STATEK®
Est. 1970

MILITARY PRODUCTS

High-Reliability Crystals and Oscillators

www.STATEK.com

About Statek

In 1970, Statek Corporation was the first company to use semiconductor technologies such as photolithography, chemical milling and micromachining to manufacture quartz resonators in wafer form. Today, Statek remains at the forefront of innovation in the design, development and manufacturing of highly reliable, ultra-miniature quartz-based frequency control products.

For over 50 years, we have supported military programs with state-of-the-art crystal resonators and oscillators. We offer a complete portfolio of frequency control products manufactured and tested to military standards: oscillators to MIL-PRF-55310 Product Level B and resonators to MIL-PRF-3098. Our dedicated servicing of the demanding requirements of the military market makes us a preferred supplier to most major defense contractors.

All our products are designed, manufactured and tested in the United States.

Technological Capability

Statek's core competence is its ability to design and manufacture ultra-miniature resonators in quartz wafers using its patented photolithographic and chemical milling processes.

With complete vertical integration, Statek has total in-house control over the manufacturing of its products. From cutting quartz bars into wafers, to wafer lapping and polishing, to photolithographic processing and chemical milling in our Wafer Fab lines, to assembly and seal, Statek has the complete in-house capability to manufacture and test high-precision, extremely rugged and reliable ceramic-packaged quartz crystal resonators, oscillators and sensors.

Variable-size batch processing allows us to maintain efficient production with a high mix of both standard and custom devices.

Materials

We cultivate long-term relationships with our domestic suppliers to ensure stable sources of high-quality materials. We manufacture our resonators with high-grade cultured alpha-quartz. Swept quartz is also available for applications requiring radiation hardness. To simplify and minimize the device circuitry, we use oscillator-specific integrated circuits. Lastly, we design our own ceramic packages, which are then manufactured by our sister company, AdTech Ceramics.

Quality Assurance Inspection

Product Continuity

Statek provides the continuity of support required for long-term military programs. In addition to maintaining complete records and traceability, we are committed to supporting the life cycle of our customers' products.

Quality Assurance

The entire Statek organization is committed to ensuring that its products and services meet or exceed its customers' expectations. Through continuous improvement, Statek has developed a quality system that incorporates AS9100 and ISO 9001.

Military Applications

- Smart Munitions
- Airborne Communication Systems
- Battlefield Simulation
- Portable Field Equipment
- Projectile Electronics
- Robust Computing Platforms
- Telemetry
- Navigation
- GPS
- Unmanned Aerial Vehicles

Military Product Features

- **Extreme high shock survivability (highest in the industry)**
- **Ultra-miniature and low-profile packaging**
- **Excellent long-term aging**
- **Full product traceability**
- **High stability and high accuracy**
- **Extended temperature ranges (-55°C to 225°C)**
- **Swept quartz available for radiation resistance**
- **Low power consumption**
- **Low acceleration sensitivity**
- **Manufacture and testing to MIL-PRF-55310 (Oscillators)**
- **Manufacture and testing to MIL-PRF-3098 (Crystals)**

Military Program Participation

AMRAAM	Advanced Medium-Range Air to Air Missile
ASRAAM	Advance Short-Range Air to Air Missile
CSEL	Combat Survivor Evader Locator
DAGR	Direct Attack Guided Rocket
DAS	Distributed Aperture System
ERGM	Extended Range Guided Munitions
EXCALIBUR	Extended Range Artillery Projectile
JASSM	Joint Air to Surface Standoff Missile
JCM	Joint Common Missile
JTRS	Joint Tactical Radio System
JSF	Joint Strike Fighter
LGB	Laser Guided Bomb
M762/M767	ET Fuze Programs
MRM	Medium Range Munition
PAC-3	Patriot Advanced Capability-3
PGK	Precision Guidance Kit
SFW	Sensor Fuzed Weapon
SM-3	Standard Missile-3
SYSI	Systems Serial Interface
WCMD	Wind Corrected Munitions Dispenser

STXOHG
Tight Stability
±5 ppm
-40ºC to +85ºC
3.2 x 2.5 mm SMD

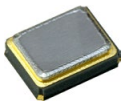
FEATURED PRODUCT

FEATURES

- 3.2 x 2.5 mm hermetically sealed ceramic package
- High shock resistance up to 75,000 g
- Tight frequency stability and low phase noise
- Ultra-low Allan deviation and phase jitter
- Ultra-low period jitter (1.4 ps rms)
- Low acceleration sensitivity
- Low current consumption; 3.0 mA max no load across temperature
- Full military testing available
- CMOS output; enable/disable with tri-state
- Fundamental frequency; no PLL artifacts
- IBIS model available
- Designed and manufactured in the USA

MIL

SURFACE MOUNT OSCILLATORS

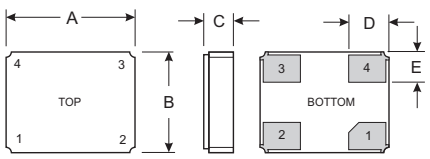


	STXOHG 3.2x2.5 mm
Frequency Range	10 MHz to 70 MHz
Supply Voltage	2.5 V to 3.3 V ±10%
Total Frequency Tolerances	±5 ppm (Industrial)
Typical Supply Current[1]	3.0 mA
Output Voltage Levels	V_{OH} > V_{DD} - 0.4 V V_{OL} < 0.4 V
Output Load (CMOS)	15 pF
Start-up Time	5 ms MAX
Rise/Fall Time	5 ns MAX
Duty Cycle	45% MIN, 55% MAX
Aging, first year	2 ppm MAX
Shock Survival[2]	Up to 75,000 g, 0.5 ms, 1/2 sine
Vibration Survival[3]	20 g, 10-2,000 Hz swept sine
Operating Temperature Ranges	-40ºC to +85ºC (Industrial) -55ºC to +125ºC (Military)
Storage Temperature Range	-55ºC to +125ºC
Typical Period Jitter (rms)	1.4 ps over 10,000 cycles
MAX Process Temperature	260ºC for 20 seconds
MIN/MAX Supply Voltage (V_{DD})	-0.3 V / 4.0 V
MIN/MAX Enable/Disable Pin Voltage (V_{IN})	-0.3 V / V_{DD} + 0.3 V
Moisture Sensitivity Level (MSL): This product is hermetically sealed and is not moisture sensitive.	

1. V_{DD} = 3.3V, 15 pF load, frequency at 40 MHz.
2. HG options for frequencies up to 50 MHz. Contact factory for HG options above 50 MHz.
3. Per MIL-STD-202, Method 204, Condition D. Random vibration testing also available.

Notes: Specifications are typical at 25ºC unless otherwise noted. Specifications are subject to change without notice. All combinations may not be available. All parameters are measured at an ambient temperature with a 10 MΩ, 15 pF load.

