

### FEATURES

- Frequency Range 10kHz to 600kHz
- High shock resistance
- Low ageing
- Designed for low power applications
- Full MIL testing available

### DESCRIPTION

CX1HSM crystals consist of a high quality tuning fork resonator in a rugged, hermetically sealed ceramic package. CX1VSM is intended for use in Series (two cascaded inverters) oscillator circuits.

### SPECIFICATION

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

Frequency Range:	10.0kHz to 600.0kHz
Standard Calibration Tolerance*:	see table
Motional Resistance (R <sub>1</sub> ):	Figure 1 Max = 10~169.9kHz, 2x typical 170~600kHz, 2.5x typical
Motional Capacitance (C <sub>1</sub> ):	Figure 2
Quality Factor (Q):	Figure 3 Min. is 0.25x typical
Shunt Capacitance (C <sub>0</sub> ):	2.0pF max.
Drive Level	
10~24.9kHz:	1.5μW max.
25~600.0kHz:	3.0μW max.
Turning Point (T <sub>0</sub> )**:	Figure 4
Temperature Coefficient (k):	-0.035ppm/°C <sup>2</sup>
Ageing, first year:	5ppm max.
Shock, survival***:	1,000g, 1ms, ½ sine
Vibration, survival***:	20g rms, 10~2000Hz
Operating Temperature Range	
Commercial:	-10° to +70°C
Industrial:	-40° to +85°C
Military:	-55 to +125°C
Storage Temperature Range:	-55° to +125°C
Maximum Process Temperature:	+260°C for 20 seconds

\* Tighter frequency calibration is available.

\*\* Other turning point is available

\*\*\* Higher shock and vibration survival is available

### PACKAGING OPTIONS

CX1HSM crystals are available either tray packed (<250pcs) or tape and reel (>250 pieces).  
16mm tape, 178mm or 330mm reels (EIA 418).

### HOW TO ORDER CX1HSM CRYSTALS

**CX1H - S - C - SM1 - 32.768K 30 / I**

'S' if special,  
custom design.  
Otherwise leave  
blank

Blank = glass lid  
C = ceramic lid

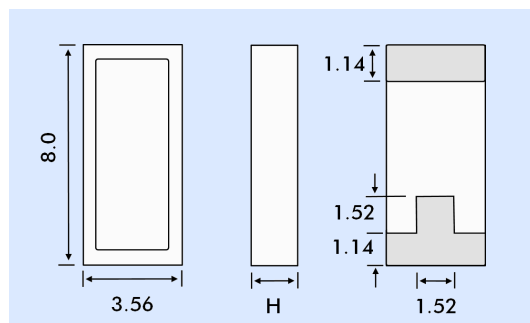
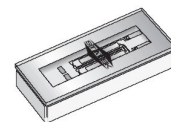
Terminations  
SM1 = Gold plated \*  
SM2 = Solder plated  
SM3 = Solder dipped  
SM4 = Solder plated \*  
SM5 = Solder dipped \*  
\* = Lead free

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

### OUTLINE & DIMENSIONS



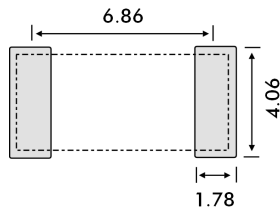
### DIMENSION 'H'

Terminations	Glass Lid	Ceramic Lid
SM1	1.65	1.78
SM2/SM4	1.70	1.83
SM3/SM5	1.78	1.90

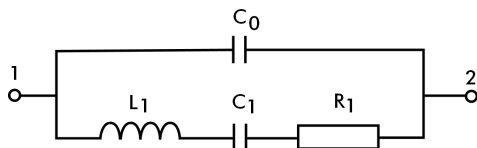
### STANDARD CALIBRATION TOLERANCE

Frequency Range (kHz)			
10~74.9	75~169.9	170~249.9	250~600
±30ppm (0.003%)	±50ppm (0.005%)	±100ppm (0.01%)	±200ppm (0.02%)
±100ppm (0.01%)	±100ppm (0.01%)	±200ppm (0.02%)	±500ppm (0.05%)
±1000ppm (0.1%)	±1000ppm (0.1%)	±2000ppm (0.2%)	±5000ppm (0.5%)

