Microsemi
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OX-172

Oven Controlled Crystal Oscillator

The OX-172 is a high stability ovenized crystal oscillator characterized for IEEE-1588 PTP applications in a 28 x 38 mm package. Driven by an SC cut crystal, the oscillator provides TDEV and MTIE values that exceed the GR1244 system performance requirements when locked through a 1 mHz bandwidth. The OX-172 is designed for operation during congested network conditions, when the frequency and quality of the packet information is degraded. The OX-172 is a member of the OX-17 oscillator series. Other oscillators in the series include the OX-170 standard oscillator, OX-171 high stability oscillator, and the OX-174 and OX-175 low phase noise oscillators. 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 2 ppb peak to peak
- Best in class MTIE and TDEV
- Optimized to support timing over packet applications
- Standard Frequencies: 10, 12.8, 20 MHz

Applications

- SETS clock support
- Edge and Core routers

Performance Specifications

Frequency Stabilities[1]
(Stabilities listed for 10 MHz. For stabilities above 10 MHz values may degrade. Please contact factory)

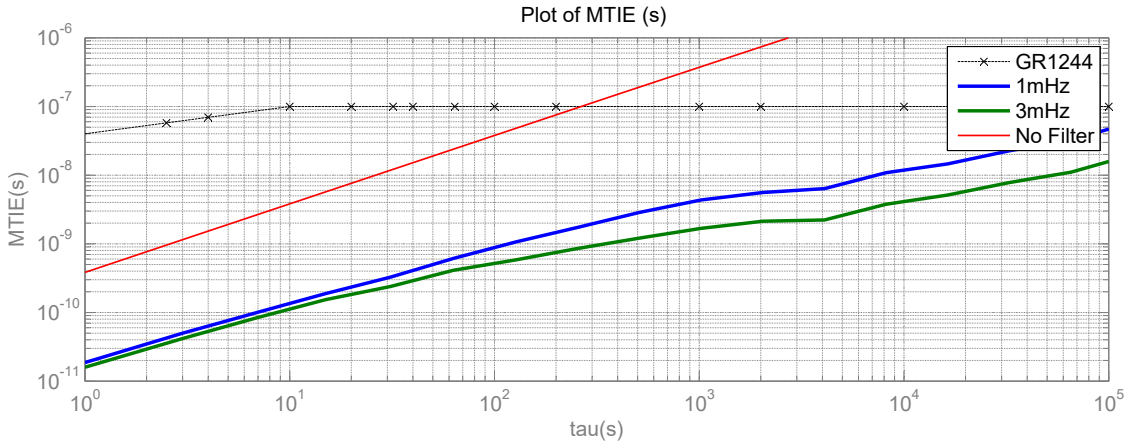
Parameter	Min	Typical	Max	Units	Condition
Overall Stability	-1.0		+1.0	ppm	Free run accuracy (20 years all conditions)
Drift	-0.3		+0.3	ppb	over 24 hours and ±3.0°C
vs. Operating Temperature Range (referenced to +25°C)			2 4	ppb pk-pk ppb pk-pk	-20 to +70°C -40 to +85°C
Initial Tolerance vs. Supply Voltage Change vs. Load Change vs. Aging / Day vs. Aging / Day vs. Aging / Year vs. Aging/ 20 Years	-500 -0.5 -0.5 -1 -0.2 -20 -300		+500 +0.5 +0.5 +1 +0.2 +20 +300	ppb ppb ppb ppb ppb ppb ppb	at time of shipment V_S ±5% Load ±5% after 24 hours operation @ 25°C after 72 hours operation @ 25°C after 72 hours operation @ 25°C after 72 hours operation @ 25°C
Retrace[2]	-10		+10	ppb	
Warm-up Time			5	minutes	to ±10ppb of final frequency (1 hour reading) @ +25°C