STXOHG



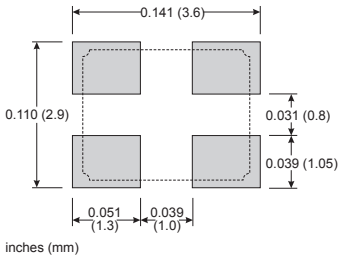
Pin Connections

1	Enable/Disable (E) or not connected (N)
2	Ground
3	Output
4	V_{DD}

Dimensions

	TYP.		MAX.	
DIM	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	0.053	1.35
$C_{(SM3/SM5)}$	0.044	1.12	0.058	1.47
D	0.040	1.00	0.041	1.10
E	0.030	0.75	0.031	0.85

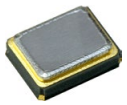
Suggested Land Pattern



How to Order | Specify - See Page 10

CXOXLPNR
Radiation Tolerant
High Shock Resistance
1.8 V to 3.3 V
-55ºC to +125ºC
3.2 x 2.5 mm SMD

MIL SURFACE MOUNT OSCILLATORS



FEATURED PRODUCT

	CXOXLPNR 3.2x2.5 mm			
Frequency Range	20 MHz to 125 MHz			
Supply Voltage	1.8 V to 3.3 V ±10%			
Calibration Tolerance[1]	±100 ppm to ±50 ppm			
Frequency-Temperature Stability[2,3]	±100 ppm to ±30 ppm (Industrial) ±100 ppm to ±50 ppm (Military)			
Typical Supply Current at 15 pF Output Load (mA)		1.8 V	2.5 V	3.3 V
	25 MHz	1.3 mA	1.8 mA	2.8 mA
	50 MHz	2.3 mA	3.2 mA	4.7 mA
	100 MHz	4.5 mA	6.1 mA	8.3 mA
	125 MHz	7.2 mA	10.0 mA	12.9 mA
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[4]	Up to 100,000 g, 0.3 ms, 1/2 sine			
Vibration Survival[5]	20 g, 10-2,000 Hz swept sine			
Operating Temperature Ranges	-40ºC to +85ºC (Industrial) -55ºC to +125ºC (Military)			
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. Contact factory.
2. Does not include calibration tolerance. Tighter tolerances available.
3. Broader temperature ranges available. Contact factory.
4. Contact factory for higher shock options for frequencies greater than 50 MHz.
5. Per MIL-STD-202, Method 204, Condition D. Random vibration testing also available.

Notes: Specifications are typical at 25ºC unless otherwise noted. Specifications are subject to change without notice. All combinations may not be available. All parameters are measured at an ambient temperature with a 10 MΩ, 15 pF load.

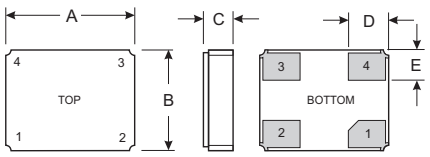
For packaged swept quartz crystals, see model **SWCX1** on our website

FEATURES

- **30 kRad (Si) total ionizing dose tolerant**
- **High shock resistance, 3-point crystal mount as required by NASA EEE-INST-002**
- **100,000 g option**
- **CMOS output with enable/disable**
- **Low phase noise and jitter**
- **Full military testing available**
- **Low acceleration sensitivity**
- **Wide supply voltage (1.8 V to 3.3 V)**
- **No PLL artifacts**
- **Hermetically sealed ceramic package**
- **IBIS model available**
- **Designed and manufactured in the USA**

Please visit our website to see the complete **CXOXLPNR** datasheet for further information on phase noise and jitter performance.

CXOXLPNR



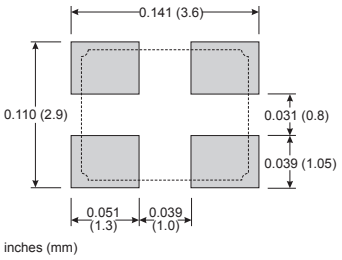
Pin Connections

1	Enable/Disable (E) or not connected (N)
2	Ground
3	Output
4	V_{DD}

Dimensions

	TYP.		MAX.	
DIM	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
$C_{(SM3/SM5)}$	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

Suggested Land Pattern



How to Order | Specify - See Page 10

CXOLATHG

Ultra Low Current
High Shock Resistance
1.8 V to 3.3 V
16.0 kHz - 32.768 kHz
3.2 x 1.5 mm SMD

FEATURED PRODUCT

FEATURES

- **Ultra low power (Less than 1 µA; V_{DD}=3.3V, OE "Low")**
- **Fast start-up (typical 3 ms)**
- **Tight frequency tolerance**
- **High shock resistance (30,000 g and higher)**
- **Low acceleration sensitivity (typically 0.5 ppb/g)**
- **Low aging**
- **CMOS output**
- **Optional output enable/disable with tri-state**
- **Hermetically sealed ceramic package**
- **Full military testing available**
- **IBIS model available**
- **Designed and manufactured in the USA**

MIL

SURFACE MOUNT OSCILLATORS

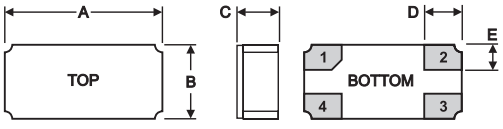
	CXOLATHG 3.2x1.5 mm
Output Frequency	16.0 kHz to 32.768 kHz
Supply Voltage	1.8 V to 3.3 V ±10%
Calibration Tolerance[1]	±25 ppm
Frequency Stability Over Temperature[2]	±20 ppm to ±50 ppm (Industrial) ±35 ppm to ±50 ppm (Military)
Typical Supply Current	10 µA < 1 µA when disabled
Output Voltage Levels	V_{OH} > 0.9 V_{DD} V_{OL} < 0.1 V_{DD}
Output Load (CMOS)	15 pF
Aging, first year	3 ppm MAX
Shock Survival	Up to 100,000 g, 0.3 ms, 1/2 sine
Vibration Survival[3]	20 g, 10-2,000 Hz swept sine
Operating Temperature Ranges	-40ºC to +85ºC (Industrial) -55ºC to +125ºC (Military)
Start-up Time	16.384 kHz: 5 ms TYP 32.768 kHz: 3 ms TYP
Rise/Fall Time (10%-90%)	t_r: 7 ns TYP, 10 ns MAX t_f: 5 ns TYP, 10 ns MAX
Duty Cycle	45% MIN, 55% MAX
Storage Temperature Range	-55ºC to +125ºC
MAX Process Temperature	260ºC for 20 seconds
MIN/MAX Supply Voltage (V_{DD})	-0.3 V / 4.0 V
MIN/MAX Enable/Disable Pin Voltage (V_{IN})	-0.3 V / V_{DD} + 0.3 V
Moisture Sensitivity Level (MSL): This product is hermetically sealed and is not moisture sensitive.	

