

Helping Customers Innovate, Improve & Grow



OX-174

The OX-174 is a low phase noise, high-stability ovenized crystal oscillator in a 28 x 38 mm package. The oscillator has a noise floor of -175 dBc/Hz, and typical ADEV below 2E-12 for t=0.1 to 100 s. The OX-174 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, OX-172 optimized for 1588 solutions, and the OX-175 low phase noise, high frequency oscillator. 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
- Temperature Stability to 5 ppb
- Frequency Range 5 to 20 MHz
- Standard Frequency: 10 MHz
- CMOS and Sinewave Options Available

Applications

- Military Radar
- Instrumentation and Test Equipment
- Synthesizers
- Military Communication Equipment
- DRO references
- Satellite Communications

Performance Specifications

Phase Noise Ordering Codes at 10 MHz, Sinewave Output

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

Phase Noise Ordering Codes at 10 MHz, CMOS Output

Frequency Offset (Hz)	A	B	C	Unit	Condition
1	-95	-100	-105	dBc/Hz	Maximum values All EFC settings (5V only)
10	-125	-130	-135	dBc/Hz	
100	-150	-155	-157	dBc/Hz	
1000	-160	-160	-160	dBc/Hz	
10,000	-160	-165	-165	dBc/Hz	
100,000	-160	-165	-165	dBc/Hz	

