



HIGH TEMPERATURE CRYSTALS

High Temperature/Low Frequency

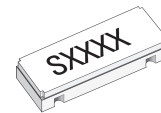
DESCRIPTION

An increasing number of applications require the use of high-temperature crystals. For these applications, Statek offers the CX1VHT/CX1HHT, CX4VHT, and CX9VHT crystals. These crystals are designed to operate at temperatures up to and including 200°C, and feature an expected life in excess of 1,000 hours at these temperatures. The frequency range offered is 10 kHz to 600 kHz for CX1VHT and CX1HHT crystals, 30 kHz to 250 kHz for CX4VHT crystals, and 32 kHz to 160 kHz for CX9VHT crystals.

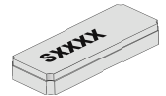
**CX1VHT/
CX1HHT**
10 kHz - 600 kHz



CX4VHT
30 kHz - 250 kHz



CX9VHT
32 kHz - 160 kHz



FEATURES

- High temperature operation up to 200°C
- High shock resistance
- Hermetically sealed ceramic package

APPLICATIONS

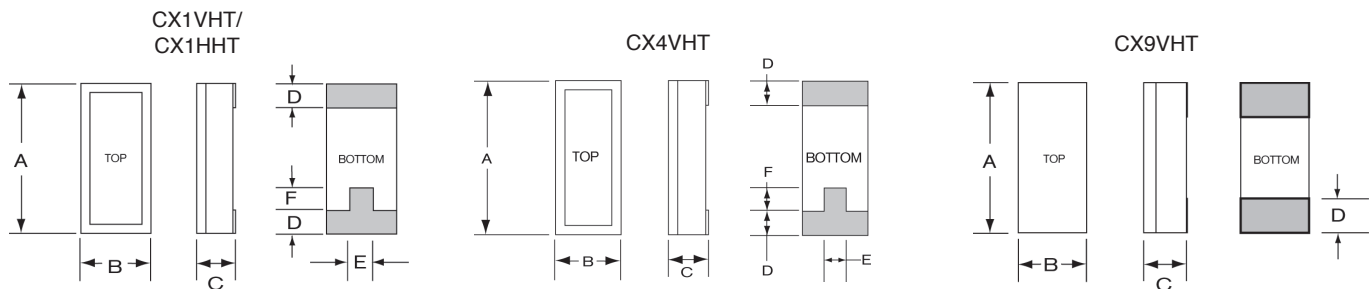
Industrial

- Downhole instrumentation
- Rotary shaft sensors
- Underground boring tools

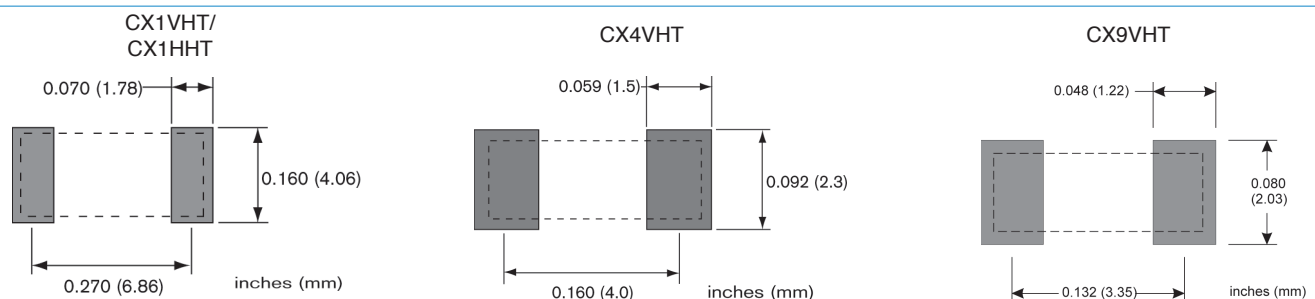
DIMENSIONS

DIM	CX1VHT/ CX1HHT MAXIMUM		CX4VHT MAXIMUM		CX9VHT MAXIMUM	
	inches	mm	inches	mm	inches	mm
A	0.330	8.38	0.210	5.33	0.170	4.32
B	0.155	3.94	0.085	2.16	0.068	1.73
C (SM1)	0.070	1.78	0.050	1.27	0.038	0.97
C (SM5)	0.075	1.90	0.053	1.35	0.040	1.02
D	0.055	1.40	0.046	1.16	0.038	0.97
E	0.070	1.78	0.020	0.51	—	—
F	0.070	1.78	0.025	0.64	—	—