1. Other tolerances available. Contact factory.
2. Does not include calibration tolerances. Other tolerances available. Contact factory.
3. Per MIL-STD-202, Method 204, Condition D. Random vibration testing also available.

Notes: Specifications are typical at 25ºC unless otherwise noted. Specifications are subject to change without notice.
All combinations may not be available.
All parameters are measured at an ambient temperature with a 10 MΩ, 15 pF load.

Please contact the factory for **Higher Frequency** options

CXOLATHG



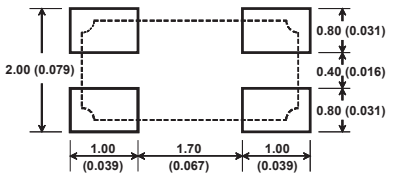
Pin Connections

1	Output
2	Ground
3	Enable/Disable (E) or not connected (N)
4	V_{DD}

Dimensions

	TYP.		MAX.	
DIM	inches	mm	inches	mm
A	0.126	3.20	0.130	3.30
B	0.059	1.50	0.063	1.60
C(SM1)	0.037	0.95	0.039	1.00
D	0.029	0.75	0.030	0.77
E	0.020	0.50	0.021	0.52

Suggested Land Pattern



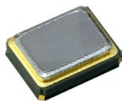
mm (inches)

How to Order | Specify - See Page 10

CXOXLPNHG

Low Phase Noise
High Shock Resistance
1.8 V to 5.0 V
-55ºC to +125ºC
3.2 x 2.5 mm SMD

MIL SURFACE MOUNT **OSCILLATORS**



FEATURED PRODUCT

FEATURES

Period Jitter – 1 ps (rms) typical for 125 MHz

Phase Jitter – 75 fs (12 kHz to 20 MHz) typical for 125 MHz

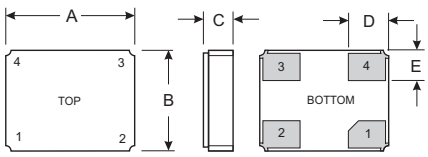
- **Hermetically sealed ceramic package**
- **High shock resistance (HG version) up to 100,000 g**
- **CMOS output with enable/disable**
- **Low phase noise, jitter and Allan deviation**
- **Operation over -55ºC to +125ºC**
- **Low acceleration sensitivity**
- **Wide supply voltage (1.8 V to 5.0 V)**
- **No PLL artifacts**
- **Full military testing available**
- **IBIS model available**
- **Designed and manufactured in the USA**

	CXOXLPNHG 3.2x2.5 mm		
Frequency Range	10 MHz to 125 MHz		
Supply Voltage[1]	1.8 V to 5.0 V ±10%		
Calibration Tolerance[2]	±100 ppm to ±50 ppm		
Frequency-Temperature Stability[3,4]	±100 ppm to ±30 ppm (Industrial) ±100 ppm to ±50 ppm (Military)		
Typical Supply Current at 15 pF Output Load	1.8 V	2.5 V	3.3 V
10 MHz	1.1 mA	1.9 mA	3.2 mA
20 MHz	1.6 mA	3.0 mA	5.0 mA
25 MHz	1.3 mA	1.8 mA	2.8 mA
50 MHz	2.3 mA	3.2 mA	4.7 mA
100 MHz	4.5 mA	6.1 mA	8.3 mA
125 MHz	7.2 mA	10.0 mA	12.9 mA
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	3 ppm MAX		
Shock Survival[5]	Up to 100,000 g, 0.5 s, 1/2 sine		
Vibration Survival[6]	20 g, 10-2,000 Hz swept sine		
Operating Temperature Ranges	-40ºC to +85ºC (Industrial) -55ºC to +125ºC (Military)		
Storage Temperature Range	-55ºC to +125ºC		
MAX Process Temperature	260ºC for 20 seconds		
MIN/MAX Supply Voltage (V_{DD})	-0.3 V / 4.0 V		
Phase Jitter	75 fs TYP, 12 kHz to 20 MHz		
Moisture Sensitivity Level (MSL): This product is hermetically sealed and is not moisture sensitive.			

1. 5.0V available, 10 MHz to 60 MHz (3.8 mA @ 25 MHz)
2. Tighter tolerances available. Contact factory.
3. Does not include calibration tolerance. Tighter tolerances available.
4. Broader temperature ranges available. Contact factory.
5. Contact factory for higher shock options for frequencies greater than 50 MHz.
6. Per MIL-STD-202, Method 204, Condition D. Random vibration testing also available.

Notes:
Specifications are typical at 25ºC unless otherwise noted.
Specifications are subject to change without notice.
All combinations may not be available.
All parameters are measured at an ambient temperature with a 10 MΩ, 15 pF load.

CXOXLPNHG



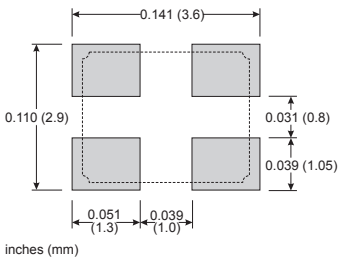
Pin Connections

1	Enable/Disable (E) or not connected (N)
2	Ground
3	Output
4	V_{DD}

Dimensions

	TYP.		MAX.	
DIM	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
$C_{(SM3/SM5)}$	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

Suggested Land Pattern



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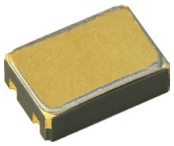
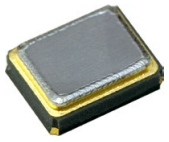
MIL SURFACE MOUNT OSCILLATORS



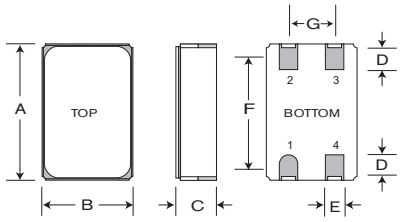


	HGXO 5.0x7.5 mm		CXOMKHG 6.5x5.0 mm	
Frequency Range	460 kHz to 50 MHz		32.768 kHz to 160 MHz (up to 200 MHz for 3.3V)	
Supply Voltage	1.8 V to 5.0 V		1.8 V to 5.0 V	
Standard Calibration Tolerances[1]	±10 ppm, ±25 ppm, ±50 ppm, ±100 ppm		±25 ppm, ±50 ppm, ±100 ppm	
Frequency Stability Over Temp. Range[2]	±25 ppm to ±100 ppm		±25 ppm to ±100 ppm	
Standard Operating Temperature Ranges	-40ºC to +85ºC / -55ºC to +125ºC		-40ºC to +85ºC / -55ºC to +125ºC	
Supply Current (Typical)	3.3 V	5.0 V	3.3 V	5.0 V
	10 mA for 50 MHz 8 mA for 40 MHz 6 mA for 30 MHz 4 mA for 24 MHz	14 mA for 50 MHz 12 mA for 40 MHz 10 mA for 30 MHz 8 mA for 24 MHz	10 mA for 50 MHz 8 mA for 40 MHz 6 mA for 30 MHz 4 mA for 24 MHz	14 mA for 50 MHz 12 mA for 40 MHz 10 mA for 30 MHz 8 mA for 24 MHz
Output Load (CMOS)[3]	15 pF		15 pF	
Start-up Time	5 ms MAX		5 ms MAX	
Rise/Fall Time	6 ns MAX		3 ns TYP, 6 ns MAX	
Duty Cycle[1]	45% MIN, 55% MAX		45% MIN, 55% MAX	
Aging, first year	Aging is dependent on frequency and other design considerations. Please contact factory.			
Shock, survival	Up to 100,000 g, 0.5 ms, 1/2 sine		Up to 100,000 g, 0.5 ms, 1/2 sine	
Vibration, survival[4]	20 g, 10-2000 Hz swept sine		20 g, 10-2000 Hz swept sine	

