OK-XBFXXXX-X Series
HF/UHF SMD TCVCXO
Ultra Low Phase Noise

Description: The OK-XBFXXXX Series of SMD temperature compensated, voltage controlled crystal oscillators (TCVCXO), provides High and Ultra High Frequency with excellent temperature stability, extremely low phase noise and jitter with a variety of different output types in a small surface mount FR4 based package.

Features

- Small, Low Profile SMD Package
- Very Low Phase Jitter and Phase Noise
- Excellent Frequency Stability
- Ultra High Frequency – up to 2.0 GHz
- CMOS, Sine-Wave, Differential PECL or LVDS outputs available
- Stratum3 available
- COTS/Dual use

Note: For frequency stability over temperature ±1ppm and tighter, the package height may be 10mm or 12.5mm

Creating a Part Number

<table>
<thead>
<tr>
<th>Package Code</th>
<th>OK - X</th>
<th>BF</th>
<th>X</th>
<th>X</th>
<th>X - X - FREQ</th>
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<tr>
<td>Supply Voltage</td>
<td>Code</td>
<td>Specification</td>
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<tr>
<td>0</td>
<td>5V ±5%</td>
<td></td>
<td></td>
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<tr>
<td>A</td>
<td>3.3V ±5%</td>
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<tr>
<td>TCXO/TCVCXO Option</td>
<td>Code</td>
<td>Specification</td>
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<tr>
<td>X</td>
<td>No V. Control</td>
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<tr>
<td>V</td>
<td>W/ V. Control</td>
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<tr>
<td>Note: Vc is not available with Code 3 Stability</td>
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Environmental

<table>
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<tr>
<th>Code</th>
<th>Specification</th>
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<tbody>
<tr>
<td>L</td>
<td>Contains a level of lead that is in excess of RoHS directive and is not designed for reflow</td>
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<tr>
<td>R</td>
<td>RoHS compliant</td>
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Temperature Range

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<thead>
<tr>
<th>Code</th>
<th>Specification</th>
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<tbody>
<tr>
<td>E</td>
<td>-10°C to 60°C</td>
</tr>
<tr>
<td>B</td>
<td>0°C to 70°C</td>
</tr>
<tr>
<td>C</td>
<td>-20°C to 70°C</td>
</tr>
<tr>
<td>D</td>
<td>-40°C to 85°C</td>
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Temp. Frequency Stability

<table>
<thead>
<tr>
<th>Code</th>
<th>Specification</th>
</tr>
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<tbody>
<tr>
<td>C</td>
<td>CMOS</td>
</tr>
<tr>
<td>P</td>
<td>PECL</td>
</tr>
<tr>
<td>S</td>
<td>Sine-wave</td>
</tr>
<tr>
<td>L</td>
<td>LVDS</td>
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Output Type

<table>
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<tr>
<th>Code</th>
<th>Specification</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>±1.0 ppm</td>
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<tr>
<td>2</td>
<td>±2.5 ppm</td>
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<tr>
<td>3</td>
<td>±0.28 ppm</td>
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### Specifications

