

# OSA 3350

Optical pumping cesium clock with outstanding frequency stability



5G Mobile



Telecom



Defense



Data center



Smart grid



Transportation



Financial



Broadcast

## Benefits

- **Ultra-high stability and 10-year warranty**  
Higher frequency stability and double the lifespan of legacy magnetic cesium atomic clocks
- **Unique innovation**  
First commercial ePRC product utilizing optical pumping technology for highly efficient utilization of cesium atoms
- **Compact design**  
Compact and robust design, ideal for cloud, core network and enterprise site applications
- **Technology leadership**  
From the only company with proven, long-standing expertise in both synchronization and optical solutions
- **RoHS-compliant**  
Fully compliant with latest RoHS standards for highest levels of environmental sustainability
- **Remote and secure management**  
Featuring SNMPv3 support, fully integrated with Adtran's Mosaic Controller management system for enhanced security

## Overview

**Increasing precision demands and GNSS vulnerabilities are driving the urgent need for secure, reliable synchronization.** Inaccurate timing can cause poor performance or even outages of complete systems. With their high levels of stability and accuracy and outstanding availability, atomic clocks provide the ideal backup for GNSS. Industry-first OSA 3350 ePRC optical cesium clock devices leverage unique, state-of-the-art optical pumping technology to meet evolving demands across applications from scientific research to critical PNT infrastructure. The OSA 3350 is specifically designed to enhance holdover capabilities for PNT services.

OSA 3350 family redefines the capabilities of ePRTC, unlocking new possibilities in their respective domains by maintaining up to 100 nanoseconds of precision for 100 days. They provide continuous, accurate timing even in environments without GNSS, and ensure reliable synchronization for critical infrastructure and communication systems around the world. Our OSA 3350 enables the deployment of ePRC solutions, which outperform even the most stringent recommendations. What's more, complementing satellite-based synchronization solutions with ultra-stable atomic clocks ensures the highest levels of availability. Combined with a highly scalable grandmaster such as our OSA 5430 or 5440 series and the OSA ePRC solution, comply with G.8272.1 ePRC parametric holdover, our OSA 3350 enables a market-leading, resolving GNSS dependency for 4G and 5G networks.



Oscilloquartz super aPNT+™ holdover cesium clock

# OSA 3350

## High-level technical specifications

### Highest stability and accuracy

- Both short- and long-term stability superior over magnetic cesium
- Outperform ITU-T G.811.1 ePRC specification

### Longest lifetime

- 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

### Wide range of interfaces

- Four BITS outputs
- Four 1PPS outputs
- Two analog outputs
- One 1PPS input

### Robust design

- Improving established cesium atomic clock design practices
- Reusing unique cesium tube assembly competence
- Operating critical components outside vacuum tube
- Fully redundant and hotswappable PSUs

### Modular design

- Standard 3RU shelf for both ETSI and 19" rack mounting
- Wide range of synchronization input and output interfaces
- Easy integration with grandmaster in ePRC/ePRTC applications

### Common management

- Native support for remote and secured management
- Common Ensemble management suite for synchronization and transport networks
- Supporting SNMP v3 for ease of integration into third-party NMS

## Applications in your network

### ePRC and ePRTC for communication and cloud service providers, power utilities, enterprises and governments

- Highly accurate and stable frequency source as per PRC G.811 / ePRC G.811.1
- 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



# OSA 3350

## Product specifications

### Frequency accuracy and settability

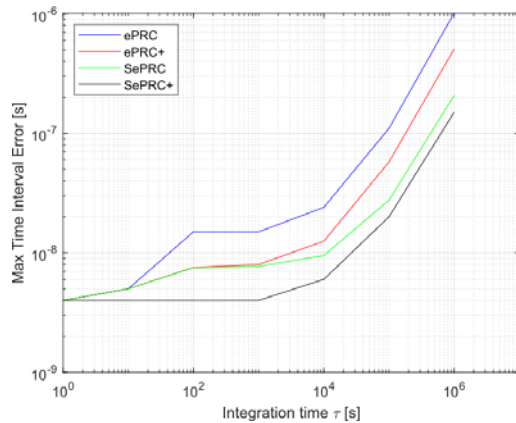
- Frequency accuracy at factory  $\leq \pm 5 \times 10^{-13}$
- Frequency reproducibility after power cycle  $\leq \pm 1 \times 10^{-13}$
- Frequency settability resolution:  $\pm 1 \times 10^{-15}$
- Frequency settability range:  $\pm 1 \times 10^{-9}$

