

CX-1HG-SM
8MHz to 160MHz
 MINIATURE AT-CUT
 SMD CRYSTAL
HIGH SHOCK

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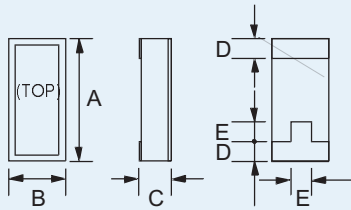
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General Description

The miniature CX-1HG-SM AT-cut crystals in leadless ceramic packages have been designed for surface-mounting on printed circuit boards or hybrid circuits. These crystals are designed for applications requiring exceptional shock and vibration survival.

- Surface-mount - infrared, vapour phase, wave solder or epoxy mount techniques
- Low profile, hermetically sealed package
- Available with glass or ceramic lid
- High shock and vibration resistance
- Custom designs available
- Full military environmental testing available

Specification



Outline

CX-1-SM Package Dimensions

Dimension	Typical (mm)	Maximum (mm)
A	8.00	8.38
B	3.56	3.94
C	-	see below
D	1.14	1.40
E	1.52	1.78

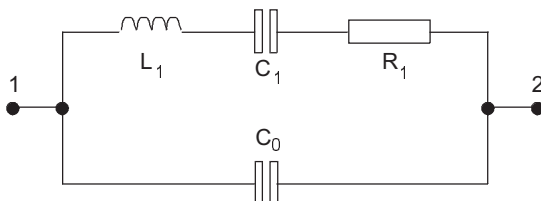
Dimension "C"	Glass Lid (mm max.)	Ceramic Lid (mm max.)
SM1	1.65	1.78
SM2	1.70	1.83
SM3	1.78	1.90

Frequency Range:	8MHz to 160MHz
Calibration Tolerance*:	A ±0.01% (±100ppm) B ±0.1% C ±1.0%
Load Capacitance:	20pF (unless other required)
Motional Resistance (R₁):	See table
Motional Capacitance (C₁):	See table
Quality Factor (Q):	See table
Shunt Capacitance (C₀):	See table
Drive Level:	500µW max.
Temperature Stability**:	-10° to +70°C from ±10ppm -40° to +85°C from ±20ppm -55° to +125°C from ±30ppm ±5ppm max.
Ageing, first year:	±5ppm max.
Shock, survival:	10,000g 0.2ms, 1/2 sine
Vibration, survival:	50g rms 10-2,000Hz random
Operating Temperature:	-10°~+70°C (commercial) -40°~+85°C (industrial) -55°~+125°C (military)
Storage Temperature:	-55°C~+125°C
Process Temperature:	260°C for 20 seconds

Specifications are typical at 25°C unless otherwise indicated. The characteristics of the frequency stability parameter follow that of AT-cut, thickness-shear mode crystals.

- * Closer calibration available, as low as ±5ppm
 ** Does not include calibration tolerance

Equivalent Circuit



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

CX-1 Motional Parameters, Q and C₀

Frequency	Motional Resistance R ₁ (Ω)	Motional Capacitance C ₁ (fF)	Quality Factor '000s	Shunt Capacitance C ₀ (pF)
10.0MHz	50	5.5	80	2.2
32MHz	20	7.8	36	2.6
155MHz	50	0.5	41	3.2

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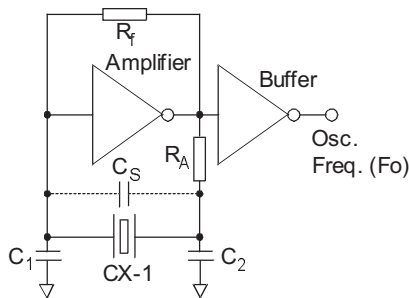
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Circuit Design

Typical HCMOS Pierce Oscillator

A conventional HCMOS Pierce oscillator is shown below. The crystal oscillates at a frequency f_o above the crystal's series-resonant frequency. The crystal is effectively inductive and in combination with R_f , C_1 and C_2 in the feedback loop, provides approximately 180° of the phase shift necessary to ensure oscillation.

Conventional HCMOS Pierce Oscillator Circuit



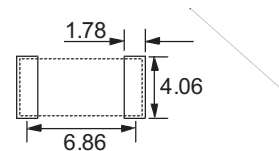
Terminations

Designation	Termination
SM1	Gold Plated
SM2	Nickel, Solder Plated
SM3	Nickel, Solder Plated and Solder Dipped

Packaging

- CX-1-SM - Bulk Pack (Standard)
- 16mm tape, 178mm or 330mm reels (Optional) per EIA 481
- Tray Pack (Optional)

Suggested Solder Pad Layout



Order Code

CX-1 | **HG** | **SM1** | **32MHz** | (**A** / **25ppm** / **50ppm** / **I**)

O.T.=3rd O.T. Mode
 Blank = Fundamental

"S" if special or custom design
 Blank if standard

C = Ceramic Lid
 Blank = Glass Lid

SM1
SM2
SM3

Frequency
32MHz

Calibration Tolerance*
 @ 25°C
A, B, C

Frequency Stability over Temperature Range
25ppm / **50ppm**

Total Frequency Tolerance
I

Temperature Range:
C = Commercial
I = Industrial
M = Military
S = Specify

*For other calibration tolerances enter figure in ppm