

COMPACT GPS CLOCK MODULE

High Performance – Low Cost - Double Oven Option

Ideal for CDMA / TDOA caller locations / TV broadcast

The EPSILON CLOCK 1S provides synchronization solutions with very accurate and stable Time and Frequency signals. The high performances suit a comprehensive range of applications where excellent accuracy is required especially: synchronization of telecom wireline infrastructure, mobile wireless base stations, emitters of digital audio or video broadcast.

The EPSILON CLOCK 1S is synchronized by UTC-GPS reference, broadcast by the GPS satellite constellation all over the world. Time – Receiver Autonomous Integrity Monitoring (T-RAIM) is achieved to discard faulty GPS satellites and then ensures Time integrity.



The EPSILTIME[®] smart predictive slaving algorithm combined with excellent short term stability of the oscillator mitigates the effects of inherent GPS noise and complies to the stringent holdover mode requirements of new standards such as CDMA-3G when GPS reference is lost.

Furthermore, the 10 MHz frequency reference is cycle locked to the 1 pps, meaning that there are always exactly 10 000 000 cycles between 1pps occurrences. This important feature, not performed in many basic designs, is essential in many applications to avoid phase jumps and wander between time and frequency references.

Two optional SMA connectors along with customizable internal module allow a wide range of dedicated versions in terms of performances and functionalities: Software adjustable frequencies for TV broadcast, SDH /E1 synchronization for SSU functionality, 2.048 MHz input for GPS back-up to perform excellent holdover performances, etc.

Main Features

■ ACQUISITION OF TIME REFERENCE

The EPSILON CLOCK 1S includes a GPS C/A code receiver tracking up to 8 satellites on L1 (1 575 MHz) as time reference.

■ FREQUENCY AND TIME KEEPING

The low cost or high performance ovenized oscillator (OCXO) slaved to the GPS input source brings a high level of performance to the EPSILON CLOCK 1S: Frequency and Time accuracies with outstanding phase noise. An optional Double Oven OCXO is proposed for excellent temperature stability and very low aging.

In case of input reference disruption, the high stability oscillator along with the EPSILTIME[®] smart predictive algorithm allows a very efficient Holdover Mode where Time and Frequency accuracies are maintained.

■ FREQUENCY AND TIME DISTRIBUTION

- 1 pps TTL / 50 Ω output.
- 10 MHz sinewave / 50 Ω output.
- Time of Day output.
- AUX1 and AUX2 optional inputs or outputs for a full range of applications (see option description overleaf)

■ CONTROL

Setup, status and alarms are accessible by remote control via a serial interface (RS 232 C).

Alarm : relay contacts.

Status displayed by 2 LEDs.

The antenna cable delay and the choice of time scale (UTC or GPS) are programmable.

EPSILON CLOCK 1S

FREQUENCY OUPUT (10 MHz)	Low Cost OCXO	High Performance OCXO	Double Oven OCXO
Accuracy (Average over 24 hours when GPS locked)	$< \pm 4 \times 10^{-12}$	$< \pm 1.5 \times 10^{-12}$	$< \pm 1 \times 10^{-12}$
Medium term stability (without GPS, constant temperature, after 2 weeks of continuous operation)	1 x 10 ⁻⁹ /day	3 x 10 ⁻¹⁰ /day	5 x 10 ⁻¹¹ /day
Short term stability (Allan Variance) @ 10 ms @ 100 ms and @ 1 s @ 10 s		5 x 10 ⁻¹¹ 1 x 10 ⁻¹¹ 3 x 10 ⁻¹¹	3 x 10 ⁻¹¹ 5 x 10 ⁻¹² 1 x 10 ⁻¹¹
Temperature stability (peak to peak)	5 x 10 ⁻⁸ (from 0 to 65 °C)	3 x 10 ⁻⁹ (from 10 to 30 °C)	2 x 10 ⁻¹⁰ (from 0 to 70 °C)
Phase noise (typical, static conditions) 10 Hz 100 Hz 1 kHz 10 kHz 100 kHz	-115 dBc / Hz -130 dBc / Hz -140 dBc / Hz -145 dBc / Hz -145 dBc / Hz	-120 dBc / Hz -145 dBc / Hz -155 dBc / Hz -160 dBc / Hz -160 dBc / Hz	-120 dBc / Hz -130 dBc / Hz -145 dBc / Hz -145 dBc / Hz -145 dBc / Hz
Signal waveform Typical level Harmonic distortion / duty cycle	1x10MHz, sinewave 5 dBm / 50 Ω (SMA)		1x10MHz, sinewave 3 dBm / 50 Ω (SMA)
TIME OUPUT (1 PPS) Accuracy to UTC, GPS locked	± 100 ns (1σ)	± 25 ns (1σ)	
Holdover mode after 4 hours	30 μs	1 μs	0.4 μs
Holdover mode after 1 day (at constant temperature, after 24 hours of GPS lock)	200 μs	16 μs	4 μs
Signal waveform and level	1 pps TTL / 50 Ω (BNC)		
GPS INPUT/ OUTPUT FOR ANTENNA AMP.	L1 GPS C/A code (TNC) / 5V @ 80mA		
STATUS & REMOTE CONTROL OUTPUTS	Remote control, RS232C serial line (HE501 connector) Alarm, relay contacts (HE501 connector)		
POWER SUPPLY DC supply required	18 – 36V (Mini Mat and Lock connector) (9 – 18 Vdc or 36 – 72Vdc on request)		
Typical power consumption at 25 °C (without options)	6 W	7 W	11 W
Max Power consumption at Warm up (without options)	9 W	10 W	14 W
SIZE	127 x 101 x 44 mm (1U)		127 x 101 x 51 mm
ENVIRONMENT Operating temperature	0°C to + 65°C	0°C to + 55°C	0°C to + 65°C
Storage temperature / Relative humidity CE compliant	- 40°C to + 85°C / 95% RH non condensing EN 300 386 / EN 55022 / EN 60950		

■ OPERATING MODE

- Cold Start-up time: < 20 minutes
- Permanent self-test of main functions
- Status display by 2 x LEDs (GPS locked, Clock status)
- Full remote control by serial port RS 232C

■ OPTIONAL DDS OUTPUTS

- 2 x software adjustable frequencies within the 100 kHz – 50 MHz range (AUX1 and AUX2). Independently programmable with EpsilWin32 Supervision software.

■ OPTIONAL TIME OUTPUTS

- IRIG B, 1PPS, 10 MHz on auxiliary outputs AUX1 and AUX2

■ OPTIONAL SDH / E1 SYNCHRONIZATION

- AUX1: 2.048 MHz or 2.048 Mbit/s input for SSU functionality and for GPS back-up to get excellent holdover performances.
- AUX2: 2.048 MHz or 2.048 Mbit/s output ITU-T G.811 compliant when GPS locked. The same signal is possible on AUX1 if no input required.

■ OPTIONAL ACCESSORIES

- Active GPS antennas and cables
- Lightning protections / On-Line amplifier / Splitters
- EPSILWIN 32 software for remote control / supervision
- AC - DC Power Supply
- Mounting kit 19 "

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