Electrical Specifications:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal Frequency</td>
<td>32.768 KHz</td>
</tr>
<tr>
<td>Frequency Tolerance at 25° C</td>
<td>±20 PPM</td>
</tr>
<tr>
<td>Aging per year</td>
<td>±3</td>
</tr>
<tr>
<td>Turnover Temperature</td>
<td>25 ±5</td>
</tr>
<tr>
<td>Temperature Coefficient</td>
<td>-0.034 ± 0.008 PPM/°C²</td>
</tr>
<tr>
<td>Temperature Range</td>
<td>-40 to +85</td>
</tr>
<tr>
<td>Temperature Range (Extended)</td>
<td>-40 to +125</td>
</tr>
<tr>
<td>Temperature Range (Storage)</td>
<td>-55 to +140</td>
</tr>
<tr>
<td>Equivalent Series Resistance</td>
<td>65 K Ohm Max</td>
</tr>
<tr>
<td>Load Capacitance</td>
<td>12.5 pF</td>
</tr>
<tr>
<td>Standard</td>
<td>6.0 pF</td>
</tr>
<tr>
<td>Optional</td>
<td>7.0 pF</td>
</tr>
<tr>
<td>Shunt Capacitance</td>
<td>1.7 pF Typ</td>
</tr>
<tr>
<td>Motional Capacitance</td>
<td>3.0 pF Typ</td>
</tr>
<tr>
<td>Drive Level</td>
<td>1.0 µW Max</td>
</tr>
<tr>
<td>Insulation Resistance</td>
<td>500 at 100 Vdc ± 15 Vdc M Ohm Min</td>
</tr>
<tr>
<td>Quality Factor</td>
<td>70000 Typ</td>
</tr>
<tr>
<td>Capacitance Ratio</td>
<td>450</td>
</tr>
<tr>
<td>Resistance to Shock</td>
<td>±5 PPM maximum offset from 75 cm drop</td>
</tr>
<tr>
<td></td>
<td>test in all axes on to a hard surface.</td>
</tr>
</tbody>
</table>

Specification Title:

Microprocessor Crystal Unit
32.768 KHz (Time of Day)
3.2 x 1.5 millimeter Surface Mount
Ceramic Package
General Product Specification

Part Number: CTS3 Series
Mechanical Outline:

Package is Ceramic-Metal.
Dimensions are millimeters.

PCB Solder Pad Layout:
Carrier Tape Dimensions:

Dimensions are millimeters.

Solder Reflow Characteristics:
### How to build a Part Number:

<table>
<thead>
<tr>
<th>Series</th>
<th>CTS</th>
<th>Parameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Package</td>
<td>3</td>
<td>3.2 x 1.5 mm SMD</td>
</tr>
<tr>
<td>Frequency</td>
<td>32.768</td>
<td>KHz</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Load Capacitance</th>
<th>Standard</th>
<th>Option</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>12.5</td>
<td>6</td>
<td>6 pF</td>
<td>6 pF</td>
</tr>
<tr>
<td></td>
<td>12.5 pF</td>
<td>9</td>
<td>9 pF</td>
<td>9 pF</td>
</tr>
</tbody>
</table>

| Frequency Tolerance | 20 | ±20 PPM |
| Temperature Range (Extended) | X  | -40 to +125 °C |

| Packaging | R | Tape and Reel |

#### Part Number Example:
CTS3-32.768-9-20-R
CTS3- 3.2 x 1.5 mm SMD Crystal Unit
32.768 KHz Nominal Frequency
9 pF Load Capacitance
20: ±20 PPM Frequency Tolerance
-40 to +85 °C Temperature Range
R: Tape and Reel Packaging

#### Frequency vs. Temperature Characteristics:

To calculate the frequency stability the parabolic curvature constant (K) is needed.

For calculating the stability at 45 °C?
1- Change in temperature (\(\Delta T\)) is (45-25) = +20 °C
2- Change in frequency is (-0.034 x (\(\Delta T\))^2) = (-0.034 x (20)^2) = -13.6 PPM

#### Notes:
1- Standard Temperature Range does not need to be included in Part Number description.
2- Product is shipped in Tape and Reel configuration. Each reel contains 3000 pieces.
3- Specification subject to change without notice.