

Helping Customers Innovate, Improve & Grow



The OX-208 is a high stability ovenized crystal oscillator in a 25 x 25 mm package, capable of aging rates of 0.15 ppb/day and temperature stabilities of 0.8 ppb over an industrial temperature range. The Microsemi design team will also help develop custom solutions where performance optimization is required for specific applications. Please contact the factory for customization options.

Features

- Reflow Process Compatible
- SC-Cut resonator
- Temperature stability to 0.4 ppb
- Aging rate 0.15 ppb/day
- Frequency Range 5 to 20 MHz
- Standard Frequencies: 5, 10, 20 MHz

Applications

- Holdover reference
- Test equipment
- Synthesizers
- Military communication equipment
- Digital Switching

Performance Specifications

| Frequency Stabilities ¹ (Stabilities listed for 10 MHz unless otherwise noted, for stabilities above 10 MHz values may degrade, please contact factory) | | | | | |
|---|-------|---------|-------|---------|--|
| Parameter | Min | Typical | Max | Units | Condition |
| vs. operating temperature range (referenced to +25°C) | -0.4 | | +0.4 | ppb | 0 to +70°C (f=< 10 MHz) |
| | -0.6 | | +0.6 | ppb | -20 to +70°C (f=< 10 MHz) |
| | -0.8 | | +0.8 | ppb | -40 to +85°C (f=< 10 MHz) |
| | -1 | | 1 | ppb | 0 to +70°C (f>10 MHz) |
| | -2 | | 2 | ppb | -40 to +85°C (f>10 MHz) |
| For better stability refer to the MX-060 or MX-041 datasheets | | | | | |
| Initial tolerance | -25 | | +25 | ppb | at time of shipment, nominal EFC |
| vs. supply voltage change | -0.5 | | +0.5 | ppb | V _s ±5% |
| vs. load change | -0.5 | | +0.5 | ppb | Load ±5% |
| vs. aging / day | -0.15 | | +0.15 | ppb | after 72 hours operation (f=< 10 MHz) |
| vs. aging / year | -20 | | +20 | ppb | after 72 hours operation (f=< 10 MHz) |
| vs. aging / year (following year) | -15 | | +15 | ppb | |
| vs. aging / 10 years | -100 | | +100 | ppb | after 72 hours operation (f=< 10 MHz) |
| vs. aging / day | -0.3 | | +0.3 | | after 72 hours operation (f> 10 MHz) |
| vs. aging / year | -40 | | +40 | | after 72 hours operation (f>10 MHz) |
| vs. aging / year (following year) | -30 | | +30 | | after 72 hours operation (f> 10 MHz) |
| vs. aging / day | -200 | | +200 | | |
| retrace ² | -5 | | +5 | ppb | |
| Warm-up time | | | 5 | minutes | to ±10 ppb of final frequency (1 hour reading) @ +25°C |

Performance Specifications

Supply Voltage (Vs)

| Parameter | Min | Typical | Max | Units | Condition |
|---------------------|-------|---------|-------|-------|----------------------------------|
| Supply Voltage (Vs) | 3.135 | 3.3 | 3.465 | VDC | Ordering Code E |
| | 4.75 | 5.0 | 5.25 | VDC | Ordering Code D |
| Power Consumption | | | 4.5 | Watts | during warm-up, all temperatures |
| | | | 2 | Watts | steady state @ +25°C |
| | | 4.5 | | Watts | steady state @ -40°C |
| | | 1 | | Watt | steady state @ +85°C |

