

High Temperature/Low Frequency

10kHz to 600kHz

FEATURES

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

DESCRIPTION

The 'HT' range of crystals are designed for applications subjected to high operating temperatures. The CX1VHT/CX1HHT, CX4VHT and CX9VHT crystals operate up to 200°C and feature an expected life in excess of 1000 hours at these temperatures. The frequency range is:
 CX1VHT and CX1HHT: 10kHz to 600kHz
 CX4VHT: 30kHz to 250kHz
 CX9VHT: 32kHz to 160kHz.

CX1VHT/ CX1HHT



10kHz ~ 600kHz

CX4VHT



30kHz ~ 250kHz

CX9VHT



32kHz ~ 160kHz

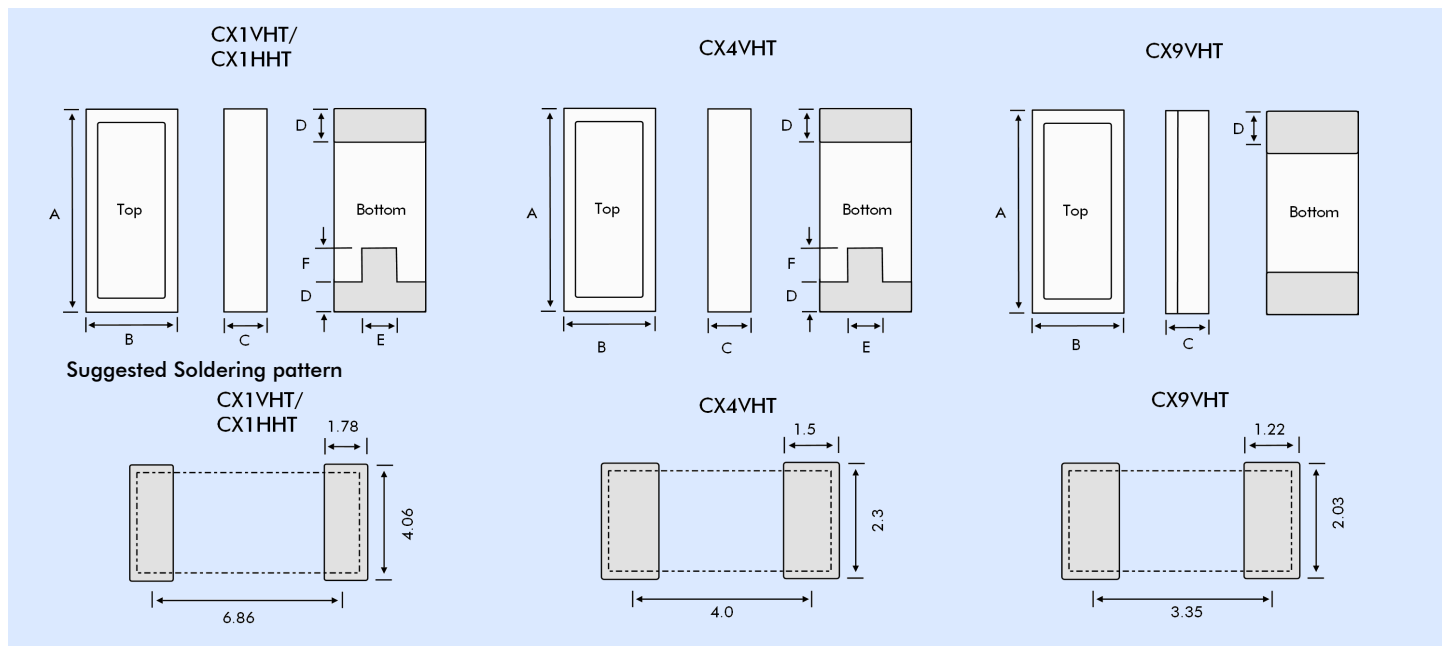
DIMENSIONS

Dim.	CX1VHT/ CX1HHT	CX4VHT	CX9VHT
A	8.38	5.33	4.32
B	3.94	2.16	1.73
C (SM1)	1.78	1.27	0.97
C (SM5)	1.90	1.35	1.02
D	1.40	1.16	0.97
E	1.78	0.51	
F	1.78	0.64	

