

Oscilloquartz coreSync™

OSA 3300

Industry-first high-performance optical pumping cesium clock



Science



Metrology



Research



Ground station



Time scale

Benefits

- **Ultra-high stability and longevity**
Offers a 10-year warranty with superior frequency stability and twice the lifespan of traditional magnetic cesium atomic clocks
- **Unique innovation**
First commercial cesium atomic clock utilizing optical pumping technology for high-performance applications
- **Compact and modern design**
Features an intuitive LCD touch screen and Ethernet connectivity for simplified local and remote configuration
- **Proven physics**
Build on and improves well established and widely deployed magnetic cesium atomic clock technology
- **Technology leadership**
Only company with a long history of expertise in both synchronization and photonic solutions, pioneering optical pumping cesium technology
- **RoHS-compliant** Fully compliant with the latest RoHS standard and strict EU demands
- **Secure and remote management**
Featuring SNMPv3 support, fully integrated with Adtran's Ensemble Controller management system for enhanced security

Overview

In critical applications – from metrology labs to satellite navigation and communication – an ultra-stable and precise frequency source is essential. Enhanced accuracy and stability underpin scientific research and enable precise calibrations and experiments in various technical fields. They ensure reliable results that set new benchmarks and drive innovation. Atomic clocks, with their combination of high accuracy and outstanding availability, perfectly complement Global Navigation Satellite Systems (GNSS). Introducing the OSA 3300 SHP: this high-performance atomic clock offers exceptional timekeeping with nanosecond precision, making it indispensable for metrology institutes and scientific research, thanks to its unmatched long-term accuracy.

Our OSA 3300 SHP is the industry's first commercial optical cesium atomic clock for high-performance applications. It enables highly precise synchronization over an extended lifetime for demanding applications in metrology, timekeeping labs, and other areas requiring high accuracy. This makes it crucial for ensuring the integrity of mission-critical networks and supporting vital infrastructure and defense operations with reliable backup timing. Its advanced optical cesium technology offers significantly higher accuracy and stability, a longer lifespan, and a more robust design compared to legacy magnetic cesium clocks. Additionally, its compact and portable design allows for use in multiple applications, even in space-constrained environments.



Front view



Rear view

Metrology cesium clock

OSA 3300

High-level technical specifications

Optical pumping benefits

- No magnetic selection; optical preparation of atoms instead
- 100 times more atoms can be measured
- 10 times higher clock stability
- Simpler mechanical design
- Higher product reliability

Longest lifetime

- Optical cesium has much higher efficiency in utilizing cesium atoms
- Double lifetime compared with legacy magnetic cesium clocks
- No compromise between lifetime and performance

Highest accuracy

- Superior short-term and long-term stability compared to magnetic cesium clocks
- Tenfold accuracy improvement over 10 years

Robust design

- Building on our longstanding and field-proven competence with magnetic clock and photonic technology
- Reusing unique cesium tube assembly competence
- Operating critical components outside vacuum tube

Modular design

- 3RU 19" rack-mounting shelf
- Hot-swappable power supplies and battery modules
- Wide range of synchronization input and ultra-low noise output interfaces

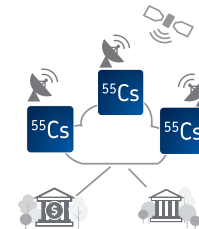
Common management

- Easy to use with automated startup and an intuitive menu with touch screen
- Remote (IP) and local (RS232) management via Windows GUI
- Simple integration with any host infrastructure

Applications in your network

Metrology, time keeping institutes and science labs

- Highly stable and low noise frequency outputs
- Ideal for contributing to national time scales for much higher accuracy and stability in applications such as GPS/GNSS-backup-as-a-service (GBaaS)



Defense communication and space navigation

- Superior short-term stability to improve precision of navigation
- Longer holdover for frequency and time keeping thanks to superior long-term stability
- Superior short-term stability of frequency outputs with low phase noise for ultra-stable carrier frequency in communication applications



Product specifications

Frequency accuracy

- Frequency accuracy: $\leq \pm 5 \times 10^{-13}$
- Frequency reproducibility after power cycle $\leq \pm 1 \times 10^{-13}$

