Features

- Ultra High Stability MCXO
- Low Power Consumption
- Up to 105°C in preparation
- Meets Stratum 3 acc. GR-1244
- ROHS 6 Compliant
- Frequency Range¹: 8 - 50 MHz
- Standard Frequencies: 10, 12.8, 16.384, 19.2, 20, 22.1184, 24.576, 25, 38.4, 40 MHz
- Uses Vectron's Ultra Smooth Compensation (USC) Algorithm
- Excellent Phase Noise and Allan Deviation

Applications

- 1588 Application
- Test Equipment
- Femto Base Station
- Communication Equipment

Performance Specifications

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Min</th>
<th>Typical</th>
<th>Max</th>
<th>Units</th>
<th>Condition¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency vs. temperature slope</td>
<td></td>
<td>±1.0</td>
<td>±1.5</td>
<td>ppb/°C</td>
<td>-30 to +80°C, 10 &amp; 20MHz</td>
</tr>
<tr>
<td>Initial tolerance vs. supply voltage change</td>
<td>-0.5</td>
<td></td>
<td>+0.5</td>
<td>ppm</td>
<td>V&lt;sub&gt;s&lt;/sub&gt; ±5% static</td>
</tr>
<tr>
<td>vs. load change</td>
<td>-10</td>
<td></td>
<td>+10</td>
<td>ppb</td>
<td>Load ±10% static</td>
</tr>
<tr>
<td>vs. aging / 1. year</td>
<td>-0.8</td>
<td></td>
<td>+0.8</td>
<td>ppm</td>
<td>after 30 days of operation</td>
</tr>
<tr>
<td>vs. aging / 10 years</td>
<td>-2.5</td>
<td></td>
<td>+2.5</td>
<td>ppm</td>
<td>after 30 days of operation</td>
</tr>
</tbody>
</table>

Footnotes:

1. Frequency Stabilities:
   - Frequency vs. operating temperature range referenced to (dFmax+dFmin)/2
   - In a 24h period at constant temperature
   - Frequency vs. temperature slope

2. Condition:
   - -20 to +70°C
   - -40 to +85°C
   - -40 to +105°C

3. Options:
### Performance Specifications

#### Supply Voltage (V_s)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Min</th>
<th>Typical</th>
<th>Max</th>
<th>Units</th>
<th>Condition¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply Voltage (standard)</td>
<td>3.135</td>
<td>3.3</td>
<td>3.465</td>
<td>V</td>
<td>8 - 50MHz</td>
</tr>
<tr>
<td>Current Consumption</td>
<td></td>
<td></td>
<td>12</td>
<td>mA</td>
<td></td>
</tr>
<tr>
<td>Supply Voltage (Option)</td>
<td>4.75</td>
<td>5</td>
<td>5.25</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>Current Consumption</td>
<td></td>
<td></td>
<td>8</td>
<td>mA</td>
<td></td>
</tr>
</tbody>
</table>

#### RF Output

- **Signal (standard)**: HCMOS
- **Load**: 15 pF
- **Signal Level (Vol)**: 0.3 V, Vs = 3.3V
- **Signal Level (Voh)**: 3 V, Vs = 3.3V
- **Duty Cycle**: 45 - 55 % @ V/2
- **Rise and Fall time**: 5 ns

#### Frequency Tuning (EFC) 8 to 26 MHz

- **Tuning Range**: Fixed frequency; No adjust
- **Tuning Range**: ±3.5 ppm
- **Linearity**: 2 %

#### Additional Parameters

- **Phase Noise**: -65 dBc/Hz, -93 dBc/Hz, -118 dBc/Hz, -140 dBc/Hz, -154 dBc/Hz, -156 dBc/Hz at 1 Hz, 10 Hz, 100 Hz, 1 kHz, 10 kHz, 100 kHz<br>  @ 20MHz
- **Jitter**: 140 fs RMS @ 12 kHz to 20 MHz
- **ADEV**: 80 E-12 @ 1sec.
- **Weight**: 2.0 g

#### Absolute Maximum Ratings

- **Supply Voltage (V_s)**: -0.6 to 6.0 V
- **Output Load**: 50 pF
- **Operable Temperature Range**: -40 to +85 °C
- **Storage Temperature Range**: -40 to +90 °C

