

# **SELECTION GUIDE** The widest choice of quartz crystals, oscillators and sensors

Visit our website www.statek.com

# THE COMPANY

In 1970, Statek Corporation was the first to use semiconductor technology such as photolithography, chemical etching 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.

Innovative in-house design, production and testing capabilities make possible not only rapid new product development and validation, but also continuous improvement of key product features such as low acceleration sensitivity, high shock, tight calibration tolerance, low aging, radiation resistance, and highly stable frequencies at increasingly higher operating temperatures.

# **KEY ATTRIBUTES**

- Ultra miniature products
- Highest shock survivability in the industry
- High stability and precision
- Proven reliability
- Excellent long-term aging
- Full military testing
- Widest selection of packaging options
- Prompt specialized technical support
- Full lot traceability
- Designed and manufactured in the USA

ISO 9001

AS9100

10100 - Rev L



# EXAMPLES OF APPLICATIONS

Medical		De	Defense and Aerospace		Industrial		
	Cardiac rhythm management		Smart munitions		Oil and gas exploration		
	Neurostimulators		High shock embedded electronics		Directional drilling		
	RF telemetry		Guidance and navigation		Ruggedized wireless communications		
	Infusion pumps		Communications		Force, temperature, pressure sensors		
	Cochlear implants		Sensors (IMU)		Inventory control		
	Orthopedic implants		Avionics		Transport safety		
	Retinal implants		Military medical devices		Public transport electronics		
	Glaucoma implants		Space / Satellites		In-flight entertainment systems		
	Patient monitoring equipment		Unmanned Aerial Vehicles (UAV)		Aircraft engines		

SURFACE MOUNT CRYSTALS – 10 kHz to 250 MHz	Frequency Range	Reference Data Sheets
CX1	10 kHz to 600 kHz (Tuning Fork) 530 kHz to 2.1 MHz (Extensional)	10121 CX1VSM TF 10122 CX1HSM TF 10183 CX1VHT 10129 CX1SM EXT 10185 CX1HT EXT
3.56mm	6 MHz to 250 MHz (AT Fundamental)	10107 CX1SM AT 10108 CX1HGSM AT 10184 CX1HT AT 10199 SWCX1SM AT
CX3	18 kHz to 600 kHz (Tuning Fork) 800 kHz to 1.35 MHz (Extensional)	10104 CX3VSM TF 10146 CX3HSM TF 10123 CX3SM EXT
2.46mm     1.35mm	9.6 MHz to 250 MHz (AT Fundamental)	10120 CX3SM AT 10182 CX3HGSM AT
HG = HIGH SHOCK		
CX4	30 kHz to 250 kHz (Tuning Fork) 600 kHz to 2.5 MHz (Extensional)	10103 CX4VSM TF 10183 CX4VHT TF 10161 CX4 EXT 10185 CX4HT EXT
HG = HIGH SHOCK. HT = HIGH TEMPERATURE	14 MHz to 250 MHz (AT Fundamental) 14 MHz to 50 MHz (High Shock)	10150 CX4SM AT 10184 CX4HT AT 10165 CX4HGSM AT
HIGHEST SHOCK SURVIVABILITY		
CX6	18 kHz to 600 kHz (Tuning Fork) 800 kHz to 1.35 MHz (Extensional)	10132 CX6VSM TF 10133 CX6SM EXT
2.62mm 0.99mm	9.6 MHz to 250 MHz (AT Fundamental)	10117 CX6SM AT
CX9	32 kHz to 250 kHz (Tuning Fork) 32 kHz to 160 kHz (Tuning Fork / High Temp)	10157 CX9VSM TF 10183 CX9VHT TF
$1.50 \text{ mm} \rightarrow 4 - 4 = 0.87 \text{ mm}$	13.5 MHz to 250 MHz (AT Fundamental)	10158 CX9SM AT 10187 CX9 Telemetry
CX11/CX11L/CX11LHG	32 kHz to 180 kHz (Tuning Fork)	10174 CX11SM TF
3.20mm	16 MHz to 250 MHz (AT Fundamental)	10179 CX11SM AT 10188 CX11L Telemetry
L = Low-Profile Package Version, 0.51mm typical height HG = HIGH SHOCK	16 MHz to 50 MHz (AT Fundamental / High Shock)	10193 CX11LHG
CX14 3.20mm 2.50mm ← → → ← 0.52mm	12 MHz to 50 MHz (AT Fundamental)	10173 CX14SM AT



