## HC49/4H SMX CRYSTALS

## ISSUE 9; 18 OCTOBER 1999

## Delivery Options

- Common frequencies are available from stock. Please see p143 for details


## Holder Style

- HC49/4H SMX crystals are resistance welded, hermetically sealed in an inert atmosphere with glass to metal seals securing the lead wires. The lead wires are formed into a gull wing and mounted on a plastic former
- Lower profiles available, please contact our sales office


## General Specifications

- Load Capacitance $\left(\mathrm{C}_{\mathrm{L}}\right): 10 \mathrm{pF}$ to 75 pF or Series
- Drive Level: 0.5mW max
- Static Capacitance ( $\mathrm{C}_{0}$ ): 9pF max
- Ageing: $\pm 3 \mathrm{ppm}$ typical per year


## Standard Frequencies

- $3.579545 \mathrm{MHz}, 3.68640 \mathrm{MHz}, 4.0 \mathrm{MHz}$, $4.91520 \mathrm{MHz}, 5.0 \mathrm{MHz}, 6.0 \mathrm{MHz}, 7.37280 \mathrm{MHz}$, $8.0 \mathrm{MHz}, 8.1920 \mathrm{MHz}, 9.83040 \mathrm{MHz}, 10.0 \mathrm{MHz}$, $11.05920 \mathrm{MHz}, 12.0 \mathrm{MHz}, 14.318180 \mathrm{MHz}$, $14.74560 \mathrm{MHz}, 15.360 \mathrm{MHz}, 16.0 \mathrm{MHz}$, $18.4320 \mathrm{MHz}, 19.66080 \mathrm{MHz}, 20.0 \mathrm{MHz}$


## Standard Frequency Tolerances and Stabilities

- $\pm 50 \mathrm{ppm}, \pm 100 \mathrm{ppm}$


## Operating Temperature Ranges

- 0 to $50^{\circ} \mathrm{C}$
-10 to $60^{\circ} \mathrm{C}$
-20 to $70^{\circ} \mathrm{C}$
-30 to $80^{\circ} \mathrm{C}$


## Storage Temperature Range

- -40 to $85^{\circ} \mathrm{C}$


## Environmental Specification

- Shock: $981 \mathrm{~m} / \mathrm{s}^{2}$ for 6 ms , three shocks in each direction along three mutually perpendicular planes
- Vibration: 10 to 60 Hz 0.75 mm displacement, 60 to $500 \mathrm{~Hz} 98.1 \mathrm{~m} / \mathrm{s}^{2}$ acceleration, 30 minutes in each of three mutually perpendicular planes


## Marking

- Frequency only


## Minimum Order Information Required

- Frequency + Holder + Frequency Tolerance @ $25^{\circ} \mathrm{C}$ + Frequency Stability + Operating Temperature Range + Circuit Condition + Overtone Order

Outline in mm (inches)


