

## CX-6V-SM

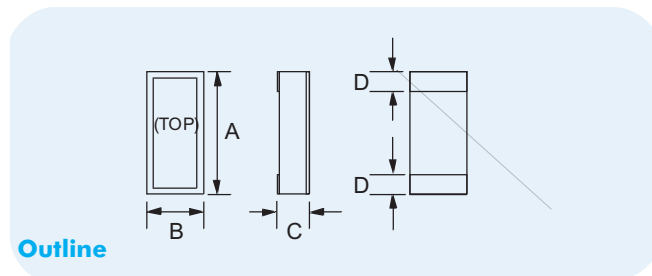
18kHz to 600kHz  
ULTRA-LOW PROFILE  
MINIATURE SMD CRYSTAL

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## General Description

The CX-6V-SM quartz crystals are leadless devices designed for surface mounting on printed circuit boards or hybrid substrates. The crystals are intended for use in Pierce oscillators. Hermetically sealed in a miniature ceramic package, the crystals are produced utilizing a photo-lithographic process ensuring consistent high quality production units.



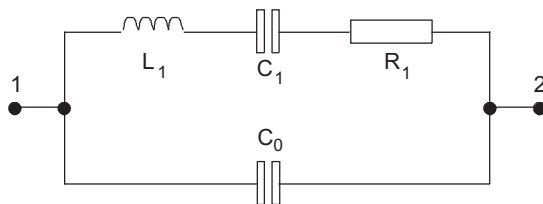
Outline

### CX-6V-SM Package Dimensions

| Dimension | Typical (mm) | Maximum (mm) |
|-----------|--------------|--------------|
| A         | 6.73         | 7.11         |
| B         | 2.62         | 2.90         |
| C         | -            | see below    |
| D         | 1.27         | 1.52         |

| Dimension "C" | Glass Lid (mm max.) | Ceramic Lid (mm max.) |
|---------------|---------------------|-----------------------|
| SM1           | 0.99                | 1.35                  |
| SM2           | 1.04                | 1.40                  |
| SM3           | 1.12                | 1.47                  |

### Equivalent Circuit



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

- Miniature tuning fork design
- Ultra-low profile (1mm)
- High shock resistance
- Designed for low power applications
- Compatible with hybrid or PCB packaging
- Low ageing
- Full military environmental testing available
- Ideal for battery operated applications

## Specification

|   |  |
|---|--|
| <b>Frequency Range:</b>                         | 18kHz to 600kHz  |
| <b>Functional Mode:</b>                         | Tuning Fork (Flexure)  |
| <b>Calibration Tolerance*:</b>                  | A, B or C (see table below)  |
| <b>Motional Resistance (<math>R_1</math>):</b>  | See Figure 1<br>Max.: 18~25kHz, 2x typ.<br>25~600kHz, 2.5x typ.              |
| <b>Motional Capacitance (<math>C_1</math>):</b> | See Figure 2   |
| <b>Quality Factor (Q):</b>                      | See Figure 3<br>Min. is 0.25 typ.  |
| <b>Shunt Capacitance (<math>C_0</math>):</b>    | 1.4pF  |
| <b>Drive Level:</b>                             | 18~25kHz 0.5µW max.<br>25~600kHz 1.0µW max.                                  |
| <b>Turning Point (<math>T_0</math>)**:</b>      | See Figure 4   |
| <b>Temperature Coefficient (k):</b>             | -0.035ppm/°C <sup>2</sup>  |
| <b>Ageing, first year:</b>                      | ±5ppm max.   |
| <b>Shock, survival***:</b>                      | 1,500g 0.3ms, ½ sine   |
| <b>Vibration, survival***:</b>                  | 10g rms 20-2,000Hz random  |
| <b>Operating Temperature:</b>                   | -10°~+70°C (commercial)<br>-40°~+85°C (industrial)<br>-55°~+125°C (military) |
| <b>Storage Temperature:</b>                     | -55°C~+125°C   |
| <b>Process Temperature:</b>                     | 260°C for 20 sec.  |

Specifications are typical at 25°C unless otherwise indicated.

