OSA 3350 ePRC+

Optical Cesium Atomic Clock

An increasing number of networks and applications need to be precisely synchronized. Inaccurate timing can cause poor performance or even outages of complete systems. While GNSS provides excellent accuracy, satellite-based timing suffers from vulnerabilities such as jamming and spoofing and so cannot be relied on as the only synchronization technology. With their high levels of accuracy and outstanding availability, atomic clocks provide the ideal backup for GNSS

Our OSA 3350 is the first commercial optical cesium atomic clock specifically designed for ePRC applications that require excellent holdover . It enables highly stable synchronization over an extended lifetime. Thanks to its advanced optical cesium technology, it provides much higher accuracy, longer lifetime and a more robust design than legacy magnetic cesium clocks. resolving GNSS dependency for 4G and 5G networks.

FEATURES

- **Both short and long-term stability superior over magnetic cesium**
- **Outperform ITU-T G.811.1 ePRC specification**
- **Optical cesium improves efficiency in utilizing Cs atoms**
- **No compromise between lifetime and performance**
- **Higher performance operation within tight specifications over 10 rather than 5 years**

Applications

- Highly accurate and stable frequency source as per PRC G811 / ePRC G811.1
- ePRC/ePRTC solutions for communication networks, in combination with satellite-based timing and grandmasters
- Replacement of magnetic cesium clocks for higher accuracy and longer lifetime
- Highly stable back-up to GNSS in cloud data centers and with power utilities
- Cloud service providers, enterprises, governments and defense organizations benefit from highest precision and an extended lifetime

Key Benefits

- **Ultra-high stability and long lifetime -** Higher frequency stability and two times longer lifetime compared to legacy magnetic cesium atomic clocks
- **Unique innovation** - First commercial ePRC product utilizing optical technology for highly efficient utilization of cesium atoms
- **Compact design -** Compact and robust design for applications in the cloud, core networks and on enterprise sites
- **Technology leadership** - From the only company with proven, longstanding expertise in both synchronization and optical solutions

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Specifications

Frequency Accuracy and Settability

Frequency accuracy at factory	≤ +/- $5x10^{-13}$
Frequency reproducibility after power cycle	≤ +/- $1x10^{-13}$
Frequency settability resolution:	+/-$1x10^{-15}$
Frequency settability range:	+/- $1x10^{-9}$

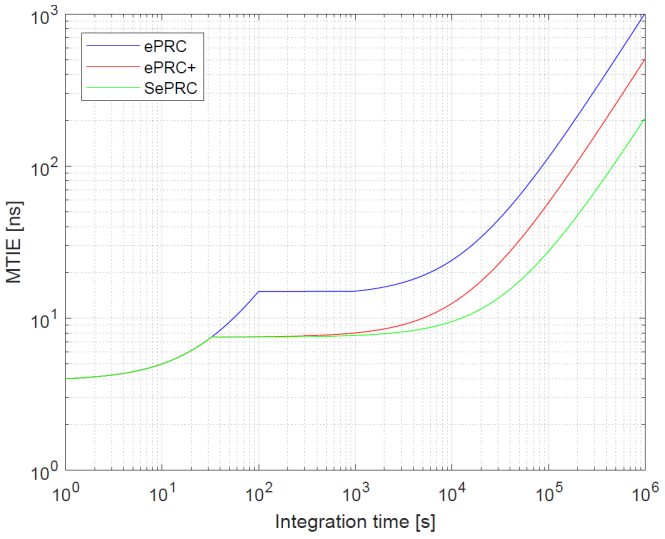
Stability of Frequency Outputs Outperforming ITU-T

The OSA 3350 is exceeding the G.811.1 ePRC specification and when combined with OSA ePRTC solution can provide holdover

