



SPECTRACOM

Synchronizing Critical Operations®

## 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
  - 1 MHz and/or 5 MHz outputs
  - IRIG-B or STANAG 4430 (Havequick) outputs
  - 2048 kHz and 2048 kbit/s (G703/G704) 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 1 or 5 MHz, IRIG-B, STANAG 4430 (Havequick), frequency synthesizer, 2048 kHz and 2048 kbit/s, and 3 additional 1 PPS. An option is available to synchronize to one external 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.

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## SPECIFICATIONS

### FREQUENCY OUTPUT (10 MHz):

	OCXO	Double Oven OCXO
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)	<div>@ 1s</div> <div>@ 10s &amp; 100s</div>	<div><math>5 \times 10^{-12}</math></div> <div><math>1 \times 10^{-11}</math></div>
Temperature Stability (peak to peak)	$1 \times 10^{-9}$ (from 0° to 60°C)	$2 \times 10^{-10}$ (from -5° to 70°C)
Phase Noise: (typical, static conditions)	<div>@10 Hz</div> <div>@100 Hz</div> <div>@1 kHz</div> <div>@10 kHz</div> <div>@100 kHz</div>	<div>-120 dBc / Hz</div> <div>-130 dBc / Hz</div> <div>-140 dBc / Hz</div> <div>-145 dBc / Hz</div> <div>-145 dBc / Hz</div>
Signal Waveform Typical Level	4 x 10 MHz, sine wave > 10 dBm / 50 Ω (BNC)	
Harmonic Distortion / Duty Cycle	-20 dBc	

### TIME OUTPUT (1 PPS):

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	1 PPS TTL / 50 Ω (BNC)	

### OTHER INPUTS/OUTPUTS:

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

### POWER:

Power Supply	<div>AC Supply</div> <div>DC Supply</div>	<div>90 to 265 V / 48 to 63 Hz</div> <div>18 to 32 V</div>
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  
 1 MHz or 5 MHz references instead of 10 MHz (mixed configuration possible)  
 2x IRIG-B outputs module  
 STANAG 4430 (Havequick) output module  
 2x 2048 kHz (G703 § 13) 75 Ω and 1x 2048 kbit/s (G703 § 9/G704) 75 Ω  
 outputs module  
 Frequency synthesizer output module  
 External 1PPS reference input module

## ACCESSORIES

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

4494-D1

Specifications subject to change or improvement without notice.  
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