#### Electrical (1)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Condition</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Unit</th>
<th>Note</th>
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<tr>
<td><strong>Frequency Range</strong></td>
<td>CMOS</td>
<td>30</td>
<td>30</td>
<td>200</td>
<td>MHz</td>
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<td></td>
<td>LVDS</td>
<td>30</td>
<td></td>
<td>1,000</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>PECL, Sine</td>
<td></td>
<td></td>
<td>2,000</td>
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<td></td>
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<tr>
<td><strong>Input Voltage</strong></td>
<td>Vcc</td>
<td>3.135</td>
<td>3.30</td>
<td>3.465</td>
<td>V</td>
<td>A</td>
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<td>4.75</td>
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<td><strong>Input Current</strong></td>
<td>Icc</td>
<td>30</td>
<td>100</td>
<td>@100MHz, 3.3V</td>
<td>mA</td>
<td>@622MHz, 3.3V</td>
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<td>CMOS, Sine</td>
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<td></td>
<td>LVDS</td>
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<tr>
<td><strong>Frequency Stability</strong></td>
<td>ΔF/F</td>
<td>±0.5</td>
<td>±0.1</td>
<td>±1</td>
<td>ppm</td>
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<tr>
<td></td>
<td>vs. Temperature vs. Vcc aging</td>
<td>±3.5</td>
<td>ppm/V</td>
<td>ppm/year</td>
<td>ppm</td>
<td></td>
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<tr>
<td><strong>Calibration</strong></td>
<td>ΔF/F</td>
<td>±0.5</td>
<td>±1</td>
<td>ppm</td>
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<tr>
<td></td>
<td>As shipped, 25°C</td>
<td></td>
<td>ppm</td>
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<td><strong>Load</strong></td>
<td>CMOS</td>
<td>15pf/10K Ohm</td>
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<td></td>
<td></td>
<td>CMOS, PECL, LVDS</td>
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<tr>
<td></td>
<td>PECL</td>
<td>Internally AC-coupled 50 Ohm</td>
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<tr>
<td></td>
<td>LVDS</td>
<td>50 Ohm to Vcc-2V or Thevenin equivalent</td>
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<td>100 Ohm between the outputs receiving end</td>
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<tr>
<td><strong>Duty cycle</strong></td>
<td>@50%</td>
<td>45</td>
<td>50</td>
<td>55</td>
<td>%</td>
<td>CMOS, PECL, LVDS</td>
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<tr>
<td><strong>Rise/Fall time</strong></td>
<td>Tr/Tf</td>
<td>20 to 80%</td>
<td>3</td>
<td>0.35</td>
<td>ns</td>
<td>CMOS</td>
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<td>PECL, LVDS</td>
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<tr>
<td><strong>Logic “1” level</strong></td>
<td>Voh</td>
<td>CMOS</td>
<td>0.9Vcc</td>
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<td>V</td>
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<td><strong>Logic “0” level</strong></td>
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<td>0.1Vcc</td>
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<tr>
<td></td>
<td>Voh</td>
<td>PECL</td>
<td>Vcc-0.96</td>
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<td>V</td>
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<td></td>
<td>Vol</td>
<td>PECL</td>
<td>Vcc-0.81</td>
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<td>V</td>
<td>100K available</td>
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<td><strong>Output Levels, LVDS</strong></td>
<td>Vod</td>
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<td>330</td>
<td>454</td>
<td>mV</td>
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<td>Vof</td>
<td>1.125</td>
<td>1.25</td>
<td>1.375</td>
<td>V</td>
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<td><strong>Output power</strong></td>
<td>P</td>
<td>0</td>
<td>3</td>
<td>7</td>
<td>dBm</td>
<td>3.3V</td>
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<td>5.0V</td>
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<td><strong>Start up time</strong></td>
<td>Ts</td>
<td>2</td>
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<td>ms</td>
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<td>12KHz to 20MHz</td>
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<td><strong>Phase Jitter</strong></td>
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<td>0.4</td>
<td>1</td>
<td>ps</td>
<td>100Hz to 20MHz</td>
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<td>0.2</td>
<td>0.4</td>
<td></td>
<td>12KHz to 20MHz</td>
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<tr>
<td><strong>Subharmonics</strong></td>
<td>PECL, LVDS, Sine</td>
<td>-45</td>
<td>-40</td>
<td>None</td>
<td>dBC</td>
<td>F=250MHz</td>
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<td></td>
<td>PECL, Sine</td>
<td>-40</td>
<td>-35</td>
<td></td>
<td>dBC</td>
<td>F=1,000MHz</td>
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<tr>
<td></td>
<td>CMOS, Sine</td>
<td></td>
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<td>dBC</td>
<td>F=250MHz</td>
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<td><strong>Spurious</strong></td>
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<td>-60</td>
<td>dBC</td>
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<tr>
<td><strong>Harmonics</strong></td>
<td>Sine-wave</td>
<td>-30</td>
<td>-25</td>
<td>-15</td>
<td>dBC</td>
<td>F=1,000MHz</td>
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<td>F=2,000MHz</td>
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<tr>
<td><strong>SSB Phase Noise</strong></td>
<td>@10Hz</td>
<td>-80</td>
<td>-110</td>
<td>-140</td>
<td>-155</td>
<td>-160</td>
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<tr>
<td></td>
<td>@100 Hz</td>
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<td></td>
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</tr>
<tr>
<td></td>
<td>@1 KH</td>
<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td>@10 KHz</td>
<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td>@100 KHz</td>
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<tr>
<td><strong>SSB Phase Noise</strong></td>
<td>@10Hz</td>
<td>-60</td>
<td>-90</td>
<td>-120</td>
<td>-130</td>
<td>-135</td>
</tr>
<tr>
<td></td>
<td>@100 Hz</td>
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</tr>
<tr>
<td></td>
<td>@1 KH</td>
<td></td>
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<tr>
<td></td>
<td>@100 KHz</td>
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<tr>
<td><strong>SSB Phase Noise</strong></td>
<td>@10Hz</td>
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</tr>
<tr>
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<td>@100 KHz</td>
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</table>
OK-XBFXXXX-X Series
HF/UHF SMD TCVCXO