10100 - Rev L

0

Roll

Co

SGS

SGS

SURFACE (continued)	MOUNT CRYSTALS	– 10 kHz to 250 MHz	Frequency Range	Reference Data Sheets
CX16	2.0 x 1.2 mm	2.00mm ↓ 1.20mm ← →	24 MHz to 50 MHz (AT Fundamental)	10200 CX16SM AT
CX17	High Pullability for VCTCXO Applications	4.80mm	12 MHz to 200 MHz (AT Fundamental)	10206 CX17SM AT
CX18	<b>1.55 x 0.95 mm</b> Actual Size ■	1.55mm ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓	30 MHz to 50 MHz (AT Fundamental)	10207 CX18SM AT



# ORDERING OPTIONS FOR STATEK QUARTZ CRYSTALS



SURFACE M 30 kHz to 3	OUNT OSCILLATORS 00 MHz	Model	Package Configuration	Features	Frequency Range	Reference Data Sheets
CXOL	3.20mm 0.95mm 1.50 mm	CXOL Fast Start-up	4-pad Ceramic SMD	1.2V to 5.0V operation CMOS/TTL compatible Enable/Tri-state output	32 kHz to 100 kHz 32.768 kHz	10205 10217
ULTRA-LOW CUR	RENT					
CXOMK		CXOMK CXOMKHG High Shock	4-pad Ceramic SMD	0.9V to 5V operation CMOS/TTL compatible Enable/Tri-state output	200 kHz to 200 MHz	10210
4.19M 6.6	50mm	CXOMKHT High Temp	4-pad Ceramic SMD	3.3V or 5V operation CMOS/TTL compatible Enable/Tri-state output	200 kHz to 50 MHz	10180
5.	↓	CXOMKHT High Temp Fast Start-up	4-pad Ceramic SMD	3.3V operation CMOS/TTL compatible Enable/Tri-state output	32.768 kHz	10201
CXOQ	2.00mm <u>1</u> 2.50mm	CXOQ/ CXOQHG High Shock	4-pad Ceramic SMD	1.8V to 3.3V operation CMOS/TTL compatible Enable/Tri-state output	400 kHz to 100 MHz	10190
CXOX		CXOX/ CXOXHG High Shock	4-pad Ceramic SMD	1.8V to 5V operation CMOS/TTL compatible Enable/Tri-state output	1 MHz to 160 MHz 32.768 kHz	10168 10203 (3.3V)
51	3.20mm	CXOXHT High Temp	4-pad Ceramic SMD	3.3V or 5V operation CMOS/TTL compatible	1 MHz to 50 MHz	10180
		Fast Start Up			32.768 kHz	10201
		CXOXULP		Ultra-Low Power		10216
DFXO	5.0 mm -7.0mm1.75mm	DFXO Differential Output Low Jitter	6-pad Ceramic SMD	2.5V to 3.3V operation LVPECL, LVDS, CMOS outputs available Low phase noise Low phase jitter High frequency	20 MHz to 300 MHz	10196
HFXO	6.50mm → → → ←1.65mm	HFXO High Precision High Shock	4-pad Ceramic SMD	0.9V to 5V operation CMOS/TTL compatible hybrid circuit Shock survivability of 75,000 g Tight frequency tolerance	220 kHz to 100 MHz	10189
HGXO	7.50mm	HGXO High Shock HGXOHT High Temp	4-pad Ceramic SMD	1.8V to 5V operation CMOS/TTL compatible Extreme high shock survivability up to	460 kHz to 50 MHz	10156 10208 (3.3V and 5 0\/)
		Fast Start Up and High Temp		100,000 g. Highest accuracy and stability	32.768 kHz	10209
HIGHEST SHOCK	SURVIVABILITY					

10100 - Rev L



SGS

SGS

SURFACE MOUNT OSCILLATORS 30 kHz to 300 MHz (continued)	Model	Package Configuration	Features	Frequency Range	Reference Data Sheets
HTXO	HTXO High Temperature	4-pad Ceramic SMD	3.3V and 5V operation CMOS output Extreme high temperature survivability up to 250°C High stability Tri-state output (optional)	1.5 MHz to 50 MHz	10214
	LFXO Fast Start Up	4-pad Ceramic SMD	1.8V to 5V operation CMOS/TTL compatible High shock resistance	32.768 kHz	10191
5.00mm + + +1.60mm	LFXOTF Low Power		Tight frequency- temperature stability		10195
	LSM	4-pad Ceramic SMD	3.3V or 5V operation CMOS compatible Tri-state output (optional)	30 kHz to 400 kHz	10151
			Lowest current Highest accuracy and stability	700 kHz to 2.1 MHz	10154
4.50mm 1.80mm LSM 1.65mm LSC	LSC	4-pad Ceramic SMD	3.3V or 5V operation CMOS compatible Tri-state output (optional) Lowest current	30 kHz to 400 kHz	10153
VCXO	VCXO	6-pad Ceramic SMD	3.3V operation CMOS/TTL compatible High frequency	16.384 MHz to 130 MHz	10197

