DESCRIPTION

The CXOXULP 32.768 kHz oscillator achieves the low power comparable with a tuning fork design and the fast start-up and tight frequency stability attained by an AT cut crystal design. Designed for applications requiring ultra-low current (12 µA) and fast start-up time (5 ms), these oscillators offer tight frequency stability over a wide temperature range (-55°C to +125°C) and high shock survivability.

FEATURES

- Ultra-low current (typical 12 µA)
- Fast start-up (typical 5 ms)
- Tight tolerance
- High shock resistance
- Low aging
- CMOS output
- Optional Output Enable/Disable with Tri-State
- Low EMI emission
- Hermetically sealed ceramic package
- Full military testing available
- Designed and manufactured in the USA

APPLICATIONS

Military, Aerospace & Avionics
- Communications
- Navigation
- GPS

Industrial, Computer & Communications
- Handheld instrumentation
- Transponder/Animal migration

Medical
- Test & diagnostic equipment
- Handheld devices

DIMENSIONS

<table>
<thead>
<tr>
<th>DIM</th>
<th>TYPICAL</th>
<th>MAXIMUM</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>inches</td>
<td>mm</td>
</tr>
<tr>
<td>A</td>
<td>0.126</td>
<td>3.20</td>
</tr>
<tr>
<td>B</td>
<td>0.099</td>
<td>2.50</td>
</tr>
<tr>
<td>C</td>
<td>0.039</td>
<td>1.00</td>
</tr>
<tr>
<td></td>
<td>SM1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SM3/SM5</td>
<td>0.044</td>
</tr>
<tr>
<td>D</td>
<td>0.040</td>
<td>1.00</td>
</tr>
<tr>
<td>E</td>
<td>0.030</td>
<td>0.75</td>
</tr>
</tbody>
</table>

PIN CONNECTIONS

1. Output Enable/Disable (E) or no connection (N)
2. Ground
3. Output
4. VDD

SUGGESTED LAND PATTERN
SPECIFICATIONS
Specifications are typical at 25°C unless otherwise noted. Specifications are subject to change without notice. Tighter specifications available (contact factory).

Supply Voltage  1.8 V to 3.3 V
Calibration Tolerance¹  ±25 ppm, ±50 ppm, ±100 ppm
Frequency Stability
  Over Temperature²  ±10 to ±50 ppm for Commercial
                     ±20 to ±100 ppm for Industrial
                     ±50 to ±100 ppm for Military
Output Load (CMOS)  15 pF
Aging, first year  5 ppm
Shock
  Std:  5,000 g, 0.3 ms, ½ sine
  HG:  50,000 g, 0.5 ms, ½ sine
Vibration³  20 g, 10-2,000 Hz swept sine
Operating Temp. Ranges -10°C to 70°C (Commercial)
                     -40°C to 85°C (Industrial)
                     -55°C to 125°C (Military)

Electrical characteristics⁴

<table>
<thead>
<tr>
<th>SYMBOL</th>
<th>PARAMETER</th>
<th>MIN</th>
<th>TYP</th>
<th>MAX</th>
<th>UNIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>V&lt;sub&gt;OH&lt;/sub&gt;</td>
<td>Output Voltage High</td>
<td>0.9V&lt;sub&gt;DD&lt;/sub&gt;</td>
<td></td>
<td></td>
<td>V</td>
</tr>
<tr>
<td>V&lt;sub&gt;OL&lt;/sub&gt;</td>
<td>Output Voltage Low</td>
<td>0.1V&lt;sub&gt;DD&lt;/sub&gt;</td>
<td></td>
<td></td>
<td>V</td>
</tr>
<tr>
<td>t&lt;sub&gt;startup&lt;/sub&gt;</td>
<td>Start-up Time</td>
<td>5.0 ms</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>t&lt;sub&gt;r&lt;/sub&gt;</td>
<td>Rise Time (10%-90%)</td>
<td>2.5 ns</td>
<td>5.0 ns</td>
<td></td>
<td></td>
</tr>
<tr>
<td>t&lt;sub&gt;f&lt;/sub&gt;</td>
<td>Fall Time (10%-90%)</td>
<td>2.1 ns</td>
<td>5.0 ns</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Duty Cycle</td>
<td>45</td>
<td>50</td>
<td>55</td>
<td>%</td>
<td></td>
</tr>
<tr>
<td>I&lt;sub&gt;DD&lt;/sub&gt;</td>
<td>Input Current</td>
<td>12 µA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Period Jitter (rms)</td>
<td>30 ps</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. Other tolerances available.
2. Does not include calibration tolerance. Other tolerances available.
4. All parameters are measured at 25°C with a 10 MΩ / 15 pF load and V<sub>DD</sub> = 3.3 V.

