

FEATURES

- Extensional mode resonator, 760kHz to 1.35MHz
- Designed for low power applications
- Ideal microprocessor clock crystal
- Low ageing
- Full military testing available

DESCRIPTION

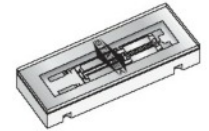
CX3SM crystals consist of a high quality extensional mode resonator in a rugged, hermetically sealed ceramic package.

SPECIFICATION

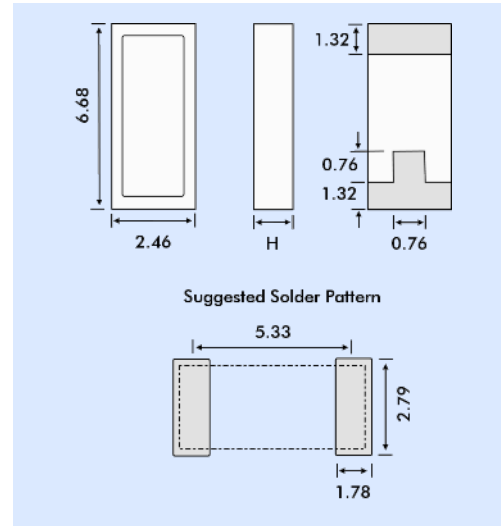
Specifications stated are typical at 25°C unless otherwise indicated. Specifications may change without notice.

Frequency Range:	800kHz to 1.35MHz
Standard Calibration Tolerance*:	±500ppm (0.05%) ±1000ppm (0.1%) ±10000ppm (1.0%)
Load Capacitance:	7pF
Motional Resistance (R1):	5kΩ maximum
Motional Capacitance (C1):	1.2fF
Quality Factor (Q):	150k
Shunt Capacitance (C0):	1.0pF
Drive Level:	3μW maximum
Turning Point (T0**):	35°C
Temperature Coefficient (k):	-0.035ppm/°C²
Ageing First Year:	±5ppm maximum
Shock, Survival:	1000g, 0.3ms, ½ sine
Vibration, Survival:	10g rms, 20~1000Hz random
Operating Temperature Range:	-10°C to +70°C (Commercial) -40°C to +85°C (Industrial) -55°C to +125°C (Military)
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.
Designed and manufactured by Statek Inc.



OUTLINE & DIMENSIONS



Dim. H	Glass Lid	Ceramic Lid
SM1	1.35	1.70
SM2	1.40	1.75
SM3	1.47	1.83
SM4	1.40	1.75
SM5	1.47	1.83

PACKAGING OPTIONS

CX3SM crystals are available either tray packed (<250pcs) or tape and reel (>250 pieces).
16mm tape, 178mm or 330mm reels (EIA 418).

Turning Point Temperature

Note: Frequency f at temperature T is related to frequency Fo at turning point temperature To by:

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

HOW TO ORDER CX3SM CRYSTALS

CX3 - S - C - SM1 - 1.0M , 500 / I

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

Blank = glass lid
C = ceramic lid

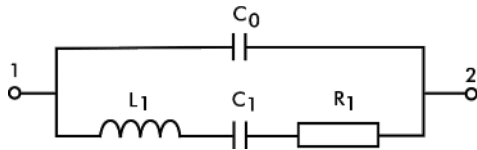
Terminations
SM1 = Gold plated *
SM2 = Solder plated
SM3 = Solder dipped
SM4 = Solder plated *
SM5 = Solder dipped *
* = Lead free

Frequency
K = kHz
M = MHz

Calibration Tolerance
@25°C
(in ppm)

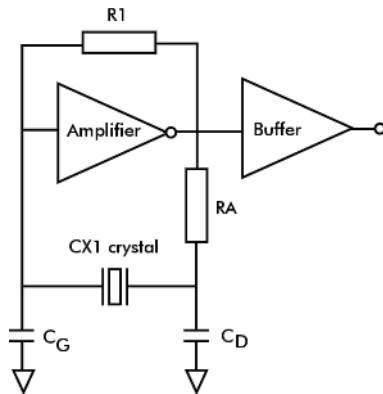
Temp. Range
C = -10° ~ +70°C
I = -40° ~ +85°C
M = -55° ~ +125°C
S = Customer specified

CRYSTAL EQUIVALENT CIRCUIT



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

CONVENTIONAL CMOS PIERCE 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)

TYPICAL APPLICATION FOR A PIERCE OSCILLATOR

The low profile CX miniature crystal is ideal for use in small, high density, battery operated portable products. The CX crystal designed in a Pierce oscillator (single inverter) circuit provides very low current consumption and high stability. A conventional Pierce oscillator is shown above. The crystal is effectively inductive and in a Pi network circuit with C_D and C_G provides the additional phase shift to sustain oscillation. The oscillation frequency (f_o) is 15 to 250ppm above the crystal's resonant frequency (f_s).

Drive Level

R_A is used to limit the crystal's drive level by forming a voltage divider between R_A and C_D . R_A also stabilizes the oscillator against changes in the amplifier's output resistance (R_o). R_A should be increased for higher voltage operation.

Load Capacitance

The CX crystal calibration tolerance is influenced by the effective circuit capacitances, specified as the load capacitance (C_L). C_L is approximately equal to:

$$C_L = \frac{C_D \times C_G}{C_D + C_G} + C_S$$

Note: C_D and C_G include stray layout-induced capacitance to ground and C_S is the stray shunt capacitance between the crystal terminal. In practice, the effective value of C_L will be less than that calculated from C_D , C_G and C_S values because of the effect of the amplifier output resistance. C_S should be minimized.

The oscillation frequency (f_o) is approximately equal to:

$$f_o = f_s \left[1 + \frac{C_1}{2(C_o + C_L)} \right]$$

Where

- f_s = Series resonant frequency of the crystal
- C_1 = Motional Capacitance
- C_o = Shunt Capacitance