Frequency offset adjustments

- Resolution: $\pm 1 \times 10^{-15}$
- Range: $\pm 1 \times 10^{-9}$

Frequency stability versus magnetic field

- Versus ± 1 Gauss: $\leq \pm 10^{-13}$

Short-term stability (frequency outputs), Allan Deviation

Tau(T)	HP/10Y	SHP/10Y
1s	$\leq 5 \times 10^{-12}$	$\leq 3 \times 10^{-12}$
10s	$\leq 3.5 \times 10^{-12}$	$\leq 1.5 \times 10^{-12}$
100s	$\leq 8.5 \times 10^{-13}$	$\leq 4.5 \times 10^{-13}$
1,000s	$\leq 2.7 \times 10^{-13}$	$\leq 1.5 \times 10^{-13}$
10,000s	$\leq 8.5 \times 10^{-14}$	$\leq 4.5 \times 10^{-14}$
100,000s	$\leq 2.7 \times 10^{-14}$	$\leq 1.5 \times 10^{-14}$
10 days	$\leq 1 \times 10^{-14}$	$\leq 8 \times 10^{-15}$
30 days	$\leq 1 \times 10^{-14}$	$\leq 8 \times 10^{-15}$
Floor (guaranteed)	$\leq 1 \times 10^{-14}$	$\leq 8 \times 10^{-15}$
Floor (typical)	$\leq 5 \times 10^{-15}$	$\leq 5 \times 10^{-15}$

- Warm-up time: 60 minutes at 25°C (Typical 30 minutes)

Low noise frequency outputs

- Number of 10MHz outputs: 2
- Number of 5MHz outputs: 1
- Number of 100 MHz output: 1
- Signal format: sine wave
- Connector: SMA/F
- Load impedance: 50Ω
- Amplitude: 10dBm min., 13dBm typical
- Harmonics: ≤ -40 dBc
- Non-harmonics (spurious) ≤ -80 dBc
- Isolation between outputs: -110 dB

SBB phase noise	5MHz output	10MHz output	100MHz output
1Hz	-106dBc/Hz	-100dBc/Hz	-70dBc/Hz
10Hz	-136dBc/Hz	-130dBc/Hz	-90dBc/Hz
100Hz	-145dBc/Hz	-145dBc/Hz	-105dBc/Hz
1,000Hz	-150dBc/Hz	-150dBc/Hz	-115dBc/Hz
10,000Hz	-154dBc/Hz	-154dBc/Hz	-120dBc/Hz
Floor	-154dBc/Hz	-154dBc/Hz	-120dBc/Hz

Timing digital outputs

- Number of 1PPS outputs: 4
- Frequency: 1 Hz
- Connector: BNC/F
- Signal format: pulse LVCMOS
- Load impedance: 50Ω
- Amplitude: 2.5Vpp with 50Ω load
- Jitter ≤ 1 ns RMS
- Rising edge ≤ 5 ns (10% to 90%)
- Output shape pulse
- Output timing signal significant slope: positive
- Pulse width: 20μs

Synchronization input

- Number of 1PPS input: 1
- Frequency: 1 Hz
- 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)

Power supply and battery options

- Number of power supply modules: 2
- Redundant and 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)

OSA 3300

- Power consumption steady state at 25°C ≤50W
- Power consumption at warm-up ≤90W
- Battery option: 60 minutes operation (full charge)
- Charge time from empty load: 4 hours

Environment and compliance

- Operating temperature: 10°C to +50°C
- Non operating temperature: -40°C to +70°C
- Operating relative humidity: 10% - 90% non condensing
- Operating DC magnetic field: 0 Gauss to 2 Gauss any direction
- Vibration/Stationary - IEC 60068-2
- Basis ETSI EN 300019-2-3:2015 Stationary use Test specification T3.2 Environmental Class 3.2
- Random Vibration / Storage / Transportation / Drop
 - IEC 60068-2
 - Basis ETSI EN 300019-2 Storage Test specification T1.1 Environmental Class 1.1
 - Basis ETSI EN 300019-2 Transportation Test specification T2.2 Environmental Class 2.2
- Altitude: 0 to 15.000m
- Safety: IEC 62368-1. IEC 60825-1
- EMC and ESD:
 - EN 55032, CISPR 32, 47 CFR, Part 15, Sub part B
 - ICES - 003 Issue 7
 - EN 55035, CISPR 35,
 - EN 61326-1, IEC 61326-1
 - CE & 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
- 19" rack mountable, 19" 3RU
- Width/with rack ears: 450mm/482.6 mm
- Depth: 510mm
- Height: 132mm
- Weight: 25Kg (with battery, 20 without)

Management features

Status LED

- 3 LEDs on front panel
- Type: Alarm, status, power

Alarm relay

- Maximum rating: U= 50VDC, I = 250mA
- Connector: SUB-D 9/F

Graphical touch screen display

- Management functions
- Alarm and status
- Monitoring
- Parameter setting

Local management port

- Connector: SUB-D9/M
- Port configuration: 115200bps, 8bits, 1 stop bit
- 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: Ensemble Controller, Ensemble Sync Director