The OX-204 is an Ultra Low Phase Noise Ovenized Crystal Oscillator with a noise floor as low as -175 dBc/Hz. Designed for applications that demand extremely low noise sources, including the reference oscillator for a phase-locked loop in the microwave spectrum. Custom frequencies available upon request.

### Features
- -140 dBc/Hz at 10 Hz offset
- -175 dBc/Hz at 10 kHz offset
- 10 MHz standard, other frequencies available

### Applications
- Military Radar
- Instrumentation and Test Equipment
- Synthesizers
- Military Communication Equipment
- DRO reference
- Satellite Communications

### Performance Specifications

#### Phase Noise Ordering Codes at 10 MHz

<table>
<thead>
<tr>
<th>Frequency Offset (Hz)</th>
<th>A</th>
<th>B</th>
<th>C (12V only)</th>
<th>D (12V only)</th>
<th>E (5V only)</th>
<th>Unit</th>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>-95</td>
<td>-100</td>
<td>-105</td>
<td>-110</td>
<td>-105</td>
<td>dBc/Hz</td>
<td>Maximum values</td>
</tr>
<tr>
<td>10</td>
<td>-125</td>
<td>-130</td>
<td>-135</td>
<td>-140</td>
<td>-135</td>
<td>dBc/Hz</td>
<td>All EFC settings</td>
</tr>
<tr>
<td>100</td>
<td>-150</td>
<td>-155</td>
<td>-157</td>
<td>-157</td>
<td>-157</td>
<td>dBc/Hz</td>
<td></td>
</tr>
<tr>
<td>1000</td>
<td>-160</td>
<td>-165</td>
<td>-167</td>
<td>-165</td>
<td>-167</td>
<td>dBc/Hz</td>
<td></td>
</tr>
<tr>
<td>10,000</td>
<td>-170</td>
<td>-170</td>
<td>-175</td>
<td>-170</td>
<td>-172</td>
<td>dBc/Hz</td>
<td></td>
</tr>
<tr>
<td>100,000</td>
<td>-170</td>
<td>-170</td>
<td>-175</td>
<td>-170</td>
<td>-173</td>
<td>dBc/Hz</td>
<td></td>
</tr>
</tbody>
</table>

#### Frequency Stabilities at 10 MHz

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Min</th>
<th>Typical</th>
<th>Max</th>
<th>Unit</th>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>vs. operating temperature range</td>
<td>-10</td>
<td>+10</td>
<td></td>
<td>ppb</td>
<td>-20 to +70°C (referenced to +25°C)</td>
</tr>
<tr>
<td>vs. Initial Tolerance</td>
<td>-100</td>
<td>+100</td>
<td></td>
<td>ppb</td>
<td>at time of shipment and 5V efc</td>
</tr>
<tr>
<td>Allan Deviation</td>
<td>5</td>
<td>E-12</td>
<td></td>
<td></td>
<td>0.1 to 1 second tau</td>
</tr>
<tr>
<td>vs. supply voltage change</td>
<td>-2</td>
<td>+2</td>
<td></td>
<td>ppb</td>
<td>±5% change</td>
</tr>
<tr>
<td>vs. load change</td>
<td>-2</td>
<td>+2</td>
<td></td>
<td>ppb</td>
<td>5% change in load</td>
</tr>
<tr>
<td>vs. aging / 1 day</td>
<td>-0.5</td>
<td>+0.5</td>
<td></td>
<td>ppb</td>
<td>after 7 days of operation</td>
</tr>
<tr>
<td>vs. aging / 1st year</td>
<td>-100</td>
<td>+100</td>
<td></td>
<td>ppb</td>
<td>after 7 days of operation</td>
</tr>
<tr>
<td>vs. aging / year</td>
<td>-30</td>
<td>+30</td>
<td></td>
<td>ppb</td>
<td>after first year of operation</td>
</tr>
<tr>
<td>Warm up time</td>
<td>5</td>
<td>minutes</td>
<td></td>
<td></td>
<td>to ±10 ppb of 2-hour frequency</td>
</tr>
</tbody>
</table>

