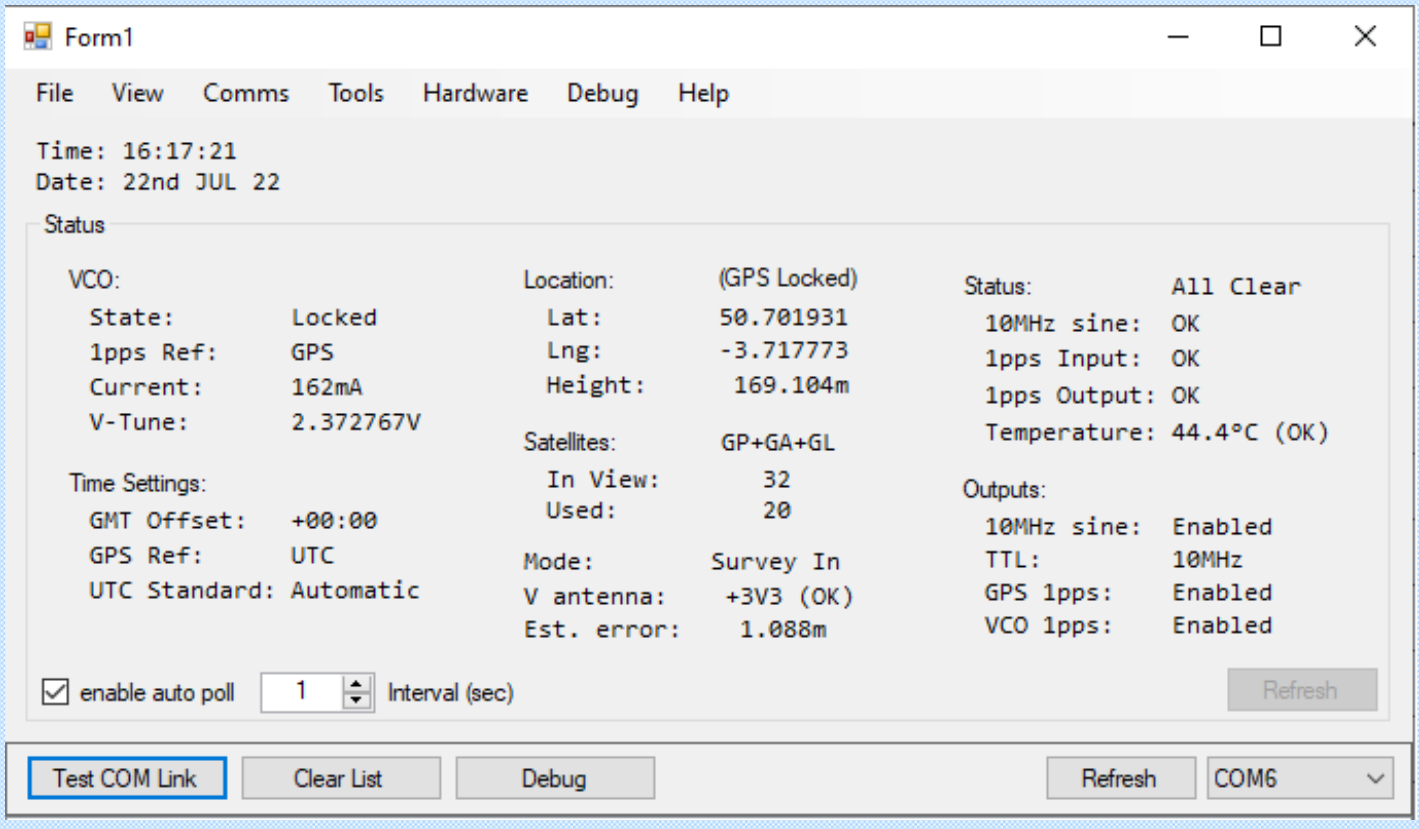
The GPS10e5 can either lock to the GNSS satellite system, or an optional external 1 pps signal. Options to lock to other frequencies, such a 1,5,10 MHz are available.

