

## HC49 CRYSTALS

ISSUE 15; 1 NOVEMBER 2010 - RoHS 2002/95/EC

### Description

- Industry standard leaded package
- Resistance welded, hermetically sealed in an inert atmosphere, glass to metal seals on leads
- Variants available include but are not limited to:-  
3L = a centre mounted third leg grounds the can  
T = a truncated height of 11.1mm  
Gull-Wing = SMD version see outline drawing
- Please contact our sales offices for more options
- Stock parts listed at the beginning of this chapter

### General Specifications

- Load Capacitance (CL): 10pF to 75pF or Series
- Drive Level: 1mW max
- Ageing:  $\pm 3$ ppm typ per year at 25°C
- Shunt Capacitance (C<sub>0</sub>): 7pF max

### Standard Frequency Tolerances and Stabilities

- $\pm 5$ ppm,  $\pm 10$ ppm,  $\pm 15$ ppm,  $\pm 20$ ppm,  $\pm 30$ ppm,  $\pm 50$ ppm,  $\pm 100$ ppm

### Operating Temperature Ranges

- 0 to 50°C
- 10 to 60°C
- 20 to 70°C
- 30 to 80°C
- 40 to 85°C
- 55 to 105°C
- 55 to 125°C

### Storage Temperature Range

- 55 to 125°C

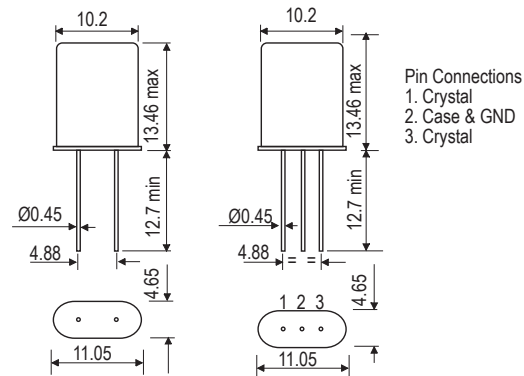
### Environmental

- Shock: 981m/s<sup>2</sup>, 6ms, 3 times in each of 3 mutually perpendicular planes
- Vibration: 10Hz-60Hz, 0.75mm amplitude, 60Hz-500Hz, 98.1m/s<sup>2</sup>, 30mins in 3 mutually perpendicular planes

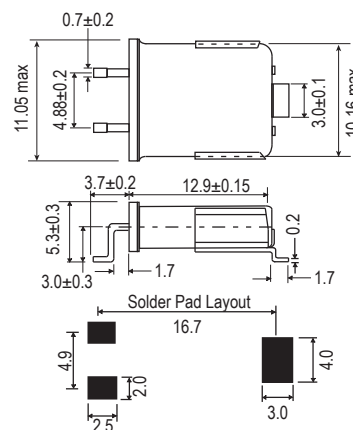
### Packaging

- Loose in bulk pack, 100pcs per bag
- Tape and reel in accordance with EIA-468-C, 1kpcs per reel (please see pages 372 & 373)
- Gull-Wing Surface Mount - Tape and reel in accordance with EIA-481-D, 1kpcs per reel (please see pages 372 & 373)

### Outline (mm) - HC49 & HC49-3L



### Outline (mm) - HC49 Gull-Wing



### Ordering Information (\*minimum required)

- Frequency\*
- Model\*
- Frequency Tolerance (@25°C)\*
- Frequency Stability (over operating temperature range)\*
- Operating Temperature Range\*
- Load Capacitance\*
- Overtone\*

