

Oscilloquartz coreSync™

OSA 3230B PRC and ePRC

Fully ITU-T compliant Cesium primary reference clock sources

Benefits

- **Fully compliant with ITU-T G.811 PRC and G.811.1 ePRC**
Accuracy better than $\pm 1 \times 10^{-12}$, meeting ITU-T G.811 PRC and G.811.1 ePRC MTIE and TDEV masks
- **Compact size**
4RU front access and 3RU rear access variants for space-efficient 19" and 23" rack deployment
- **Unique flexibility**
Optional digital and analog signal expansion providing up to five additional low-noise outputs
- **Extended performance**
10-year long-life cesium beam tube for OSA 3230B PRC variants and 8-year life for ePRC variants
- **Standards compliant**
Designed according to all relevant industry standards including ITU-T, ETSI, ANSI, Telcordia and CE; fully compliant with RoHS
- **Operational simplicity**
Multiple local and remote management options for easy integration into industrial, professional time and frequency host systems

Overview

Most relevant infrastructure demands a cesium primary reference clock (PRC) source that generates highly stable and precise frequency signals. Our OSA 3230B PRC and ePRC cesium units, fully compliant with the most stringent ITU-T recommendations, are the key for assured and precise synchronization, even in absence of a GNSS signal.

Highly accurate synchronization has become vital not only for mobile network infrastructure but also for other fields such as defense, metrology and space-related applications, as well as data centers and speed trading. Moreover, mission-critical applications cannot rely on GNSS alone for the supply of accurate timing. GNSS threats, such as jamming and spoofing, are growing. ePRTC solutions that include cesium enhanced PRC (ePRC) sources, provide the necessary immunity against GNSS outages.

Our OSA 3230B PRC is a highly stable and accurate cesium clock that provides a frequency source with an accuracy better than $\pm 1 \times 10^{-12}$, together with very high frequency stability. The OSA 3230B ePRC achieves this and more. It meets the much more stringent enhanced PRC requirements, including maintaining sub-nanosecond time deviation (TDEV) for at least 10,000s. This enables the deployment of enhanced primary reference time clocks (ePRTCs) compliant with the stringent ITU-T G.8272.1 recommendation. Our ePRTCs solve the GNSS dependency while providing higher performance levels than standard PRTC systems.



OSA 3230B PRC AND EPRC

High-level technical specifications

Cesium performance

- Two variants: PRC (ITU-T G.811) and ePRC (ITU-T G.811.1)
- Freq. accuracy: $\pm 1 \times 10^{-12}$
- Reproducibility: $\pm 1 \times 10^{-12}$
- Adjustability:
 - Resolution $< 1 \times 10^{-15}$
 - Range $\pm 1 \times 10^{-9}$

Sync input

- 1PPS TTL ($\geq 3V$) at 50 Ω
- BNC connector
- One on rear side plus one on front side for 19" version

Outputs

- Two direct frequency interfaces 1 x 5MHz and 1 x 10MHz
- One analog interface programmable from 0.1MHz to 50MHz sine
- Three digital outputs: 1PPS, 1.5MHz and 10MHz

Optional output expansion

- Five additional outputs:
 - Four digital output interfaces configurable to 2048MHz/E1/T1/1PPS/10MHz
 - One analogue output interface configurable from 0.1MHz to 50MHz sine

Management

- Control and monitoring via:
 - Three alarm contacts,
 - RS232 communication for local management with GUI
 - Ensemble suite for remote management via external TCP-IP device