LEADED OSCILLATORS 320 kHz to 50 MHz	Model	Package Configuration	Features	Frequency Range	Reference Data Sheets
LHGAT/LHTAT	LHGAT High Shock LHTAT High Temperature	4-Pin Ceramic (outward bent leads available)	3.3V operation CMOS/TTL compatible Enable/Tri-state output	320 kHz to 50 MHz	10211

# ORDERING OPTIONS FOR STATEK QUARTZ CRYSTAL OSCILLATORS



Roll

SGS

SGS

TEMPERATURE SENSORS - 160 kHz to 350 kHz	Frequency Range	Reference Data Sheets
TS1 See CX1 surface mount and leaded package configurations for typical dimensions.	160 kHz to 350 kHz (Tuning Fork)	10162
TS2 See CX2 surface mount and leaded package configurations for typical dimensions.	160 kHz to 350 kHz (Tuning Fork)	10162

# LEGACY OSCILLATORS

Statek provides full support for its legacy oscillators. Please contact us.



3 Pin / 6 Pin

TO-39 / TO-5



24 Pad LCC Leadless Chip Carrier



4 Pin Half DIP



4 Pin Full DIP

TCXO/OCXO

# PLEASE CONTACT OUR SISTER COMPANY: GREENRAY INDUSTRIES, TEL: 717-766-0223 FAX: 717-790-9509 / WEBSITE: WWW.GREENRAYINDUSTRIES.COM







Greenray Industries Mechanicsburg, Pennsylvania

Statek Corporation maintains synergetic relationships with sister companies Greenray Industries (www.greenrayindustries.com) and Advanced Technical Ceramics Company (www.adtechceramics.com), both leaders in their respective industries. Our alliance helps us to best serve our customers with leading-edge innovation and world-class manufacturing, all from a single source.



Advanced Technical Ceramics Company Chattanooga, Tennessee



# **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)





STATEK

Fax 714-997-1256 www.statek.com







	HGXO		CXOMKHG			
	5x7.5mm		6.5x5mm			
Frequency Range	32.768 kHz to 50 MHz		32.768 kHz to 1	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 <sup>1</sup>	±10 ppm, ±25 p	om, ±50 ppm, ±100 ppm	±25 ppm, ±50 p	pm, ±100 ppm		
Frequency Stability Over Temp. Range <sup>2</sup>	±25 ppm to ±10	0 ppm	±25 ppm to ±10	00 ppm		
Standard Operating Temperature Ranges	-40°C to +85°C	/ -55°C to +125°C	-40°C to +85°C	/ -55°C to +125°C		
Supply Current (Typical)	3.3 V	5.0 V	3.3 V	5.0 V		
	10 mA for 50 MHz	14 mA for 50 MHz	10 mA for 50 MHz	14 mA for 50 MHz		
	8 mA for 40 MHz	12 mA for 40 MHz	8 mA for 40 MHz	12 mA for 40 MHz		
	6 mA for 30 MHz	10 mA for 30 MHz	6 mA for 30 MHz	10 mA for 30 MHz		
	4 mA for 24 MHz	8 mA for 24 MHz	4 mA for 24 MHz	8 mA for 24 MHz		
Output Load (CMOS) <sup>3</sup>	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 <sup>1</sup>	40% MIN, 60% MAX		40% MIN, 60% MAX			
Aging, first year Aging is dependent on FREQUENCY		NT ON FREQUENCY AND OTHER	DESIGN CONSIDERAT	TIONS. 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 <sup>4</sup>	20 g, 10-2000 H	z swept sine	20 g, 10-2000 Hz swept sine			

1. Other tolerances available.

2. Does not include calibration tolerance. Other tolerances available.

TTL loads and higher CMOS loads available. Contact Factory.
 Per MIL-STD-202G, Method 204D, Condition D. Random vibration testing also available.

Notes: Specifications are typical at 25°C 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** Enable/Disable (E or T) or not connected (N) 1
- 2 Ground
- 3 Output
- 4 VDD

DIMENSIONS

	TYP.		MAX	
DIM	inches	mm	inches	mm
А	0.295	7.50	0.302	7.68
В	0.197	5.00	0.204	5.18
C*	0.089	2.25	0.098	2.50
D	0.055	1.40		
Е	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.





