Quartz Crystal Specification
CX3 EXT

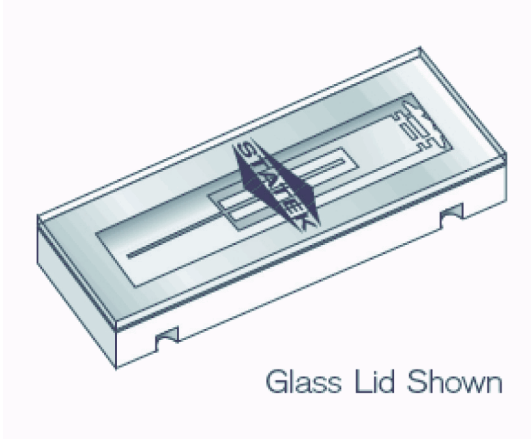
ISSUE 1; January 2016

Description

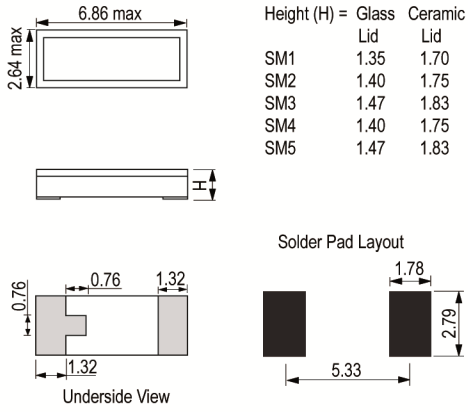
- The CX3 EXT surface-mount quartz crystal is hermetically sealed in a rugged ceramic package. This crystal has been designed utilising the experience acquired by producing millions of crystals for industrial, commercial, military and medical applications.
- -C SM1 Gold plated (lead free) ceramic lid
- -C SM4 Solder plated (lead free) ceramic lid
- -C SM5 Solder dipped (lead free) 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 CX3 EXT 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 150 ppm 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 CX3 EXT crystal frequency tolerance is influenced by the effective circuit capacitances, specified as the load capacitance (CL). CL is approximately equal to: CL = ((CD x 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 minimized.
- The oscillation frequency (f0) is approximately equal to:

  f0 = fS [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.

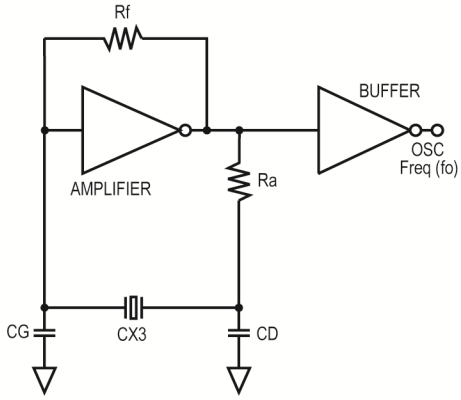


Outline (mm) -C SM1 = Gold plated (lead free) ceramic lid



Height (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

Conventional CMOS Pierce Oscillator Circuit



Sales Office Contact Details:

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Frequency Parameters

- Frequency 800.0kHz to 1.35MHz
- Frequency Tolerance ±500.00ppm to ±10,000.00ppm
- Tolerance Condition @ 25°C
- Ageing ±5ppm max in 1st year @ 25°C
- Turning Point: 35°C standard
  Other values are available - please contact an IQD Sales Office
- Temperature Coefficient: -0.035ppm/°C² typ
  Note: Frequency f at temperature T is related to frequency fo at turning point temperature To by: $(f-fo)/fo = k(T-To)^2$
- 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) 1pF typ
- Drive Level 3µW max
- Motional Capacitance: 1.2fF typ
- Quality Factor: 150k typ

Operating Temperature Ranges

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

Environmental Parameters

- Shock: 1000g, 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
  1.0MHz CX3 EXT-SM1
  1000/-/-40 to 85C/7

Compliance

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

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Packaging Details

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

Electrical Specification - maximum limiting values

Frequency Min	Frequency Max	Temperature Range	Stability (Min)	Over Tone Order	ESR
		°C	ppm		Ω
800.0kHz	1.35MHz	-10 to 70 -40 to 85 -55 to 125		EXT	5,000

**Stability Maximum values ±0ppm*

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