1. Other tolerances available.
2. Does not include calibration tolerance. Other tolerances available.
3. TTL loads and higher CMOS loads available. Contact Factory.
4. Per MIL-STD-202, Method 204, Condition D. Random vibration testing also available.

Notes: Specifications are typical at 25ºC unless otherwise noted. Specifications are subject to change without notice.
All combinations may not be available. All parameters are measured at an ambient temperature with a 10 MΩ, 15 pF load.

HGXO



Pin Connections

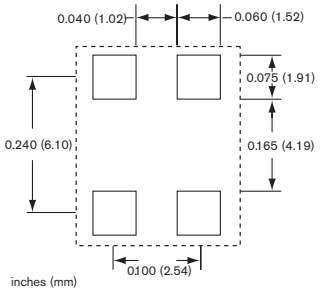
1	Enable/Disable (E or T) or not connected (N)
2	Ground
3	Output
4	VDD

Dimensions

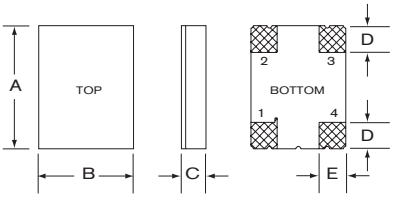
	TYP.		MAX.	
DIM	inches	mm	inches	mm
A	0.295	7.50	0.302	7.68
B	0.197	5.00	0.204	5.18
C*	0.089	2.25	0.098	2.50
D	0.055	1.40		
E	0.040	1.02		
F	0.240	6.10		
G	0.100	2.54		

* SM1 (Termination material is Au over Ni over W). Solder dip (SM3 and SM5) also available.

Suggested Land Pattern



CXOMKHG



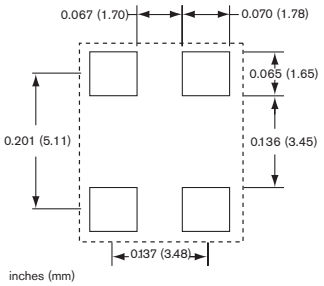
Pin Connections

1	Enable/Disable (E or T) or not connected (N)
2	Ground
3	Output
4	VDD

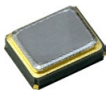
Dimensions

	TYP.		MAX.	
DIM	inches	mm	inches	mm
A	0.256	6.50	0.263	6.68
B	0.197	5.00	0.204	5.18
C(SM1)	0.055	1.34	0.060	1.52
C(SM3/SM5)	0.060	1.52	0.065	1.65
D	0.055	1.40	0.065	1.65
E	0.060	1.52	0.070	1.78

Suggested Land Pattern



MIL SURFACE MOUNT OSCILLATORS

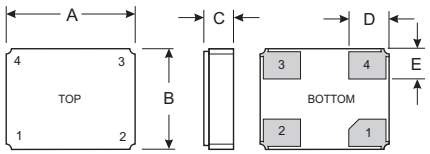


	CXOXHG 3.2x2.5 mm		CXOQHG 2.5x2.0 mm	
Frequency Range[1]	16 kHz to 160 MHz		16 kHz to 100 MHz	
Supply Voltage[2]	1.8 V to 5.0 V		1.8 V to 5.0 V	
Standard Calibration Tolerances[3]	±25 ppm, ±50 ppm, ±100 ppm		±25 ppm, ±50 ppm, ±100 ppm	
Frequency Stability Over Temp. Range[4]	±25 ppm to ±100 ppm		±25 ppm to ±100 ppm	
Standard Operating Temperature Ranges	-40ºC to +85ºC / -55ºC to +125ºC		-40ºC to +85ºC / -55ºC to +125ºC	
Supply Current (Typical)	1.8 V	3.3 V	1.8 V	3.3 V
	2.6 mA for 50 MHz	4.5 mA for 50 MHz	3 mA for 50 MHz	6 mA for 50 MHz
	1.8 mA for 32 MHz	3.0 mA for 32 MHz	2 mA for 32 MHz	3 mA for 32 MHz
	1.4 mA for 24 MHz	2.3 mA for 24 MHz	1.5 mA for 24 MHz	3 mA for 24 MHz
	68 µA for 32.768 kHz	75 µA for 32.768 kHz	115 µA for 32.768 kHz	125 µA for 32.768 kHz
Output Load (CMOS)[5]	15 pF		15 pF	
Start-up Time	5 ms MAX (0.6 ms for 32.768 kHz)		5 ms MAX (1 ms for 32.768 kHz)	
Rise/Fall Time[6]	6 ns MAX (20 ns for 32.768 kHz)		6 ns MAX (6 ns for 32.768 kHz)	
Duty Cycle[3]	45% MIN, 55% MAX		45% MIN, 55% MAX	
Aging, first year	Aging is dependent on frequency and other design considerations. Please contact factory.			
Shock, survival	Up to 100,000 g, 0.5 ms, 1/2 sine		Up to 75,000 g, 0.5 ms, 1/2 sine	
Vibration, survival[7]	20 g, 10-2000 Hz swept sine		20 g, 10-2000 Hz swept sine	

1. Not all frequencies are available under 1 MHz. Contact factory. 2. Not all voltages are available at all frequencies. Contact factory.
3. Other tolerances available. 4. Does not include calibration tolerance. Other tolerances available.
5. TTL loads and higher CMOS loads available. Contact Factory. 6. Maximum rise/fall times for 32.768 kHz are at 3.3 V. Contact factory for rise/fall times at other voltages.
7. Per MIL-STD-202, Method 204, Condition D. Random vibration testing also available.

Notes: Specifications are typical at 25ºC unless otherwise noted. Specifications are subject to change without notice.
All combinations may not be available. All parameters are measured at an ambient temperature with a 10 MΩ, 15 pF load.

