

ISSUE 1; January 2016

Description

- The CX1 EXT surface-mount quartz crystal is hermetically sealed in a rugged ceramic package. This crystal is manufactured using a photolithographic process developed by Statek and has been designed utilising the experience acquired by producing millions of crystals for industrial, commercial, military and medical applications.
- -C SM1 Gold Plated (lead free) with ceramic lid
- -C SM4 Solder Plated (lead free) with ceramic lid
- -C SM5 Solder Dipped (lead free) with ceramic lid
- -SM1 Gold Plated (lead free) glass lid
- -SM4 Solder Plated (lead free) glass lid
- -SM5 Solder Dipped (lead free) glass lid
- FEATURES:
 - Extensional mode
 - Ideal for use with microprocessors
 - Designed for low power applications
 - Compatible with hybrid or PC board packaging
 - Low ageing
 - Full military testing available
 - Ideal for battery operated applications
- TYPICAL APPLICATION FOR A PIERCE OSCILLATOR:

The low profile CX miniature surface-mount crystal is ideal for 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 CMOS Pierce oscillator circuit is shown. The crystal is effectively inductive and in a PI-network circuit with CD and CG provides the additional phase shift necessary to sustain oscillation. The oscillation frequency (f0) is 15 to 250ppm above the crystal's series resonant frequency (fS).
- Drive Level:

RA is used to limit the crystal's drive level by forming a voltage divider between RA and CD. RA also stabilizes the oscillator against changes in the amplifiers output resistance (R0). RA should be increased for higher voltage operation.
- Load Capacitance:

The CX crystal frequency tolerance is influenced by the effective circuit capacitances, specified as the load capacitance (CL). CL is approximately equal to: $CL = ((CD \times CG)/(CD + CG)) + CS$
- Note: CD and CG include stray layout to ground and CS is the stray shunt capacitance between the crystal terminal. In practice, the effective value of CL will be less than that calculated from CD, CG and CS values because of the effect of the amplifier output resistance. CS should be minimised.
- The oscillation frequency (f0) is approximately equal to:

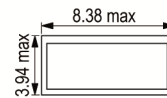
$$f_0 = f_S [1 + ((C1/(2*(C0+CL)))]$$

Where fS = Series resonant frequency of the crystal
 C1 = Motional Capacitance
 C0 = Shunt Capacitance
- Please note that all data is only valid at 25°C unless otherwise stated.

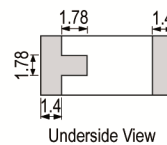


Glass Lid Shown

Outline (mm) -SM1 = Gold Plated (lead free) glass lid

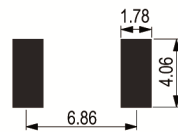


	Height (H) = Glass Lid	Ceramic Lid
SM1	1.65 max	1.78 max
SM2	1.70 max	1.83 max
SM3	1.78 max	1.90 max
SM4	1.70 max	1.83 max
SM5	1.78 max	1.90 max

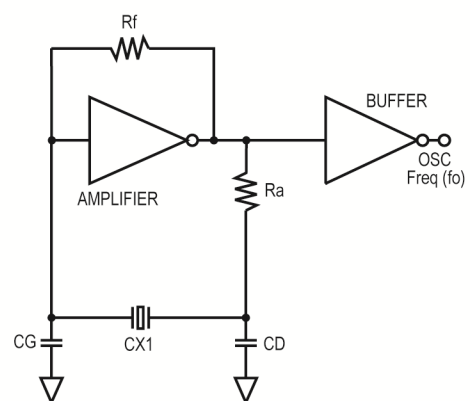


Underside View

Solder Pad Layout



Conventional CMOS Pierce Oscillator Circuit



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Frequency Parameters

- Frequency 530.0kHz to 2.1MHz
- Frequency Tolerance $\pm 500.00\text{ppm}$ to $\pm 10,000.00\text{ppm}$
- Tolerance Condition @ 25°C
- Ageing $\pm 5\text{ppm}$ max in 1st year @ 25°C
- Turning Point: 35°C standard
Other values are available - please contact an IQD Sales Office
- Temperature Coefficient: $-0.035\text{ppm}/^\circ\text{C}^2$ typ
Note: Frequency f at temperature T is related to frequency f_0 at turning point temperature T_0 by: $(f-f_0)/f_0 = k(T-T_0)^2$
- Function Mode: Extensional
- Note: Tighter Frequency Tolerances are available - please contact an IQD Sales Office

Electrical Parameters

- Load Capacitance (CL) 7.0pF
- Shunt Capacitance (C0) 1.3pF typ
- Drive Level 3 μ W max
- Typical Motional Values:

Freq (Hz)	555k	614k	1.0M	1.4M	1.8432M	2.1M
R1 (Ω)	600	275	500	775	300	475
C1 (fF)	2.5	3.6	2.0	1.5	2.8	2.6
Q (k)	170	260	190	100	110	70
C0 (pF)	1.2	1.3	1.1	1.0	1.3	1.3
- Note: Other Load Capacitances are available - please contact an IQD Sales Office

Operating Temperature Ranges

- 10 to 70°C
- 40 to 85°C
- 55 to 125°C

Environmental Parameters

- Shock: 750g, 0.3ms, 1.2 sine
- Vibration: 10G rms, 20-1000Hz random
- Storage Temperature Range: -55 to 125°C

Manufacturing Details

- Maximum Process Temperature: 260°C for 20sec max

Ordering Information

- Frequency*
- Model*
- Lid Variant*
- Termination Variant*
- Frequency Tolerance (@ 25°C)*
- Operating Temperature Range*
- Load Capacitance*
- (*minimum required)
- Lid Variants:
 - Blank = Glass
 - C = Ceramic
- Termination Variants:
 - SM1 = Gold Plated
 - SM4 = Solder Plated
 - SM5 = Solder Dipped

Note: non-RoHS compliant terminations are available - please contact an IQD Sales Office
- Example
1.40MHz CX1 EXT-SM1
1000/-/-40+85C/7

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Compliance

- RoHS Status (2011/65/EU) Optional
- REACH Status Compliant
- MSL Rating (JDEC-STD-033): Not Applicable

Packaging Details

- Pack Style: Tray Supplied on a tray
 Pack Size: 1
- Pack Style: Reel Tape & reel in accordance with EIA-481-D
 Pack Size: 1,000

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