RF Output

| | | | | | |
|---------------------|-----------|----|-----|-----|---|
| start time | | 1 | 2 | s | time required to achieve 90% of amplitude |
| Signal [standard] | HCMOS | | | | |
| Load | | 15 | | pF | |
| Signal Level (Vol) | | | 0.3 | VDC | with Vs=3.3V and 15pF Load |
| | | | 0.4 | VDC | with Vs=5.0V and 15pF Load |
| Signal Level (Voh) | 2.5 | | | VDC | with Vs=3.3V and 15pF Load |
| | 3.6 | | | | with Vs=5.0V and 15pF Load |
| Duty Cycle | 45 | | 55 | % | @ (Voh-Vol)/2 |
| Signal | Sine Wave | | | | |
| Load | | 50 | | Ω | |
| Output Power @3.3V | 2 | 5 | 8 | dBm | |
| Output Power @ 5.0V | 5 | 8 | 11 | dBm | |
| Harmonics | | | -40 | dBc | |

Frequency Tuning (EFC)

| | | | | | |
|-----------------------|----------|-----|------|------|------------------------------------|
| Tuning Range | ±250 | | ±500 | ppb | (fixed frequency option available) |
| Linearity | | 10 | | % | |
| Tuning Slope | Positive | | | | |
| Input Impedance | | 100 | | kOhm | |
| Bandwidth Modulation | 150 | | | Hz | |
| Control Voltage Range | 0.0 | 1.4 | 2.8 | VDC | with Vs=3.3V |
| | 0.0 | 2.0 | 4.0 | VDC | with Vs=5.0V |

Reference Voltage Output (Vref)

The OX-2080 can be configured with a reference voltage. This configuration requires a custom part number. Please contact the factory for ordering information.

| | | | | | |
|-------------------|------|-----|------|-----|-------------------|
| Reference Voltage | 2.75 | 2.8 | 2.85 | VDC | with Vs = 3.3 VDC |
| | 3.92 | 4.0 | 4.08 | VDC | with Vs = 5.0 VDC |