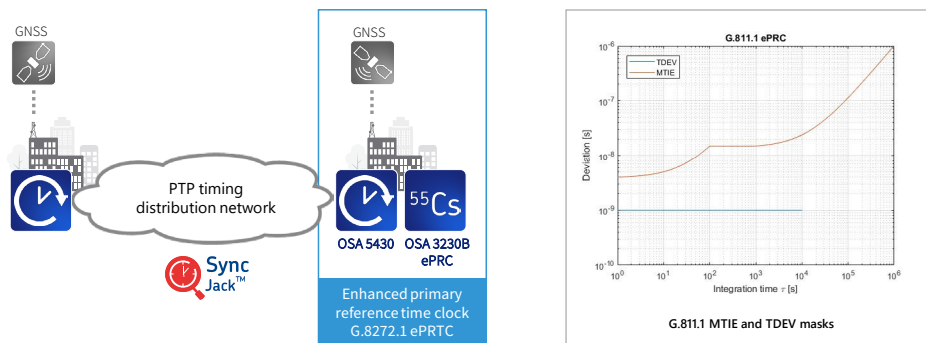
Mechanical

- ETSI (4RU shelf) and 19" (3RU shelf) variants
- Dual feed 48VDC or mixed 110-240VAC/48DC power supply
- Power consumption: 50W at 25°C

Applications in your network

PRC and ePRC cesium clocks for highly precise synchronization of mission-critical infrastructure

- Precise synchronization of time-based communication networks such as radio access networks for mobile communications, defense systems or metrology applications; also legacy networks such as SONET/SDH
- Deployment of ePRC solutions that provide highly accurate and stable synchronization even without GNSS



Our OSA 3230B is fully compliant with ITU-T G.811.1 MTIE and TDEV
All units are tested against G.811.1 TDEV and MTIE masks
The results are provided in the factory acceptance test documentation

Product specifications

Cesium performance

- Frequency Accuracy: $\pm 1 \times 10^{-12}$
- Reproducibility: $\pm 1 \times 10^{-12}$
- Adjustability:
 - Resolution $< 1 \times 10^{-15}$
 - Range $\pm 1 \times 10^{-9}$

Wander generation

OSA 3230B PRC

- Conforming to ITU-T G.811 and GR-2830 – PRS
- 45 minutes warm-up time at 25°C
- MTIE limit (μs) Observation interval τ (s)

$0.275 \times 10^{-3}\tau + 0.025$	$0.1 < \tau \leq 1,000$
$10^{-5}\tau + 0.29$	$\tau > 1,000$
- TDEV limit (ns) Observation interval τ (s)

3	$0.1 < \tau \leq 100$
0.03 τ	$100 < \tau \leq 1000$
30	$1000 < \tau < 10000$

OSA 3230B ePRC

- Conforming to ITU-T G.811.1
- 45 minutes warm-up time at 25°C
- MTIE limit (μs) Observation interval τ (s)

0.004	$0.1 < \tau \leq 1$
$0.11114 \times 10^{-3}\tau + 0.00389$	$1 < \tau \leq 100$
$0.0375 \times 10^{-6}\tau + 0.015$	$100 < \tau \leq 1000$
$10^{-6}\tau + 0.0140375$	$\tau > 1000$
- TDEV limit (ns) Observation interval τ (s)

1	$0.1 < \tau \leq 10000$
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Outputs

- Direct frequency output
 - Interfaces: 2
 - Frequency: $1 \times 5\text{MHz} + 1 \times 10\text{MHz}$
 - Level and connector: 13dBm at 50 Ω (BNC)
- Analog output
 - Interfaces: 1
 - Frequency: programmable from 0.1 to 50MHz sine
 - Shape: wave output at 50 Ω (BNC)
 - Level:
 - 500mVrms (typical)
 - 250mVrms (minimal)

- Digital output
 - Interfaces: 3
 - Frequency: 1PPS / 1, 5 and 10MHz
 - Level: $\geq 3\text{V}$ at 50 Ω
 - Shape: square
 - Connector: BNC

Synchronization input

- Type: 1PPS TTL ($\geq 3\text{V}$)
- Connector: BNC
- Location: 1 on rear side plus 1 on front side for 19" version

Power supply

- Voltage: 48VDC nominal floating (24V to 60V)
- Power feeds: dual
- Power consumption: 50W at 25°C (max. 60W during warm-up)
- Optional configuration: 1xAC plus 1xDC with OSA 3230B 19" version (110-240VAC 50-60Hz)