Electrical (continued)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symb</th>
<th>Condition</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Unit</th>
<th>Note</th>
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<tbody>
<tr>
<td>Input Impedance</td>
<td></td>
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<td>&gt; 10KOhm</td>
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<tr>
<td>Control voltage</td>
<td>Vc</td>
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<td>0</td>
<td></td>
<td>3.3</td>
<td>V</td>
<td></td>
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<tr>
<td>Modulation bandwidth</td>
<td>MB</td>
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<td>2 Hz</td>
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<td></td>
<td>ppm</td>
<td>Contact Factory for wider MB</td>
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<tr>
<td>Deviation</td>
<td></td>
<td>Vc=0V to 3.3V,25°C</td>
<td>±5</td>
<td></td>
<td>±7</td>
<td>ppm</td>
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Note 1. All parameters, unless otherwise specified, are at nominal conditions, ie: T=25°C, Nominal Vcc & Nominal Load.

Absolute Maximum Ratings

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symb</th>
<th>Condition</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Unit</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input Break Down Voltage</td>
<td>Vcc</td>
<td></td>
<td>-0.5</td>
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<td>5.5</td>
<td>V</td>
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<tr>
<td>Storage temp.</td>
<td>Ts</td>
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<td>-40</td>
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<td>105</td>
<td>°C</td>
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<td>Contr. Voltage</td>
<td>Vc</td>
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<td>-1</td>
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<td>9</td>
<td>V</td>
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Environmental and Mechanical

Operating temp. range
0°C to 70°C, -40°C to 85°C, see chart, page 1

Mechanical Shock
Per MIL-STD-202, Method 213, Cond. E

Thermal Shock
Per MIL-STD-883, Method 1011, Cond. A

Vibration
Per MIL-STD-883, Method 2007, Cond. A

Soldering Conditions
See MAX reflow profile; The device may be reflowed once. Reflowing upside down is not allowed. NO CLEAN assembly is recommended.

Hermetic Seal
Leak rate less than 1x10^-6 atm.cc/s of helium (crystal only)

Electrical Connections

<table>
<thead>
<tr>
<th>Pin Out</th>
<th></th>
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<tbody>
<tr>
<td>Pin #1- Voltage Control ; Pin #2 – N/C ; Pin #3 – Vcc; Pin #4 – Output, CMOS, or Sine; Pin #5 – PECL/LVDS Output; Pin #6 – PECL/LVDS Complementary Output; Pin #7 - GND</td>
<td></td>
</tr>
</tbody>
</table>

Maximum solder reflow profile

The device may be reflowed once. Reflowing upside down is not allowed. NO CLEAN assembly is recommended.