



CXOXLPR OSCILLATOR

20 MHz to 125 MHz

Radiation Tolerant, Ultra-Miniature, Low Phase Noise & Low Jitter, High Shock Crystal Oscillator

DESCRIPTION

Statek's ultra miniature Low Earth Orbit (LEO) applicable oscillators are high shock and 30 kRad survivable. These oscillators deliver a low voltage CMOS output with ultra low phase noise, jitter, and acceleration sensitivity. At 50 MHz the typical RMS phase jitter from 12 kHz to 20 MHz is only 150 fs.

FEATURES

- 30 kRad (Si) Total Ionizing Dose
- High shock resistance, three point mount*
- 100,000 g option
- 3.2 x 2.5 mm miniature package, other package options available
- CMOS output with Enable/Disable
- Low phase noise and jitter
- Full military testing available
- Low acceleration sensitivity
- Wide supply voltage options (1.8 V to 3.3 V)
- No PLL artifacts
- Hermetically-sealed ceramic package
- Designed and manufactured in the USA

* Meets NASA EEE-INST-002

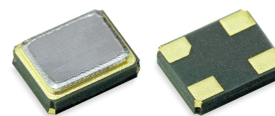
APPLICATIONS

Space & Aerospace

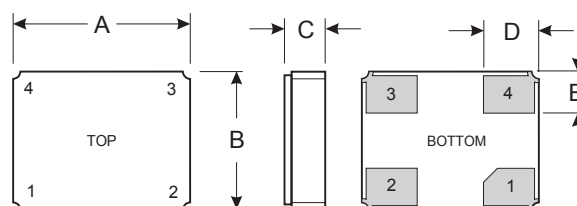
- Small satellites
- Command & Data Handling (C&DH)
- Communications
- Navigation
- GPS

PACKAGING OPTIONS

- Tray Pack
- Tape and Reel (per EIA 481). See Tape and Reel datasheet 10109.



PACKAGE DIMENSIONS¹



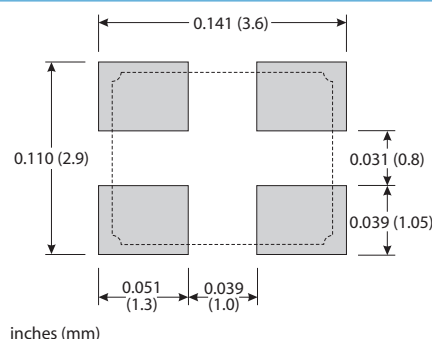
DIM	Termination	TYPICAL		MAXIMUM	
		inches	mm	inches	mm
A		0.126	3.20	0.136	3.40
B		0.099	2.50	0.107	2.70
C	SM1	0.039	1.00	0.043	1.09
	SM3/SM5	0.044	1.12	0.048	1.21
D		0.040	1.00	0.041	1.10
E		0.030	0.75	0.031	0.85

1. Other package options available. Please consult factory.

PIN CONNECTIONS

1. Output Enable/Disable (E) or no connection (N)
2. Ground
3. Output
4. V_{DD}

SUGGESTED LAND PATTERN



10232 Rev B

SPECIFICATIONS

Specifications are typical at 25°C unless otherwise noted. Specifications are subject to change without notice.
Tighter specifications available.

Frequency Range	20 MHz to 125 MHz			
Supply Voltage	1.8 V to 3.3 V $\pm$ 10%			
Calibration Tolerance ¹	$\pm$ 100 ppm to $\pm$ 50 ppm			
Frequency-Temperature Stability ²	$\pm$ 100 ppm to $\pm$ 25 ppm (Industrial) $\pm$ 100 ppm to $\pm$ 50 ppm (Military)			
Typical Supply Current @15 pF Output Load (mA)	25 MHz	<u>1.8 V</u> 1.3	<u>2.5 V</u> 1.8	<u>3.3 V</u> 2.8
	50 MHz	2.3	3.2	4.7
	100 MHz	4.5	6.1	8.3
	125 MHz	7.2	10.0	12.9
Output Load (CMOS)	15 pF			
Start-up Time	5 ms MAX			
Rise/Fall Time	2 ns TYP			
Duty Cycle	45% MIN, 55% MAX			
Aging, First Year	2 ppm MAX			
Shock Survival ³	Up to 100,000 g, 0.5 ms, 1/2 sine High Shock Options in "How to Order"			
Vibration Survival ⁴	20 g, 10-2,000 Hz swept sine			
Operating Temperature Ranges	-40°C to +85°C (Industrial) -55°C to +125°C (Military)			
Storage Temperature Range	-55°C to +125°C			
Max Process Temperature	260°C for 20 seconds			
Min/Max Supply Voltage V _{DD}	-0.3 V / 4.0 V			
Min/Max Input Voltage (Pin 1)	-0.3 V / V _{DD} +0.3 V			
Phase Jitter	150 fs (rms) typical over 12 kHz to 20 MHz (50 MHz)			
Moisture Sensitivity Level (MSL)	This product is hermetically sealed and is not moisture sensitive.			