APPLICATIONS

- Downhole instrumentation
- Rotary shaft sensors
- Underground boring tools

OUTLINES & DIMENSIONS



SPECIFICATIONS TABLE

	Frequency Range	Motional Resistance R1 @ 25°C	Motional Capacitance C1 @ 25°C	Shunt Capacitance C0 @ 25°C	Quality Factor Q @ 25°C	Load Capacitance CL	Turnover Temperature	Drive Level
CX1VHT	10kHz to 600kHz	30kΩ @ 32.768kHz 10kΩ @ 100kHz	2.3fF @ 32.768kHz 1.0fF @ 100kHz	2.0pF max.	68k @ 32.768kHz 140k @ 100kHz	9pF @ 32.768kHz 8pF @ 100kHz	21°C @ 32.768kHz 9°C @ 100kHz	0.5μW max. 10~24.9kHz 1.0μW max. 25~600kHz
CX1HHT	10kHz to 600kHz	140kΩ @ 32.768kHz 47kΩ @ 100kHz	2.3fF @ 32.768kHz 1.0fF @ 100kHz	2.0pF max.	18k @ 32.768kHz 31k @ 100kHz	9pF	21°C @ 32.768kHz 10°C @ 100kHz	0.5μW max. 10~24.9kHz 1.0μW max. 25~600kHz
CX4VHT	30kHz to 250kHz	50kΩ @ 32.768kHz 18kΩ @ 100kHz	2.3fF @ 32.768kHz 1.0fF @ 100kHz	2.3pF @ 32.768kHz 1.07pF @ 100kHz	40k @ 32.768kHz 85k @ 100kHz	9pF @ 32.768kHz 8pF @ 100kHz	25°C @ 32.768kHz 10°C @ 100kHz	0.5μW max.
CX9VHT	32kHz to 160kHz	70kΩ @ 32.768kHz 19kΩ @ 100kHz	2.3fF @ 32.768kHz 1.0fF @ 100kHz	2.2pF @ 32.768kHz 0.84pF @ 100kHz	27k @ 32.768kHz 80k @ 100kHz	9pF @ 32.768kHz 5pF @ 100kHz	20°C @ 32.768kHz 16°C @ 100kHz	0.5μW max.

GENERAL SPECIFICATION

Specifications stated are typical at 25°C unless otherwise indicated.
Specifications may change without notice.

Frequency Range:	see specifications table
Calibration Tolerance*:	see table
Operating Temperature Range:	-55°C to +200°C
Frequency Stability over Temperature**:	$\frac{f(T)-f(T_0)}{f(T_0)} = k(T-T_0)^2$
Temperature Coefficient (k):	-0.035ppm/°C ²
Ageing, first year:	5ppm max.
Shock, survival***:	
CX1VHT:	1,000g, 1ms, ½ sine
CX1HHT:	1,000g, 1ms, ½ sine
CX4VHT:	5,000g, 0.3ms, ½ sine
CX9VHT:	5,000g, 0.3ms, ½ sine
Vibration, survival:	20g rms, 10~2000Hz

* Tighter frequency calibration is available.

** Where $f(T)$ = frequency at temperature T

T = Temperature

T_0 = Turnover temperature

f_0 = frequency at turnover temperature T_0

*** Higher shock and vibration survival is available

STANDARD CALIBRATION TOLERANCE

Frequency Range (kHz)			
10~74.9	75~169.9		
±30ppm	±50ppm	±100ppm	±200ppm
±100ppm	±100ppm	±200ppm	±500ppm
±1000ppm	±1000ppm	±2000ppm	±5000ppm

FREQUENCY SHIFT vs. TIME

Epoxy Type	Temp.	Frequency shift after:			
		1,008 hrs (Actual Data)	1,824 hrs (Actual Data)	4,320 hrs (Projected Data)	8,760 hrs (Projected Data)
Epoxy A	150°C	1.97ppm	2.51ppm	3.30ppm	3.94ppm
Epoxy B	150°C	3.94ppm	4.91ppm	6.32ppm	7.46ppm
Epoxy A	175°C	4.80ppm	5.66ppm	6.94ppm	7.99ppm
Epoxy B	175°C	4.13ppm	5.06ppm	6.41ppm	7.52ppm
Epoxy A	200°C	29.40ppm	36.82ppm	47.61ppm	56.46ppm
Epoxy B	200°C	23.31ppm	30.59ppm	41.63ppm	50.89ppm

PACKAGING OPTIONS

Tray packed (<250pcs) or tape and reel (>250 pieces).
16mm tape, 178mm or 330mm reels (EIA 418).

HOW TO ORDER CX1VHT, CX1HHT, CX4VHT and CX9VHT CRYSTALS

CX4V - HT - S - SM5 - 32.768K, 30 / I

CX1V CX1H CX4V CX9V	HT = High Temperature	'S' if special, custom design. Otherwise leave blank	Terminations SM1 = Gold plated SM5 = Solder Dipped Lead free	Frequency K = kHz	Calibration Tolerance @25°C (in ppm)	Temp. Range C = -10° ~ +70°C I = -40° ~ +85°C M = -55° ~ +125°C S = Customer specified
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