Management interface

- Interface: RS232C on DB-9 for both local management with CMSW GUI and remote management using Ensemble Suite management software with UMI interface module
- Locations: 1 connector on rear side plus 1 connector on front side for 19" version
- Alarms: 3 relay contacts
- LED Monitoring: 3 LEDs for monitoring power supply status, operation and alarms
- LED Location: 3 LEDs on front side plus 3 LEDs on rear side for 19" version

Mechanical

- ETSI: 436mm x 176mm (4RU) x 240mm (W x H x D) with front access connectors, adapter for 19" rack standard
- 19": 436mm x 132mm (3RU) x 400mm (W x H x D) with rear access connectors, adapter for 23" rack standard
- Weight $< 15\text{kg}$ (excluding packaging)

Telecom signal expansion (optional)

- Digital Output
 - Interfaces: 4
 - Frequency: configurable to 2.048MHz / E1 / T1 / 1PPS / 10MHz
 - Level: according to G.703
 - Connector: BNC 75 Ω or DB9 120 Ω (T1:DB-9 100 Ω)

OSA 3230B PRC AND EPRC

- Analog Output
 - Interfaces: 1
 - Frequency: configurable from 0.1 to 50MHz
 - Format: Sine wave output
 - Connector: BNC 50Ω
 - Level: 500mVrms (typical) / 250mVrms (minimal)

Environmental

- Operating conditions:
 - EN 300 019-1-3, class 3.2.
 - Extended range from -5°C to +55°C
- Transportation: EN 300 019-1-2, class 2.2
- Storage: EN 300 019-1-1, class 1.1
- Humidity: Up to 95%
- Altitude (operating): 0 to 15,000m
- DC magnetic field: ±2 Gauss (maximum)
- Safety: EN 60950-1:2005
- EMC emission:
 - EN 55032: 2012, 2015
 - EN 61000-6-2: 2005
 - EN 61326-1: 2013
- EMC immunity:
 - EN 55024: 2010
 - EN 61000-6-2: 2005
 - EN 61326-1: 2013
- CE certified
- UL certified by NRTL laboratory
- Fully RoHS compliant

OSA 3230B ePRC for enhanced PRTC solutions

- The **OSA ePRTC solution** (figure 1) comprises two OSA devices: an OSA 3230B ePRC cesium clock that is connected to an OSA 5430 grandmaster with a single clock module

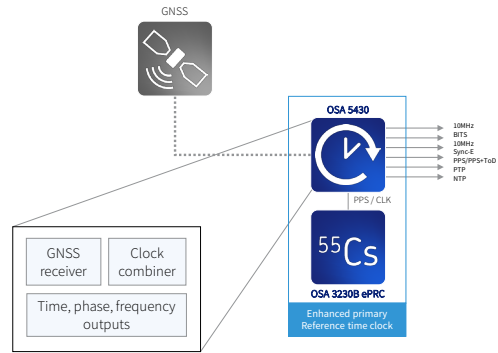


Fig. 1 Unprotected ePRTC (OSA 5430 with single clock module + OSA 3230B ePRC Cesium)

- The **fully protected OSA ePRTC solution** (figure 2) comprises two OSA 3230B ePRC cesium clocks connected to an OSA 5430 grandmaster with dual clock modules

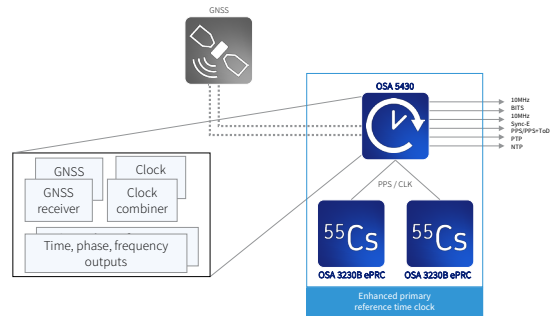


Fig. 2 Protected ePRTC (OSA 5430 with dual clock modules + two OSA 3230B ePRC Cesium)



