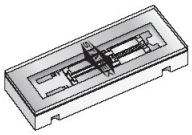
EUROQUARTZ

CX3SM CRYSTAL

Low Profile Miniature SMD AT Crystal 800kHz to 1.35MHz



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

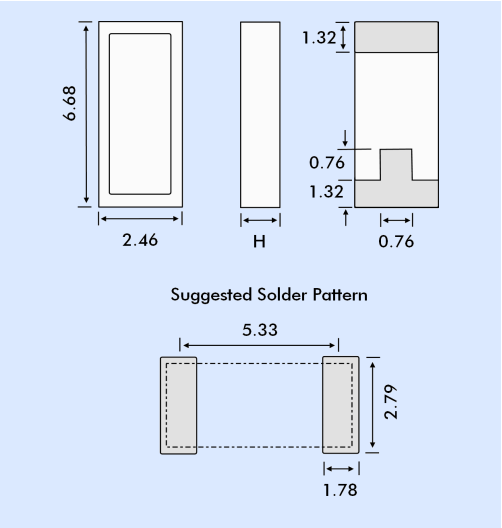
* *Tighter frequency calibration is available.*
** *Other turning point is available.*

Turning Point Temperature

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

$$\frac{f-fo}{fo} = k(T-To)^2$$

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).

HOW TO ORDER CX3SM CRYSTALS

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

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

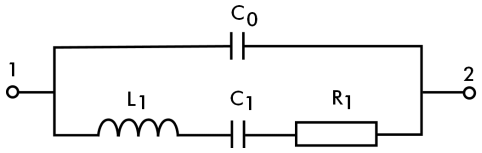
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CX3SM CRYSTAL

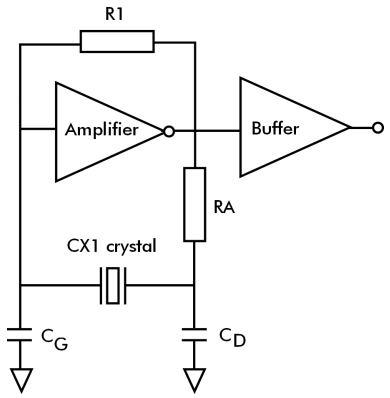
Low Profile Miniature SMD Crystal 800kHz to 1.35MHz

CRYSTAL EQUIVALENT CIRCUIT



R1 Motional Resistance
C1 Motional Capacitance
L1 Motional Inductance
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

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