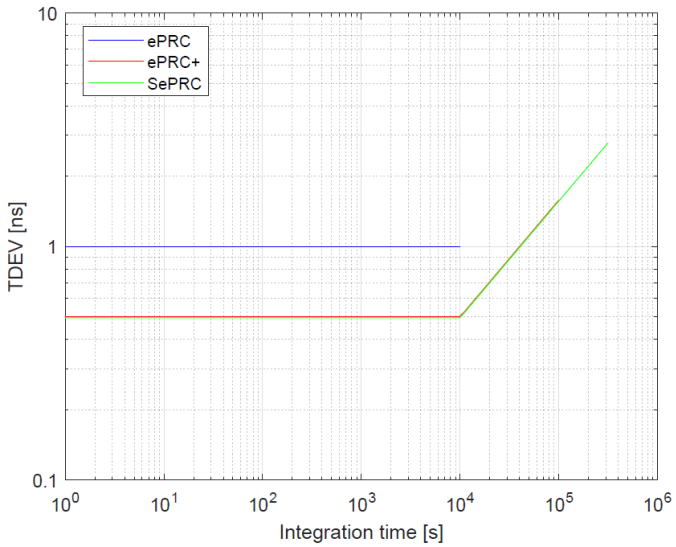
100nsec over min 25 days (guaranteed) with ePRC+ (typical 30 days)

100nsec over min 45 days (guaranteed) with SePRC (typical 55 days)

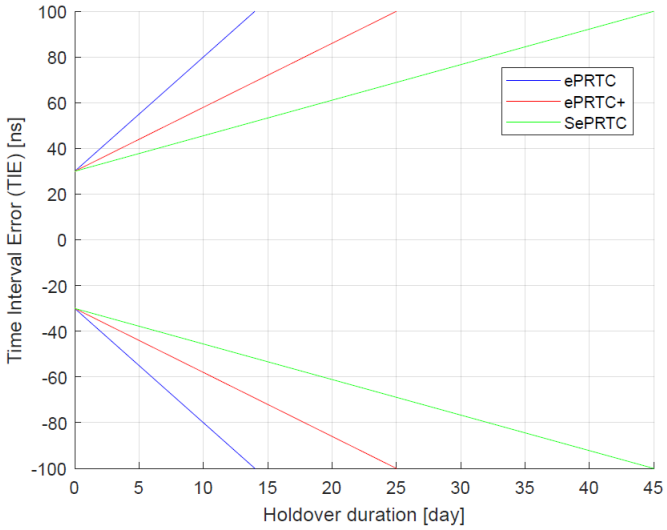
G.811.1 MTIE ePRC vs OSA ePRC+ vs OSA SePRC:



G.811.1 TDEV ePRC vs OSA ePRC+ vs OSA SePRC:



G.8272.1 ePRTC holdover vs OSA ePRTC+ holdover vs OSA SePRTC holdover (guaranteed values):



Short-Term Stability (Frequency Outputs), Standard Allan Deviation

Tau(τ)	ePRC+	SePRC
1s	≤$5x10^{-12}$	≤$5x10^{-12}$
10s	≤$3.5x10^{-12}$	≤$3.5x10^{-12}$
100s	≤$8.5x10^{-13}$	≤$8.5x10^{-13}$
1,000s	≤$2.7x10^{-13}$	≤$2.7x10^{-13}$
10,000s	≤$8.5x10^{-14}$	≤$8.5x10^{-14}$
100,000s	≤$2.7x10^{-14}$	≤$2.7x10^{-14}$
14 days	≤$1x10^{-14}$	≤$1x10^{-14}$
Floor (guaranteed)	NA	≤$1x10^{-14}$
Floor (typical)	NA	≤$5x10^{-15}$

Warm-Up Time

30 minutes @ 25°C

Telecom BITS Outputs

Number of BITS outputs:	4
Signal type:	E1 or T1
SSM support:	Yes
Connectors:	2 x BNC for E1 and T1 2 x RJ-48 for E1 and T1
Impedance:	120Ω for RJ-48 75Ω for BNC