OSA 3235B Cesium Clock

Metrological Reference Clock Source using the Digital Cesium technology

TIME & FREQUENCY



Highlights

- Allan deviation:
 $\sigma_{(T)} = 2.7 \times 10^{-11} T^{-1/2}$
- Front or Rear access connectors
- Compact 3U high, 400 mm depth
- Accuracy better than $\pm 1 \times 10^{-12}$
- 5 MHz and 10 MHz low noise direct output
- Up to 2x sine wave 100kHz to 50MHz programmable outputs
- Multiple programmable outputs 1PPS and 1/5/10MHz
- Dual PPS Synchronization input
- 10 years warranty on cesium tube
- Redundant AC/DC power supply inputs

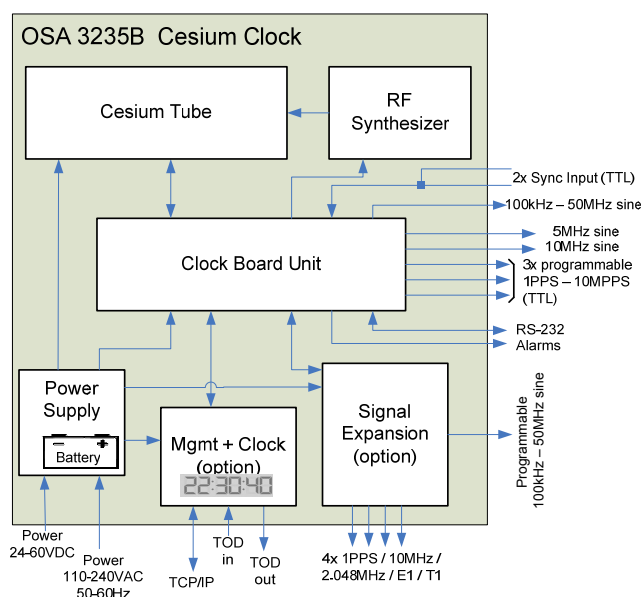
Applications

- Metrology
- Science, deep space research
- Nanometrology, medical devices
- Navigation and localization

For years, cesium beam frequency standards have been constantly improved so as to satisfy the increasingly stringent specification of time and frequency reference equipments. The availability of “easy to operate” instrument of reduced size and weight and of exceptional accuracy and stability provides the user with great flexibility in using cesium standards for meeting the stringent requirements of navigation, communication and timing systems.

The OSA 3235B Cesium Clock is an atomic frequency standard based on a hyperfine transition in the ground state of the cesium 133 atom. The OSA 3235B Cesium Clock is specifically designed and produced with the latest technology in a very compact and reduced size.

Taking into consideration its unique reduced volume, the OSA 3235B offers a set of operation features and performance without comparison on the market. Available with a long life cesium tube, OSA 3235B will meet the requirements where performances are needed over a long period of time.



OSA 3235B Cesium Clock

Metrological Reference Clock Source using the Digital Cesium technology

Cesium performances characteristics

▪ Frequency accuracy	$\pm 1 \times 10^{-12}$
▪ Reproducibility	$\pm 1 \times 10^{-12}$
▪ Short Term Stability :	ADEV
1s	1.2×10^{-11}
10s	8.5×10^{-12}
100s	2.7×10^{-12}
1'000s	8.5×10^{-13}
10'000s	2.7×10^{-13}
100'000s	8.5×10^{-14}
5 days	5×10^{-14}
30 days	5×10^{-14}
Floor	5×10^{-14}
▪ Settability: Resolution	$< 1 \times 10^{-15}$
Range	$\pm 1 \times 10^{-9}$
▪ Warm-up time	45 minutes @ 25°C