1. Tighter tolerances available.

2. Does not include calibration tolerances. Tighter tolerances available.

3. Contact Statek for higher shock options for frequencies greater than 50 MHz.

4. Per MIL-STD-202, Method 204, Condition D. Random vibration testing also available.

Note: All parameters are measured at ambient temperature with a 10 M Ω , 15 pF load.

ENABLE/DISABLE OPTIONS (E/N)

Statek offers two enable/disable options: E and N. The E-version has a tri-state output and stops oscillating internally when the output is put into the high Z state. The N-version does not have PIN 1 connected internally and so has no enable/disable capability. The following table describes the enable/disable option E.

ENABLE/DISABLE OPTION E FUNCTION TABLE

	Enable (Pin 1 High*)	Disable (Pin 1 Low)
Output	Frequency Output	High Z State
Oscillator	Oscillates	Stops
Current	Normal	Very Low

*When PIN 1 is allowed to float, it is held high by an internal pull-up resistor.

OSCILLATOR TEST OPTIONS

OSCILLATOR PRODUCT LEVEL B TEST OPTIONS

Standard Testing includes: Internal Visual Inspection, Stabilization Bake, Seal Test, PIND, Electrical Test, & Final Visual Inspection.

Statek Test Options

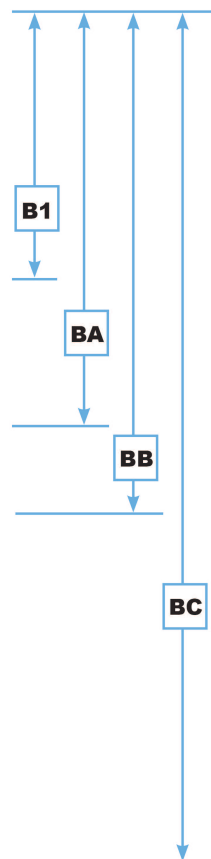
Screening		MIL-Standard	Test Method	Condition	Sample Size
Internal Visual (Pre-Seal)		MIL-STD-883	2017 & 2032	–	100%
Stabilization Bake (150°C)		MIL-STD-883	1008	C	100%
Temperature Cycling		MIL-STD-883	1010	B	100%
Constant Acceleration		MIL-STD-883	2001	A (5000g, Y1 Axis only)	100%
Seal Test (Fine and Gross Leak)		MIL-STD-883	1014	A1 & C	100%
PIND (Particle Impact Noise Detection)		MIL-STD-883	2020	A	100%
Electrical Test		–	–	–	100%
Burn-in, operating		MIL-PRF-55310	Table III	–	100%
Final Electrical Test		–	–	–	100%

Group A		MIL-Standard	Test Method	Condition	Sample Size
subgroup	1	Electrical Tests	MIL-PRF-55310	–	per MIL-PRF-55310
	2	Visual & Mechanical	MIL-PRF-55310	–	per MIL-PRF-55310
	3	Solderability	MIL-STD-202	208	per MIL-PRF-55310

Group B		MIL-Standard	Test Method	Condition	Sample Size
30-day Frequency Aging		MIL-PRF-55310	Para. 4.8.35	–	per MIL-PRF-55310

Group C (Destructive Tests)		MIL-Standard	Test Method	Condition	Sample Size
subgroup	1	Vibration	MIL-STD-202	204	8 Units
		Shock	MIL-STD-202	213	
	2	Thermal Shock	MIL-STD-202	107	4 Units
		Ambient Pressure	MIL-PRF-55310	Para. 4.8.46	
subgroup	3	Storage Temperature	MIL-PRF-55310	Para. 4.8.47	2 Units
		Resistance to Soldering Heat	MIL-STD-202	210	
	4	Moisture Resistance	MIL-STD-202	106	2 Units
		Salt Atmosphere	MIL-STD-883	1009	
subgroup	4	Terminal Strength (as applicable)	MIL-STD-202	211	2 Units
		Resistance to Solvents	MIL-STD-202	215	

- The paragraph numbers listed in this table refer to MIL-PRF-55310
- Please contact factory for additional tests such as Radiographic Inspection and MIL-PRF-55310 Product Level S tests