@+25°C
## Performance Specifications

### Supply Voltage (Vs)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Min</th>
<th>Typical</th>
<th>Max</th>
<th>Unit</th>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply Voltage</td>
<td>11.4</td>
<td>12.0</td>
<td>12.6</td>
<td>VDC</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4.75</td>
<td>5</td>
<td>5.25</td>
<td>VDC</td>
<td></td>
</tr>
<tr>
<td>Power Consumption</td>
<td>4.0</td>
<td></td>
<td></td>
<td>Watts</td>
<td>during warm-up</td>
</tr>
<tr>
<td></td>
<td>1.8</td>
<td></td>
<td></td>
<td>Watts</td>
<td>steady state@+25°C</td>
</tr>
<tr>
<td>Reference Voltage</td>
<td>10</td>
<td></td>
<td></td>
<td>VDC</td>
<td>12 V version</td>
</tr>
<tr>
<td></td>
<td>4.35</td>
<td></td>
<td></td>
<td>VDC</td>
<td>5 V version</td>
</tr>
</tbody>
</table>

### RF Output

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Signal</th>
<th>Load</th>
<th>Unit</th>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Load</td>
<td>Sinewave</td>
<td>50</td>
<td>Ohms</td>
<td></td>
</tr>
<tr>
<td>Output Power</td>
<td>+7.0</td>
<td>+13.0</td>
<td>dBm</td>
<td>50 Ohm load @ Vs=12V</td>
</tr>
<tr>
<td>Harmonics</td>
<td>-30</td>
<td>+7.0</td>
<td>dBm</td>
<td>50 Ohm load</td>
</tr>
<tr>
<td>Spurious</td>
<td>-80</td>
<td></td>
<td>dBc</td>
<td></td>
</tr>
</tbody>
</table>

### Frequency Tuning (EFC)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Tuning Range</th>
<th>Control Voltage Range</th>
<th>Modulation Bandwidth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tuning Range</td>
<td>±400</td>
<td>±10 VDC</td>
<td>150 Hz</td>
</tr>
<tr>
<td>Linearity</td>
<td>15%</td>
<td>0-10 VDC</td>
<td></td>
</tr>
<tr>
<td>Tuning Slope</td>
<td>Positive</td>
<td>0-10 VDC</td>
<td></td>
</tr>
<tr>
<td>Input Impedance</td>
<td>100 kOhm</td>
<td>4.35 VDC</td>
<td></td>
</tr>
<tr>
<td>Modulation Bandwidth</td>
<td>150 Hz</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Additional Parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>g-sensitivity</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>g-sensitivity</td>
<td>1.5 ppb/g</td>
<td>20 grams</td>
</tr>
</tbody>
</table>

### Absolute Maximum Ratings

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Min</th>
<th>Typical</th>
<th>Max</th>
<th>Unit</th>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply Voltage (Vs)</td>
<td>15</td>
<td>7</td>
<td>V</td>
<td>V</td>
<td>12V version</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5V version</td>
</tr>
<tr>
<td>Output Load</td>
<td>-55</td>
<td>+95</td>
<td>°C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operable Temperature Range</td>
<td>-55</td>
<td>+95</td>
<td>°C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Device will not sustain damage when operated at temperatures between the operating range and the operable range, but will not be specification compliant</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Environmental and Product Classification

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shock (Endurance)</td>
<td>MIL-STD-202, Method 213, Condition J, 30g 11 ms</td>
</tr>
<tr>
<td>Sine Vibration (Endurance)</td>
<td>MIL-STD-202, Method 201 and 204, Condition A, except 5g to 500 Hz, 1 sweep each axis</td>
</tr>
<tr>
<td>Random Vibration (Endurance)</td>
<td>MIL-STD-202, Method 214, Condition I-D</td>
</tr>
<tr>
<td>Humidity</td>
<td>MIL-STD-202, Method 103, Condition B, 100% rh</td>
</tr>
<tr>
<td>Seal</td>
<td>MIL-STD-202, Method 112, Condition D</td>
</tr>
<tr>
<td>Altitude</td>
<td>MIL-STD-202, Method 105, sea level to space</td>
</tr>
<tr>
<td>Terminal Strength</td>
<td>MIL-STD-202, Method 11, Condition C (5 bends at 45°, 2 lbs)</td>
</tr>
<tr>
<td>Moisture Sensitive Level</td>
<td>1</td>
</tr>
<tr>
<td>RoHS</td>
<td>6 (fully compliant) - no pure tin options available upon request, the device will be assigned a customer part number, not orderable through ordering codes</td>
</tr>
<tr>
<td>Storage Temperature Range</td>
<td>-55</td>
</tr>
</tbody>
</table>
Outline Drawing