Outputs

Direct outputs:	5MHz	10MHz
Amplitude	$1V_{rms} \pm 0,2 @ 50\Omega$	$1V_{rms} \pm 0,2 @ 50\Omega$
SSB Phase		
1Hz	-106dBc/Hz	-100dBc/Hz
10 Hz	-136dBc/Hz	-130dBc/Hz
100Hz	-145dBc/Hz	-145dBc/Hz
1,000Hz	-150dBc/Hz	-150dBc/Hz
10,000Hz	-150dBc/Hz	-150dBc/Hz
100,000Hz	-155dBc/Hz	-155dBc/Hz
Auxiliary outputs	Analog	Timing Outputs
Number	1	3
Frequency	0.1-50MHz	1PPS/1/5/10MHz
Output level:	Typ. $500mV_{rms} @ 50\Omega \geq 3V @ 50\Omega$ (min. $250mV_{rms}$)	
Output shape	Sine	square or pulse
Connector	BNC	BNC

Synchronization input

Number	2 (1x front + 1x rear side)
Input type and connector	1PPS TTL ($\geq 3V$)-BNC

Signal expansion (optional)

Programmable analog output

Number	1
Programmable Frequency	0.1 - 50 MHz
Output level	Typ. $500mV_{rms} @ 50\Omega$ (min. $250mV_{rms}$)
Connector	BNC
Programmable Telecom outputs	
Number	4
Frequency	Configurable: 2.048 MHz / E1 / T1 / 1PPS / 10MHz
Output level	According to G703
Connector	BNC 75 Ω (T1: DB-9 100 Ω)

Power Supply

Voltage

- 1x230VAC (88V-264VAC 50-60Hz)
- 1x48VDC nominal floating (20V to 60V)
- Power feeds Dual
- Power consumption 60W @25°C (warm-up max. 70W)

Optional battery backup

Optional internal battery for 45 minutes of operation without power source

Management

Communication port

Port: RS-232C on DB-9 (1x front + 1x rear side) for local management and / or remotely using SyncView Plus™

Alarms

Relay contacts: 3 x alarm indication

Front panel LED indication

Monitoring: 6x LED's (3x front + 3x rear) for monitoring Power Supply Status, Operation, Alarms

Management and Clock expansion^(optional)

Communication port

Management Port	Ethernet TCP/IP port on RJ45
TOD (Time Of Day)	1 x TOD input on DB-9 (m) 1x TOD output on DB-9 (f) with programmable shift
Display	5.7" tactile LCD display on front side

Mechanical

19":	3U 132 x 436 x 400 mm (HxWxD) with rear and front access connectors. Adapters for 23" rack standard
Table-top case	Optional table-top case
Weight	<15kg (excluding packing)

Environmental Conditions

Operating conditions	EN 300 019-1-3, class 3.2 (temperature range extended from -5°C to +55°C)
Transportation	EN 300 019-1-2, class 2.2
Storage	EN 300 019-1-1, class 1.1
Humidity	Up to 95%
Altitude (operating)	0 - 15'000m
DC magnetic field	± 2 Gauss maximum
Safety	EN 61010-1
EMC & ESD	EN 50081-1, EN 50082-1 IEC 801 parts 2, 3, 4, 5 and 6 CE compliant

¹ Consult factory for availability

Subject to change without prior notice.

OSA 3030B EUDICS

European digital cesium frequency standard

Benefits

- **Autonomous primary reference clock**
Cesium clock technology with minimum footprint
- **Extremely compact size**
Rugged housing with the smallest volume/footprint in its class, suitable for space-restricted applications
- **Extended DC supply range**
Large DC input range makes it very easy to integrate with any application requiring a highly precise reference
- **Excellent frequency accuracy and stability**
Long-life cesium tube with excellent frequency accuracy over a large temperature range
- **Standards compliant**
Designed according to relevant industry standards including CE and RoHS
- **Operational simplicity**
Extremely easy to operate with monitoring and control options available via RS232

Overview

Today's critical infrastructure demands a highly accurate frequency source but in some applications, space is very limited. Our OSA 3030B EUDICS is specifically designed and produced to serve these complex applications in space-restricted environments. Highly compact, the OSA 3030B EUDICS offers a unique set of operational features performance, including greatly enhanced and easy integration into industrial, professional, and time and frequency host systems.