CXOXHG



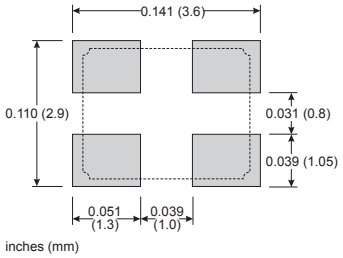
Pin Connections

1	Enable/Disable (E) or not connected (N)
2	Ground
3	Output
4	VDD

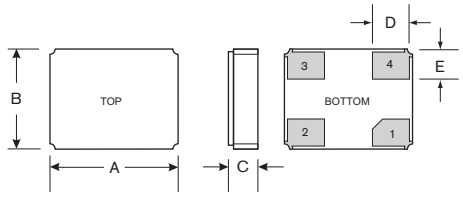
Dimensions

	TYP.		MAX.	
DIM	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
$C_{(SM3/SM5)}$	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

Suggested Land Pattern



CXOQHG



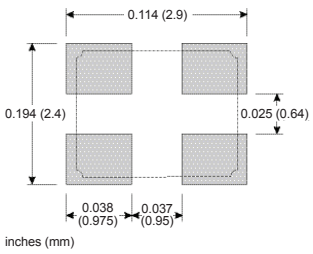
Pin Connections

1	Enable/Disable (E) or not connected (N)
2	Ground
3	Output
4	VDD

Dimensions

	TYP.		MAX.	
DIM	inches	mm	inches	mm
A	0.098	2.50	0.102	2.60
B	0.079	2.00	0.083	2.10
$C_{(SM1)}$	0.035	0.89	0.039	1.00
$C_{(SM3/SM5)}$	0.040	1.02	0.048	1.22
D	0.026	0.67	0.027	0.69
E	0.022	0.57	0.023	0.59

Suggested Land Pattern



MIL LEADED OSCILLATORS

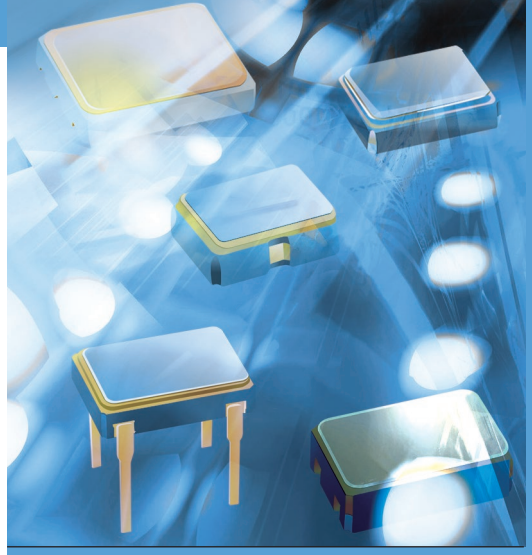
LHGAT

5.0x7.0 mm w/ Leads

Frequency Range	320 kHz to 50 MHz	
Supply Voltage	1.8 V to 5.0 V	
Standard Calibration Tolerances[1]	±20 ppm and up	
Frequency Stability Over Temp. Range[2]	±40 ppm to ±100 ppm	
Standard Operating Temperature Ranges	-40ºC to +85ºC / -55ºC to +125ºC	
Supply Current (Typical)	3.3 V	5.0 V
	6.0 mA for 50 MHz	13 mA for 50 MHz
	5.5 mA for 40 MHz	12 mA for 40 MHz
	5.0 mA for 32 MHz	10 mA for 32 MHz
	3.0 mA for 24 MHz	8.0 mA for 24 MHz
Output Load (CMOS)[3]	15 pF	
Start-up Time	5 ms MAX	
Rise/Fall Time	4 ns TYP, 8 ns MAX	
Duty Cycle[1]	45% MIN, 55% MAX	
Aging, first year[4]	See note 4 below	
Shock, survival	Up to 100,000 g, 0.5 ms, 1/2 sine	
Vibration, survival[5]	20 g, 10-2000 Hz swept sine	

1. Other specifications available.
2. Does not include calibration tolerance. Other tolerances available.
3. TTL loads and higher CMOS loads available. Contact Factory.
4. Aging is dependent on frequency and other design considerations. Please contact factory.
5. Per MIL-STD-202, Method 204, Condition D. Random vibration testing also available.

Notes: Specifications are typical at 25ºC unless otherwise noted. Specifications are subject to change without notice. All combinations may not be available. All parameters are measured at an ambient temperature with a 10 MΩ, 15 pF load.



Absolute Maximum Ratings

Supply Voltage V_{DD}	
Nominal voltage < 4.0 V	-0.5 V to 4.0 V
Nominal voltage ≥ 4.0 V	-0.5 V to 7.0 V
Storage Temperature	-55ºC to +125ºC
Maximum Process Temp.	260ºC for 20 seconds

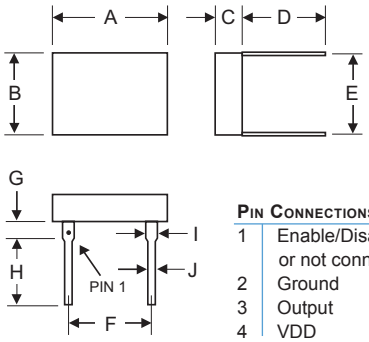
Enable / Disable Options (E/T/N)

Statek offers three enable/disable options: E, T, and N. Both the E-version and T-version have Tri-State outputs and differ in whether the oscillator continues to run internally when the output is put into the high Z state: it stops in the E-version and continues to run in the T-version. So, the E-version offers very low current consumption when the oscillator is disabled and the T-version offers very fast output recovery when the oscillator is re-enabled. The N-version does not have PIN 1 connected internally and so has no enable/disable capability. The following table summarizes the three options.

Options	E	T	N
When enabled (PIN 1 is high*)			
Output	Freq. output	Freq.output	Freq. output
Oscillator	Oscillates	Oscillates	Oscillates
Current	Normal	Normal	Normal
When disabled (PIN 1 is low)			
Output	High Z state	High Z state	Freq. output
Oscillator	Stops	Oscillates	Oscillates
Current	Very low	Lower than normal	Normal
When re-enabled (PIN 1 changes from low to high)			
Output recovery	Delayed	Immediate	N/A

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

LHGAT



Pin Connections

1	Enable/Disable (E) or not connected (N)
2	Ground
3	Output
4	VDD

Dimensions

	TYP.		MAX.	
DIM	inches	mm	inches	mm
A	0.276	7.00	0.281	7.14
B	0.197	5.00	0.202	5.13
C	0.065	1.65	0.070	1.78
D	0.200	5.08	0.205	5.20
E	0.195	4.90	0.205	5.20
F	0.200	5.08	0.205	5.20
G	0.040	1.02		
H	0.160	4.06		
I	0.028	0.71		
J	0.018	0.46	0.021	0.53

How to Order | Specify

CXOXLPN **4** **D** **S** **E** **SM3** - **32.0M** **A** **1** **BA**

Model Number
STXOHG
CXOXLPNR
CXOLATHG
CXOXLPNHG
HGXO
CXOMKHG
CXOXHG
CXOQHG
LHGAT

Supply Voltage Code
1 = 1.8V
2 = 2.5V
3 = 3.0V
4 = 3.3V
5 = 5.0V

Shock Level Code
A = 5,000 g
B = 10,000 g
C = 20,000 g
D = 30,000 g
F = 50,000 g
G = 75,000 g
H = 100,000 g

Special or Custom
S = Special or custom
Blank = Standard

Enable/Disable Option Code
E, T, or N
E and T are not available in all frequencies; contact factory with specific requirements.