## Options

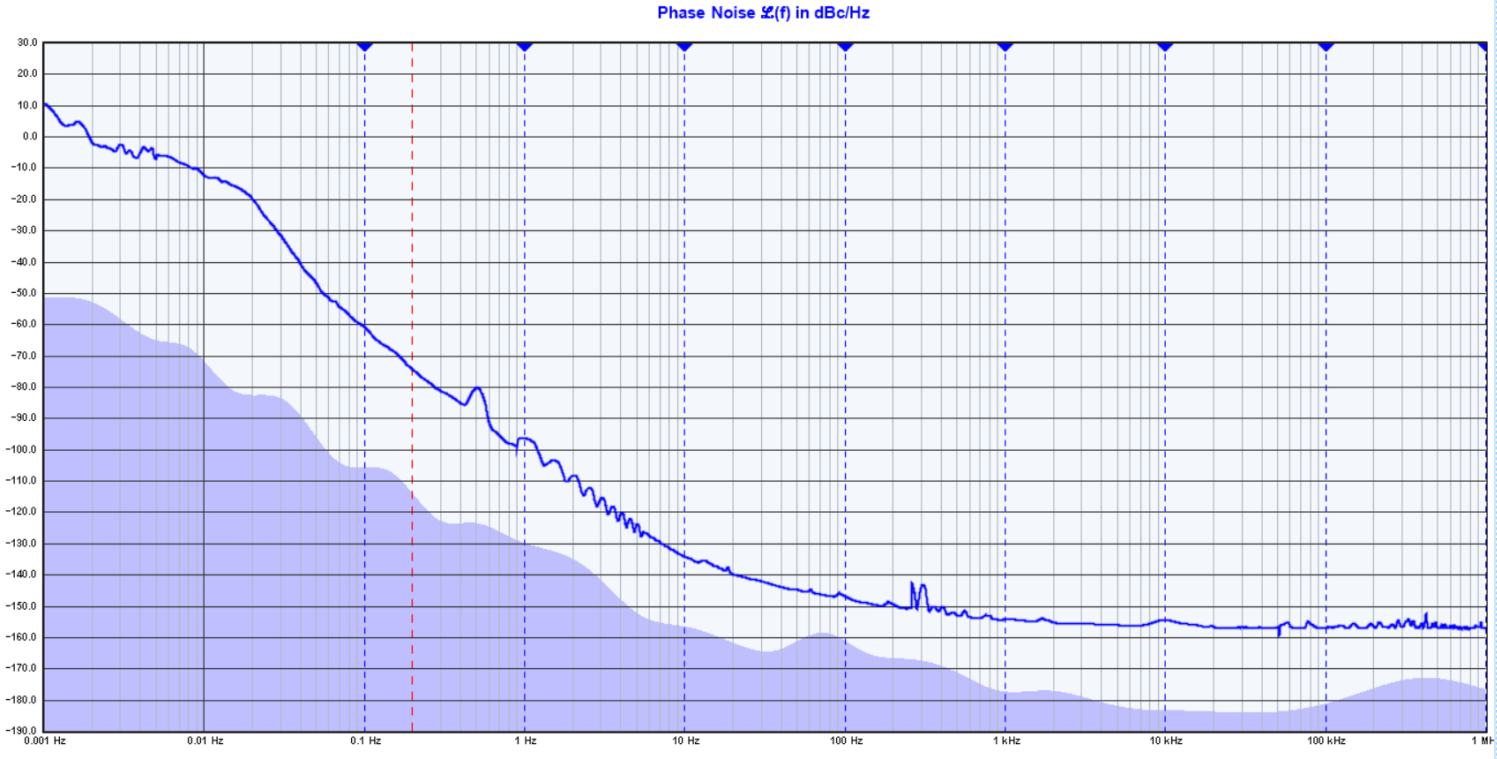
- Options for more sinewave outputs
- Squarewave outputs at 10 MHz or other frequencies
- Antenna Amplifier allowing the GPS antenna to be placed up to 350 m away from the GPS10e5.
- Alarm Relay Output.
- Redundancy. Two units operate together with automatic switchover if one unit fails.
- NTP Server option (option 38)