Dimensions in mm

<table>
<thead>
<tr>
<th>Code</th>
<th>Height “H”</th>
<th>Pin Length “L” Min</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>15.0</td>
<td>6.2</td>
</tr>
</tbody>
</table>

Pin Connections

1. RF Output
2. Ground (Case)
3. Electronic Frequency Control Input (EFC)/ No Connect
4. Reference Voltage
5. Supply Voltage Input (VS)

Dimensions in inches

<table>
<thead>
<tr>
<th>Code</th>
<th>Height “H”</th>
<th>Pin Length “L” Min</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>17.0 mm</td>
<td>na</td>
</tr>
</tbody>
</table>

Pin Connections

1. RF Output
4. Ground (Case)
7. Electronic Frequency Control Input (EFC)/ No Connect for Fixed frequency Oscillators
8. Reference Voltage
14. Supply Voltage Input (VS)
**Ordering Information**

<table>
<thead>
<tr>
<th>Product Family</th>
<th>OX: OCXO</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Package</strong></td>
<td>25x25mm</td>
</tr>
<tr>
<td><strong>Height</strong></td>
<td>0: 15.00 mm tht</td>
</tr>
<tr>
<td></td>
<td>1: 17.00 mm smd</td>
</tr>
<tr>
<td><strong>Supply Voltage</strong></td>
<td>B: +12V</td>
</tr>
<tr>
<td></td>
<td>D: +5V</td>
</tr>
<tr>
<td><strong>Stability Code</strong></td>
<td>108: ±10ppb (Temp Code J only)</td>
</tr>
<tr>
<td></td>
<td>208: ±20ppb</td>
</tr>
<tr>
<td><strong>Phase Noise and Frequency Control</strong></td>
<td>0: No Tuning, phase noise code A</td>
</tr>
<tr>
<td></td>
<td>1: No Tuning, phase noise code B</td>
</tr>
<tr>
<td></td>
<td>2: No Tuning, phase noise code C</td>
</tr>
<tr>
<td></td>
<td>3: Frequency Tuning, phase noise code A</td>
</tr>
<tr>
<td></td>
<td>4: Frequency Tuning, phase noise code B</td>
</tr>
<tr>
<td></td>
<td>5: Frequency Tuning, phase noise code C</td>
</tr>
<tr>
<td></td>
<td>6: No Tuning, phase noise code D</td>
</tr>
<tr>
<td></td>
<td>7: No Tuning, phase noise code E</td>
</tr>
<tr>
<td></td>
<td>8: Frequency Tuning, phase noise code E</td>
</tr>
<tr>
<td><strong>Frequency</strong></td>
<td></td>
</tr>
<tr>
<td><strong>RF Output Code</strong></td>
<td>E: Sinewave</td>
</tr>
<tr>
<td><strong>Temperature Range</strong></td>
<td>E: -40°C to +85°C</td>
</tr>
<tr>
<td></td>
<td>J: -20°C to +70°C</td>
</tr>
</tbody>
</table>

**Notes:**
1. Contact factory for improved stabilities or additional product options including no pure tin options.
2. Certain codes available for sampling and short lead time requests. Please review website for codes.
3. Unless otherwise stated, all values are valid after warm-up time and refer to typical conditions for supply voltage, frequency control voltage, load, and temperature (25°C).
4. Contact factory for other frequencies. Phase noise degrades for frequencies greater than 10 MHz.
5. Subject to technical modification.
6. Contact factory for availability.