Termination Code
SM1 & SM5 are Pb-free. SM3 is 60/40 Sn/Pb.

Frequency Code
K = kHz
M = MHz

Accuracy at 25ºC Code
A = 100 ppm
D = 10 ppm
F = 25 ppm
G = 30 ppm
H = 50 ppm
X = Total Tolerance

Frequency Temperature Stability Code / Total Tolerance Code
1 = 100 ppm; -40ºC to +85ºC
2 = 50 ppm; -40ºC to +85ºC
3 = 25 ppm; -40ºC to +85ºC
4 = 100 ppm; -55ºC to +125ºC
5 = 50 ppm; -55ºC to +125ºC

Test Option Code
B0 = Standard Testing Only
B1 = Screening (MIL-PRF-55310)
BA = Screening + Group A
BB = Screening + Groups A & B
BC = Screening + Groups A, B, & C

example
CXOXLPN4DSESM3-32.0MA1BA

see next page

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**

B0

	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%

B1

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

BA

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

BB

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

BC

- 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

IN-HOUSE TEST CAPABILITIES FOR OSCILLATORS

Electrical Testing	Frequency, current, duty cycle, rise/fall time, etc.	PIND (Particle Impact Noise Detection)	MIL-STD-883, Method 2020, Conditions A–B
Temperature Testing	Frequency, current, etc. over temperature	Moisture Resistance	MIL-STD-202, Method 106
Die Shear Strength	MIL-STD-883, Method 2019	Salt Atmosphere	MIL-STD-202, Method 101, Condition B
Wirebond Pull Test	MIL-STD-883, Method 2023	Solderability	MIL-STD-883, Method 2003
Burn-In	MIL-PRF-55310 per Table III	Temperature Cycling	MIL-STD-883, Method 1010
Seal Testing	MIL-STD-883, Method 1014 MIL-STD-202, Method 112	Thermal Shock	MIL-STD-202, Method 107, Conditions A–B
Mechanical Shock	MIL-STD-202, Method 213, Conditions A–F MIL-STD-883, Method 2002, Conditions A–G	Radiographic Inspection	MIL-STD-202, Method 209 MIL-STD-883, Method 2012
Mechanical Vibration	MIL-STD-202, Method 204, Conditions A, B, D	Aging	MIL-PRF-55310, Para 4.8.35

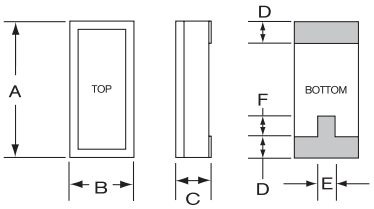
MIL SURFACE MOUNT CRYSTALS

	CX4HGSM 5.0x1.83 mm					CX11LHGSM 3.2x1.5 mm		
Frequency Range	14 MHz to 50 MHz					16 MHz to 50 MHz		
Fundamental Frequency	14.7456 MHz	16 MHz	20 MHz	32 MHz	40 MHz	16 MHz	24 MHz	32 MHz
Motional Resistance R1 (Ω)	60	75	50	30	30	90	30	25
Motional Capacitance C1 (fF)	1.4	1.5	1.4	2.5	1.5	1.5	1.6	1.9
Quality Factor Q (k)	120	90	110	70	90	70	150	110
Shunt Capacitance C0 (pF)	0.8	0.9	0.9	1.1	1.0	0.7	0.7	0.9
Calibration Tolerance[1]	±100 ppm, or tighter as required					±100 ppm, or tighter as required		
Load Capacitance	10 pF (unless specified otherwise)					10 pF (unless specified otherwise)		
Drive Level	200 µW MAX					200 µW MAX		
Frequency - Temp. Stability[2]	±30 ppm to ±100 ppm					±30 ppm to ±100 ppm		
Standard Operating Temp. Ranges	-40ºC to +85ºC / -55ºC to +125ºC					-40ºC to +85ºC / -55ºC to +125ºC		
Aging, first year	Aging is dependent on frequency and other design considerations. Please contact factory.							
Shock, survival[3]	Up to 100,000 g, 0.5 ms, 1/2 sine					Up to 100,000 g, 0.5 ms, 1/2 sine		
Vibration, survival[4]	20 g, 10-2,000 Hz swept sine					20 g, 10-2,000 Hz swept sine		
Storage Temp. Range	-55ºC to +125ºC					-55ºC to +125ºC		
Max Process Temperature	+260ºC for 20 sec.					+260ºC for 20 sec.		

1. Other tolerances available, contact factory.
2. Does not include calibration tolerance. The characteristics of the frequency stability over temperature follow that of the AT thickness-shear mode.
3. For over 100,000 g. Contact factory.
4. Per MIL-STD-202, Method 204, Condition D. Random vibration testing also available.

Notes: Specifications are typical at 25ºC unless otherwise noted. Specifications are subject to change without notice. All combinations may not be available.

CX4HGSM



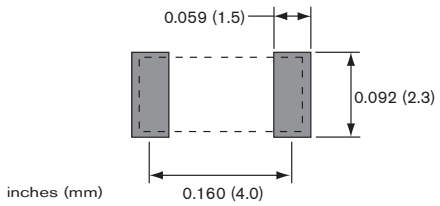
Dimensions

DIM	TYP. inches	TYP. mm	MAX. inches	MAX. mm
A	0.197	5.00	0.210	5.33
B	0.072	1.83	0.085	2.16
C	–	–	see below	
D	0.036	0.91	0.046	1.16
E	0.020	0.51	–	–
F	0.025	0.64	–	–

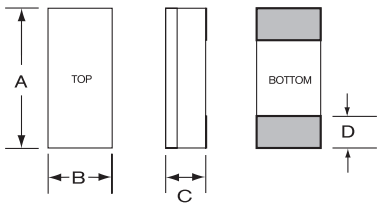
Thickness Dimension C (Maximum)

Termination	Glass Lid inches	Glass Lid mm	Ceramic Lid inches	Ceramic Lid mm
SM1	0.045	1.14	0.050	1.27
SM2/SM4	0.046	1.17	0.051	1.30
SM3/SM5	0.048	1.22	0.053	1.35