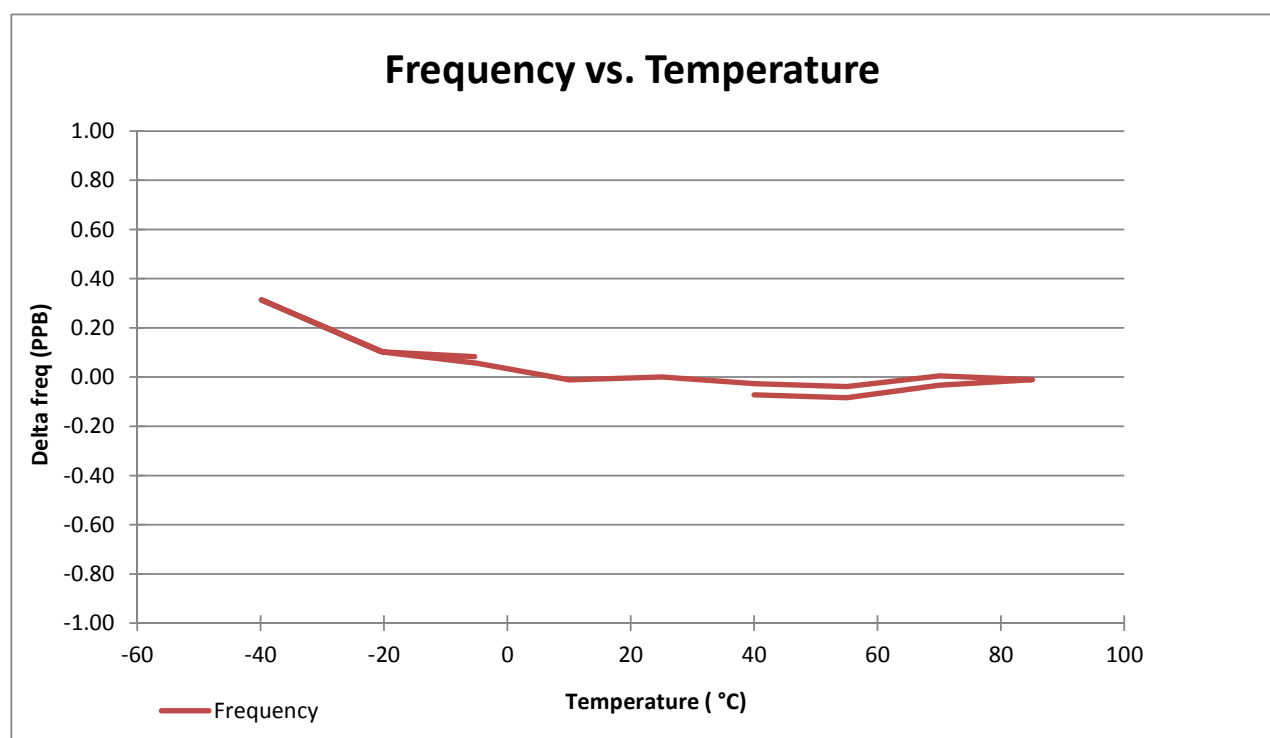
Phase Noise

| Parameter | Min | Typical | Max | Units | Condition |
|--------------------------|-----|---------|------|--------|-----------|
| Phase Noise ³ | | | -95 | dBc/Hz | 1 Hz |
| | | | -125 | dBc/Hz | 10 Hz |
| | | | -140 | dBc/Hz | 100 Hz |
| | | | -155 | dBc/Hz | 1 kHz |
| | | | -155 | dBc/Hz | 10 kHz |

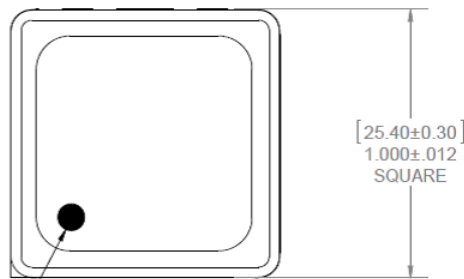
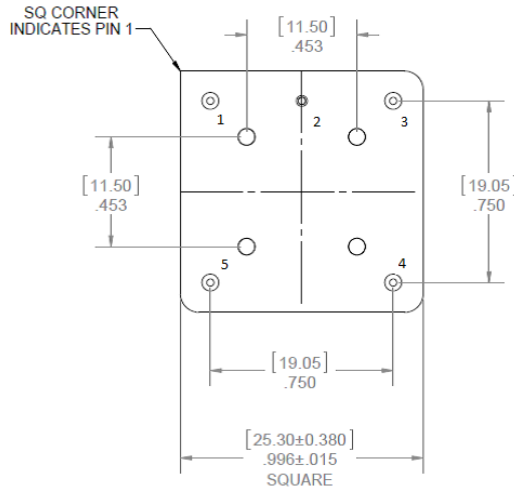
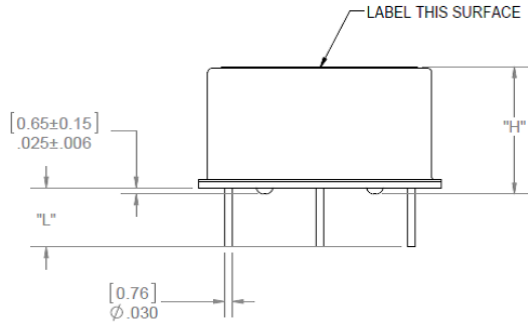
For lower phase please review the OX-174 datasheet.

| | | | | | |
|-------------|--|--|------|--------|--------|
| Phase Noise | | | -89 | dBc/Hz | 1 Hz |
| | | | -119 | dBc/Hz | 10 Hz |
| | | | -134 | dBc/Hz | 100 Hz |
| | | | -149 | dBc/Hz | 1 kHz |
| | | | -155 | dBc/Hz | 10 kHz |