Atomic clocks are needed to generate highly accurate frequencies. These are typically used as primary reference in navigations systems, ground stations, long wave and medium wave broadcasting stations, among others. Atomic clocks can also be used for specific inertial navigation systems where external time reference signals are not available or insufficiently protected regarding transmission risks. Our OSA 3030B EUDICS is a highly stable and accurate cesium clock specifically designed to serve these mission-critical applications, where an extremely accurate reference signal and a minimal footprint are needed. With its long-life cesium tube and its multiple outputs, the OSA 3030B EUDICS is the most flexible and the most compact primary reference clock source available on the market, meeting the most stringent requirements where any type of clock signal is needed over a long period.



OSA 3030B EUDICS

High-level technical specifications

Output signals

- Frequency: 10MHz and 5MHz
- Level value:
1Vrms \pm 0.2Vrms/50 Ω
- Accuracy: $\pm 1 \times 10^{-12}$
- Reproducibility: $\pm 1 \times 10^{-12}$

Outputs

- 5 or 10MHz sine with setability of:
 - Resolution $< -1 \times 10^{-15}$
 - Range: $\pm 1 \times 10^{-9}$
- RS-232
- Alarms

Environmental

- Operating temperature range: -5°C to 55°C
- In-use humidity: up to 95%
- Atmospheric pressure: 0 to 15,000m
- DC magnetic field: +/- 2Gauss

Power supply

- Input voltage: 20V to 60V
- Power consumption: 50W at 25°C (warm-up max. 60W)
- Warm-up time @ 25°C (cold start): 45min typical

Management

- Control and monitoring via:
 - 3 x alarm contacts (minor, major and critical)
 - RS232 communication for local management with GUI

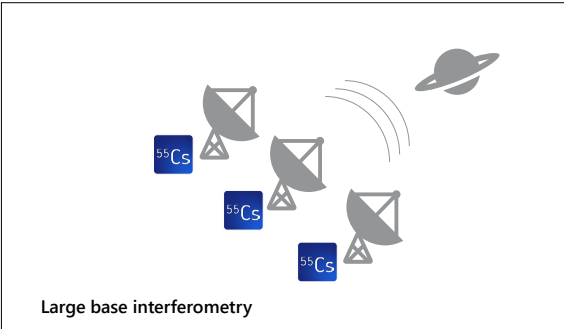
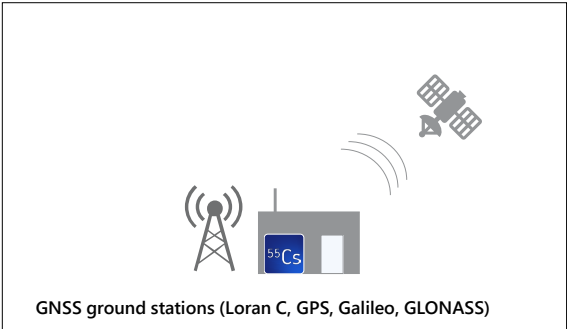
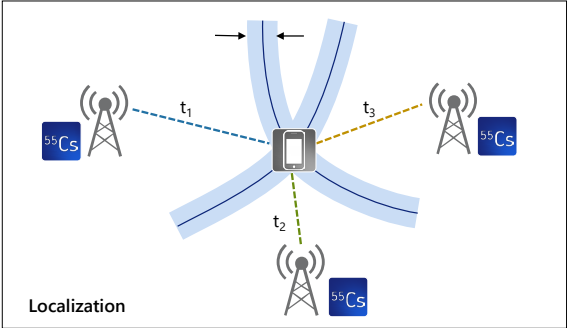
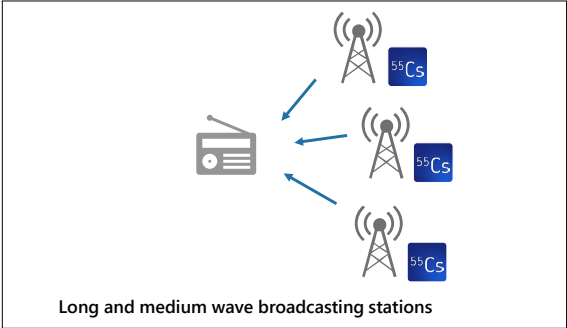
Mechanical