Suggested Land Pattern



CX11LHGSM



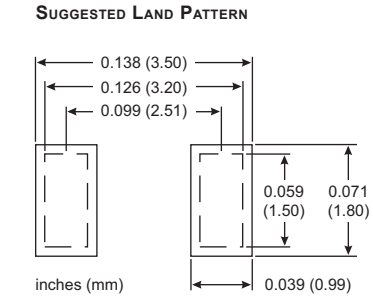
Dimensions

DIM	TYP. inches	TYP. mm	MAX. inches	MAX. mm
A	0.127	3.20	0.135	3.48
B	0.060	1.50	0.068	1.73
C	–	–	see below	
D	0.028	0.71	0.037	0.94

Thickness Dimension C (Maximum)

Termination	Glass Lid inches	Glass Lid mm	Ceramic Lid inches	Ceramic Lid mm
SM1	0.034	0.87	0.023	0.59
SM2/SM4	0.035	0.89	0.024	0.60
SM3/SM5	0.037	0.94	0.025	0.63

Suggested Land Pattern



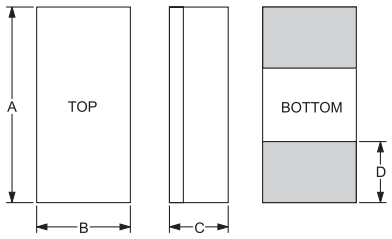
MIL SURFACE MOUNT CRYSTALS

	CX20HGSM 2.5x1.2 mm		CX16HGSM 2.0x1.2 mm		
Frequency Range	16 MHz to 50 MHz		24 MHz to 100 MHz		
Fundamental Frequency	16 MHz	24 MHz	24 MHz	32 MHz	48 MHz
Motional Resistance R1 (Ω)	150	50	45	45	30
Motional Capacitance C1 (fF)	1.2	1.6	1.6	1.8	2.3
Quality Factor Q (k)	60	80	90	60	50
Shunt Capacitance C0 (pF)	0.7	0.8	0.7	0.8	0.8
Calibration Tolerance[1]	±100, or tighter as required		±100 ppm, or tighter as required		
Load Capacitance	9 pF (unless specified otherwise)		10 pF (unless specified otherwise)		
Drive Level	200 µW MAX		200 µW MAX		
Frequency - Temp. Stability[2]	±30 ppm to ±100 ppm		±30 ppm to ±100 ppm		
Standard Operating Temp. Ranges	-40ºC to +85ºC / -55ºC to +125ºC		-40ºC to +85ºC / -55ºC to +125ºC		
Aging, first year	Aging is dependent on frequency and other design considerations. Please contact factory.				
Shock, survival	Up to 100,000 g, 0.5 ms, 1/2 sine		Up to 50,000 g, 0.5 ms, 1/2 sine		
Vibration, survival[3]	20 g, 10-2,000 Hz swept sine		20 g, 10-2,000 Hz swept sine		
Storage Temp. Range	-55ºC to +125ºC		-55ºC to +125ºC		
MAX Process Temperature	+260ºC for 20 sec.		+260ºC for 20 sec.		

1. Other tolerances available, contact factory.
2. Does not include calibration tolerance.
   The characteristics of the frequency stability over temperature follow that of the AT thickness-shear mode.
3. Per MIL-STD-202, Method 204, Condition D. Random vibration testing also available.

Notes: Specifications are typical at 25ºC unless otherwise noted. Specifications are subject to change without notice. All combinations may not be available.

CX20HGSM



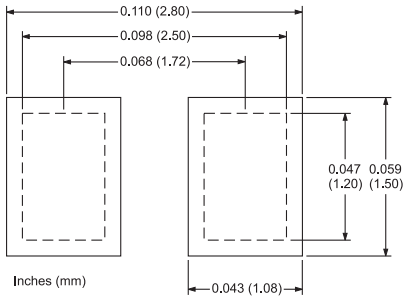
Dimensions

DIM	TYP. inches	TYP. mm	MAX. inches	MAX. mm
A	0.098	2.50	0.106	2.68
B	0.047	1.20	0.055	1.38
C	–	–	see below	
D	0.030	0.75	0.035	0.88

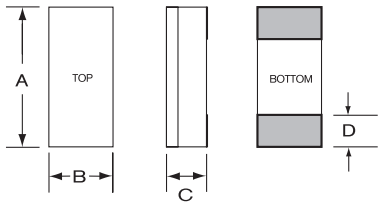
Thickness Dimension C (Maximum)

Termination	Ceramic Lid inches	Ceramic Lid mm
SM1	0.021	0.53
SM2/SM4	0.022	0.55

Suggested Land Pattern



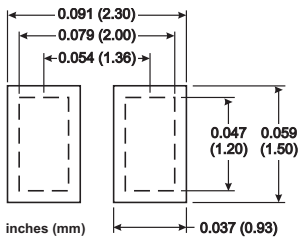
CX16HGSM



Dimensions

DIM	TYP. inches	TYP. mm	MAX. inches	MAX. mm
A	0.079	2.00	0.083	2.11
B	0.047	1.20	0.056	1.42
C	0.017	0.43	0.020	0.51
D	0.026	0.66	0.029	0.74

Suggested Land Pattern



MIL SURFACE MOUNT CRYSTALS

CX18HGSM

1.6x1.0 mm

Frequency Range	30 MHz to 100 MHz	
Fundamental Frequency	32 MHz	49 MHz
Motional Resistance R1 (Ω)	60	45
Motional Capacitance C1 (fF)	1.0	1.2
Quality Factor Q (k)	80	60
Shunt Capacitance C0 (pF)	0.6	0.5
Calibration Tolerance[1]	±100 ppm, or tighter as required	
Load Capacitance	9 pF (unless specified otherwise)	
Drive Level	100 µW MAX	
Frequency - Temp. Stability[2]	±30 ppm to ±100 ppm	
Standard Operating Temp. Ranges	-40ºC to +85ºC / -55ºC to +125ºC	
Aging, first year[3]	See note 3 below	
Shock, survival	Up to 75,000 g, 0.5 ms, 1/2 sine	
Vibration, survival[4]	20 g, 10-2,000 Hz swept sine	
Storage Temp. Range	-55ºC to +125ºC	
MAX Process Temperature	+260ºC for 20 sec.	

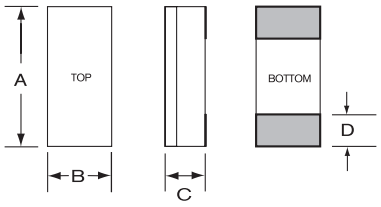
1. Other tolerances available, contact factory.
2. Does not include calibration tolerance.
   The characteristics of the frequency stability over temperature follow that of the AT thickness-shear mode.
3. Aging is dependent on frequency and other design considerations. Please contact factory.
4. Per MIL-STD-202, Method 204, Condition D. Random vibration testing also available.

