

# GPS-500

## 10 MHz OCXO-based GPS Disciplined Oscillator



### Key Features

- Specially designed for cost-sensitive LTE applications
- Solder-in module
- High-performance GPS receiver
- Small footprint and low profile: only 1.6" x 1.9" x 0.63"
- $\pm 5$  ppb temperature coefficient over extended temperature range of  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$
- Holdover stability of  $< \pm 10\mu\text{s}$  over 24 hrs. at  $+25.0^{\circ}\text{C}$  (no motion or airflow, 3+ days with GPS)
- 1 PPS output accuracy of  $\pm 35$  ns to UTC RMS (1-sigma), GPS-locked
- SC-cut crystal
- Outputs can be optionally specified as CMOS compatible

### Applications

- Unmanned Aerial Vehicles (UAV's)
- Tactical radios
- LTE

The Symmetricom® GPS-500 is 10 MHz OCXO-based GPS Disciplined Oscillator (GPSDO), which features a very small footprint and low profile (1.6" x 1.9" x 0.63") and an extended operating temperature range ( $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$ ) in a design aimed at cost-sensitive LTE applications. The GPS-500 has a high-performance GPS receiver that can track up to 50 GPS signals, down to levels as low as  $-158$  dBm. The receiver is compatible with GPS, WAAS, EGNOS, and MSAS signals.

The GPS-500 command set is compatible with Symmetricom's GPS-2000 series of GPSDO's. The unit can be monitored and controlled through an RS-232 port via standard SCPI commands, and it can also generate NMEA-0183 output sentences for easy integration into existing system architectures.

The GPS-500 has two outputs. The first is a 1 PPS LVDS output with  $\pm 35$  ns accuracy to UTC RMS (1-sigma), once GPS-lock has been achieved. The second is 10 MHz LVDS output, with a low phase noise floor of  $-155$  dBc. Both outputs can be optionally specified as CMOS compatible.

Holdover stability is  $< \pm 10\mu\text{s}$  over 24 hrs. at  $+25.0^{\circ}\text{C}$ , once the unit has been locked to GPS for 3+ days. Steady-state power consumption is  $< 2.4\text{W}$  at  $+25^{\circ}\text{C}$ . The unit can be soldered into a PC board as a through-hole component, or it can be mounted in a socket.

# GPS-500 10 MHz OCXO-based GPS Disciplined Oscillator

## Specifications

### ELECTRICAL SPECIFICATIONS

#### MODULE SPECIFICATIONS:

1 PPS Accuracy	LVDS level (CMOS optional) ±35ns to UTC RMS (1-sigma) GPS locked
Holdover Stability	±15µs over 24 hrs., at +25.0°C (no motion or airflow, 5+ days with GPS)
RS-232 Control	Full control via SCPI-99 control commands, NMEA-0183
GPS Frequency	L1, C/A 1574MHz
GPS Antenna	Passive or active 5V
GPS Receiver	50 channels, mobile, SBAS WAAS, EGNOS, MSAS capable
Sensitivity	Acquisition - 142 dBm Tracking - 158 dBm
GPS TTFF	Cold start - < 45 sec Warm start - 1 sec Hot start - 1 sec
ADEV	1Ks < 1E-10, 10Ks < 8E-12 (GPS locked, 25°C, no motion)
TTL Alarm Output	GPS lock and event indicator
Warm Up Time / Stabilization Time	< 9 min to 5.0E-9 accuracy at +25°C, no airflow
Supply Voltage (Vdd)	12V ±5%
Power Consumption	< 2.4W steady state, < 8W warmup
Operating Temperature	-40°C to +85°C
Storage Temperature	-45°C to +85°C
Output Signal Levels	10MHz LVDS pair (CMOS optional), 1PPS LVDS pair

#### OSCILLATOR SPECIFICATION (OCXO):

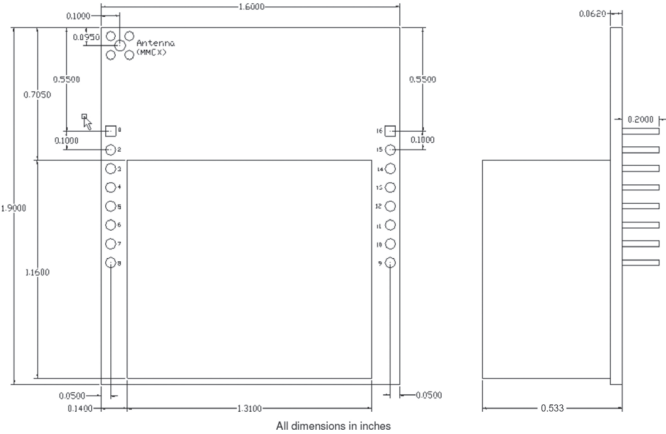
Frequency Output	10MHz CMOS
10MHz Retrace	±2E-08 after 24 hrs. on, 24 hrs. off, 1 hr. on at +25°C (no GPS)
Frequency Stability	±5E-09 (no GPS)
24-hr Frequency Stability	< 1.0E-12 (with GPS, no airflow)
Output Amplitude	LVDS, or CMOS option
Oscillator Heater Warm Up Time	< 3 min at +25°C

#### PHASE NOISE

1Hz	-90dBc/Hz
10Hz	-120dBc/Hz
100Hz	-140dBc/Hz
1kHz	-150dBc/Hz
10kHz	-155dBc/Hz
100KHz	-155dBc/Hz

#### ORDERING INFORMATION

090-01592-000	LVDS Outputs
090-02410-000	CMOS Outputs



PIN # (LVDS OUTPUTS)	FUNCTION	DESCRIPTION
1	LOCK_OK	3.3V CMOS event indicator (no event == 3.3V)
2	GND	GND
3	-1PPS LVDS	LVDS level 1PPS output - negative trace, terminate via 1000hms to +1PPS LVDS
4	+1PPS LVDS	LVDS level 1PPS output - positive trace or CMOS 1PPS output option
5	GND	GND
6	-10MHz LVDS	LVDS 10MHz output - negative trace, terminate via 1000hms to +10MHz LVDS
7	+10MHz LVDS	LVDS level 10MHz output - positive trace or CMOS 10MHz output option
8	GND	GND
9	GND	GND
10	TX RS-232	RS-232 level command and control interface transmit trace
11	RX RS-232	RS-232 level command and control interface receive trace
12	ENTER_ISP#	Pull to GND during power-on to enter software update mode. Internally pulled up to 3.3V via 4.7K Ohm resistor. Use open collector to drive this pin
13	1PPS_IN	TTL or CMOS level external 1PPS reference input rising edge aligned. Internally pulled down to GND via 4.7K Ohm resistor
14	GND	GND
15	+12V	+12V Power, +/-5%, <0.6A max during warmup
16	+12V	+12V Power, +/-5%, <0.6A max during warmup

