

## CX-2V-SM

16kHz to 600kHz

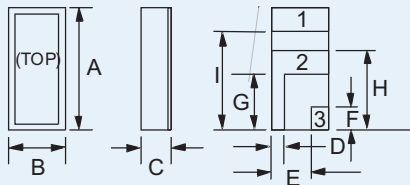
MINIATURE SMD CRYSTAL  
FOR PIERCE OSCILLATORS

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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

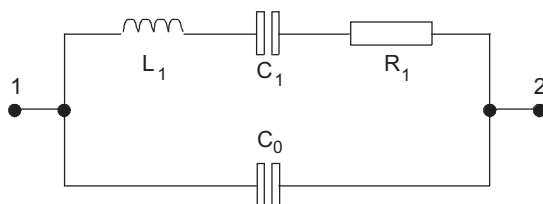
### Outline

### 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

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

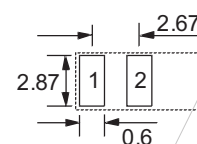
Specifications are typical at 25 $^{\circ}$ C unless otherwise indicated.

- \* 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



**CX-2V-SM**  
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## Circuit Design

### Conventional HCMOS Pierce Oscillator Circuit

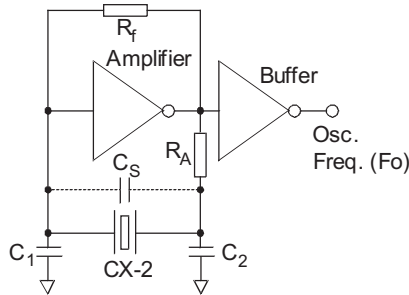


Figure 1 - CX-2V Typical Motional Resistance (R<sub>1</sub>)

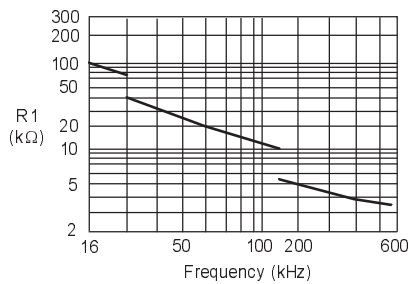


Figure 2 - CX-2V Typical Motional Capacitance (C<sub>1</sub>)

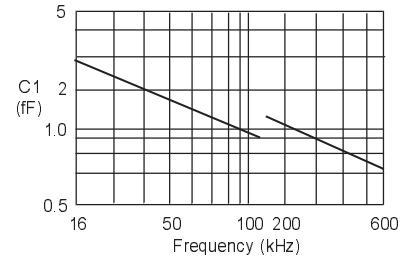


Figure 3 - CX-2V Typical Quality Factor (Q)

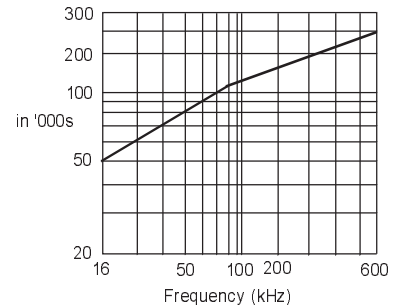
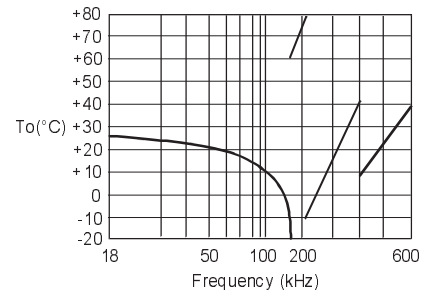


Figure 4 - CX-2V Typical Turning Point Temp. (°C)



## 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  
Blank if standard **-SM1** **32.768kHz** **( A / I )**  
"S" if special or custom design SM1 Calibration Tolerance\* @ 25°C Temperature Range:  
Blank if standard SM2 A, B, C C = Commercial  
Blank if standard SM3 S = Specify I = Industrial  
Blank if standard SM3 M = Military  
Blank if standard SM3 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