### Stability of frequency outputs outperforming ITU-T

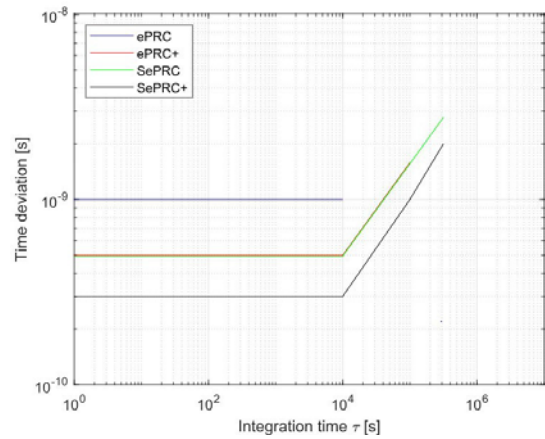
- All variants - OSA 3350 exceeding the G.811.1 ePRC specification and when combined with OSA ePRTC solution comply with G.8272.1 ePRTC (Parametric Holdover)
- Additionally, max holdover performance
  - 100nsec over 40/60 days (guaranteed / typical) with ePRC+
  - 100nsec over 55/90 days (guaranteed / typical) with SePRC
  - 100nsec over 100/150 days (guaranteed / typical) with SePRC+

Note: The tracking period for maximum holdover may vary

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



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



### Short-term stability (frequency outputs), Standard Allan Deviation

Tau( $\tau$ )	ePRC+	SePRC	SePRC+
1s	$\leq 5 \times 10^{-12}$	$\leq 5 \times 10^{-12}$	$\leq 3 \times 10^{-12}$
10s	$\leq 3.5 \times 10^{-12}$	$\leq 3.5 \times 10^{-12}$	$\leq 1.5 \times 10^{-12}$
100s	$\leq 8.5 \times 10^{-13}$	$\leq 8.5 \times 10^{-13}$	$\leq 4.5 \times 10^{-13}$
1,000s	$\leq 2.7 \times 10^{-13}$	$\leq 2.7 \times 10^{-13}$	$\leq 1.5 \times 10^{-13}$
10,000s	$\leq 8.5 \times 10^{-14}$	$\leq 8.5 \times 10^{-14}$	$\leq 4.5 \times 10^{-14}$
100,000s	$\leq 2.7 \times 10^{-14}$	$\leq 2.7 \times 10^{-14}$	$\leq 1.5 \times 10^{-14}$
14 days	$\leq 1 \times 10^{-14}$	$\leq 1 \times 10^{-14}$	$\leq 8 \times 10^{-15}$
Floor (guaranteed)	NA	$\leq 1 \times 10^{-14}$	$\leq 8 \times 10^{-15}$
Floor (typical)	NA	$\leq 5 \times 10^{-15}$	$\leq 5 \times 10^{-15}$

# OSA 3350

## Warm-up time

- 30 minutes @ 25°C (Typical)

## Telecom BITS outputs

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

## Analog frequency outputs

- Number of analog outputs: 2
- Frequency: 5MHz and 10MHz
- Signal format: sine wave
- Connector: BNC
- Load impedance: 50Ω +/- 5%
- Amplitude: 13dBm +/- 1dBm
- Harmonics:  $\leq -40$ dBc
- Non harmonics (spurious)  $\leq -70$ dBc

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

- Number 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

## Timing digital outputs 1PPS

- Number of 1PPS outputs: 4
- Frequency: 1 Hz
- Connector: BNC/F
- Signal format: pulse LVCMOS
- Load impedance: 50Ω
- Amplitude: 2.5 Vpp with 50Ω load
- Jitter  $\leq 1$ ns RMS
- Rising edge  $\leq 5$ ns (10% to 90%)
- Output shape: pulse

- 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: pulse 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)

## Synchronisation of 1PPS timing outputs

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

## Power supply

- 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  $\leq 50$ W
- Power consumption at warm-up  $\leq 90$ W

# OSA 3350

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## Environment

- 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
  - Comply 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
- Depth: 510mm
- Height: 132mm
- Weight: 20kg

## Management features

### Status LED

- 3x (ALARM-STATUS-POWER)
- On the front panel (management card)

### Alarm relay

- Alarm relay: 3
- Maximum rating: U= 50 VDC, I = 250 mA
- connector: SUB-D 9/F
- On the front panel (management card)

## Local management port

- RS-232C
- Connector: SUB-D9/M
- Port Configuration: Baudrate 115200 bps
- Port Configuration: 8 databits, 1 StopBit
- Port Configuration: No Parity, No Handshake
- Management commands: CLI
- Management software: Windows GUI

## Remote management port

- Remote management port: Ethernet – TCP-IP Connector: RJ45
- Management commands: SNMP v3 (including authentication and encryption)
- Management software: Mosaic Network Controller and Sync Director
- Syslog: alarm log, audit log, security log and clock data

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