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Specifications

Analog Frequency Outputs

Number of analog outputs:	2
Frequency:	5MHz and 10MHz
Signal format:	sine wave
Connector:	BNC
Load impedance:	50Ω +/- 5%
Amplitude:	>10dBm min., 13dBm typical
Harmonics:	≤ -40dBc
Non harmonics (spurious):	≤ -70dBc

SBB Phase noise	5 MHz	10MHz output
1Hz	-95 dBc/Hz	-90 dBc/Hz
10Hz	-125 dBc/Hz	-120 dBc/Hz
100Hz	-140 dBc/Hz	-135 dBc/Hz
1.000Hz	-150 dBc/Hz	-145 dBc/Hz
10.000Hz	-150 dBc/Hz	-145 dBc/Hz
100.000Hz	-150 dBc/Hz	-145 dBc/Hz

Digital Frequency Outputs

No. of digital frequency outputs:	1
Signal format:	square wave
Frequency:	2.048MHz, 1.544MHz, 1MHz, 5MHz,10MHz, 25MHz,50MHz,100KHz
Connector:	SMA
Amplitude:	< 2.5VPP @ 50Ω load

1 PPS Outputs

Number of 1PPS outputs:	4
Frequency:	1 Hz
Connector:	BNC/F
Signal format:	square LVCMOS
Load impedance:	50Ω
Amplitude:	2.5 Vpp with 50Ω load
Jitter:	≤1ns RMS
Rising edge:	≤5ns (10% to 90%)
Output shape:	Square
Output timing signal significant slope:	Positive
Pulse width:	100 µs

Timing Synchronization Input 1PPS

Number of 1PPS input:	1
Frequency:	1Hz
Connector:	BNC/F
Signal format:	Square LVCMOS
Load impedance:	50Ω or 1MΩ (programmable)
Amplitude:	min. 2.5V; max. 5V
Pulse width:	100ns-100µs
Input timing signal significant slope:	positive or negative (programmable)

Synchronization of 1PPS Timing Outputs

Synchronisation range:	+/- 500µs
One shot external sync resolution (sync on 1PPS Input)	≤ ± 10 ns Manual phase adjustment of 1PPS outputs 4 outputs adjustable independently
Resolution of manual adjustment:	1 ns

Power

Number of power supply modules:	2
	Fully redundant power blocks
	Hot swappable
	Automatic switching
Option 1	
	AC 110-240V, C15 connector
	Range 88V up to 264V
	Range 45Hz up to 65Hz
Option 2	
	DC +24V (range 18V up to 30V)
Option 3	
	DC-48V (accepted range -36V up to -72V)
Power consumption steady state @ 25°C	≤60W
Power consumption at warm-up	≤90W

Environmental

Operating temperature:	10°C - +50°C
Non-operating temperature:	-40°C - +70°C
Operating relative humidity:	10% - 90% non condensing
Operating DC magnetic field:	0 Gauss to 2 Gauss any direction
Random vibration/storage/transportation/drop	IEC 60068-2 Basis ETSI EN 300019-2 test specification T1.1
environmental class 1.1	Basis ETSI EN 300019-2 test specification T2.2
environmental class 2.2	
Altitude (storage):	0 -15,000 m
Safety:	IEC 62368-1
EMC and ESD	EN 55032, CISPR 32, 47 CFR, Part 15, Subpart B ICES-003 issue 7 EN 55035, CISPR 35 CISPR 35:2016 EN 61326-1, IEC 61326 CE and UL compliant
RoHS	10/10

Compliant with directive 2011/65/EU of the European Parliament and Commission Delegated Directive (EU) 2015/863

Mechanical

Table top or rack mountable 19”

Width/with rack ears:	450mm/482.6mm (17.72”/19”)
Depth:	510mm (20.0787”)
Height:	132mm (5.25”)
Weight:	20kg (44 lbs.)

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