



Epsilon Board

Model EBO3



- **GPS Clock OEM module**
- **Variety of external references**
 - **GPS 12 channels reception on L1 (1575 MHz) C/A code**
 - **1PPS input**
 - **10 MHz input**
 - **NMEA standard ToD via RS-232**
- **1PPS TTL output**
- **10 MHz sine wave output**
- **NMEA/Time of Day output**
- **RoHS Compliant**

The Epsilon Board Model EBO3 provides synchronization solutions with very accurate and stable time and frequency signals. The high performance and the optimized architecture are well-suited for transmitter synchronization of Digital Broadcast (DVB-T, DVB-H, DVB-SH, T-DMB, MediaFLO, DAB or DRM) in SFN modes, or wireless synchronization of BTS (CDMA, TD-SCDMA).

Epsilon Board Model EBO3 is mechanically and electrically compatible with the Epsilon Board Model EBO2, allowing a smooth transition for those who have already integrated the EBO2 in their design. The EBO3 can also be provided without a GPS receiver (MFN modes), using an external 1PPS or other references.

An ovenized oscillator (OCXO) slaved to the input source offers outstanding accuracy and phase noise. The smart EpsilTime™ Kalman based algorithm allows intelligent input signal filtering and provides real adaptability to the quality of the active input reference (GPS, external pps, etc.). In case of total input reference disruption, the highly stable oscillator allows a very efficient holdover mode where Time (SFN) and Frequency (MFN & SFN) accuracies are maintained.

Setup, status and alarms are accessible via 10 Base-T Ethernet interface, through embedded SNMP protocol and/or web server. The antenna cable delay and the choice of time scale (UTC or GPS) are programmable.

Specifications

Frequency Output (10 MHz)

	Broadband Applications WiMax	Broadcast Applications DVB-T, DVB-H, T-DMB
Accuracy: with GPS (average over 24 hours when GPS locked)	$< \pm 2 \times 10^{-12}$	$< \pm 1 \times 10^{-12}$
Accuracy: without GPS	$< \pm 5$ Hz	$< \pm 2$ Hz
Medium Term Stability (without input reference, constant temperature, after 2 weeks of continuous operation locked on input source)	1×10^9 /day	2×10^{10} /day
Short Term Stability (Allan Variance) @ 1s @ 10s & 100s	1×10^{-10} 3×10^{-10}	1×10^{-11} 3×10^{-11}
Temperature Stability (peak to peak)	1×10^8 (from 0° to 60°C)	1×10^9 (from -5° to 70°C)
Phase Noise (typical, static conditions) @ 10 Hz @ 100 Hz @ 1 kHz @ 10 kHz @ 100 kHz	-120 dBc / Hz -135 dBc / Hz -145 dBc / Hz -145 dBc / Hz -145 dBc / Hz	
Signal Waveform Typical Level	Sine Wave 4 dBm \pm 1.5 dB / 50 Ω (MCX)	
Harmonic Distortion	-40 dBc	

Time Output (1PPS)

	± 50 ns (1 σ)	± 25 ns (1 σ)
Accuracy to UTC (GPS locked)		
Holdover Mode After 4 Hours	3 μ s	0.8 μ s
Holdover Mode After 1 Day (at constant temperature, after 24 hours of GPS lock)	60 μ s	12 μ s
Signal Waveform and Level	TTL / 50 Ω (MCX)	

Other Inputs/Outputs

Datation Output (NMEA 0183 Message)	TTL serial line (HE-1302 connector)
Status and Remote Control Outputs	Local control: TTL serial line (HE-1302 connector) Remote Control: IP access, through any web browser with password protection Manageable through SNMP

Input Sources

GPS (active antenna)	(MCX) 5 V supply
1PPS	TTL / 50 Ω (HE-1302 connector)
10 MHz	10 to 30 dBm / 50 Ω (HE-1302 connector)
NMEA 0183	TTL serial line (HE-1302 connector)

Power

Power Supply (DC supply required)	+5 V , +12 V
Typical Power Consumption at 25° C	5 V / 500 mA & 12 V / 300 mA
Max Power Consumption at Warm Up	5 V / 500 mA & 12 V / 500 mA

Physical

Size: 150 x 60 x 26 mm

Weight: 150 g

Environmental

Operating Temperature: -5° to 60°C

Storage Temperature: -40° to 85°C

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

RoHS Compliant

Operating Mode

- **Cold start-up time:** < 20 minutes
- **Hot start-up time:** < 5 minutes
- Permanent self-test of main functions

Accessories

- Active GPS antennas and cables
- Lightning protections/In-line amplifier/Splitters