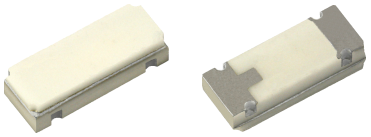
SWCX4V/SWCX4 SWEPT QUARTZ CRYSTALS

32.768 kHz, 14 MHz to 100 MHz

Radiation Resistant, Surface Mount



DESCRIPTION

For applications that require resistance to radiation, Statek offers the SWCX4V (tuning-fork) and SWCX4 (AT-cut) swept-quartz resonators. Made with cultured quartz that is electrically "swept" at high temperature, these resonators are superior to those utilizing non-swept quartz in maintaining their frequency and other electrical characteristics under exposure to radiation levels of above 100 krad (1 kGy). As rad-hard applications typically require various degrees of high-reliability components, Statek offers these resonators in three distinct screening options to meet mission critical program requirements from engineering to flight.

FEATURES

- Radiation resistant to total doses above 100 krad
- High shock resistance, three point mount*
- Ultra-high reliability
- Custom designs available
- Military and space screening available
- Low aging
- Critical processes performed in cleanroom
- Designed, manufactured and tested in the USA

* As required by NASA EEE-INST-002 (SWCX4 only)

APPLICATIONS

Military & Aerospace

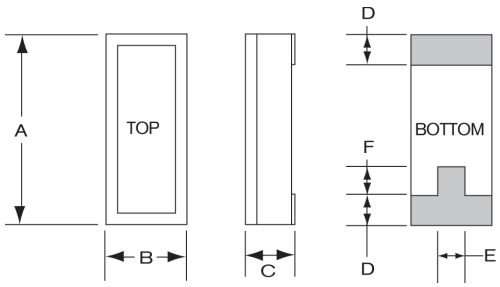
- Satellite
- Space exploration systems
- Deep space probes
- Telemetry

PACKAGING OPTIONS

- Tray Pack
- 16mm tape, 7" or 13" reels

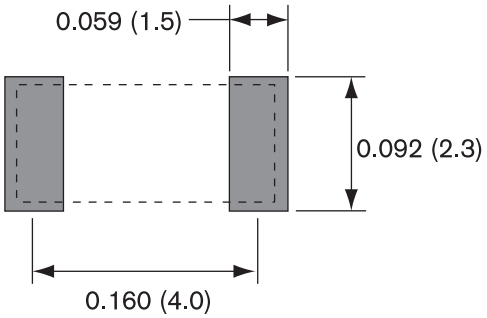
  Per EIA 481 (see Tape and Reel datasheet 10109)

PACKAGE DIMENSIONS



DIM	Termination	TYPICAL		MAXIMUM	
		inches	mm	inches	mm
A		0.197	5.00	0.210	5.33
B		0.072	1.83	0.085	2.16
C	SM1	—	—	0.050	1.27
	SM3	—	—	0.053	1.35
D		0.036	0.91	0.046	1.16
E		0.020	0.51	—	—
F		0.025	0.64	—	—

SUGGESTED LAND PATTERN



inches (mm)

TERMINATIONS AVAILABLE SM

Designation	Termination
SM1	Gold Plated
SM3	Solder Dipped

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GENERAL SPECIFICATIONS (Specifications are typical at 25°C unless otherwise noted.)

Parameter	Values
Frequency	32.768 kHz for SWCX4V 14 MHz to 100 MHz for SWCX4
Calibration Tolerance at 25°C	±50 ppm to ±10 ppm
Load Capacitance, CL	9 pF for SWCX4V, or value specified; 10 pF for SWCX4, or value specified
Standard Operating Temperature Ranges	Commercial: -10°C to +70°C Industrial: -40°C to +85°C Military: -55°C to +125°C
Frequency-Temperature Stability Options (SWCX4 only)	±50 ppm to ±10 ppm, over -10°C to +70°C ±50 ppm to ±20 ppm, over -40°C to +85°C ±50 ppm to ±30 ppm, over -55°C to +125°C
Drive Level (max)	0.5 µW for SWCX4V, or value specified; 200 µW for SWCX4, or value specified
Aging, First Year	±3 ppm
Vibration, survival	20 g, 10 to 2,000 Hz, swept sine
Shock, survival	5,000 g, 0.3 ms, ½ sine, for SWCX4V 10,000 g, 0.2 ms, ½ sine, for SWCX4 (higher shock available)
Storage Temperature Range	-55°C to +125°C
Max Processing Temperature	260°C for 20 seconds
Moisture Sensitivity Level (MSL)	These parts are hermetically sealed and are not moisture sensitive.