# **CXOMKHG**





Enable/Disable (E or T) or not connected (N) 1

2 Ground

- 3 Output
- 4 VDD

DIMENSIONS									
	TYP	MAX	Κ.						
DIM	inches	mm	inches	mm					
А	0.256	6.50	0.263	6.68					
В	0.197	5.00	0.204	5.18					
C(SM1)	0.055	1.34	0.060	1.52					
C(SM3/SM	5) 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









#### **CXOXHG** CXOQHG 3.2x2.5mm 2.5x2mm Frequency Range 32.768 kHz to 160 MHz 400 kHz to 100 MHz 1.8 V to 5.0 V 1.8 V to 3.3 V Supply Voltage Standard Calibration Tolerances<sup>1</sup> ±25 ppm, ±50 ppm, ±100 ppm ±30 ppm to ±100 ppm Frequency Stability Over Temp. Range<sup>2</sup> ±25 ppm to ±100 ppm ±25 ppm to ±100 ppm Standard Operating Temperature Ranges -40°C to +85°C / -55°C to +125°C -40°C to +85°C / -55°C to +125°C Supply Current (Typical) 3.3 V 5.0 V 1.8 V 3.3 V 6 mA for 50 MHz 13 mA for 50 MHz 3 mA for 50 MHz 6 mA for 50 MHz 5.5 mA for 40 MHz 12 mA for 40 MHz 2 mA for 32 MHz 5 mA for 32 MHz 5 mA for 32 MHz 10 mA for 32 MHz 1.5 mA for 24 MHz 3 mA for 24 MHz 3 mA for 24 MHz 8 mA for 24 MHz Output Load (CMOS)<sup>3</sup> 15 pF 15 pF Start-up Time 5 ms MAX 5 ms MAX **Rise/Fall Time** 3 ns TYP, 6 ns MAX 10 ns MAX Duty Cycle<sup>1</sup> 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 50,000 g, 0.5 ms, 1/2 sine Vibration, survival4 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

SURFACE MOUNT OSCILLATORS

3. TTL loads and higher CMOS loads available. Contact Factory.

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

Notes: Specifications are typical at 25°C 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 M $\Omega$ , 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 А 0.126 3.20 0.136 3.40 В 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 Е 0.030 0.75 0.031 0.85

#### SUGGESTED LAND PATTERN



#### CXOQHG



1 Enable/Disable (E) or not connected (N)

- 2 Ground
- 3 Output
- 4 VDD

DIMENSIONS											
	TY	P.	MA	MAX.							
DIM	inches	mm	inches	mm							
А	0.098	2.50	0.102	2.60							
В	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							
Е	0.022	0.57	0.023	0.59							

#### SUGGESTED LAND PATTERN









	LHGAT 5x7mm w/ Lead	S				
Frequency Range	320 kHz to 50 M	320 kHz to 50 MHz				
Supply Voltage	1.8 V to 5.0 V					
Standard Calibration Tolerances <sup>1</sup>	±20 ppm and up	)				
Frequency Stability Over Temp. Range <sup>2</sup>	±40 ppm to ±10	0 ppm				
Standard Operating Temperature Ranges	-40°C to +85°C / -55°C to +125°C					
Supply Current (Typical)	3.3 V	5.0 V				
	6.0 mA for 50 MHz	13 mA for 50 MHz				
	3.0 mA for 24 MHz	8.0 mA for 24 MHz				
Output Load (CMOS) <sup>3</sup>	15 pF	15 pF				
Start-up Time	5 ms MAX					
Rise/Fall Time	4 ns TYP, 8 ns N	XAN				
Duty Cycle <sup>1</sup>	40% MIN, 60%	40% MIN, 60% MAX				
Aging, first year <sup>4</sup>	See note below					
Shock, survival	Up to 30,000 g, 0.5 ms, 1/2 sine					
Vibration, survival <sup>5</sup>	20 g, 10-2000 H	Iz 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.

A gaing is dependent on frequency and other design considerations. Please contact factory.
 Per MIL-STD-202G, Method 204D, Condition D. Random vibration testing also available.

Notes: Specifications are typical at 25°C 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.