### Example

- 10.0MHz HC49  
50/50/-40 to 85C/10 FUND



**Electrical Specifications - maximum limiting values**

| Frequency Range    | Frequency Tolerance<br>@25°C ±2°C | Operating Temperature<br>Range | Frequency Stability Available Over<br>Operating Temperature Range |         | ESR<br>Max | Vibration<br>Mode     |
|--------------------|-----------------------------------|--------------------------------|---|---------|------------|-----------------------|
|                    |                                   |                                | Minimum   | Maximum |            |                       |
| 1.84320 to <2.0MHz | ±5ppm to ±100ppm                  | 0 to 50°C                      | ±15ppm  | ±200ppm | 800Ω       | Fundamental<br>AT cut |
|                    |                                   | -10 to 60°C                    | ±20ppm  |         |            |                       |
|                    |                                   | -20 to 70°C                    |   |         |            |                       |
|                    |                                   | -30 to 80°C                    | ±25ppm  |         |            |                       |
|                    |                                   | -40 to 85°C                    | ±30ppm  |         |            |                       |
|                    |                                   | -55 to 105°C                   | ±50ppm  |         |            |                       |
|                    |                                   | -55 to 125°C                   | ±100ppm   |         |            |                       |
| 2.0 to <3.0MHz     |                                   | 0 to 50°C                      | ±15ppm  |         | 600Ω       |                       |
|                    |                                   | -10 to 60°C                    | ±20ppm  |         |            |                       |
|                    |                                   | -20 to 70°C                    |   |         |            |                       |
|                    |                                   | -30 to 80°C                    | ±25ppm  |         |            |                       |
|                    |                                   | -40 to 85°C                    | ±30ppm  |         |            |                       |
|                    |                                   | -55 to 105°C                   | ±50ppm  |         |            |                       |
|                    |                                   | -55 to 125°C                   | ±100ppm   |         |            |                       |
| 3.0 to <4.0MHz     |                                   | 0 to 50°C                      | ±15ppm  |         | 150Ω       |                       |
|                    |                                   | -10 to 60°C                    | ±20ppm  |         |            |                       |
|                    |                                   | -20 to 70°C                    |   |         |            |                       |
|                    |                                   | -30 to 80°C                    | ±25ppm  |         |            |                       |
|                    |                                   | -40 to 85°C                    | ±30ppm  |         |            |                       |
|                    |                                   | -55 to 105°C                   | ±50ppm  |         |            |                       |
|                    |                                   | -55 to 125°C                   | ±100ppm   |         |            |                       |
| 4.0 to <7.0MHz     |                                   | 0 to 50°C                      | ±15ppm  | ±100ppm | 100Ω       |                       |
|                    |                                   | -10 to 60°C                    | ±20ppm  |         |            |                       |
|                    |                                   | -20 to 70°C                    |   |         |            |                       |
|                    |                                   | -30 to 80°C                    | ±25ppm  |         |            |                       |
|                    |                                   | -40 to 85°C                    | ±30ppm  |         |            |                       |
|                    |                                   | -55 to 105°C                   | ±50ppm  |         |            |                       |
|                    |                                   | -55 to 125°C                   | ±100ppm   |         |            |                       |
| 7.0 to <10.0MHz    |                                   | 0 to 50°C                      | ±15ppm  |         | 50Ω        |                       |
|                    |                                   | -10 to 60°C                    | ±20ppm  |         |            |                       |
|                    |                                   | -20 to 70°C                    |   |         |            |                       |
|                    |                                   | -30 to 80°C                    | ±25ppm  |         |            |                       |
|                    |                                   | -40 to 85°C                    | ±30ppm  |         |            |                       |
|                    |                                   | -55 to 105°C                   | ±50ppm  |         |            |                       |
|                    |                                   | -55 to 125°C                   | ±100ppm   |         |            |                       |

Note: For other frequency / specification combinations, please contact our sales offices