Notes: Specifications are typical at 25ºC unless otherwise noted. Specifications are subject to change without notice.
All combinations may not be available.

Statek's Crystal Expertise

Statek's innovative design and manufacturing processes can support the most demanding applications. Photo-lithographic micromachining and ceramic packaging expertise allows us to offer ultra-miniature highly reliable products with frequencies ranging from 1 Hz to 250 MHz, the broadest industry offering for crystal resonators and oscillators.

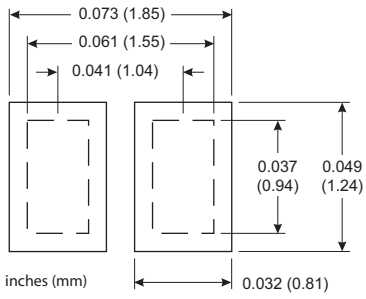
CX18HGSM



Dimensions

DIM	TYP. inches	TYP. mm	MAX. inches	MAX. mm
A	0.063	1.60	0.066	1.68
B	0.039	1.00	0.042	1.07
C	0.016	0.41	0.018	0.46
D	0.022	0.56	0.025	0.64

Suggested Land Pattern



How to Order | Specify

CX4	HG3	S	C	SM3	XMC	-	32.0M	100 / 100 / – /	M
Model Number	**Shock Level Code**	**Special or Custom Code**	**Lid Code**	**Termination Code**	**Screening Code**		**Frequency and Code**	**Accuracy at 25ºC / Frequency Stability Over Temp Range**	**Operating Temperature Range Code**
CX4 CX11L CX16 CX18 CX20	Blank = Standard shock level HG1 = 10,000 g HG2 = 20,000 g HG3 = 30,000 g HG4 = 50,000 g HG5 = 75,000 g HG6 = 100,000 g	S = Special or custom Blank = Standard	C = Ceramic Blank = Glass	SM1, SM4, & SM5 are Pb-free. SM2 & SM3 are 60/40 Sn/Pb.	XMA, XMB, or XMC See chart on next page.		K = kHz M = MHz	As required or Combined	C = -10ºC to +70ºC I = -40ºC to +85ºC M = -55ºC to +125ºC S = Customer Specified

Note: Other package styles are available, please inquire.

Note: Not all shock levels are available for all packages listed.
Shock levels beyond 100,000 g are available, please consult the factory.

example

CX4HG3CSM3XMC-32.0M100/100/–/M

— / — / 200 / M

CRYSTAL SCREENING OPTIONS

Statek Test Option **XMA**

Standard Testing includes: Internal Visual Inspection, Frequency & Resistance over Operating Temperature Range, Seal Test, Electrical Testing, and Final Visual Inspection.

Statek Test Option **XMB**

Screening	Standard	Method	Condition	Comments
Internal Visual	Statek Internal Standard			Pre-seal
Unwanted Modes	MIL-PRF-3098			Spurious-mode ratio of 2:1 or greater
Frequency and Resistance over Operating Temperature Range	MIL-PRF-3098			Measure every 2.5ºC or tighter over the operating temperature range; frequency and resistance must meet specification.
Seal Test (Fine Leak)	MIL-STD-202	112	C	
Seal Test (Gross Leak)	MIL-STD-202	112	D or E	
DLD Testing	Modified IEC 60444-6			Sweep from 10 nW to nominal drive level and back again in 1 dB steps, requiring that resistance be no greater than the maximum allowed resistance or 1.5 times the minimum resistance.
Final Electrical Test	IEC 60444	π-Network		Measure Fs, R1, C1, C0, Q, and FL
External Visual	Statek Internal Standard			Post-seal

Statek Test Option **XMC**

Screening	Standard	Method	Condition	Comments
Internal Visual	Statek Internal Standard			Pre-seal
PIND Testing	MIL-STD-883	2020	A	Performed in both the thickness and width directions.
Unwanted Modes	MIL-PRF-3098			Spurious-mode ratio of 2:1 or greater
Frequency and Resistance over Operating Temperature Range	MIL-PRF-3098			Measure every 2.5ºC or tighter over the operating temperature range; frequency and resistance must meet specification.
Thermal Shock	MIL-STD-202	107	B	Frequency and resistance must meet specification before and after thermal shock.
Seal Test (Fine Leak)	MIL-STD-202	112	C	
Seal Test (Gross Leak)	MIL-STD-202	112	D or E	
Accelerated Aging	MIL-PRF-3098			Aging at 105ºC ± 3ºC for a minimum of 168 hours. For all parts, their frequency and resistance must meet specification before and after aging. For 30 randomly selected parts, the change in series frequency must be not greater than than 5 ppm.
DLD Testing	Modified IEC 60444-6			Sweep from 10 nW to nominal drive level and back again in 1 dB steps, requiring that resistance be no greater than the maximum allowed resistance or 1.5 times the minimum resistance.
Final Electrical Test	IEC 60444	π-Network		Measure Fs, R1, C1, C0, Q, and FL
Radiographic Inspection	MIL-STD-202	209		Viewed from both the thickness and width directions. Inspected to remove parts that are abnormal or defective.
External Visual	Statek Internal Standard			Post-seal

IN-HOUSE TEST CAPABILITIES FOR CRYSTALS

Electrical Testing	Crystal parameters, DLD testing, spur testing, etc.	PIND (Particle Impact Noise Detection)	MIL-STD-883, Method 2020, Conditions A–B
Temperature Testing	Frequency and resistance over temperature	Moisture Resistance	MIL-STD-202, Method 106
Thermal Shock	MIL-STD-202, Method 107, Conditions A–B	Salt Atmosphere	MIL-STD-202, Method 101, Condition B
Seal Testing	MIL-STD-202, Method 112	Solderability	MIL-STD-202, Method 208
Mechanical Shock	MIL-STD-202, Method 213, Conditions A–F MIL-STD-883, Method 2002, Conditions A–G	Radiographic Inspection	MIL-STD-202, Method 209 MIL-STD-883, Method 2012
Mechanical Vibration	MIL-STD-202, Method 204, Conditions A, B, D	Aging	MIL-PRF-3098

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Orange, California

Statek Corporation maintains synergetic relationships with its sister companies Greenray Industries (high precision oscillators) and Advanced Technical Ceramics Company (HTCC, ceramic feedthroughs, multilayer ALN, chemical milling, injection molding) both leaders in their respective industries. Our alliance helps us to serve our customers with leading-edge innovation and world-class manufacturing, all from a single source.

Greenray Industries
Mechanicsburg, Pennsylvania

AdTech Ceramics
Chattanooga, Tennessee

Ultra-Miniature, High-Reliability
Quartz Crystals, Oscillators and Sensors

AS9100

ISO 9001

All of our products are designed and manufactured in the United States of America.

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