ABSOLUTE MAXIMUM RATINGS
Supply Voltage V<sub>DD</sub>  -0.3 V to 5.0 V
Storage Temperature -55°C to 125°C
Maximum Process Temperature 260°C for 20 seconds

ENABLE/DISABLE OPTIONS (E/N)
For the 32.768 kHz CXOXULP, Statek offers two enable/disable options: E and N. The E-version has a Tri-State output and stops oscillating internally when the output is put into the high Z state. The N-version does not have PIN 1 connected internally and so has no enable/disable capability. The following table summarizes the Enable/Disable option E.

<table>
<thead>
<tr>
<th>FUNCTION TABLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>SYMBOL</td>
</tr>
<tr>
<td>V&lt;sub&gt;OH&lt;/sub&gt;</td>
</tr>
<tr>
<td>V&lt;sub&gt;OL&lt;/sub&gt;</td>
</tr>
<tr>
<td>t&lt;sub&gt;startup&lt;/sub&gt;</td>
</tr>
<tr>
<td>t&lt;sub&gt;r&lt;/sub&gt;</td>
</tr>
<tr>
<td>t&lt;sub&gt;f&lt;/sub&gt;</td>
</tr>
<tr>
<td>Duty Cycle</td>
</tr>
<tr>
<td>I&lt;sub&gt;DD&lt;/sub&gt;</td>
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<td></td>
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</tbody>
</table>

* When PIN 1 is allowed to float, it is held high by an internal pull-up resistor.

PACKAGING OPTIONS
CXOXULP
- Tray Pack
- 12 mm tape, 7” or 13” reels
  Per EIA 481 (see Tape and Reel data sheet #10109)

HOW TO ORDER CXOXULP 32.768 kHz SURFACE MOUNT CRYSTAL OSCILLATORS

<table>
<thead>
<tr>
<th>CXOXULP</th>
<th>HG</th>
<th>4</th>
<th>S</th>
<th>N</th>
<th>SM3</th>
<th>-</th>
<th>32.768k</th>
<th>/</th>
<th>50</th>
<th>/</th>
<th>50</th>
<th>/</th>
<th>-</th>
<th>/</th>
<th>I</th>
</tr>
</thead>
</table>
|         | HG = High Shock, Otherwise leave blank | Supply Voltage 1 = 1.8 V
  2 = 2.5 V
  3 = 3.0 V
  4 = 3.3 V | “S” if special or custom design. Blank if Std. | Enable/Disable Option E or N | Terminations
  Blank = SM1
  = Gold Plated
  SM3 = Solder Dipped
  SM5 = Solder Dipped (Lead Free) | Frequency
  k = kHz | Calibration Tolerance @ 25°C (in ppm) | Frequency Stability over Temp. Range (in ppm) | Temp. Range:
  C = -10°C to +70°C
  I = -40°C to +85°C
  M = -55°C to +125°C
  S = Customer Specified

OR

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<thead>
<tr>
<th>-</th>
<th>-</th>
<th>-</th>
<th>-</th>
<th>100</th>
<th>/</th>
<th>I</th>
</tr>
</thead>
</table>
|      | Total Frequency Tolerance (in ppm) | Temp. Range:
  C = -10°C to +70°C
  I = -40°C to +85°C
  M = -55°C to +125°C
  S = Customer Specified

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10216 Rev C