DIMENSIONS



	TY	P.	MA	X.
DIM	inches	mm	inches	mm
А	0.276	7.00	0.281	7.14
В	0.197	5.00	0.202	5.13
С	0.065	1.65	0.070	1.78
D	0.200	5.08	0.205	5.20
Е	0.195	4.90	0.205	5.20
F	0.200	5.08	0.205	5.20
G	0.040	1.02		
н	0.160	4.06		
I	0.028	0.71		
J	0.018	0.46	0.021	0.53



### **Absolute Maximum Ratings**

Supply Voltage V<sub>DD</sub> Nominal voltage < 4.0 V -0.5 V to 4.0 V Nominal voltage  $\geq$  4.0 V -0.5 V to 7.0 V Storage Temperature -55°C to +125°C Maximum Process Temp. 260°C 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 reenabled. The N-version does not have PIN 1 connected internally and so has no enable/ disable capability. The following table summarizes the three options.

E	Т	N						
When enabled (PIN 1 is high*)								
Freq. output	Freq.output	Freq. output						
Oscillates	Oscillates	Oscillates						
Normal	Normal	Normal						
1 is low)								
High Z state	High Z state	Freq. output						
Stops	Oscillates	Oscillates						
Very low	Lower than normal	Normal						
When re-enabled (PIN 1 changes from low to high)								
Delayed	Immediate	N/A						
	E 1 is high") Freq. output Oscillates Normal 1 is low) High Z state Stops Very low N1 changes from Delayed	E         T           1 is high")         Freq.output           Freq.output         Freq.output           Oscillates         Oscillates           Normal         Normal           1 is low)         High Z state           High Z state         Oscillates           Stops         Oscillates           Very low         Lower than normal           1 / tanges from low to high         Delayed						

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

STAT

How to Order   Specify											
CXOMKHG	5	D	S	T	SM3	32.0M	, <u>A</u>		BA		
Model Number	Supply Voltage	Shock Level Code	Special or Custom	Enable/Disable Option Code	Termination Code	Frequency Code	Accuracy at 25°C	Frequency/Temperature Stability Code	Test Option Code B0 = Standard		
HGXO CXOMKHG CXOXHG CXOQHG LHGAT	1 = 1.8V 2 = 2.5V 3 = 3.0V 4 = 3.3V 5 = 5.0V	A = 5,000  g B = 10,000  g C = 20,000  g D = 30,000  g F = 50,000  g	S = Special or custom Blank = Standard	E, T, or N E and T are not available in all frequencies; contact factory with	SM1 & SM5 are Pb-free. SM3 is 60/40 Sn/Pb.	K = kHz M = MHz	A = 100 ppm D = 10 ppm F = 25 ppm G = 30 ppm H = 50 ppm	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	B1 = Screening (MIL-PRF-55310) BA = Screening + Group A BB = Screening +		
		H = 100,000 g		specific requirements.		example CXOMKI	HG5DSTSN	//3-32.0M, A1BA	BC = Screening + Groups A, B, & C		



# **OSCILLATOR PRODUCT LEVEL B TEST OPTIONS**

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

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 С 100% В Temperature Cycling MIL-STD-883 1010 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% 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
	Electrical Tests	MIL-STD-202	-	-	per MIL-PRF-55310
2	Visual & Mechanical	MIL-STD-202	-	-	per MIL-PRF-55310
}	Solderability	MIL-STD-202	208	-	per MIL-PRF-55310

Group BMIL-StandardTest MethodConditionSample Size30-day AgeMIL-PRF-55310Para. 4.7.1.5–per MIL-PRF-55310

	Group C (Destructive Tests)	MIL-Standard	Test Method	Condition	Sample Size
1	Vibration	MIL-STD-202	204	D	8   Inits
	Shock	MIL-STD-202	213	I	0 Offits
	Thermal Shock	MIL-STD-202	107	В	
2	Ambient Pressure	MIL-PRF-55310	Para. 4.8.46	-	4 Units
	Storage Temperature	MIL-PRF-55310	Para. 4.8.47	-	
_	Resistance to Soldering Heat	MIL-STD-202	210	В	
3	Moisture Resistance	MIL-STD-202	106	-	2 Units
	Salt Atmosphere	MIL-STD-883	1009	А	
4	Terminal Strength (as applicable)	MIL-STD-202	211	С	0.11-11-
-	Resistance to Solvents	MIL-STD-202	215	-	2 Units

• The paragraph numbers listed in this table refer to MIL-PRF-55310, Revision E

Please contact factory for additional tests, including MIL-PRF-55310 Level S tests