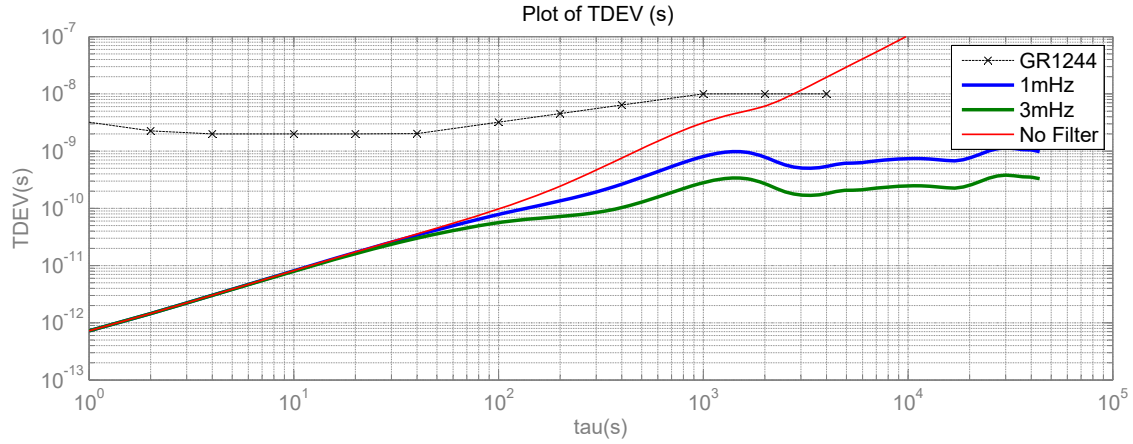
Performance Specifications

Phase Stability (at 10 MHz)					
Parameter	Min	Typical	Max	Units	Condition
Additional Parameters					
MTIE 1 s MTIE 10 s MTIE 100 s MTIE 1000 s		0.02 0.1 1.0 5.0		ns ns ns ns	Wander Generation per GR1244, system performance when locked through a 1mHz loop bandwidth, see typical performance data.
TDEV 1 s TDEV 10 s TDEV 100s TDEV 1000s		0.001 0.008 0.1 1		ns ns ns ns	Wander Generation per GR1244, system performance when locked through a 1mHz loop bandwidth, see typical performance data.
Phase Noise			-85 -115 -135 -145 -150	dBc/Hz dBc/Hz dBc/Hz dBc/Hz dBc/Hz	1 Hz 10 Hz 100 Hz 1 kHz 10 kHz
For lower phase noise, please review the OX-174 datasheet.					
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 <0.5 ppb/g, please review the OX-043 series.					

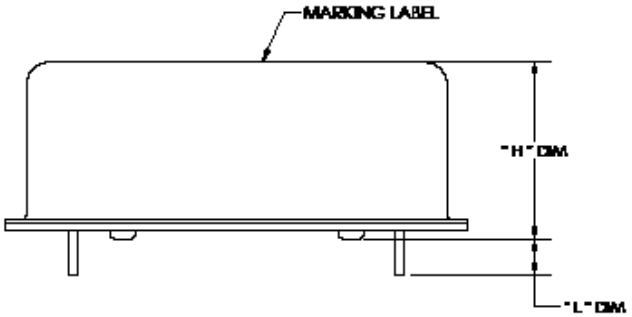
Supply Voltage (Vs)					
Parameter	Min	Typical	Max	Units	Condition
Supply Voltage (Vs)	3.135	3.3	3.465	VDC	
	4.75	5.0	5.25	VDC	
Power Consumption			3.5	Watts	during warm-up, all temperatures
			1.5	Watts	steady state @ +25°C
		3.3		Watts	steady state @ -40°C
		0.5		Watts	steady state @ +85°C
RF Output					
Start Time		1		s	time required to achieve 90% of amplitude
Signal [standard]	HCMOS				
Load		15		pF	
Signal Level (Vol)			0.4	VDC	with Vs=3.3V
Signal Level (Vol)			0.5		with Vs=5.0V
Signal Level (Voh)	2.4			VDC	with Vs=3.3V
Signal Level (Voh)	3.5				with Vs=5.0V
Duty Cycle	45		55	%	@ (Voh-Vol)/2
Frequency Tuning (EFC)					
Tuning Range	Fixed OCXO; No adjust				

Absolute Maximum Ratings					
Supply Voltage (Vs)			6.5	VDC	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	6 (fully compliant)				
Storage Temperature Range	-55		+125	°C	
Weight			25	g	