TYPICAL ELECTRICAL PARAMETERS (at 25°C)

SWCX4V (Tuning-fork) Typical Parameters

Parameter	Value
Frequency [kHz]	32.768
Motional Resistance, R1 [kΩ]	50
Motional Capacitance, C1 [fF]	2.3
Shunt Capacitance, C0 [pF]	1.1
Quality Factor, Q [k]	40

SWCX4 (AT-cut) Typical Parameters

Parameter	Values			
Frequency [MHz]	14.7456	16	32	80
Motional Resistance, R1 [Ω]	60	75	30	30
Motional Capacitance, C1 [fF]	1.4	1.5	2.5	1.8
Shunt Capacitance, C0 [pF]	0.8	0.9	1.1	1.0
Quality Factor, Q [k]	120	90	70	40

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STANDARD TESTS & SCREENING OPTIONS

Code					
S	**M**	**E**	***Item***	***Method***	***Comments***
X	X	X	Made with swept quartz		
X	X		Internal visual (pre-seal)	Statek internal standard	
X			PIND testing	MIL-STD-883 Method 2020 Condition A	Performed in both the width and thickness directions.
X			Radiographic inspection	MIL-STD-202 Method 209	
X	X		Unwanted modes	MIL-PRF-3098	Spurious-mode ratio 2:1 or greater
X	X		Low temperature storage	MIL-PRF-3098	Resistance must meet specifications at this low temperature.
X	X		Frequency and resistance over operating temperature range	MIL-PRF-3098	Measure every 2.5°C or tighter over operating temperature range; frequency and resistance must meet specification.
X	X		Accelerated aging	105°C for 160 hours	Frequency and resistance must meet specification after aging; maximum allowed change in series frequency 5 ppm.
X	X	X	Seal test (fine leak)	MIL-STD-883 Method 1014 Condition A1	
X	X	X	Seal test (gross leak)	MIL-STD-883 Method 1014 Condition C	
X	X	X	Final electrical test	π-network measurement per IEC 60444	Measure F_s, R_1, C_1, C_0, Q and F_L
X	X	X	External visual (post seal)	Statek internal standard	

S: For space-based applications.
M: For military applications.
E: For engineering prototypes and applications not requiring the additional screening.

HOW TO ORDER SWCX4V (TUNING-FORK)

SWCX4V S S C SM1 — 32.768K , 50 / I , 9pF

- **SWCX4V** — Swept Quartz Crystal
- **S** — Screening per option code: S = Space, M = Military, E = Engineering
- **S** — **Special**: Blank = Standard, S = Special or Custom
- **C** — C = Ceramic Lid
- **SM1** — **Terminations**: SM1 = Gold Plated, SM3 = Solder Dipped
- **32.768K** — **Frequency**: K = kHz
- **50** — **Calibration Tolerance** @ 25°C (in ppm)
- **I** — **Operating Temp. Range**: C = -10°C to +70°C, I = -40°C to +85°C, M = -55°C to +125°C, S = Customer Specified
- **9pF** — **Load Capacitance** (Customer Specified)

Example Only

HOW TO ORDER SWCX4 (AT-CUT)

SWCX4 M S HG1 C SM1 — 20.0M , 50 / 50 / — / M , 10pF

- **SWCX4** — Swept Quartz Crystal
- **M** — Screening per option code: S = Space, M = Military, E = Engineering
- **S** — **Special**: Blank = Standard, S = Special or Custom
- **HG1** — **Shock Level**: HG1 = 10,000g, HG2 = 20,000g, HG3 = 30,000g, HG4 = 50,000g, HG5 = 75,000g, HG6 = 100,000g
- **C** — C = Ceramic Lid
- **SM1** — **Terminations**: SM1 = Gold Plated, SM3 = Solder Dipped
- **20.0M** — **Frequency**: M = MHz
- **50** — **Calibration Tolerance** @ 25°C (in ppm)
- **50** — **Frequency Stability** over Temp. Range (in ppm)
- **M** — **Operating Temp. Range**: C = -10°C to +70°C, I = -40°C to +85°C, M = -55°C to +125°C, S = Customer Specified
- **10pF** — **Load Capacitance** (Customer Specified)

OR , — / — / 100 / M , 10pF

- **100** — **Total Frequency Tolerance** (in ppm)
- **M** — **Operating Temp. Range**: C = -10°C to +70°C, I = -40°C to +85°C, M = -55°C to +125°C, S = Customer Specified
- **10pF** — **Load Capacitance** (Customer Specified)

Example Only

10238 Rev A