



# Epsilon Clock

## Model EC3S



- **Very high performance standard**
- **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 1PPS TTL outputs**
- **Time of Day output**
- **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)**
- **Monitoring through keypad and display**

The Epsilon Clock™ 3S is a very high performance GPS clock with compact atomic Rubidium oscillator.

The extremely accurate and stable time and frequency signals in a compact stand alone chassis (2U high – 19" wide) suits a comprehensive range of applications where excellent accuracy and stability are required.

The high performance Rubidium oscillator slaved to the GPS input source offers outstanding accuracy and phase noise. 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 1PPS, meaning that there are always exactly ten million cycles between 1PPS occurrences. This unique feature is essential to avoid phase jumps and wander between time and frequency references.

In addition to the 1PPS, 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 1PPS. An option is available to synchronize to one external 1PPS.

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

## SPECIFICATIONS

### FREQUENCY OUTPUT (10 MHz):

	Double Oven OCXO	High Performance RUBIDIUM
Accuracy (Average over 24 hours when GPS locked, after 3 months of continuous operation)	$< \pm 1 \times 10^{-12}$	$< \pm 1 \times 10^{-12}$
Medium Term Stability (without GPS, constant temperature after 3 months of continuous operation)	$1 \times 10^{-10}/\text{day}$	$< \pm 1 \times 10^{-11}/\text{day}$ $< \pm 3 \times 10^{-11}/\text{month}$
Short Term Stability (Allan Variance)	@10s @100s	$5 \times 10^{-12}$ $1 \times 10^{-11}$
Frequency Retrace within 1h after 24 hours (at constant temperature, gravity, pressure and magnetic field conditions)	$2 \times 10^{-10}$ (from $-5^{\circ}$ to $70^{\circ}\text{C}$ )	$< \pm 5 \times 10^{-11}$
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	$4 \times 10 \text{ MHz}$ , sinewave $> 10 \text{ dBm} / 50 \Omega$ (BNC)	

### TIME OUTPUT (1PPS):

	$\pm 100 \text{ ns}$ ( $1\sigma$ )	
Accuracy to UTC (GPS locked)		
Holdover Mode After 4 Hours	$< 0.6 \mu\text{s}$	$< 0.3 \mu\text{s}$
Holdover Mode After 1 Day (average over 24 hours when GPS locked after 3 months of continuous operation)	$< 7 \mu\text{s}$	$< 2 \mu\text{s}$
Signal Waveform and Level	1PPS TTL / $50 \Omega$ (BNC)	

### OTHER INPUTS/OUTPUTS:

Status, Remote Control Outputs and Display	Remote Control and Time of Day (RS-232C serial lines) Alarm: relay contact User interface by keypad and LCD display 2 lines of 40 characters
GPS Input	L1 GPS C/A code (TNC) / 5 V @ 80 mA

### POWER:

Power Supply	AC Supply DC Supply	90 to 265 V / 48 to 63 Hz 18 to 32 V
Typical Power Consumption (without options)	$< 25 \text{ W}$	$< 60 \text{ W}$

## PHYSICAL

**SIZE** 19" 2U unit (483 x 340 x 88 mm)

**WEIGHT**  $< 7 \text{ kg}$

## ENVIRONMENTAL

**Operating Temperature:**  $-5^{\circ}$  to  $50^{\circ}\text{C}$

**Storage Temperature:**  $-40^{\circ}$  to  $85^{\circ}\text{C}$

**Relative Humidity:** 95% RH @  $40^{\circ}\text{C}$ , non condensing

**CE Compliance:** EN 50082/EN 55022

**Safety:** EN 60950

## 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

## 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 W and 1x 2048 kbit/s (G703 § 9/G704) 75 W  
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

4495-E0

Specifications subject to change or improvement without notice.  
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