

Epsilon Board

Model EBO2



- **GPS Clock OEM module**
- **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**
- **1 PPS TTL output**
- **10 MHz sine wave output**
- **Time of Day output**
- **RoHS Compliant**

The Epsilon Board Model EBO2 provides a fully integrated GPS synchronization solution with very accurate and stable time and frequency signals. Its high performance suits applications where excellent accuracy is required especially for synchronization of telecom wireline infrastructure, mobile wireless base stations, and emitters 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.

Set-up and control of the EBO2 is via a serial interface. Status and alarms are via a TTL interface. Selection of all settings including antenna cable delay and choice of time scale (UTC or GPS) are user programmable. An Epsilon Board Evaluation Kit is available to facilitate development work.

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)	@ 1s	1×10^{-11}
	@ 10s	3×10^{-11}
Temperature Stability (peak to peak)	1×10^{-11} (from 0° to 60°C)	2×10^{-10} (from -5° to 70°C)
Phase Noise (typical, static conditions)	@10 Hz	-120 dBc / Hz
	@100 Hz	-130 dBc / Hz
	@1 kHz	-140 dBc / Hz
	@10 kHz	-145 dBc / Hz
	@100 kHz	-145 dBc / Hz
Signal Wave Form Typical Level	1 x 10 MHz, sinewave 5dBm / 50 Ω (MCX)	
Harmonic Distortion / Duty Cycle	-40dBc	

TIME OUTPUT (1 PPS):

	OCXO	Double Oven OCXO
Accuracy to UTC (GPS locked)	$\pm 100 \text{ ns (1}\sigma\text{)}$	
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 (MCX)	

OTHER INPUTS/OUTPUTS:

	OCXO	Double Oven OCXO
GPS Input	GPS Antenna Connector (MCX)	
Status and Remote Control Outputs	TTL serial line (HE-1302 connector)	

POWER:

	OCXO	Double Oven OCXO
Power Supply (DC supply required)	+ 5 V (± 0.5 V) + 12 V (± 1 V)	+ 5 V (± 0.5 V) + 12 V (± 0.6 V)
Typical Power Consumption at 25° C (without options)	5 V / 500 mA & 12 V / 300 mA	5 V / 500 mA & 12 V / 350 mA
Max Power Consumption at Warm Up (without options)	5 V / 500 mA & 12 V / 500 mA	5 V / 500 mA & 12 V / 800 mA

PHYSICAL

Size: 150 x 60 x 26 mm
Weight: 150 g (OCXO); 180 g (Double Oven OCXO)

ENVIRONMENTAL

Operating Temperature: -5° to 60°C (OCXO); -5° to 70°C (Double Oven OCXO)
Storage Temperature: -40° to 80°C
Relative Humidity: 95% RH @ 40°C, non condensing
RoHS Compliant

OPERATING MODE

Cold start-up time: < 20 minutes
Synchronization and slaving on GPS reference
Permanent self-test of main functions
Status (GPS locked, b/w failure) available via TTL output
Full remote control by TTL serial line

ACCESSORIES

Active GPS antennas and cables
Lightning protections / In-Line amplifiers / Splitters
Evaluation Kit: Adapter board, connectors EpsilWin32 software
for remote control/supervision