## Software

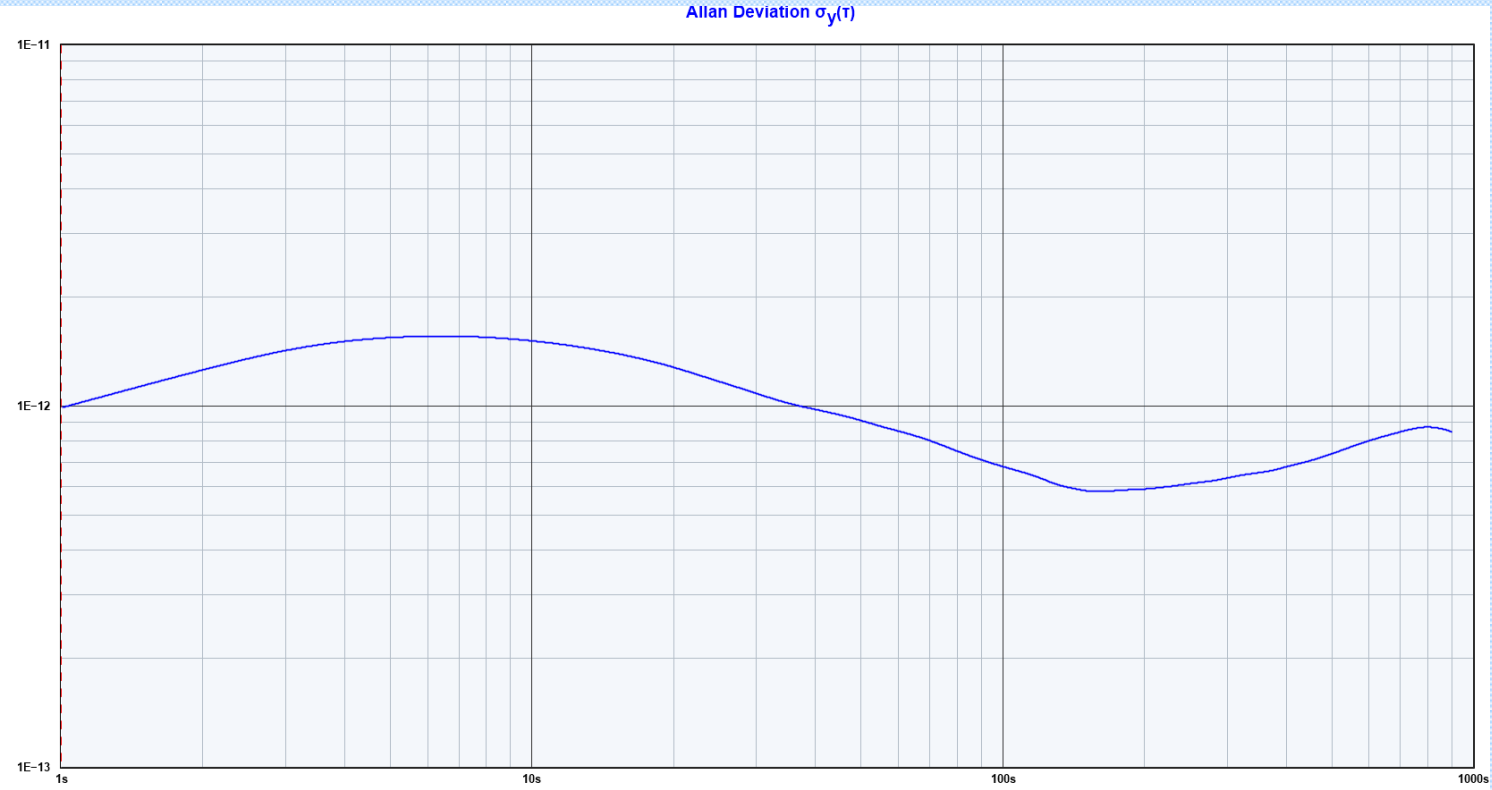
Free window software is included to continuously monitor the GPS10e5. A screen print-out of the software is shown below



Two plots below show the typical phase noise and Allan deviation  of the GPS10e5.
The phase noise is better than -95 dBc @ 1 Hz with a -153 dBc/Hz floor noise.