Solder pad layout


Typical Frequency vs Temperature Curves for various angles of AT-cut crystals


Typical Solder Condition - Infrared Reflow


Electrical Specification - maximum limiting values

| Frequency Range | Frequency Tolerance <br> @ $25^{\circ} \mathrm{C} \pm 2^{\circ} \mathrm{C}$ | Operating Temperature Range | Frequency Stability Available Over Operating Temperature |  | ESR <br> Max | Vibration Mode |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  | Minimum | Maximum |  |  |
| $\begin{gathered} 3.50 \text { to } \\ <5.0 \mathrm{MHz} \end{gathered}$ | $\pm 15 \mathrm{ppm}$ to $\pm 100 \mathrm{ppm}$ | 0 to $50^{\circ} \mathrm{C}$ | $\pm 15 \mathrm{ppm}$ | $\pm 100 \mathrm{ppm}$ | $200 \Omega$ | Fundamental AT cut |
|  |  | -10 to $60^{\circ} \mathrm{C}$ | $\pm 20 \mathrm{ppm}$ | $\pm 100 \mathrm{ppm}$ |  |  |
|  |  | -20 to $70^{\circ} \mathrm{C}$ | $\pm 20 \mathrm{ppm}$ | $\pm 100 \mathrm{ppm}$ |  |  |
|  |  | -30 to $80^{\circ} \mathrm{C}$ | $\pm 25 \mathrm{ppm}$ | $\pm 100 \mathrm{ppm}$ |  |  |
| $\begin{aligned} & 5.0 \text { to } \\ & <8.0 \mathrm{MHz} \end{aligned}$ | $\pm 15 \mathrm{ppm}$ to $\pm 100 \mathrm{ppm}$ | 0 to $50^{\circ} \mathrm{C}$ | $\pm 15 \mathrm{ppm}$ | $\pm 100 \mathrm{ppm}$ | $120 \Omega$ | Fundamental AT cut |
|  |  | -10 to $60^{\circ} \mathrm{C}$ | $\pm 20 \mathrm{ppm}$ | $\pm 100 \mathrm{ppm}$ |  |  |
|  |  | -20 to $70^{\circ} \mathrm{C}$ | $\pm 20 \mathrm{ppm}$ | $\pm 100 \mathrm{ppm}$ |  |  |
|  |  | -30 to $80^{\circ} \mathrm{C}$ | $\pm 25 \mathrm{ppm}$ | $\pm 100 \mathrm{ppm}$ |  |  |
| $\begin{aligned} & 8.0 \text { to } \\ < & 12.0 \mathrm{MHz} \end{aligned}$ | $\pm 15 \mathrm{ppm}$ to $\pm 100 \mathrm{ppm}$ | 0 to $50^{\circ} \mathrm{C}$ | $\pm 10 \mathrm{ppm}$ | $\pm 100 \mathrm{ppm}$ | $70 \Omega$ | Fundamental AT cut |
|  |  | -10 to $60^{\circ} \mathrm{C}$ | $\pm 15 \mathrm{ppm}$ | $\pm 100 \mathrm{ppm}$ |  |  |
|  |  | -20 to $70^{\circ} \mathrm{C}$ | $\pm 15 \mathrm{ppm}$ | $\pm 100 \mathrm{ppm}$ |  |  |
|  |  | -30 to $80^{\circ} \mathrm{C}$ | $\pm 20 \mathrm{ppm}$ | $\pm 100 \mathrm{ppm}$ |  |  |
| $\begin{gathered} 12.0 \text { to } \\ <25.0 \mathrm{MHz} \end{gathered}$ | $\pm 15 \mathrm{ppm}$ to $\pm 100 \mathrm{ppm}$ | 0 to $50^{\circ} \mathrm{C}$ | $\pm 10 \mathrm{ppm}$ | $\pm 100 \mathrm{ppm}$ | $50 \Omega$ | Fundamental AT cut |
|  |  | -10 to $60^{\circ} \mathrm{C}$ | $\pm 15 \mathrm{ppm}$ | $\pm 100 \mathrm{ppm}$ |  |  |
|  |  | -20 to $70^{\circ} \mathrm{C}$ | $\pm 15 \mathrm{ppm}$ | $\pm 100 \mathrm{ppm}$ |  |  |
|  |  | -30 to $80^{\circ} \mathrm{C}$ | $\pm 20 \mathrm{ppm}$ | $\pm 100 \mathrm{ppm}$ |  |  |
| 25.0 to 32.0 MHz | $\pm 15 \mathrm{ppm}$ to $\pm 100 \mathrm{ppm}$ | 0 to $50^{\circ} \mathrm{C}$ | $\pm 10 \mathrm{ppm}$ | $\pm 100 \mathrm{ppm}$ | $30 \Omega$ | Fundamental AT cut |
|  |  | -10 to $60^{\circ} \mathrm{C}$ | $\pm 15 \mathrm{ppm}$ | $\pm 100 \mathrm{ppm}$ |  |  |
|  |  | -20 to $70^{\circ} \mathrm{C}$ | $\pm 15 \mathrm{ppm}$ | $\pm 100 \mathrm{ppm}$ |  |  |
|  |  | -30 to $80^{\circ} \mathrm{C}$ | $\pm 20 \mathrm{ppm}$ | $\pm 100 \mathrm{ppm}$ |  |  |
| $\begin{aligned} & 25.0 \text { to } \\ & 40.0 \mathrm{MHz} \end{aligned}$ | Inclusive with Frequency Stabiity | 0 to $50^{\circ} \mathrm{C}$ | $\pm 50 \mathrm{ppm}$ | $\pm 100 \mathrm{ppm}$ | $50 \Omega$ | Fundamental BT cut |
|  |  | -10 to $60^{\circ} \mathrm{C}$ | $\pm 50 \mathrm{ppm}$ | $\pm 100 \mathrm{ppm}$ |  |  |
|  |  | -20 to $70^{\circ} \mathrm{C}$ | $\pm 100 \mathrm{ppm}$ | $\pm 100 \mathrm{ppm}$ |  |  |
|  |  | -30 to $80^{\circ} \mathrm{C}$ | $\pm 100 \mathrm{ppm}$ | $\pm 100 \mathrm{ppm}$ |  |  |
| $\begin{aligned} & 25.0 \text { to } \\ & 70.0 \mathrm{MHz} \end{aligned}$ | $\pm 15 \mathrm{ppm}$ to $\pm 100 \mathrm{ppm}$ | 0 to $50^{\circ} \mathrm{C}$ | $\pm 15 \mathrm{ppm}$ | $\pm 100 \mathrm{ppm}$ | $100 \Omega$ | 3rd Overtone AT cut |
|  |  | -10 to $60^{\circ} \mathrm{C}$ | $\pm 20 \mathrm{ppm}$ | $\pm 100 \mathrm{ppm}$ |  |  |
|  |  | -20 to $70^{\circ} \mathrm{C}$ | $\pm 20 \mathrm{ppm}$ | $\pm 100 \mathrm{ppm}$ |  |  |
|  |  | -30 to $80^{\circ} \mathrm{C}$ | $\pm 25 \mathrm{ppm}$ | $\pm 100 \mathrm{ppm}$ |  |  |

Outline in mm (inches) - Tape


Outline in mm (inches) - Reel (scale 1:8)