# IN-HOUSE TEST CAPABILITIES FOR OSCILLATORS:

Aging (Elevated Temperature)	MIL-PRF-55310, Para. 4.8.35	Salt Atmosphere	MIL-STD-883, Method 1009
Burn-in	MIL-PRF-55310, Table III	Solderability	MIL-STD-883, Method 2003
Die Shear Strength	MIL-STD-883, Method 2019	Temperature Cycling	MIL-STD-883, Method 1010
Fine/Gross Leak Testing	MIL-STD-883, Method 1014;	Temperature Range	MIL-PRF-55310, Para. 1.2.1.3, Table III
	MIL-STD-202, Method 112	Thermal Shock	MIL-STD-202, Method 107
Lead Integrity	MIL-STD-883, Method 2004	Vibration	MIL-STD-202, Method 204
Moisture Resistance	MIL-STD-202, Method 106	Wirebond Pull Test	MIL-STD-883, Method 2023
PIND (Particle Impact Noise Detection)	MIL-STD-883, Method 2020;		
	MIL-STD-202, Method 217		



Statek Test Options

**B1** 

BA

BB

subgroup







	CX1HGSM 8x3.56mm				<b>CX4HGSM</b> 5x1.83mm					
Frequency Range	6 MHz to 250 MHz		14 MHz to 50 MHz							
Fundamental Frequency	10 MHz	32 MHz	155.52	MHz	14.7	456 MHz	16 MHz	20 MHz	32 MHz	40 MHz
Motional Resistance R1 (Ω)	30	25	15			60	75	50	30	30
Motional Capacitance C1 (fF)	5.5	6.2	4.0			1.4	1.5	1.4	2.5	1.5
Quality Factor Q (k)	100	30	30			120	90	110	70	90
Shunt Capacitance C0 (pF)	2.2	2.3	2.3			0.8	0.9	0.9	1.1	1.0
Calibration Tolerance <sup>1</sup>	±100 pp	m, or tighte	r as requ	iired	±100 ppm, or tighter as required					
Load Capacitance <sup>2</sup>	20 pF fo	r f ≤ 50 MH	Z		10 pF					
	10 pF fo	r f > 50 MH	z							
Drive Level	500 µW	max for $f \leq$	50 MHz		200 μW max					
	200 µW	max for f >	50 MHz							
Frequency - Temp. Stability <sup>3</sup>	±30 ppm	n to ±100 pp	om		±30 ppm to ±100 ppm					
Standard Operating Temp. Ranges	-40°C to	+85°C / -5	5°C to +1	25°C	-40°	C to +85	°C / -55°	C to +125	°C	
Aging, first year	Aging is	DEPENDENT (	ON FREQUE	NCY AND OTHER	DESIG	IN CONSID	ERATIONS.	PLEASE CO	ONTACT FAC	CTORY.
Shock, survival <sup>4</sup>	Up to 100,000 g, 0.5 ms, 1/2 sine		Up t	o 100,00	00 g, 0.5	ms, 1/2 si	ne			
Vibration, survival⁵	20 g, 10	-2,000 Hz s	swept sin	е	20 g	j, 10-2,00	00 Hz sw	ept sine		
Storage Temp. Range	-55°C to	+125°C			-55°C to +125°C					
Max Process Temperature	+260°C	for 20 sec.			+260°C for 20 sec.					

 1. Other tolerances available, contact factory.
 2. Other specifications available, contact factory.

 3. Does not include calibration tolerance. The characteristics of the frequency stability over temperature follow that of the AT thickness-shear mode.

 4. For over 100,000 g. Contact factory.

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

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

DIMENSIONS TYP.



#### CX4HGSM

CX1HGSM



DIM	inches		mr	n	inc	ches	mm		
А	0.31	315 8.00		0.3	330	8.38			
В	0.14	10	3.5	56	0.1	155	3.94		
С	-		-		se	e belo	W		
D	0.04	15	1.1	4	0.0	)55	1.40		
Е	0.06	60	1.5	52	0.0	070	1.78		
THICKNESS DIMENSION C (Maximum)									
Temina	ation	Gla	SS	Lid	C	erami	c Lid		
		inche	es	mm	ii	nches	mm		
SM1		0.06	5	1.65	C	.070	1.78		
SM2/S	SM4	0.06	7	1.70	C	.072	1.83		
SM3/5	SM5	0.07	0	1.78	C	.075	1.90		
DIMENS	IONS	TYP	2			MA	Х.		
DIM	inc	hes	r	nm	ir	nches	mm		
А	0.1	97	5	5.00	0	.210	5.33		
В	0.0	)72	1	.83	0	.085	2.16		
С	-		-	-	s	ee bel	ow		
D	0.0	)36	C	).91	0	.046	1.16		

MAX.

