

## ULN-1100 Ultra Low Noise 100 MHz GPSDO

- ▶ Sine, CMOS, LVDS Outputs
- ▶ -162dBc/Hz Phase Noise Floor
- ▶ Optimized for Up-Conversion to Ka/Ku/K Bands
- ▶ NMEA-0183 SCPI-99 Plug and Play



ULN-1100 is an extremely small Global Positioning System Disciplined Oscillator (GPSDO) that has various 100MHz outputs, as well as several 10MHz outputs, Distribution Amplifiers, and a high-performance 50-channel GPS receiver with -160dBm tracking capability. All outputs are frequency and phase-synchronized to UTC via the GPS system, and thus provide Better-Than-Cesium™ long-term performance. By providing both a 100MHz as well as 10MHz reference in one compact board, the unit is a good fit for Ultra-Low-Phase-Noise up-conversion systems as used in Radar and Satellite communication equipment.

ULN-1100 is backwards fit, and function compatible to the FireFly-IIA GPSDO, and offers higher performance, and additional functionality in the same footprint. The ULN-1100 as a bonus provides special support for airborne applications by providing avionics systems with a 3D-Velocity Vector, Attitude/Tilt information, Speed, Heading, Height (both MSL and GPS Height), Position, Time, Date, Frequency, Time-Stamping, and Health information.

At only 1.5 x 4.0 Inches small, ULN-1100 provides Stratum-1 long-term performance of better than 5 parts per Trillion (5E-012) averaged over 24 hours with various options for temperature range, thermal stability, as well as g-sensitivity, and shock/vibration insensitivity. ULN-1100 has a built-in 100MHz, 2-port distribution amplifier with +13dBm Sine Wave outputs, as well as 10MHz Sine Wave and LVDS outputs. ULN-1100 also available with a Ruggedized, extended temp-range, low-g Oscillator option for demanding applications. For mission-critical applications ULN-1100 provides a direct redundancy feature allowing multiple units to be daisy-chained to each other for increased reliability.

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### Electrical Specifications:

#### Module Specification:

1 PPS Accuracy	±30ns to UTC RMS (1-Sigma) GPS Locked
Frequency Accuracy	Better than ±3E-010 after 1 hours operation with GPS locked
Holdover Stability	<±7us over 24 Hour Period @+25°C (No Motion)
ADEV	1s to 1000s: <5E-11 with GPS lock typical
1 PPS Outputs (OCXO Flywheel Generated)	Three outputs: 5V CMOS, LVDS, and RS-232 level output
10/100MHz Outputs (9 outputs total, 7 @100MHz, 2 at 10MHz)	4x LVDS 100MHz, 2x +7dBm, 1x CMOS, 1x Sine 10MHz, 1x LVDS 10MHz
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, GPS, WAAS, EGNOS, MSAS supported, Galileo ready
Sensitivity	Acquisition -144 dBm, Tracking -160 dBm
GPS TTFF	Cold Start - <45 sec, Warm Start - 1 sec, Hot Start - 1 sec
TTL Alarm Output	GPS Unlock and Hardware Failure indicator
Warm Up Time / Stabilization Time	<10 min at +25°C to 1E-09 Accuracy Typ.
Supply Voltage (Vdd)	11.0V to 16.0V DC Nominal
Power Consumption	< 4W at +25°C with DOCXO
Operating Temperature	-25C to +75C (+85C extended temp range option)
Environmental Conformance	MIL-STD-202, Method 204, Condition I-A
Storage Temperature	-45°C to +85°C

#### Oscillator Specification:

Frequency Output	Both 10MHz, and 100MHz outputs		
10MHz Retrace	±2E-08 After 1 Hour		
Frequency Stability Over Temperature	±2.5E-010 over temperature, low-g option: ±3E-010 per g per axis		
Output Amplitude	100MHz: LVDS, CMOS 5V, +7dBm Sine. For 10MHz: LVDS, +12dBm Sine		
Warm Up Time	< 12 min		
Phase Noise	1Hz -60dBc/Hz	10Hz -95dBc/Hz	100Hz -118dBc/Hz
	1kHz -140dBc/Hz	10kHz -155dBc/Hz	100kHz -160dBz/Hz

#### Also Available:

25 MHz & 10 MHz single oven standard temp.  
 Double oven standard temp.  
 Double oven extended temp.

50 MHz & 10 MHz Single oven standard temp.  
 Double oven standard temp.  
 Double oven extended temp.

100 MHz & 10 MHz Single oven standard temp.  
 Double oven standard temp.  
 Double oven extended temp.

**DESIGNED LIFETIME > 10 YEARS**