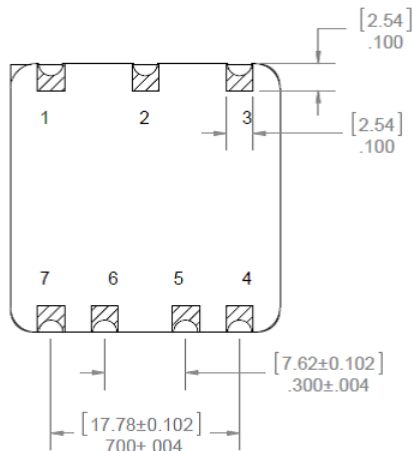
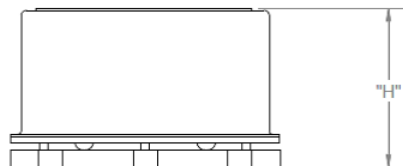
| Additional Parameters | | | | | | |
|--|--|---------|------|-------|--|---------|
| Parameter | Min | Typical | Max | Units | Condition | |
| Allan deviation | | | 5 | E-12 | 1 s tau | @ 10MHz |
| | | | 8 | E-12 | 10 s tau | |
| | | | 1 | E-11 | 100 s tau | |
| | | | 5 | E-11 | 1000 s tau | |
| g-sensitivity | | 1 | | | ppb/g | |
| g-sensitivity of 0.5 ppb/g available in this package size. Please contact factory for ordering information. For g sensitivity <0.1 ppb/g please review the OX-043 series. | | | | | | |
| Weight | | | 15 | g | | |
| Absolute Maximum Ratings | | | | | | |
| Supply Voltage (Vs) | | | 6.5 | V | with Vs=3.3 & 5.0 VDC | |
| Output Load | | | 50 | pF | | |
| Operable Temperature Range | -55 | | +95 | °C | operable temperature range implies the device will continue to operate with no long-term damage to unit however it will not be specification compliant outside the operating temperature range | |
| Environmental and Product Classification | | | | | | |
| Shock (Endurance) | MIL-STD-202, Method 213, Condition J, 30g 11 ms | | | | | |
| Sine Vibration (Endurance) | MIL-STD-202, Method 201 and 204, Condition A, except 5g to 500 Hz, 1 sweep each axis | | | | | |
| Random Vibration (Endurance) | MIL-STD-202, Method 214, Condition I-D | | | | | |
| Humidity | MIL-STD-202, Method 103, Condition B, 100% rh | | | | | |
| Seal | MIL-STD-202, Method 112, Condition D, hermetic, washable | | | | | |
| Altitude | MIL-STD-202, Method 105, sea level to space | | | | | |
| Resistance to Soldering Heat | MIL-STD-202, Method 210, Condition A,B,C | | | | | |
| Terminal Strength | MIL-STD-202, Method 211, Condition C (5 bends at 45°, 2 lbs) | | | | | |
| Moisture Sensitive Level | 1 | | | | | |
| RoHS | compliant with exemption 7c-i | | | | | |
| Storage Temperature Range | -55 | | +125 | °C | | |



Outline Drawing / Enclosure



PIN 1 INDICATOR



Through hole Package configuration A

| | Height "H" | Pin Length "L" |
|---|---------------|----------------|
| 0 | 12.7 | 4.5 mm min |

Pin Connections

| | |
|---|--|
| 1 | RF output |
| 2 | Ground (Case) |
| 3 | Electronic Frequency Control (EFC) |
| 4 | Reference Voltage option (requires custom part number) |
| 5 | Supply Voltage (Vs) |

