



Epsilon Clock

Model EC2S



- High performance reference clock
- 12 channel reception on L1 (1575 MHz) C/A code
- Continuous Time Integrity Monitoring (T-RAIM)
- Automatic self survey with robust OD fixed mode
- Antenna propagation delay compensation
- 4 x 10 MHz sine wave outputs
- Up to 4 x 1 PPS TTL outputs
- Time of Day output
- Improved holdover mode
- Numerous distribution options
 - 5 MHz outputs
 - IRIG-B or STANAG 4430 (Havequick) outputs
- RoHS Compliant

The Epsilon Clock™ 2S is a high performance GPS clock with OCXO oscillator. The extremely accurate and stable time and frequency signals in a compact stand alone chassis (1U high – 19" wide) suits a comprehensive range of applications where excellent accuracy and stability are required especially for synchronization of telecom wireline infrastructure, mobile wireless base stations, transmitters of digital audio or video broadcast.

An ovenized oscillator (OCXO) slaved to the GPS input source offers outstanding accuracy and phase noise. An optional Double Oven OCXO is available for a very low aging. The oscillator in conjunction with the EpsilTime™ smart predictive slaving algorithm mitigates the effects of inherent GPS noise and complies to the most stringent holdover mode requirements if GPS is lost. Furthermore, the 10 MHz frequency reference is cycle locked to the 1 PPS, meaning that there are always exactly ten million cycles between 1 PPS occurrences. This unique feature is essential to avoid phase jumps and wander between time and frequency references.

In addition to the 1 PPS, 4 x 10 MHz, and time of day outputs, many distribution options are available including 5 MHz, IRIG-B, STANAG 4430 (Havequick), and 3 additional 1 PPS.

Time of day and status is available via the front panel display. Selection of all settings including squelch of frequency outputs, antenna cable delay, choice of time scale (UTC or GPS) are user programmable. Extended status is available via the serial line interface. Optional EpsilWin32 software achieves complete remote control and supervision.



Specifications

Frequency Output (10 MHz)

	OXCXO	Double Oven OXCXO
Accuracy (Average over 24 hours when GPS locked)	$< \pm 2 \times 10^{-12}$	$< \pm 1 \times 10^{-12}$
Medium Term Stability (without GPS, constant temperature, after 2 weeks of continuous operation)	$2 \times 10^{-10}/\text{day}$	$1 \times 10^{-10}/\text{day}$
Short Term Stability (Allan Variance) @ 1s @ 10s & 100s	1×10^{-11} 3×10^{-11}	5×10^{-12} 1×10^{-11}
Temperature Stability (peak to peak)	1×10^{-9} (from 0° to 60°C)	2×10^{-10} (from -5° to 70°C)
Phase Noise (typical, static conditions)	@10 Hz @100 Hz @1 kHz @10 kHz @100 kHz	-120 dBc / Hz -130 dBc / Hz -140 dBc / Hz -145 dBc / Hz -145 dBc / Hz
Signal Waveform Typical Level	4 x 10 MHz, sine wave > 10 dBm / 50 Ω (BNC)	
Harmonic Distortion / Duty Cycle	-20 dBc	

Time Output (1PPS)

Accuracy to UTC (GPS locked)	$\pm 100 \text{ ns } (1\sigma)$	
Holdover Mode After 4 Hours	0.8 μs	0.6 μs
Holdover Mode After 1 Day (at constant temperature, after 24 hours of GPS lock)	12 μs	7 μs
Signal Waveform and Level	1PPS TTL / 50 Ω (BNC)	

Other Inputs/Outputs

GPS Input/ Output For Antenna Amp	L1 GPS C/A code (TNC) / 5 V @ 80 mA
Status and Remote Control Outputs	Remote control and time of day (RS-232C serial lines) Alarm: relay contacts 1 line of 20 characters display (date and time)

Power

Power Supply	AC Supply DC Supply	90 to 256 V/48 to 63 Hz 18 to 32 V
Typical Power Consumption (without options)	<25 W	

Physical

Size: 19" 1 U unit (483 x 340 x 44 mm)

Weight: < 5 kg

Environmental

Operating Temperature: -5° to 60°C

Storage Temperature: -40° to 85°C

Relative Humidity: 95% RH @ 40°C, non condensing

CE Compliance: EN 50082/EN 55022

Safety: EN 60950

RoHS Compliant

Operating Mode

- Cold start-up time: < 20 minutes
- Synchronization and slaving on GPS reference
- Squelch of frequency outputs on set threshold
- Status displayed by LEDs (GPS, Power, PPS)
- Permanent self-test of main functions
- Full remote control by serial port RS-232C
- 1 line / 20 characters display on front panel (Date and time)

Options

- 3 additional 1PPS output module
- 5 MHz references instead of 10 MHz (mixed configuration possible)
- 2x IRIG-B outputs module
- STANAG 4430 (Havequick) output module

Accessories

- Active GPS antennas and cables
- Lightning protections/In-line amplifier/Splitters
- EpsilWin32 software for remote control/supervision