Plot of MTIE (s)
MTIE(s)
tau(s)
GR1244
1mHz
3mHz
No Filter

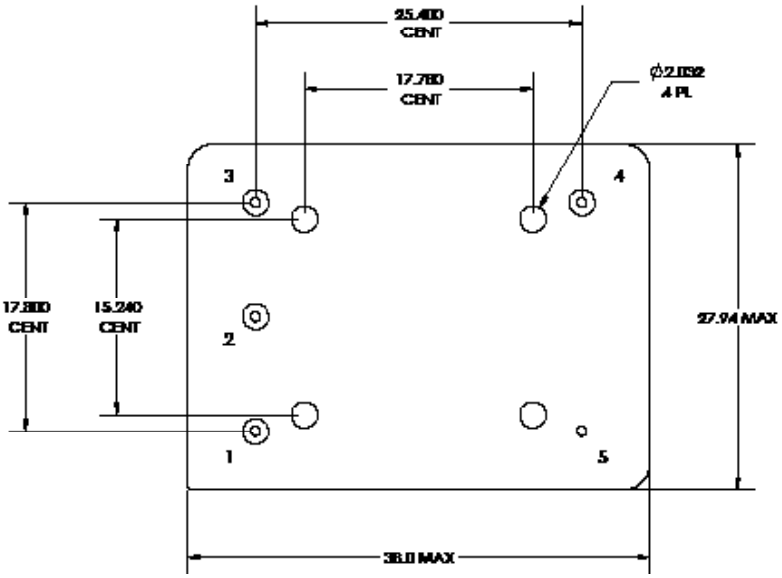

Plot of TDEV (s)
TDEV(s)
tau(s)
GR1244
1mHz
3mHz
No Filter

Outline Drawing / Enclosure



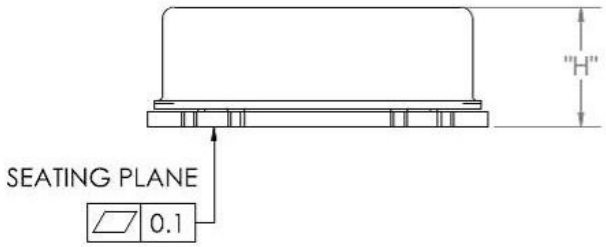
Through hole Package configuration A		
	Height "H"	Pin Length "L"
0	18.2 max	4.5 mm min
Additional height options available contact factory . Note lower height reduces stability		

5 PL

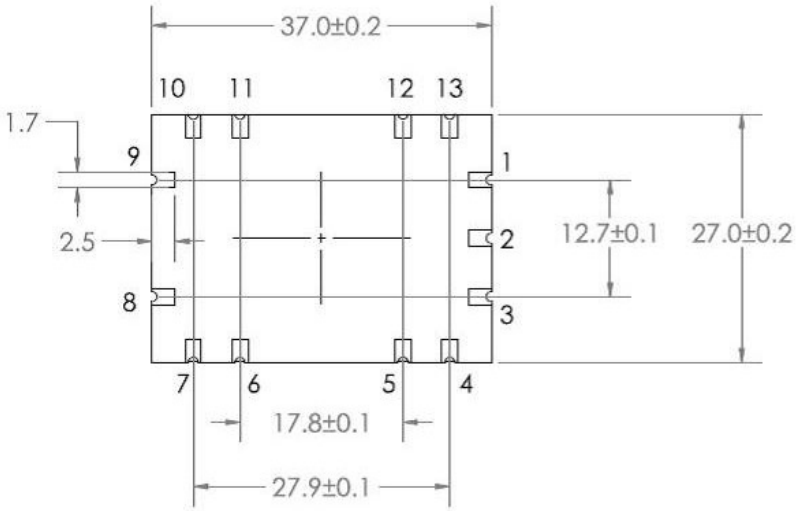


Pin Connections	
1,2	No Connect
3	Supply Voltage Input (VS)
4	RF Output
5	Ground (Case)

Dimensions in mm



Surface mount Package configuration B		
	Height "H"	Pin Length "L"
1	20.3 max	n/a
Additional height options available contact factory . Note - lower height reduces stability		



Pin Connections	
1,2,4,5,6,7, 11,12,13	No Connect
3	Supply Voltage Input (Vs)
8	RF Output
9,10	Ground (Case)

Ordering Information[3]

OX - 172 0 - E A E - 409 0 - 20M0000000

Product Family
OX: OCXO

Model
172

Height and Package
0: 18.2 mm, package A - THT
1: 20 mm, package B - SMD

Supply Voltage
D: 5V
E: 3.3V

RF Output Code
A: HCMOS

Temperature Range
E: -40°C to +85°C
J: -20°C to +70°C
T: 0°C to +70°C

Stability Code
209: 2 ppb pk-pk (temperature range T and J only)
409: 4 ppb pk-pk
509: 5 ppb pk-pk

Frequency Control
0:Fixed frequency

Frequency
10M0000000
12M8000000
20M0000000
(others available on request)

Additional Ordering Options

Additional ordering options available include custom aging rates, custom temperature ranges, custom temperature stabilities, custom phase noise requirements, sine wave option, improved g-sensitivity, and oscillators with EFC and reference voltages. 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-1720-EAE-4090-20M00000000
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, load, and temperature (25°C).
2. Retrace is defined as the frequency difference between the end of two 24 hour on power periods with a 24 hour off period in between while at a constant temperature.
3. Not all options and codes available at all frequencies.

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