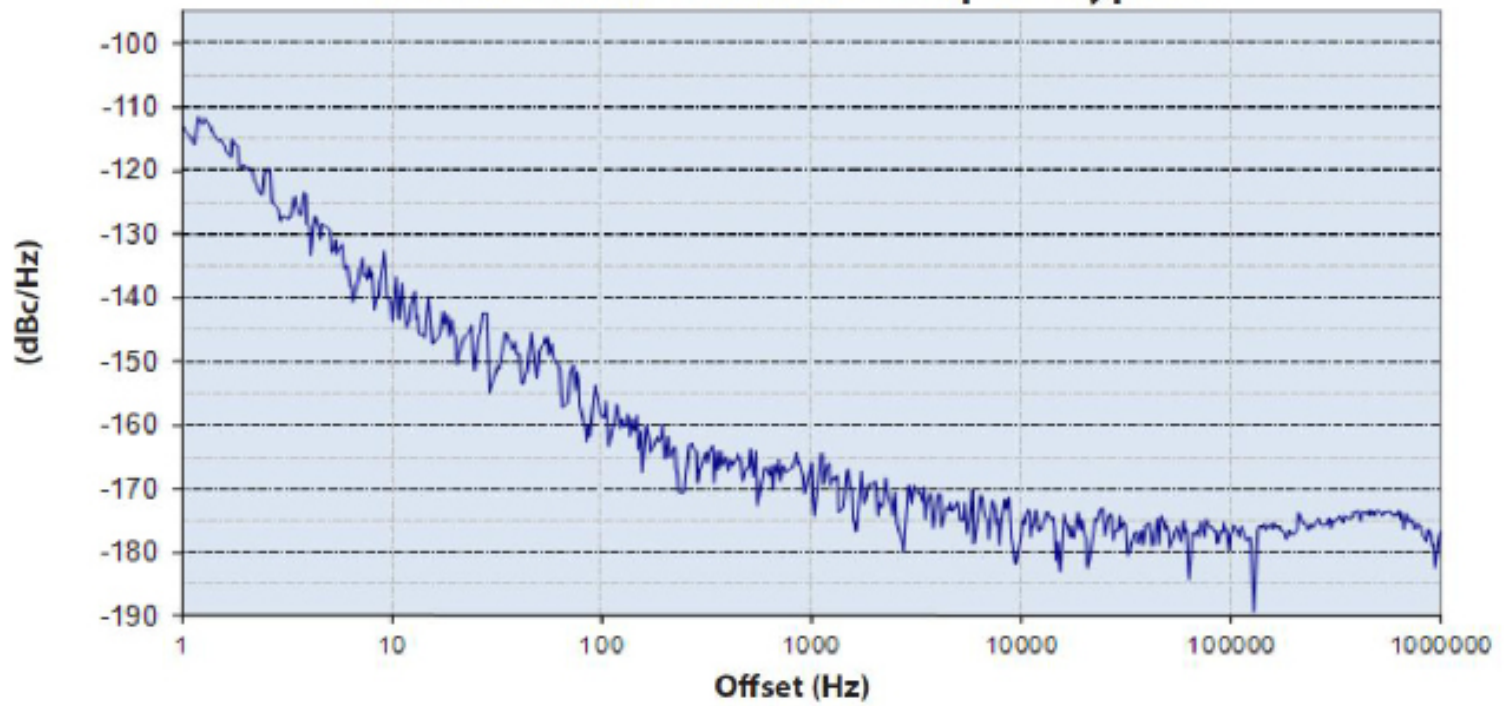
Performance Specifications

Parameter	Min	Typical	Max	Units	Condition
Allan Deviation		2	5	E-12	0.1s tau
		1	3	E-12	1 s tau
		1.5	4	E-12	10 s tau
		1.8	5	E-12	100 s tau
		2	5	E-12	1000 s tau
For oscillators with TDEV and MTIE requirements please review the OX-172 datasheet.					

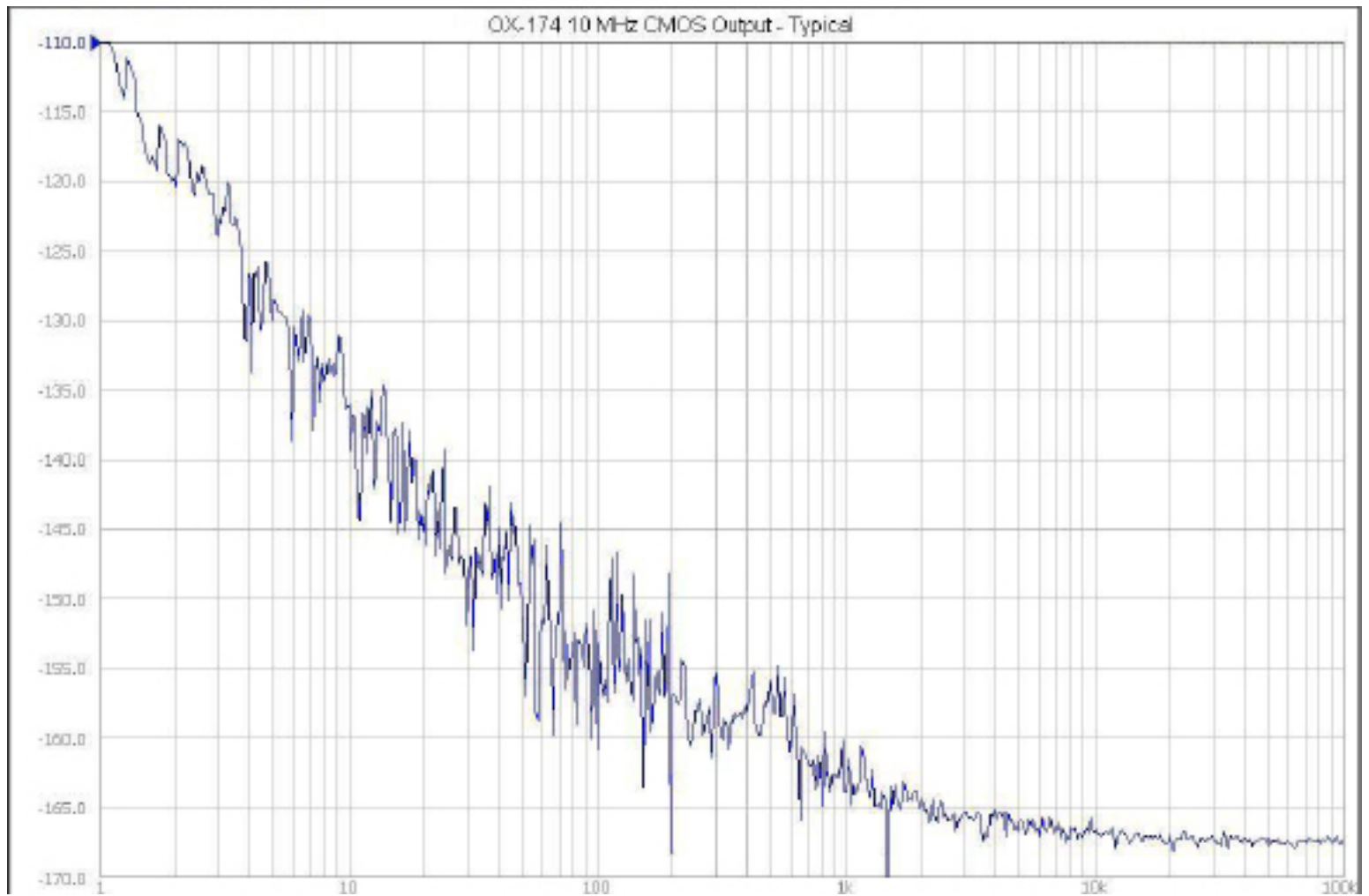
Frequency Stabilities ¹ (Stabilities listed for 10 MHz. For stabilities above 10 MHz values may degrade. Please contact factory)					
Parameter	Min	Typical	Max	Units	Condition
vs. Operating Temperature Range (referenced to +25°C)	-5		+5	ppb	-20 to +70°C
	-10		-10	ppb	-40 to +85°C
For better stability please review the OX-171 datasheet.					
Initial Tolerance	-50		+50	ppb	at time of shipment, nominal EFC
vs. Supply Voltage Change	-2		+2	ppb	$V_s \pm 5\%$
vs. Load Change	-2		+2	ppb	Load $\pm 5\%$
vs. Aging / Day	-0.5		+0.5	ppb	after 7 days operation
vs. Aging / 1 st Year	-100		+100	ppb	after 7days operation
vs. Aging / Year (following years)	-30		+30	ppb	
Retrace ²	-10		+10	ppb	
Warm-up Time			5	minutes	to ± 10 ppb of final frequency (1 hour reading) @ +25°C
Supply Voltage (Vs)					
Parameter	Min	Typical	Max	Units	Condition
Supply Voltage (Vs)	4.75	5.0	5.25	VDC	ordering option D
	11.4	12.0	12.6	VDC	ordering option B
Power Consumption			3.5	Watts	during warm-up, all temperatures
			1.8	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	HCMOS				5 Volt only
Load		15		pF	
Signal Level (Vol)			0.5		
Signal Level (Voh)	3.5				
Duty Cycle	45		55	%	@ (Voh-Vol)/2
Rise and Fall Time (Tr/Tf)			10	ns	
Signal	Sine Wave				
Load		50		Ω	
Output Power	+7	+8	+10	dBm	$V_s=12$ VDC
	+4	+5	+7	dBm	$V_s=5$ VDC
Harmonics			-30	dBc	
Spurious			-80	dBc	