Above plot shows the typical Phase Noise. Below plot is the Allan deviation



# GPS10e5 Specifications

| Description | Specification | Remarks |
|---|---|---|
| **Outputs** | | |
| Sinewave Output Frequency | 10 MHz | Other frequencies optionally available |
| TTL Squarewave Output Frequency 1 | 10 MHz, 5MHz, 2 MHz, 1 MHz, 100 kHz | Other frequencies optionally available |
| TTL Pulse Output | 1 pps derived from GNSS receiver or OXCO | Aligned to UTC time ± 20 ns. |
| **Allan Deviation & Frequency Accuracy - locked to GPS Satellites** | | |
| Observation Time 1 seconds | $< 5 \times 10^{-12}$ | GPS10e5 in full lock for > 1 week. > 3 satellites in view. Ambient temperature 0 °C to +40 °C. Temperature changes less than 1 °C per hour. |
| Observation Time 10 seconds | $<3 \times 10^{-11}$ | |
| Observation Time 100 seconds | $< 2.5 \times 10^{-11}$ | |
| Observation Time 10k seconds | $< 6 \times 10^{-13}$ | |
| Frequency Accuracy (Tau=10/1k/10k secs) | $< 3 \times 10^{-11} / < 5 \times 10^{-12} / < 5 \times 10^{-13}$ | |
| Frequency Accuracy (Worse case peak) | $< \pm 2.5 \times 10^{-10}$ | |
| **Phase Noise** | | |
| 1 Hz offset (dBc/Hz) | -95 dBc | |
| 10 Hz offset (dBc/Hz | -133 dBc | |
| 100 Hz offset (dBc/Hz) | -146 dBc | |
| 1 kHz offset (dBc/Hz) | -153 dBc | |
| 10 kHz offset (dBc/Hz) | -153 dBc | |
| 100 kHz offset (dBc/Hz) | -153 dBc | |
| **Output Drift when GPS10e5 NOT Locked to GPS Satellites (Holdover)** | | |
| Drift due to aging | $< 5 \times 10^{-10}$ per day, $< 2 \times 10^{-6}$ per year | |
| Drift due to temperature (when unlocked) | $< 2 \times 10^{-8}$ | Relative to 25 °C |
| **GNSS / GPS Receiver** | | |
| Number of Channels | 72 channels | |
| GNSS systems available | GPS, Galileo, GLONASS, BeiDou | |
| Acquisition Time / Sensitivity (cold start) | < 29 s. / -148 dBm. | Sensitivity -160 dBm (GPS & Galileo) |
| **Miscellaneous** | | |
| Connectors | BNC standard. SMA optionally available | The antenna connector is either BNC or SMA |
| Operating Temperature | 0 °C to +50 °C | |
| Storage Temperature | -20 °C to +60°C | |
| Power Inlet | 9 - 15 VDC | |
| Interface | USB or Ethernet | Battery backup optionally available |
| Dimensions (rack mount version) | 483 mm wide x 300 mm deep x 44 mm high | 19” Rack Mount Case, 1U height |
| Dimensions (Bench Mount Case) | 230 mm x 190 mm x 50 mm | |
| Supplied Accessories | Antenna, AC Power Adapter, Manual | GPS1 Magnetic mount antenna |
| **Options** | | |
| Option 01 | Additional sinewave outputs (5 in total) | Many other options available. Please just ask if you need an option not listed here. 01C = 10 outputs, 01D = 15 outputs |
| Option 01B | Squarewave Output (10/5/2/1/0.1MHz) | |
| Option 01C / 01D | Additional sinewave outputs (10 / 15 in total) | |
| Option 03: | Redundancy | |
| Option 09A | IRIG-B Output | |
| Option 26 and 26B | Ultra-low and low phase noise options | |
| Option 38: | NTP Server | |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Full specifications available from www.ptsyst.com. Specifications and features subject to change without notice (110423)