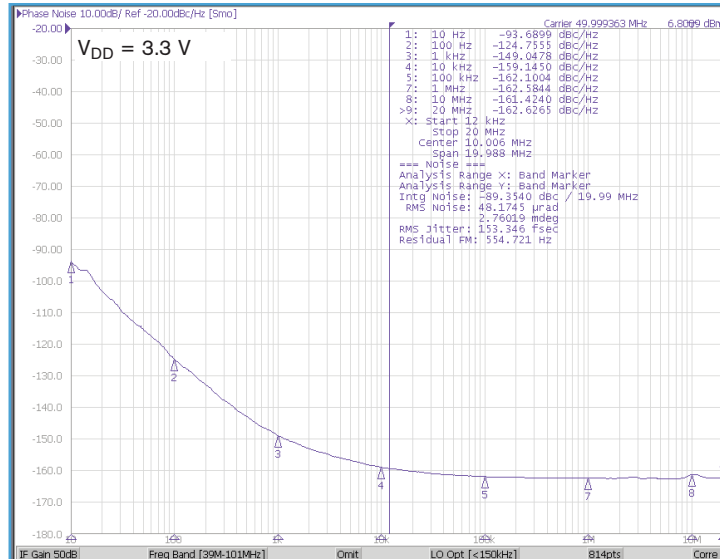
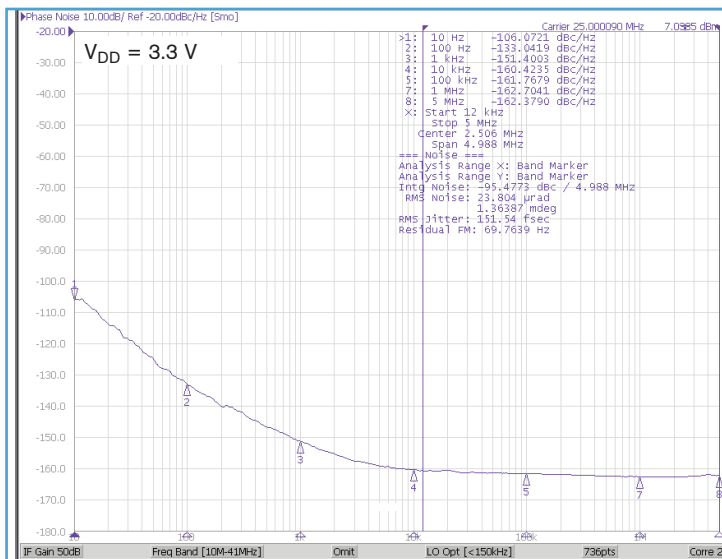


HOW TO ORDER CXOXLPRN SURFACE MOUNT CRYSTAL OSCILLATORS

Model Number ¹	Supply Voltage	Shock Level	Special or Custom	Enable/Disable Code	Termination Code	Frequency & Code	Accuracy @ 25°C Code	Frequency Temperature Stability/ Total Tolerance Code	Test Option Code
CXOXLPRN	1 = 1.8 V 2 = 2.5 V 3 = 3.0 V 4 = 3.3 V	B = 10,000 g C = 20,000 g D = 30,000 g F = 50,000 g G = 75,000 g H = 100,000 g	"S" = special or custom Blank = Standard	E or N	Blank = Gold Plated (Lead Free) SM3 = Solder Dipped (60/40 Sn/Pb) SM5 = Solder Dipped (Lead Free)	M = MHz	A = 100 ppm D = 10 ppm F = 25 ppm G = 30 ppm H = 50 ppm X = Total Tolerance	1 = 100 ppm; -40°C to +85°C 2 = 50 ppm; -40°C to +85°C 3 = 25 ppm; -40°C to +85°C 4 = 100 ppm; -55°C to +125°C 5 = 50 ppm; -55°C to +125°C	B0 = Standard Testing Only B1 = Screening (MIL-PRF-55310) BA = Screening + Group A BB = Screening + Group A & B BC = Screening + Group A, B, & C

1. Other package options available please consult factory.

PHASE NOISE PERFORMANCE AT 25 MHZ AND 50 MHZ



PHASE NOISE AND JITTER PERFORMANCE

Typical phase noise for two oscillator frequencies [dBc/Hz] (3.3 V)

Offset frequency	25 MHz	50 MHz
10 Hz	-106	-93
100 Hz	-133	-124
1 kHz	-151	-149
10 kHz	-160	-159
100 kHz	-161	-162
1 MHz	-162	-162
5 MHz	-162	-162
20 MHz	—	-162

Integrated RMS phase jitter¹

Frequency	V _{DD} = 2.5 V	V _{DD} = 3.3 V
25 MHz	160 fs	151 fs
50 MHz	179 fs	153 fs

1. 12 kHz to 20 MHz, unless noted otherwise.

Period jitter (typical) over 10,000 cycles (3.3 V)

Frequency	RMS	Peak to Peak
25 MHz	1.15 ps	9.6 ps
50 MHz	1.02 ps	8.1 ps