E	0.020	0.51	-	-						
F	0.025	0.64	-	-						
THICKNESS DIMENSION C (Maximum)										
Temina	tion Glas	s Lid	Cerami	c Lid						
	inches	s mm	inches	mm						
SM1	0.045	1.14	0.050	1.27						
SM2/SI	M4 0.046	1.17	0.051	1.30						
SM3/SI	M5 0.048	1.22	0.053	1.35						

0.270 (6.86)

SUGGESTED LAND PATTERN 0.070 (1.78)-

SUGGESTED LAND PATTERN



STATEK CORPORATION

512 N. Main St., Orange, CA 92868

Tel. 714-639-7810 Fax 714-997-1256

inches (mm)

www.statek.com

0.160 (4.06)







	CX11LHGSM 3.2x1.5mm			<b>CX16HGSM</b> 2.0x1.2mm			
Frequency Range	16 MHz to 50 MHz		24 MHz to 50 MHz				
Fundamental Frequency	16 MHz	24 MHz		24 MHz	26.5	MHz	
Motional Resistance R1 (Ω)	90	30		100	90		
Motional Capacitance C1 (fF)	1.5	1.6		1.3	1.4		
Quality Factor Q (k)	70	150		30	30		
Shunt Capacitance C0 (pF)	0.7	0.7		0.6	0.6		
Calibration Tolerance <sup>1</sup>	±100, or	tighter a	required	±100 ppm, or tighter as required			
Load Capacitance	10 pF (u	nless spe	cified otherwise)	10 pF (unless specified otherwise)			
Drive Level	200 µW	max		200 μW max			
Frequency - Temp. Stability <sup>2</sup>	±30 ppm	n to ±100	opm	$\pm 30$ ppm to $\pm 100$ ppm			
Standard Operating Temp. Ranges	-40°C to	+85°C / -	55°C to +125°C	-40°C to	-40°C to +85°C / -55°C to +125°C		
Aging, first year	Aging is	DEPENDEN	ON FREQUENCY AND OTHER DE	SIGN CONSIDI	ERATIONS	. PLEASE CONTACT FACTORY.	
Shock, survival	Up to 75,000 g, 0.5 ms, 1/2 sine		Up to 50,000 g, 0.5 ms, 1/2 sine				
Vibration, survival <sup>3</sup>	20 g, 10-2,000 Hz swept sine		20 g, 10-2,000 Hz swept sine				
Storage Temp. Range	-55°C to	+125°C		-55°C to +125°C			
Max Process Temperature	+260°C	for 20 se	•	+260°C 1	+260°C 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-202G, Method 204D, Condition E. Random vibration testing also available.

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



**←**B



DIMENSIONS								
TYP.						MAX.		
DIM	inch	es	mm	l .	ir	nches	mm	
А	0.12	7	3.2	0	0	.135	3.48	
В	0.06	0	1.5	0	0	.068	1.73	
С	-		-		s	ee belov	N	
D	0.02	8	0.7	1	0	.037	0.94	
THICKNESS DIMENSION C (Maximum)								
Termination Glass Lid Ceramic Lid						c Lid		
		inche	es	mm		inches	mm	
SM1		0.034	4	0.87		0.023	0.59	
SM2/S	SM4	0.03	5	0.89		0.024	0.60	

#### SUGGESTED LAND PATTERN



#### CX16HGSM



DIMENS	NIONS T	YP.	MAX.			
DIM	inches	mm	inche	s mm		
А	0.079	2.00				
В	0.047	1.20				
С	-	-				
D	0.025	0.64				
THICKNESS DIMENSION C (Maximum)						
Termination Ceramic Lid						
		inches	mm			
SM1		0.017	0.43			

SM3/SM5 0.037 0.94

#### SUGGESTED LAND PATTERN





0.025 0.63





	CX18HGSM 1.55x0.95mm			
Frequency Range	30 MHz to 50 MHz			
Fundamental Frequency	32 MHz 49 MHz			
Motional Resistance R1 (Ω)	150 50			
Motional Capacitance C1 (fF)	0.9 1.1			
Quality Factor Q (k)	60 54			
Shunt Capacitance C0 (pF)	0.6 0.5			
Calibration Tolerance <sup>1</sup>	±30 to ±50 ppm, or tighter as required			
Load Capacitance	10 pF (unless specified otherwise)			
Drive Level	100 μW max			
Frequency - Temp. Stability <sup>2</sup>	±30 ppm to ±100 ppm			
Standard Operating Temp. Ranges	-40°C to +85°C / -55°C to +125°C			
Aging, first year <sup>3</sup>	See note below			
Shock, survival	Up to 75,000 g, 0.5 ms, 1/2 sine			
Vibration, survival <sup>4</sup>	20 g, 10-2,000 Hz swept sine			
Storage Temp. Range	-55°C to +125°C			
Max Process Temperature	+260°C for 20 sec.			