### SUGGESTED SOLDERING PATTERN

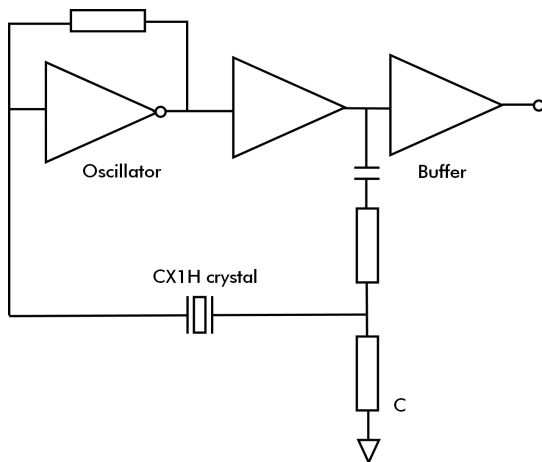


### CRYSTAL EQUIVALENT CIRCUIT



R1 Motional Resistance  
C1 Motional Capacitance  
L1 Motional Inductance  
C0 Shunt Capacitance

### CONVENTIONAL SERIES OSCILLATOR CIRCUIT



### TERMINATIONS - PLATING

Designation	Termination
SM1	Gold Plated (Lead Free)
SM2	Solder Plated
SM3	Solder Dipped
SM4	Solder Plated (Lead Free)
SM5	Solder Dipped (Lead Free)

### Turning Point Temperature

Note: Frequency  $f$  at temperature  $T$  is related to frequency  $F_0$  at turning point temperature  $T_0$  by:

$$\frac{f-f_0}{f_0} = k(T-T_0)^2$$

FIGURE 1

CX1H Typical Motional Resistance R1

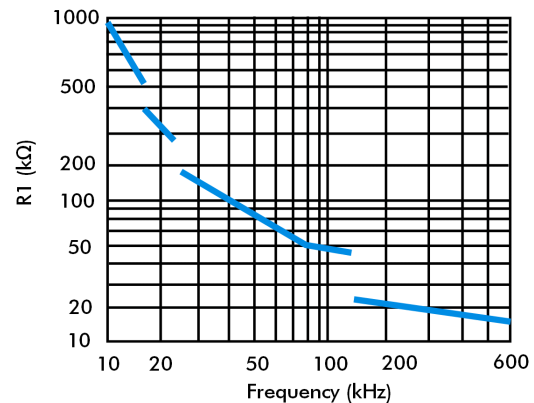


FIGURE 2

CX1H Typical Motional Capacitance C1

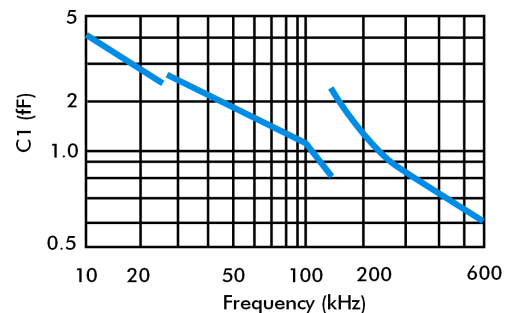


FIGURE 3

CX1H Typical Quality Factor (Q)

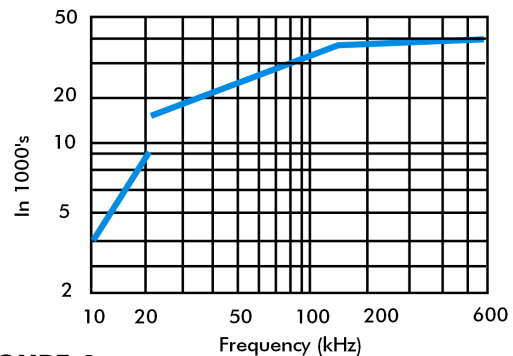


FIGURE 4

CX1H Typical Turning Point Temperature ( $T_0$ )

