Epsilon Clock

Model EC20S

- High-Performance GPS/GALILEO/GLONASS clock
- 32-channel multi-GNSS receiver
- High time and frequency accuracy, even if GNSS is lost
- Low phase noise oscillators
- 1PPS/NMEA External Reference
- High output port density:
  - *Up to 10 x 1 PPS TTL outputs*
  - *Up to 10 x 10 MHz sine wave, low phase noise outputs*
- Network management based on Web User Interface and SNMP
- NTP Stratum 1 support & NMEA Time Code RS232 Output

High-Performance GPS/GALILEO/GLONASS Clock Designed to Exceed Digital TV, Digital Radio, 4G Base Stations, Satcom Time and Frequency Synchronization Requirements

The Epsilon Clock Model EC20S provides accurate and stable time and frequency signals for your high-performance synchronization application. The unit's optimized architecture is well-suited to transmitter synchronization of digital broadcast signals (DVB-T/T2, T-DMB, DAB or DRM) in Single Frequency Networks (SFN) modes: The high port density allows to synchronize up to 10 emitters simultaneously on the same site.

It is also ideal for 4G or 4G advanced base stations synchronization, because it meets stringent requirements for absolute time accuracy as well as frequency stability.

Now, using a recent GNSS receiver, Epsilon Clock Model EC20S can receive GPS and/or Galileo and Glonass satellites, which increases the probability of having the right number of satellites in view, and decreases the probability of being jammed. This receiver also includes Timing Receiver Autonomous Integrity Monitoring (T-RAIM) to help preventing spoofing.

The EC20S is available either with an OCXO (oven-controlled quartz oscillator) or Rubidium (atomic clock) internal timebase, so it can maintain its timescale as close as possible to UTC, even during GNSS shortage (holdover capability). It supports a 1PPS reference from an external source to discipline the internal oscillator if GNSS reception is lost.

It provides extensive network management functions, including status monitoring, configuration, software update, event log, alarms management. These functions are accessible via a web user interface (manual operation) and via SNMP (automated operations through a network management system). EC20S embeds a simple NTP v3/v4 server to provide timing to network devices.

Thanks to the combination of Epsilon Clock EC20S and Epsilon SAS17E or SAS36E, it is possible to build high reliability, redundant synchronization architectures, with even more time and frequency outputs, while keeping network management consistency between EC20S and SAS17/36E.

Specifications

Frequency Output (10 MHz)

		OCXO	Rubidium
Accuracy (average over 24 hours when GPS locked)		$< \pm 2 \times 10^{-12}$	$< \pm 1 \times 10^{-12}$
Medium Term Stability (without GPS, content temperature, after 2 weeks of continuous operation)		2×10^{-10}/day	5×10^{-11}/month
Short Term Stability (Allan Variance)	@1s @10s @100s	1×10^{-11} 3×10^{-11} 3×10^{-11}	3×10^{-11} 1×10^{-11} 3×10^{-12}
Temperature Stability (peak to peak)		1×10^{-9} (from 0° to 60°C)	1×10^{-10} (from 0° to 50°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 -150 dBc / Hz -150 dBc / Hz	-110 dBc / Hz -130 dBc / Hz -140 dBc / Hz -145 dBc / Hz -145 dBc / Hz
Signal Waveform (typical level)		7 X 10 MHz, Sine Wave, > 12 dBm ± 2 dB / 50 Ω (BNC)	
Harmonic Distortion Spurious		-40 dBc -60 dBc	

Time Output (1PPS)

Accuracy to UTC (at constant temperature, after 24 hours of GPS lock) Measured over 24 hours.	± 25 ns (1σ)	
Holdover Mode After 4 Hours (at constant temperature, after 24 hours of GPS lock)	0.8 μs	0.3 μs
Holdover Mode After 1 Day (at constant temperature, after 24 hours of GPS lock)	10 μs	2 μs
Signal Waveform and Level	7 X 1PPS / 50 Ω, (BNC)	

Other Inputs/Outputs

GPS Input/ Output For Antenna	L1 GPS C/A code / 5V @ 80 mA (N)
1PPS External Reference	TTL / 50 Ω (BNC)
Time Code - Input/Output	NMEA 0183, RS232
NTP Output	Stratum 1 time stamp over Ethernet 10/100 Base-T (RJ45)
Management Port	Ethernet w/wo Base-T (RJ45)

Power

Power Supply	AC Supply DC Supply	100 to 240 V / 48 to 63 Hz (CEE22) ± 24 to 48 VDC (XLR)	
Typical Power Consumption (without options)		20W	30W
Max Power Consumption at warmup		25W	50W

GNSS Receiver
- 32 channels GPS L1 - GALILEO E1 - GLONASS L1
- T-RAIM
- GNSS antenna DC powered by receiver

Physical
Size: 19" 1U unit (483 x 340 x 44 mm)
Weight: < 5 kg

Environmental
Operating Temperature: -5° to 60°C (OCXO), -5° to 50°C (Rubidium)
Storage Temperature: -40° to 85°C
Relative Humidity: 95% RH @ 40°C, non-condensing

Agency Approvals
- CE Mark:
  - Safety: EN 60950-1
  - EMC : EN61000-6-2, EN61000-6-3
- FCC Part 15 class A
- RoHS, WEEE

Operating Mode
- Cold start-up time < 20 minutes
- Hot start-up time < 5 minutes
- Permanent self-test of main functions
- Status, configuration, alarms via web user interface (http) & SNMP (v1, v2)
- Status through front panel LEDs
- Relay alarm on back panel
- Conditional mute of outputs

Ordering information
EC20S-XO: Epsilon Clock EC20S with OCXO
EC20S-Rb: Epsilon Clock EC20S with Rubidium
EC20S-XO-O1: Epsilon Clock EC20S with OCXO and 3 additional 1PPS outputs
EC20S-XO-O2: Epsilon Clock EC20S with OCXO and 3 additional 10 MHz outputs
EC20S-XO-O3: Epsilon Clock EC20S with OCXO and 3 additional 1PPS & 10 MHz outputs
8230: 40 dB active GNSS antenna with mounting kit (a GNSS antenna is required for GLONASS & GALILEO reception)
EC-PK3: GPS antenna pack for EC20S, includes GPS antenna + post-mount kit, lightning protection, 10 m RG58 cable, 25 m RG213 cable