Frequency Tuning (EFC)					
Parameter	Min	Typical	Max	Units	Condition
Tuning range	±400		±800	ppb	(fixed frequency option available)
Linearity		15		%	
Tuning Slope	Positive				
Input Impedance		100		kOhm	
Bandwidth Modulation	150			Hz	
Control Voltage Range	0.0		4.35	VDC	with Vs=5.0 VDC
	0.0		10	VDC	with Vs=12.0 VDC
Reference Voltage Output (Vref)					
Reference Voltage (Vref)	4.26	4.35	4.44	VDC	with Vs = 5.0 VDC
	9.8	10	10.2	VDC	with Vs =12 VDC
The OX-174 series can be configured without a voltage reference. Please contact the factory for ordering information.					
Additional Parameters					
Parameter	Min	Typical	Max	Units	Condition
g-sensitivity				1.5	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.					
Weight			25	g	
Absolute Maximum Ratings					
Supply Voltage (Vs)			6.5	VDC	with Vs= 5.0 VDC
			15.0	VDC	with Vs= 12 VDC
Output Load	25		open 50	Ω pF	Sinewave CMOS
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	

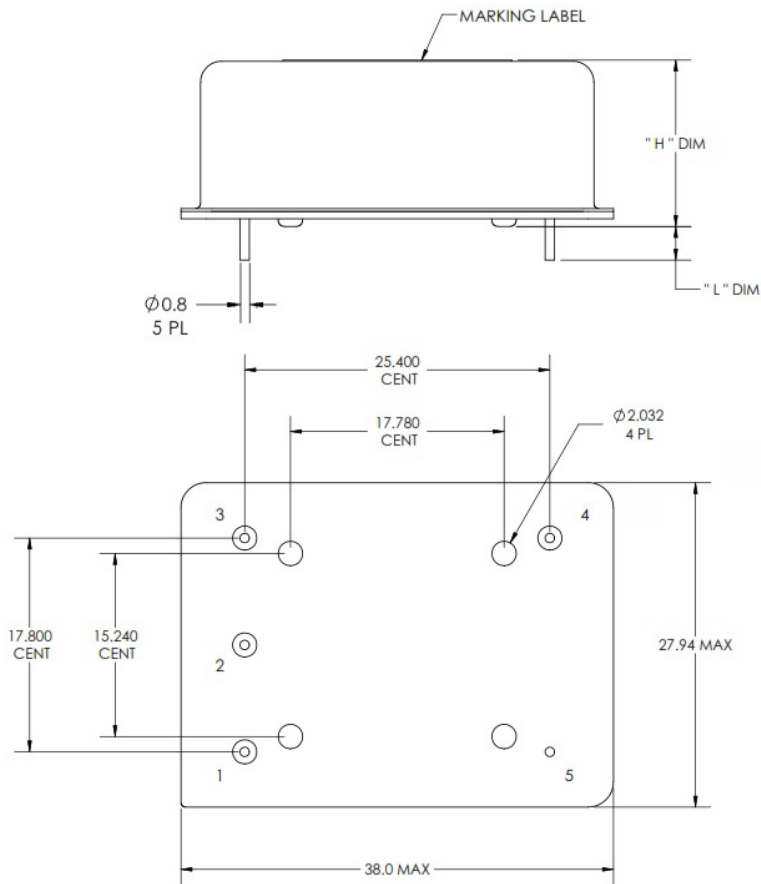
OX-174 10 MHz Sinewave Output - Typical



OX-174 10 MHz CMOS Output - Typical



Outline Drawing / Enclosure



Through hole Package configuration A

	Height "H"	Pin Length "L"
0	18.2 max	4.5 mm min

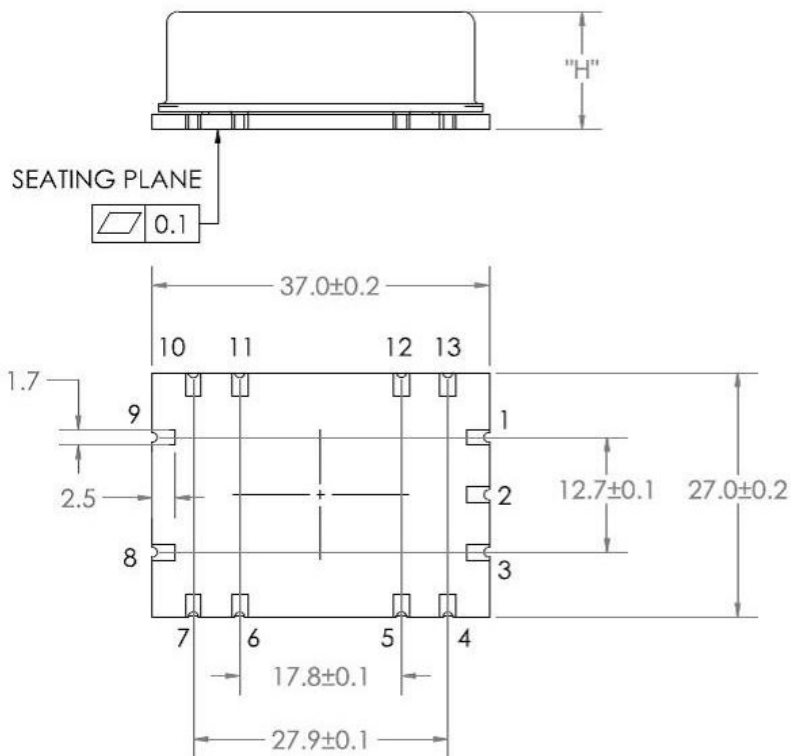
Pin Connections

1	Electronic Frequency Control Input (EFC) No Connect for Fixed frequency Oscillators
2	Reference Voltage (Vref)
3	Supply Voltage Input (Vs)
4	RF Output
5	Ground (Case)

