

Ruggedized Rubidium Oscillator

8200



The 8200 is a ruggedized rubidium oscillator 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 emissions and susceptibility. For ease of integration, the 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.

KEY FEATURES

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

Specifications

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

Performance

Phase Noise (SSB), £(f)

SB Frequency	10 MHz
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 σ_y (τ) (Allan deviation)

Time	Allan Deviation
1 s	$\leq 3 \times 10^{-11}$
10 s	$\leq 1 \times 10^{-11}$
100 s	$\leq 3 \times 10^{-12}$
Aging	
Monthly*	$\pm 5 \times 10^{-11}$

*After 1 month of operation

Frequency Characteristics	
Accuracy at shipment	$< \pm 5 \times 10^{-11}$ (25 °C)
Retrace	$< \pm 5 \times 10^{-11}$ (on-off-on: 24 hour, 24 hour, 24 hr at 25°C)
Voltage sensitivity	(10% voltage change from normal 28 Vdc) $< 5 \times 10^{-12}$
Tempco	$< 3 \times 10^{-10}$ (over operational temperature range)
Orientation sensitivity	$< 5 \times 10^{-11}$ for any orientation
Magnetic field sensitivity dc	(≤ 2 Gauss) $\leq \pm 4 \times 10^{-11}$ Gauss
Frequency Control	
With analog input (optional)	$\pm 6.5 \times 10^{-9}$, 0-5V into 5 kΩ
With digital input	$\pm 1 \times 10^{-6}$ (with resolution $\pm 1 \times 10^{-12}$)
Warm-up Time	
Time to lock	<8 min (-40°C)
Time to $< 1 \times 10^{-9}$	<10 min (-40°C)
Input Power	
Warm-up	<20 W (28V, -40°C baseplate)
Operating	<16 W (28V, -40°C baseplate) <12 W (28V, 25°C baseplate) <8 W (28V, 80°C baseplate)
Input voltage range	15 Vdc to 32 Vdc
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 and Physical

Physical Specifications	
Relative humidity (operating)	0 to 95% RH per MIL-STD-810, Method 507.4
Salt fog	MIL-STD-810, Method 509.4
Operating Temperature	-40°C to 80°C baseplate
Storage Temperature	-55°C to 95°C
Thermal shock (non-operating)	MIL-STD-202, Method 107, Test condition A, 10 cycles -55°C to 85°C
Operating Altitude	Sea level to 40,000' (12,192 m)
Non-operating Altitude	Sea level to 80,000' (24,384 m)
Operating Vibration MIL-STD-810, Method 514.5, Procedure I	Category 24, Minimum Integrity, 7.7 grms at 0.04 g2/Hz 20 Hz 1 kHz, 15 min/axis (maintain lock)
Non-operating Vibration MIL-STD-810, Method 514.5, Procedure I	Category 24, Minimum Integrity, 15.4 grms at 0.16 g2/Hz 20 Hz 1 kHz, 30 min/axis
Operating Shock MIL-STD-202, Method 213	30 g, 11 ms, half-sine (maintain lock)
Non-operating Shock MIL-STD-202, Method 213	50 g, 11 ms, half-sine
Emissions MIL-STD-461	Ce102, Re102
Susceptibility MIL-STD-461	Cs101, CS114, Rs103
MTBF Reliability	MIL-HDBK-217F, 76000 hours. Ground fixed at 40°C baseplate
On-Off cycling endurance Reliability	5000 cycles at 10°C baseplate
Input Connector DB-15-pin	Input power, monitoring and I/O
Height	0.95"
Width	4"
Depth	4.63"
Volume	17.6 in ³
Weight	<1.5 lbs

Connector Designation

Connector	Pin	Function
	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