Other tolerances available, contact factory.
 Does not include calibration tolerance.

The characteristics of the frequency stability over temperature follow that of the AT thickness-shear mode. Aging is dependent on frequency and other design considerations. Please contact factory.
 Per MIL-STD-202G, Method 204D, Condition E. Random vibration testing also available.

Notes: Specifications are typical at 25°C 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. Photolithographic 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



DIMENS	SIONS TY	MAX.				
DIM	inches	mm	inches	mm		
А	0.061	1.55				
В	0.037	0.95				
С	see below					
D	0.020	0.51				
THICKNESS DIMENSION C (Maximum)						
Termination Glass Lid						
inches mm						
SM1	0.0	138 0.3	5			

#### SUGGESTED LAND PATTERN



STATEK

## How to Order | Specify

CX4	HG3	S	С	SM3	XMC	- 32.0M	, 100 / 100 / – /	<u> </u>
Model	Shock Level	Special	Lid Code	Termination Code	Screening	Frequency	Accuracy	Operating
Number	Code	or Custom			Code	and	at 25°C /	Temperature
		Code				Code	Frequency	Range Code
CX1	Blank = Standard	S = Special	C = Ceramic	SM1, SM4, & SM5	XMA, XMB,	K = kHz	Stability	$C = -10^{\circ}C \text{ to } +70^{\circ}C$
CX4	shock level	or custom	Blank = Glass	are Pb-free.	or XMC	M = MHz	Over Temp	I = -40°C to +85°C
CX11L	HG1 = 10,000 g	Blank =		SM2 & SM3 are	See chart on		Range Code	M = -55°C to +125°C
CX16	HG2 = 20,000 g	Standard		60/40 Sn/Pb.	next page.		As required	S = Customer Specified
CX18	HG3 = 30,000 g		•				or Combined	
Note: Other package	HG4 = 50,000 g							
styles are available,	HG5 = 75,000 g							
piedoe inquire.	HG6 = 100,000 g		example					
	Note: Not all shock levels a packages listed. Shock levels beyond 100,0 please consult the factory.	are available for all 000 g are available,	CX4H0	33CSM3XMC-32	.0M,100/100/-	/M	/	200 / M



# **CRYSTAL SCREENING OPTIONS**

Statek Test Option



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

Statek Test Option				
Screening XMB	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	MIL-PRF-3098			Measure every 2.5°C or tighter over the operating temperature
Operating Temperature Range				range; frequency and resistance must meet specification.
Seal Test (Fine Leak)	MIL-STD-202	112	С	
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				
Screening AWC	Standard	Method	Condition	Comments
Internal Visual	Statek Internal Standard			Pre-seal
PIND Testing	MIL-STD-883	2020	А	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	MIL-PRF-3098			Measure every 2.5°C or tighter over the operating temperature
Operating Temperature Range				range; frequency and resistance must meet specification.
Thermal Shock	MIL-STD-202	107	В	Frequency and resistance must meet specification before
				and after thermal shock.
Seal Test (Fine Leak)	MIL-STD-202	112	С	
Seal Test (Gross Leak)	MIL-STD-202	112	D or E	
Accelerated Aging	MIL-PRF-3098			Aging at 105°C $\pm$ 3°C 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	Full crystal parameters, DLD behavior, and more	PIND (Particle Impact Noise Detection)	MIL-STD-883, Method 2020, Condition A
Temperature Testing	Crystal frequency and resistance over temperature	Radiographic Inspection	MIL-STD-202, Method 209
Thermal Shock	MIL-STD-202, Method 107, Condition B	Moisture Resistance	MIL-STD-202, Method 106
Fine & Gross Leak Testing	MIL-STD-202, Method 112	Salt Atmosphere	MIL-STD-202, Method 101, Condition B
Mechanical Shock	MIL-STD-202, Method 213, Conditions A-F	Solderability	MIL-STD-202, Method 208
Vibration	MIL-STD-202, Method 204, Condition A	Aging	MIL-PRF-3098





TATEK

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.



NIR

Greenray Industries Mechanicsburg, Pennsylvania



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



AdTech Ceramics Chattanooga, Tennessee

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