- \* Closer calibration available
- \*\* Other Turning Point available
- \*\* A higher shock and vibration version is available

### CX-6V-SM Crystal Calibration Tolerance at 25°C

| Calibration | Frequency Range (kHz) |          |           |         |
|-------------|-----------------------|----------|-----------|---------|
|             | 18~74.9               | 75~169.9 | 170~249.9 | 250~600 |
| A           | ±0.003%               | ±0.005%  | ±0.01%    | ±0.02%  |
| B           | ±0.01%                | ±0.01%   | ±0.02%    | ±0.05%  |
| C           | ±0.1%                 | ±0.1%    | ±0.2%     | ±0.5%   |

Other calibration values are available - consult Euroquartz sales office

### Load Capacitance ( $C_L$ ) Used to Calibrate CX-6V

| Frequency Range (kHz) | Load Cap. (pF) | Frequency Range (kHz) | Load Cap. (pF) |
|-----------------------|----------------|-----------------------|----------------|
| 18~24.9               | 10             | 100.1~179.9           | 5              |
| 25~54.9               | 9              | 180~160               | 4              |
| 55~100                | 8              |                       |                |

(Other  $C_L$  available)

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## Circuit Design

Figure 1 - CX-6V Typical Motional Resistance (R<sub>1</sub>)

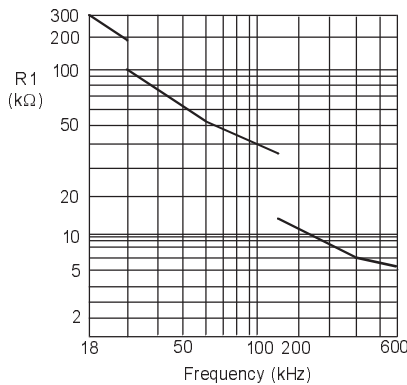


Figure 2 - CX-6V Typical Motional Capacitance (C1)

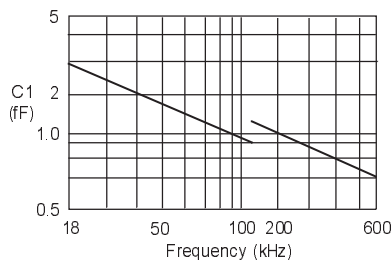


Figure 3 - CX-1H Typical Quality Factor (Q)

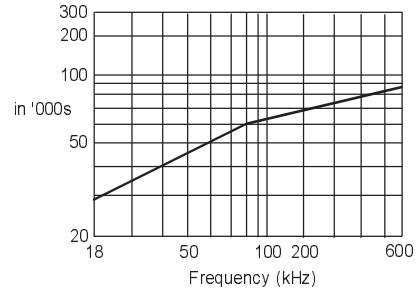
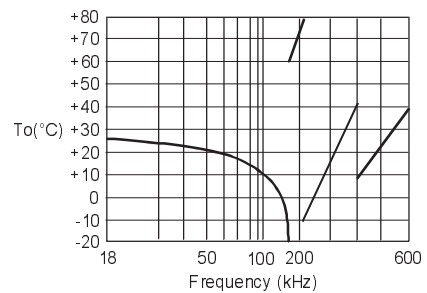


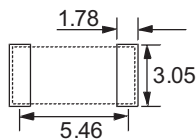
Figure 4 - CX-1H Typical Turning Point Temp. (°C)



Note: Frequency (f) deviation from frequency (fo) @ turning point

$$\frac{f-f_0}{f_0} = k(T-T_0)^2$$

## Solder Pad Layout



## Order Code

**CX-6V** ——— **C = Ceramic Lid**  
 Blank = Glass Lid

**-SM1** ——— **Frequency**  
 SM1  
 SM2  
 SM3

**32.768kHz** ( **A** / **I** )

**"S"** if special or custom design  
 Blank if standard

**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 |

## Packaging

- CX-6V-SM- Bulk Pack (Standard)
- 16mm tape, 178mm or 330mm reels (Optional) per EIA 481
  - Tray Pack (Optional)