8200

Ruggedized Rubidium Oscillator

Features

- 10 MHz output
- Hermetically sealed
- Shock or vibration hardened
- Digital monitor and control
- <1.0 inches high

The Microsemi 8200 is a ruggedized rubidium osillator designed for ground tactical, shipboard, and airborne applications where superior frequency stability under diverse environmental conditions is required. Advanced communications, navigation, and targeting systems require precision oscillators that can withstand a wide range of operating environments with minimal degradation in frequency accuracy and stability. The 8200 supports these applications with superior phase noise and excellent short and long term frequency stability.

The 8200 is unique as it combines short and long term frequency stability in a small and low profile package measuring less than one inch high.

The long life rubidium lamp and extended crystal control range of the 8200 helps extend operating periods and minimize maintenance intervals. An alarm signal derived from the basic physics operation indicates if the output frequency is roughly outside 5×10^{-8} of absolute frequency offset. The low temperature coefficient and excellent frequency stability facilitate extended holdover performance.

The height and footprint is ideal for low profile applications. Use of a filtered D-connector for I/O signals minimizes EMI emmissions and susceptibility. For ease of integration, the Microsemi 8200 only needs one input supply voltage and allow direct plug-in into another circuit board.

The 8200 is designed around proven rubidium technology that has been deployed in numerous airborne, shipboard, and ground tactical platforms for over thirty years.

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Specifications

Electrical

RF Output

- Frequency: 10 MHz
- Format: Sinewave
- Amplitude: 0.7 V rms nominal
- Load impedence: 50 Ω at 10 MHz
- Output connector: SMA (f)
- Quantity: One

Performance

Phase noise (SSB), £(f)

SB Frequency	Phase Noise
1 Hz	<–72 dBc/Hz
10 Hz	<–90 dBc/Hz
100 Hz	<–128 dBc/Hz
1 kHz	<–140 dBc/Hz
10 kHz	<–148 dBc/Hz

Spectral purity

- Harmonics: <–50 dBc
- Non-harmonics: <–70 dBc (<150 MHz)
<–80 dBc (>150 MHz)

Short term stability $\sigma_y(\tau)$ (Allan deviation)

Time	Allan Deviation
1 s	$\leq 3\times10^{-11}$
10 s	$\leq 1\times10^{-11}$
100 s	$\leq 3\times10^{-12}$

Aging

- Monthly*: $\pm 5\times10^{-11}$

*After 1 month of operation

Frequency Characteristics

- Accuracy at shipment: $<\pm 5\times10^{-11}$ (25 °C)
- Retrace: $<\pm 5\times10^{-11}$ (on-off-on: 24 hour, 24 hour,24 hr at 25°C)
- Voltage sensitivity (10% voltage change from normal 28 Vdc): $<5\times10^{-12}$
- Tempco: $<3\times10^{-10}$ (over operational temperature range)
- Orientation sensitivity: $<5\times10^{-11}$ for any orientation
- Pressure sensitivity: $<1\times10^{-13}$/mbar
- Magnetic field sensitivity: dc (≤2 Gauss)
$\leq\pm 4\times10^{-11}$ Gauss

Control range

- With analog input (optional): $\pm 6.5\times10^{-9}$, 0-5 V into 5 kΩ
- With digital input: $\pm 1\times10^{-6}$
(with resolution $\pm 1\times10^{-12}$)

Warm-up time at –40 °C

- Time to lock: <8 min
- Time to $<1\times10^{-9}$: <10 min

Power consumption

- Warm-up: <20 W (28 V, –40 °C baseplate)
- Operating: <16 W (28 V, –40 °C baseplate)
<12 W (28 V, 25 °C baseplate)
<8 W (28 V, 80 °C baseplate)

Health Monitoring

- Lock status (BITE)
- TTL low: Lock
- TTL high: Unlock
- RS-232 control/monitor interface. Provides ID, status/monitor information, and frequency/operating parameter adjustments. Protocol: 9600, 8, 1, none, no flow control

Environmental

Humidity

- Relative humidity (operating): 0 to 95% RH per MIL-STD-810, Method 507.4
- Salt fog: MIL-STD-810, Method 509.4

Temperature

- Operating: –40 °C to 80 °C baseplate
- Storage: –55 °C to 95 °C
- Thermal shock (non-operating): MIL-STD-202, Method 107, Test condition A, 10 cycles –55 °C to 85 °C

Altitude

- Operating: Sea level to 40,000' (12,192 m)
- Non-operating: Sea level to 80,000' (24,384 m)

Vibration

- MIL-STD-810, Method 514.5, Procedure I
- Operating: Category 24, Minimum Integrity, 7.7 grms at 0.04 g^2/Hz 20 Hz-1 kHz, 15 min/axis (maintain lock)
- Non-operating: Category 24, Minimum Integrity, 15.4 grms at 0.16 g^2/Hz 20 Hz-1 kHz, 30 min/axis

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Shock

- MIL-STD-202, Method 213
- Operating — 30 g, 11 ms, half-sine (maintain lock)
- Non-operating — 50 g, 11 ms, half-sine

EMI

- MIL-STD-461
- Emissions — CE102, RE102
- Susceptibility — CS101, CS114, RS103

Reliability

- MTBF — MIL-HDBK-217F, 76000 hours. Ground fixed at 40 °C baseplate
- On-Off cycling endurance — 5000 cycles at 10 °C baseplate

Input Connector

- DB-15pin I/O — Input power, monitoring and
- Input voltage range — 15 Vdc to 32 Vdc

Physical

Specification	Value
Height	0.95"
Width	4"
Depth	4.63"
Volume	17.6 in^3
Weight	<1.5 lbs

Connector Designation

Connector	Pin	Function
J1 "D" connection plug 15 pins MIL-DTL-24308	1	Power In
	2	Power In
	3	D_OUT (RS232)
	4	GND
	5	GND
	6	NC
	7	Lock
	8	GND
	9	NC
	10	D_In (RS232)
	11	Freq Ctrl (Optional)
	12	GND
	13	NC
	14	Service
	15	GND
J2 SMA plug MIL-PRF-39012	RF Out	

Part Number

Part Number	Description
16052-101	8200 Rb Oscillator, 10 MHz

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