- Size (H x W x D) without connectors:
187.5mm x 124mm x 366mm / 7.4" x 4.9" x 14.4"
- Weight: 10kg
- All connectors are placed on the front panel

Applications in your network

Cesium clock for space-restricted applications

- Autonomous primary reference clock for advanced and mission-critical applications where space is limited, such as:



OSA 3030B EUDICS

Product specifications

Technical specifications

Output signal

- Frequency: 10MHz and 5MHz
- Level value: 1Vrms \pm 0.2Vrms/50 Ω
- Accuracy: $\pm 1 \times 10^{-12}$
- Reproducibility: $\pm 1 \times 10^{-12}$

Frequency stability (Allan standard deviation)

Tau(τ)	Navigation	Metrology
1s	2×10^{-11}	1.2×10^{-11}
10s	2×10^{-11}	8.5×10^{-12}
100s	5×10^{-12}	2.7×10^{-12}
1,000s	1.5×10^{-12}	8.5×10^{-13}
10,000s	5×10^{-13}	2.7×10^{-13}
100,000s	3×10^{-13}	8.5×10^{-14}
Floor	3×10^{-13}	5×10^{-14}

Thermal frequency deviation

- Temperature -5°C + 55°C: $\pm 1 \times 10^{-12}$

Setability

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

SSB phase noise spectral density (BW 1Hz)

Frequency	5MHz	10MHz
1Hz	-90dBc/Hz	-90dBc/Hz
10Hz	-120dBc/Hz	-120dBc/Hz
100Hz	-135dBc/Hz	-135dBc/Hz
1KHz	-145dBc/Hz	-145dBc/Hz

Power supply

- Input voltage: 20V to 60V
- Power consumption: 50W at 25°C (max. 60W during warm-up)
- Warm-up time at 25°C (cold start): 45min. typical

Environmental

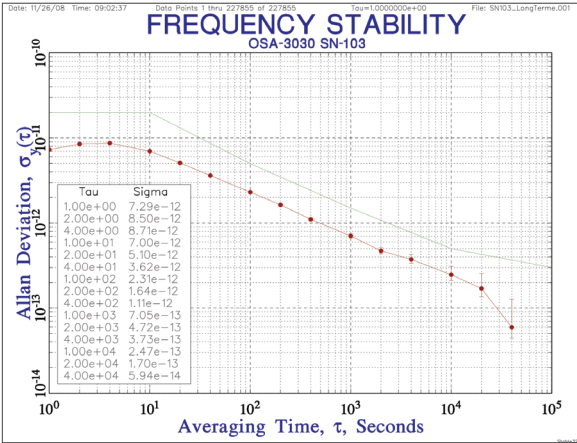
- Operating mode: EN 300-019-1-3 class 3.2 ; -5°C to 55°C
- Storage: EN 300-019-1-1 class 1.1; 40°C to 70°C
- Transportation: EN 300-019-1-2 class 2.2
- Altitude (operating) : up to 15,000 m
- In-use humidity: up to 95%
- Atmospheric pressure: 0 to 15,000m
- DC magnetic field: +/- 2Gauss

Mechanical

- Size (HxWxD) without connectors: 187.5mm x 124mm x 366mm / 7.4" x 4.9" x 14.4"
- Size (HxWxD) with connectors: 187.5mm x 124mm x 381.7mm / 7.4" x 4.9" x 15"
- Weight: 10kg
- All connectors are placed on the front panel

Performance data

Short-term frequency stability



Phase noise