Dimensions in mm

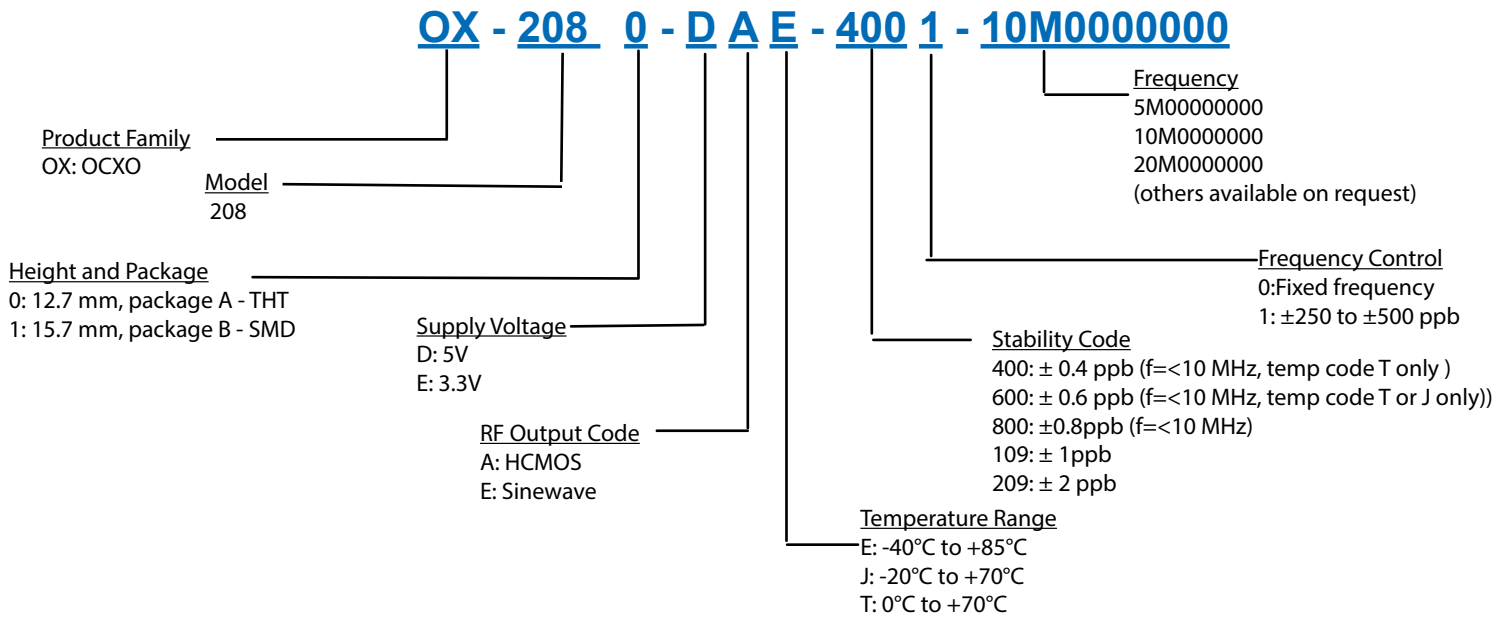
SMD Package configuration 1

| | Height "H" |
|---|------------|
| 1 | 15.7 |

Pin Connections

| | |
|-------|--|
| 1 | Electronic Frequency Control Input (EFC) No Connect for Fixed frequency Oscillators |
| 2,5,6 | No Connect |
| 3 | Supply Voltage Input (Vs) |
| 4 | RF Output |
| 7 | Ground (Case) |

Ordering Information⁴



Additional Ordering Options

Additional ordering options available include custom heights, custom aging rates, custom temperature ranges, custom temperature stabilities, custom phase noise requirements, improved g-sensitivity, and oscillators with voltage reference output on pin 4. These modifications require a custom dash number - please contact the factory for additional information.

Design Tools

| |
|--|
| Microsemi stocks the following items for small orders and prototype development: |
| OX-2080-DEE-8001-10M00000000 |
| Microsemi stocks the following evaluation board for this product: |
| OCXO Evaluation Board |
| Application Notes: |
| None |

Notes:

1. 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).
2. Retrace defined as $f_1 - f_0$ where f_0 is the reading after the unit has been on power for 24 hours, and f_1 is the frequency after 24 hours off followed by 60 minutes on.
3. Phase noise degrades with increasing output frequency.
4. Not all options and codes available at all frequencies.



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