#### Environmental Conditions

- **Rapid Temperature Changes**: MIL-883-1010 Cond B 500 cycles -55/125C
- **Vibration**: MIL-STD-883 Meth 2007 Cond A 20G 20-2000Hz 4x in each 3axis 4 min
- **Shock**: MIL-STD-202 Meth 213B Cond. F; 1500g 0.5ms 6 shocks in each direction
- **Solderability**: J_STD_002C Cond A, Through hole device/ Cond. B, SMD 255C (dving time 50,5sec.) Dip+Look with 8h damp pre-treatment: solder wetting >95%
- **Solvent Resistance**: MIL-STD-883 Meth 2015 Solv. 1,3,4
- **ESD**: JESD22-A114F Class 1B; 10* 2000V
- **Moisture Sensitivity**: Level 1 JESD22-A113-B
- **RoHS Compliance**: 100% ROHS 6 Compliant
Outline Drawing / Enclosure

**MX-503**

<table>
<thead>
<tr>
<th>Height &quot;H&quot;</th>
<th>Pin Length &quot;L&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.8</td>
<td>NA</td>
</tr>
</tbody>
</table>

**Pin Connections**

<table>
<thead>
<tr>
<th>Pin</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Control Voltage Input (Vc) / N.C.</td>
</tr>
<tr>
<td>2</td>
<td>Enable / N.C.</td>
</tr>
<tr>
<td>3</td>
<td>Ground (Case)</td>
</tr>
<tr>
<td>4</td>
<td>RF-Output</td>
</tr>
<tr>
<td>5</td>
<td>N.C.</td>
</tr>
<tr>
<td>6</td>
<td>Supply Voltage Input (Vs)</td>
</tr>
</tbody>
</table>

**Enable true table (optional): MX-503**

<table>
<thead>
<tr>
<th>Pin 2</th>
<th>Pin 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>Data</td>
</tr>
<tr>
<td>Open</td>
<td>Data</td>
</tr>
<tr>
<td>Low</td>
<td>High Tristate</td>
</tr>
</tbody>
</table>

Dimensions in mm
Performance Data

<table>
<thead>
<tr>
<th>TDEV-without filter</th>
<th>ADEV</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="" /></td>
<td><img src="image2" alt="" /></td>
</tr>
</tbody>
</table>

Temperature Stability

![](image3)

Phase Noise

![](image4)
Performance Data

**Frequency vs. Load**

- Specification: MX-503
- Nominal Frequency: 20,000 MHz

- Frequency deviation [ppm]

**Frequency vs. Supply Voltage**

- Specification: MX-503
- Nominal Frequency: 20,000 MHz

- Frequency deviation [ppm]

**Aging**

- Aging: MX-503 @ 20MHz
- Ambient temperature = 60°C

- Frequency deviation vs. Time [Years]
Recommended Reflow Profile

TP: max 250°C (@ solder joint, customer board level)

Tₚ: max: 10…30 sec

Additional Information:

This SMD oscillator has been designed for pick and place reflow soldering

SMD oscillators must be on the top side of the PCB during the reflow process.

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Standard Shipping Method (MX-503)

<table>
<thead>
<tr>
<th>Enclosure Type</th>
<th>Tape Width W (mm)</th>
<th>Quantity per meter</th>
<th>Quantity per reel</th>
<th>Dimension P</th>
</tr>
</thead>
<tbody>
<tr>
<td>G287</td>
<td>24</td>
<td>83,3</td>
<td>750</td>
<td>16</td>
</tr>
</tbody>
</table>

Dimension in mm:
A, B and K are dependent upon component dimensions
production tolerance complying DIN IEC 286-3

All dimensions in millimeters unless otherwise stated
Ordering Information

MX - 503  0 - E A J - 308  0 - 10M0000000

Frequency

Frequency Control
0: No Tuning
1: ±3.5 ppm
2: Enable
3: ±3.5 ppm; Enable

Stability Code
208: ± 20 ppb
308: ± 30 ppb
107: ±100 ppb

Temperature Range
J: -20°C to +70°C
E: -40°C to +85°C
F: -40°C to +105°C

Notes:
1. Contact factory for other frequencies. Not all options and codes are available at all frequencies.
2. Unless otherwise stated conditions are valid at F=20MHz; V_s=3.3V; V_c=1.65V; T=25°C; Output Signal=HCMOS; load=15pF
3. Contact factory for availability.
4. Phase noise degrades with increasing output frequency.
5. In preparation with stability code 107

Subject to technical modification.