Dimensions in mm

Surface mount Package configuration B

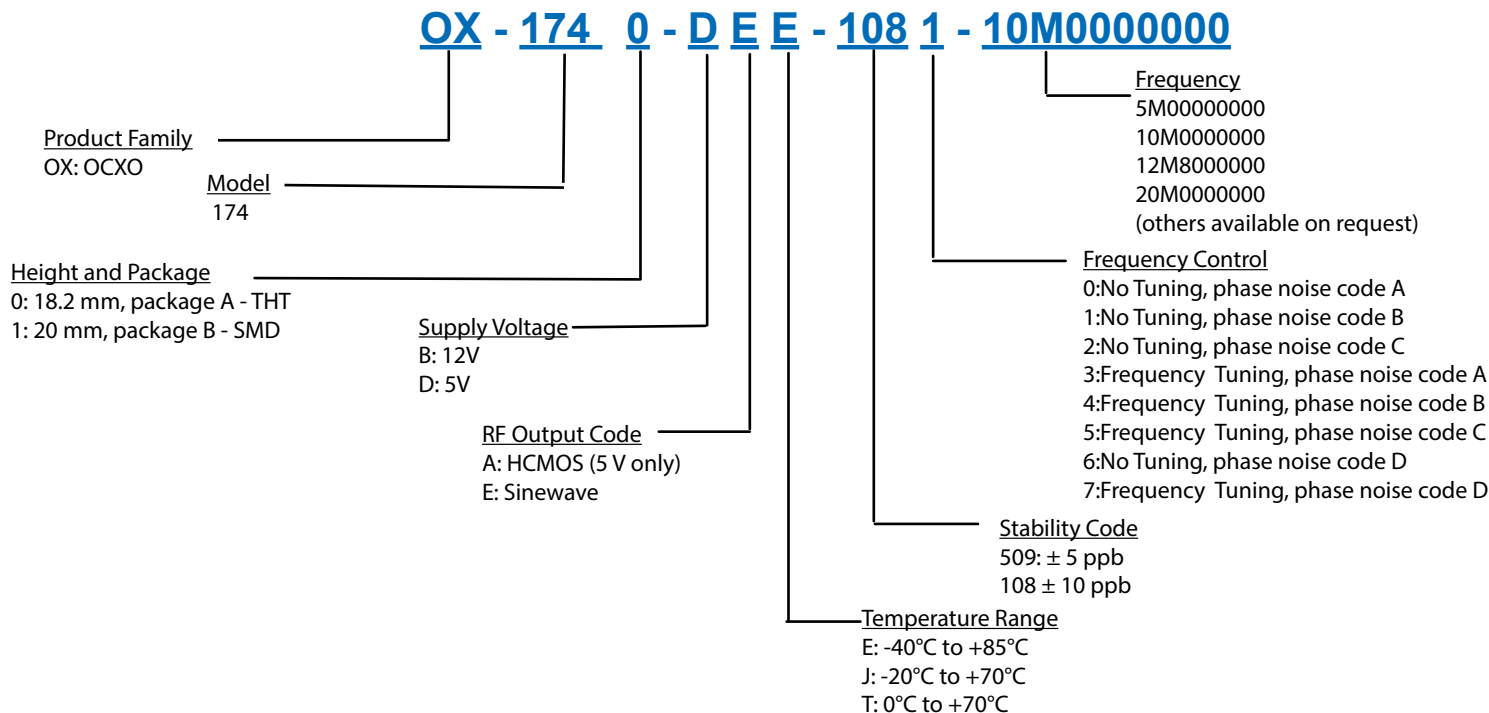
	Height "H"	Pin Length "L"
1	20.3 max	n/a



Pin Connections

4,5,6,7, 11,12,13	No Connect
1	Electronic Frequency Control Input (EFC) No Connect for Fixed frequency Oscillators
2	Reference Voltage (Vref)
3	Supply Voltage Input (Vs)
8	RF Output
9,10	Ground (Case)

Ordering Information³



Additional Ordering Options

Additional ordering options available include custom aging rates, custom temperature ranges, custom temperature stabilities, custom phase noise requirements, improved g-sensitivity, and oscillators with no voltage reference output on pin 2. These modifications require a custom dash number - please contact the factory for additional information.

Design Tools

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 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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