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8200LN

Ruggedized Rubidium Oscillator

Summary

The Microchip 8200LN 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 8200LN support these applications with superior phase noise and excellent short and long term frequency stability.



The 8200LN is unique in that it combines excellent frequency stability and low dynamic phase noise in a small, low profile package measuring less than 1.0 inches high and weighing less than 2 lbs.

The standard performance 8200LN provides both 10 MHz and 1PPS outputs along with a 1PPS input for disciplining to a GPS receiver or other primary standard. Optional configurations can support additional outputs or custom outputs. When equipped with an optional low g sensitivity crystal, the 8200LN can maintain low phase noise performance over a wide range of vibration profiles. The 8200LN is designed around proven rubidium and OCXO technology that has been deployed in numerous airborne, shipboard and ground tactical platforms for over thirty years.

Key Features

- 10 MHz output
- 1PPS output
- 1PPS input
- Low phase noise
- Low physical profile (<1.0" high)
- Low weight <2 lbs.
- Digital monitor and control
- Shock/vibration hardened

Optional Features

- 5 MHz output
- Low-g sensitivity

Key Benefits

- Superior frequency stability
- Diverse environmental conditions support

Electrical Specifications

RF Output	
Frequency	10 MHz (nominal)
Format	Sinewave
Amplitude	+10 dBm ±2 dBm (0.7V rms nominal)
VSWR	1.5:1
Harmonic distortion	<–30 dBc
Non-harmonic distortion	<–80 dBc
Load impedance	50Ω at 10 MHz
Connector	SMA female
Quantity	2
1PPS Output	
Rise time	<5 ns
Pulse width	<400 ns ±10%
Level	>3 Vdc TTL compatible
Jitter	<10 ps RMS
Output impedance	50Ω
Connector	SMA female
Quantity	2

Performance Parameters

Phase noise (SSB), £(f), dBc/Hz (Static)

SB Frequency	10 MHz	5 MHz
1 Hz	<–98	<–103
10 Hz	<–130	<–135
100 Hz	<–148	<–153
1 kHz	<–154	<–155
10 kHz	<–157	<–157

- Harmonics <–40 dBc
- Non-harmonics <–80 dBc

Frequency Stability	
Aging (monthly, after 1 month)	$<\pm5.0 \times 10^{-11}$
Frequency accuracy at shipment	$<\pm5.0 \times 10^{-11}$ (at 25ºC)
Frequency retrace	$<\pm5.0 \times 10^{-11}$ (on-off-on: 24 hrs, 24 hrs, 24 hrs at 25ºC)

Short-Term Stability (Allan Deviation)

(T)	σ_y
1s	$<1.4 \times 10^{-11}$
10s	$<7.0 \times 10^{-12}$
100s	$<2.5 \times 10^{-12}$

Frequency Control	
Analog frequency	$\pm1.5 \times 10^{-9}$, 0V to 5V into adjusted range 5 kΩ impedance (optional)
Digital frequency resolution adjusted resolution	$\pm1.0 \times 10^{-6}$ with 1.0×10^{-12}

Warm-Up Times	
Time to lock	<8 min (–40ºC), <6 min (25ºC)
Time to $<1 \times 10^{-9}$	<10 min (–40ºC), <8 min (25ºC)

Input Power	
Input voltage range	15 to 32 Vdc (protected against reverse polarity and transients)
Voltage sensitivity	$<5.0 \times 10^{-12}$ Vdc (±10% voltage change from nominal 28 Vdc input)
Power @ –40ºC baseplate	<20W, Quiescent @ 28 Vdc
Power @ 25ºC baseplate	<15W, Quiescent @ 28 Vdc
Power @ 75ºC baseplate	<11W, Quiescent @ 28 Vdc
All Temp's	<28 W (during warm-up)

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 Specifications

Operating temperature	–40ºC to 75ºC baseplate
Storage temperature	–55ºC to 95ºC
Frequency Sensitivity	<3.0 × 10^{-10} over operating temperature range
Thermal shock (non-operating)	MIL-STD-202, Method 107, Test Condition A, 10 cycles –55°C to 85ºC
Orientation sensitivity	<5.0 x 10^{-11} for any orientation
Pressure sensitivity	<1.0 x 10^{-13}/mbar
Operating altitude	Sea level to 40,000' (12,192 m)
Non-operating altitude	Sea level to 80,000' (24,384 m)
Magnetic field sensitivity	(DC field, ≤2 Gauss) ≤±4.0 × 10^{-11}/Gauss
Relative humidity (operating)	0 to 95% RH per MIL-STD-810, Method 507.4
Salt fog	MIL-STD-810, Method 509.4
MTBF	70,000 hours (ground fixed) at 40ºC baseplate
On-Off cycling endurance	5000 cycles at 10ºC baseplate
Reliability specification	MIL-HDBK-217F
Input connector	(1) DB-9 (All input power); (1) DB-9 (All monitoring)
Dimensions	0.95” (H); 6.13” (W); 5.52” (D); 32.2 in^3 (Volume)
Weight	<2.0 lbs

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

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

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

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