| Frequency Range  | Frequency Tolerance<br>@25°C ±2°C     | Operating Temperature<br>Range | Frequency Stability Available Over<br>Operating Temperature Range |         | ESR<br>Max             | Vibration<br>Mode     |
|------------------|---------------------------------------|--------------------------------|---|---------|------------------------|-----------------------|
|                  |                                       |                                | Minimum   | Maximum |                        |                       |
| 10.0 to 36.0MHz  | ±5ppm to ±100ppm                      | 0 to 50°C                      | ±15ppm  | ±100ppm | 35Ω                    | Fundamental<br>AT cut |
|                  |                                       | -10 to 60°C                    | ±20ppm  |         |                        |                       |
|                  |                                       | -20 to 70°C                    |   |         |                        |                       |
|                  |                                       | -30 to 80°C                    | ±25ppm  |         |                        |                       |
|                  |                                       | -40 to 85°C                    | ±30ppm  |         |                        |                       |
|                  |                                       | -55 to 105°C                   | ±50ppm  |         |                        |                       |
|                  |                                       | -55 to 125°C                   | ±100ppm   |         |                        |                       |
| 20.0 to 45.0MHz  | Inclusive with<br>Frequency Stability | 0 to 50°C                      | ±50ppm  | 35Ω     | Fundamental<br>BT cut  |                       |
|                  |                                       | -10 to 60°C                    |   |         |                        |                       |
|                  |                                       | -20 to 70°C                    | ±100ppm   |         |                        |                       |
|                  |                                       | -30 to 80°C                    |   |         |                        |                       |
| 21.0 to 90.0MHz  | ±5ppm to ±100ppm                      | 0 to 50°C                      | ±15ppm  | 40Ω     | 3rd Overtone<br>AT cut |                       |
|                  |                                       | -10 to 60°C                    | ±20ppm  |         |                        |                       |
|                  |                                       | -20 to 70°C                    |   |         |                        |                       |
|                  |                                       | -30 to 80°C                    | ±25ppm  |         |                        |                       |
|                  |                                       | -40 to 85°C                    | ±30ppm  |         |                        |                       |
|                  |                                       | -55 to 105°C                   | ±50ppm  |         |                        |                       |
|                  |                                       | -55 to 125°C                   | ±100ppm   |         |                        |                       |
| 45.0 to 135.0MHz | Inclusive with<br>Frequency Stability | 0 to 50°C                      | ±50ppm  | 35Ω     | 3rd Overtone<br>BT cut |                       |
|                  |                                       | -10 to 60°C                    |   |         |                        |                       |
|                  |                                       | -20 to 70°C                    | ±100ppm   |         |                        |                       |
|                  |                                       | -30 to 80°C                    |   |         |                        |                       |
| 60.0 to 150.0MHz | ±5ppm to ±100ppm                      | 0 to 50°C                      | ±10ppm  | 70Ω     | 5th Overtone<br>AT cut |                       |
|                  |                                       | -10 to 60°C                    | ±15ppm  |         |                        |                       |
|                  |                                       | -20 to 70°C                    |   |         |                        |                       |
|                  |                                       | -30 to 80°C                    | ±20ppm  |         |                        |                       |
|                  |                                       | -40 to 85°C                    | ±25ppm  |         |                        |                       |
|                  |                                       | -55 to 105°C                   | ±50ppm  |         |                        |                       |
|                  |                                       | -55 to 125°C                   |   |         |                        |                       |
| 90.0 to 225.0MHz | Inclusive with<br>Frequency Stability | 0 to 50°C                      | ±50ppm  | 70Ω     | 5th Overtone<br>BT cut |                       |
|                  |                                       | -10 to 60°C                    |   |         |                        |                       |
|                  |                                       | -20 to 70°C                    | ±100ppm   |         |                        |                       |
|                  |                                       | -30 to 80°C                    |   |         |                        |                       |

Note: For other frequency / specification combinations, please contact our sales offices





| Frequency Range   | Frequency Tolerance<br>@25°C ±2°C     | Operating Temperature<br>Range | Frequency Stability Available Over<br>Operating Temperature Range |         | ESR<br>Max             | Vibration<br>Mode      |
|-------------------|---------------------------------------|--------------------------------|---|---------|------------------------|------------------------|
|                   |                                       |                                | Minimum   | Maximum |                        |                        |
| 85.0 to 210.0MHz  | ±5ppm to ±100ppm                      | 0 to 50°C                      | ±5ppm   | ±100ppm | 100Ω                   | 7th Overtone<br>AT cut |
|                   |                                       | -10 to 60°C                    |   |         |                        |                        |
|                   |                                       | -20 to 70°C                    | ±10ppm  |         |                        |                        |
|                   |                                       | -30 to 80°C                    | ±20ppm  |         |                        |                        |
|                   |                                       | -40 to 85°C                    | ±25ppm  |         |                        |                        |
|                   |                                       | -55 to 105°C                   | ±50ppm  |         |                        |                        |
|                   |                                       | -55 to 125°C                   |   |         |                        |                        |
| 125.0 to 300.0MHz | Inclusive with<br>Frequency Stability | 0 to 50°C                      | ±50ppm  | 150Ω    | 7th Overtone<br>BT cut |                        |
|                   |                                       | -10 to 60°C                    | ±100ppm   |         |                        |                        |
|                   |                                       | -20 to 70°C                    |   |         |                        |                        |
|                   |                                       | -30 to 80°C                    |   |         |                        |                        |
| 110.0 to 270.0MHz | ±5ppm to ±100ppm                      | 0 to 50°C                      | ±5ppm   | 150Ω    | 9th Overtone<br>AT cut |                        |
|                   |                                       | -10 to 60°C                    | ±10ppm  |         |                        |                        |
|                   |                                       | -20 to 70°C                    |   |         |                        |                        |
|                   |                                       | -30 to 80°C                    | ±20ppm  |         |                        |                        |
|                   |                                       | -40 to 85°C                    | ±25ppm  |         |                        |                        |
|                   |                                       | -55 to 105°C                   | ±50ppm  |         |                        |                        |
|                   |                                       | -55 to 125°C                   |   |         |                        |                        |

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