

CX-2V-SM

16kHz to 600kHz

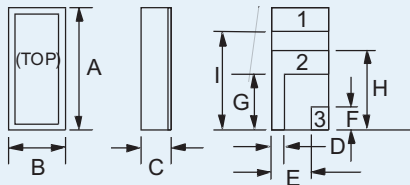
MINIATURE SMD CRYSTAL
FOR PIERCE OSCILLATORS

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General Description

The miniature CX-2V-SM quartz crystal is a high quality tuning-fork resonator for use in Pierce (single inverter) oscillators. The CX-2V-SM is hermetically sealed in a rugged, leadless ceramic package. The crystal has been designed for surface-mounting on printed circuit boards or hybrid circuits. The crystal is manufactured using a photo-lithographic process, yielding consistently high quality production parts.



Terminal 1 is electrically connected to terminal 3

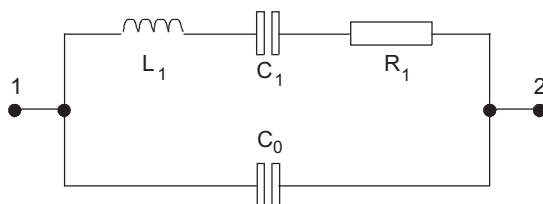
Outline

CX-2-SM Package Dimensions

| Dimension | Typical (mm) | Maximum (mm) |
|-----------|--------------|--------------|
| A | 6.60 | 6.99 |
| B | 2.39 | 2.74 |
| C | - | see below |
| D | 0.89 | 1.14 |
| E | 1.50 | 1.75 |
| F | 1.27 | 1.52 |
| G | 2.67 | 2.92 |
| H | 3.94 | 4.19 |
| I | 5.33 | 5.59 |

| Dimension "C" | Glass Lid (mm max.) | Ceramic Lid (mm max.) |
|---------------|---------------------|-----------------------|
| SM1 | 1.65 | 1.91 |
| SM2 | 1.70 | 1.96 |
| SM3 | 1.78 | 2.03 |

Equivalent Circuit



R_1 Motional Resistance L_1 Motional Inductance
 C_1 Motional Capacitance C_0 Shunt Capacitance

- Miniature tuning-fork design
- High shock resistance
- Designed for low-power applications
- Compatible with hybrid or PC board packaging
- Low ageing
- Full military environmental testing available
- Ideal for battery operated applications

Specification

| | |
|---|--|
| Frequency Range: | 16kHz to 600kHz |
| Calibration Tolerance*: | A, B or C (see table) |
| Motional Resistance (R_1): | Figure 1 Max.: 16 ~ 169.9kHz, 2x typ. 170~600kHz, 2.5x typ. |
| Motional Capacitance (C_1): | Figure 2 |
| Quality Factor (Q): | Figure 3 Min. is 0.25x typ. |
| Shunt Capacitance (C_0): | 2.0pF max. |
| Drive Level: | 16~24.98kHz 0.5 μ W max. 25~600kHz 1.0 μ W max. |
| Turning Point (T_0)**: | Figure 4 |
| Temperature Coefficient: | -0.035ppm/ $^{\circ}$ C ² |
| Ageing, first year: | \pm 5ppm max. |
| Shock, survival***: | 1,500g 0.3ms, 1/2 sine |
| Vibration, survival***: | 10g rms, 20-2,000Hz random |
| Operating Temperature: | -10 $^{\circ}$ ~+70 $^{\circ}$ C (commercial) -40 $^{\circ}$ ~+85 $^{\circ}$ C (industrial) -55 $^{\circ}$ ~+125 $^{\circ}$ C (military) |
| Storage Temperature: | -55 $^{\circ}$ C~+125 $^{\circ}$ C |
| Process Temperature: | 260 $^{\circ}$ C for 20 seconds |

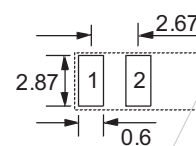
Specifications are typical at 25 $^{\circ}$ C unless otherwise indicated.

- * Tighter frequency calibration available
- ** Other turning point available
- *** Higher shock and vibration version available

CX-1V-SM Crystal Calibration Tolerance at 25 $^{\circ}$ C

| Calibration | Frequency Range (kHz) | | | |
|-------------|-----------------------|--------------|-------------|-------------|
| | 16~74.9 | 75~169.9 | 170~249.9 | 250~600 |
| A | \pm 0.003% | \pm 0.005% | \pm 0.01% | \pm 0.02% |
| B | \pm 0.01% | \pm 0.01% | \pm 0.02% | \pm 0.05% |
| C | \pm 0.1% | \pm 0.1% | \pm 0.2% | \pm 0.5% |

Solder Pad Layout



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Circuit Design

Conventional HCMOS Pierce Oscillator Circuit

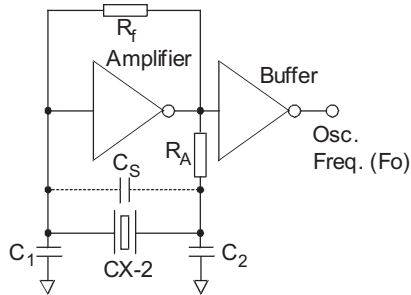


Figure 1 - CX-2V Typical Motional Resistance (R₁)

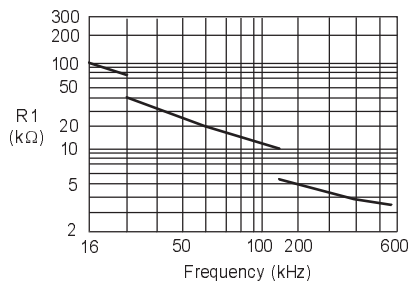


Figure 2 - CX-2V Typical Motional Capacitance (C₁)

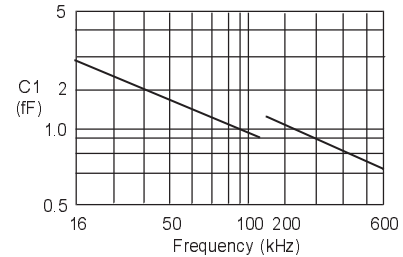


Figure 3 - CX-2V Typical Quality Factor (Q)

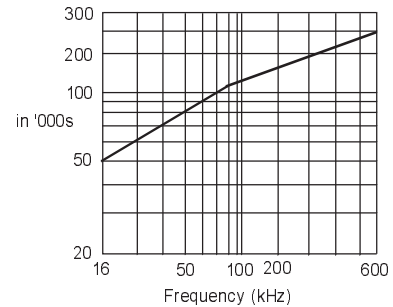
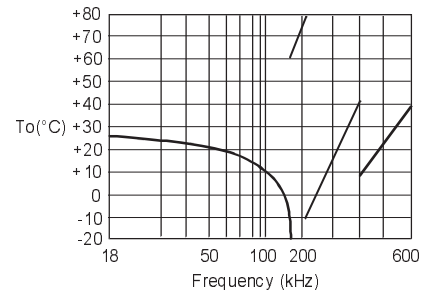


Figure 4 - CX-2V Typical Turning Point Temp. (°C)



Packaging

CX-2V-SM - Bulk Pack (Standard)
 - 16mm tape, 178mm or 330mm reels (Optional)
 per EIA 481
 - Tray Pack (Optional)

Order Code

CX-2V C = Ceramic Lid
Blank = Glass Lid Frequency **-SM1 32.768kHz** (**A** / **I**)

"S" if special or custom design
 Blank if standard

SM1
 SM2
 SM3

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

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

*For other calibration tolerances enter figure in ppm

Terminations

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