PACKAGE DIMENSIONS



SUGGESTED LAND PATTERN



10183 Rev C



SPECIFICATIONS

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

Frequency Range	See Specifications Table below
Calibration Tolerance ¹	See Standard Calibration Tolerance Table at right
Operating Temperature Range	-55°C up to +200°C
Frequency Stability Over Temperature ²	$\frac{f(T) - f(T_o)}{f(T_o)} = k(T-T_o)^2$
Temperature Coefficient (k)	-0.035 ppm/°C ²
Aging, first year	5 ppm at 25°C
Shock, survival ³	CX1VHT: 1,000 g, 1 ms, 1/2 sine CX1HHT: 1,000 g, 1 ms, 1/2 sine CX4VHT: 5,000 g, 0.3 ms, 1/2 sine CX9VHT: 5,000 g, 0.3 ms, 1/2 sine
Vibration, survival ³	20 g RMS, 10-2,000 Hz

1. Tighter frequency calibration available. Contact factory.
2. Where f(T) = Frequency at temperature T
T = Temperature
T_o = Turnover temperature
f_o = Frequency at turnover temperature T_o
3. Higher shock and vibration available.

PACKAGING OPTIONS

- Tray Pack
- 7" or 13" reels

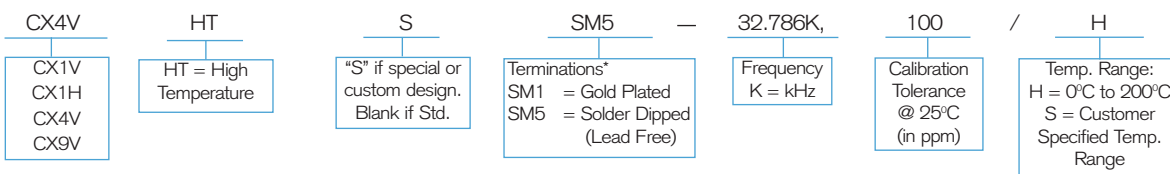
Per EIA 481 (see Tape and Reel data sheet # 10109)

SPECIFICATIONS TABLE¹ (Specifications shown are typical unless otherwise noted.)

Product ¹	Frequency Range	Typical for 32.768 kHz at 25 °C						Typical Motional Resistance at		Drive Level
		Motional Resistance	Motional Capacitance	Quality Factor	Shunt Capacitance	Load Capacitance	Turnover Temperature	150 °C	200 °C	
		R ₁	C ₁		C ₀	C _L ²	T _o	R ₁	R ₁	
CX1VHT	10 kHz to 600 kHz	40 kΩ	2.3 fF	53 k	1.7 pF	9 pF	26°C	55 kΩ	73 kΩ	0.5 μW MAX. 10-24.9 kHz
CX4VHT	30 kHz to 250 kHz	70 kΩ	2.3 fF	31 k	1.1 pF		23°C	100 kΩ	125 kΩ	0.5 μW MAX.
CX9VHT	32 kHz to 160 kHz	100 kΩ	2.2 fF	22 k	1.0 pF		22°C	125 kΩ	160 kΩ	0.5 μW MAX.

1. CX1HHT available from 10 kHz to 600 kHz.
2. Other load capacitance available.

HOW TO ORDER CX1VHT, CX1HHT, CX4VHT and CX9VHT CRYSTALS



*Special terminations per customer requirements will be considered. Contact factory.

ABSOLUTE MAXIMUM RATINGS

Storage Temperature	-55°C to 125°C
Maximum Process Temperature	260°C for 20 seconds

Standard Calibration Tolerances at 25°C

Frequency Range (kHz)			
10-74.9	75-169.9	170-249.9	250-600
±30 ppm	±50 ppm	±100 ppm	±200 ppm
±100 ppm	±100 ppm	±200 ppm	±500 ppm
±1000 ppm	±1000 ppm	±2000 ppm	±5000 ppm

FREQUENCY SHIFT VS. TIME¹

Temp.	Frequency shift after:			
	1,008 hours (Actual Data)	1,824 hours (Actual Data)	4,320 hours ² (Projected Data)	8,760 hours ² (Projected Data)
150°C	1.97 ppm	2.51 ppm	3.30 ppm	3.94 ppm
175°C	4.80 ppm	5.66 ppm	6.94 ppm	7.99 ppm
200°C	29.40 ppm	36.82 ppm	47.61 ppm	56.46 ppm

1. The data listed in this table is for a 32.768 kHz CX4 Statek crystal.
2. The data shown for 4,320 hours and 8,760 hours is data that has been projected using a curve-fitting method.