

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 high frequency oscillator. The Vectron 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	Unit	Condition
1	-95	-100	-105	dBc/Hz	Maximum values All EFC settings
10	-125	-130	-135	dBc/Hz	
100	-150	-155	-157	dBc/Hz	
1000	-160	-165	-167	dBc/Hz	
10,000	-170	-170	-175	dBc/Hz	
100,000	-170	-170	-175	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
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	

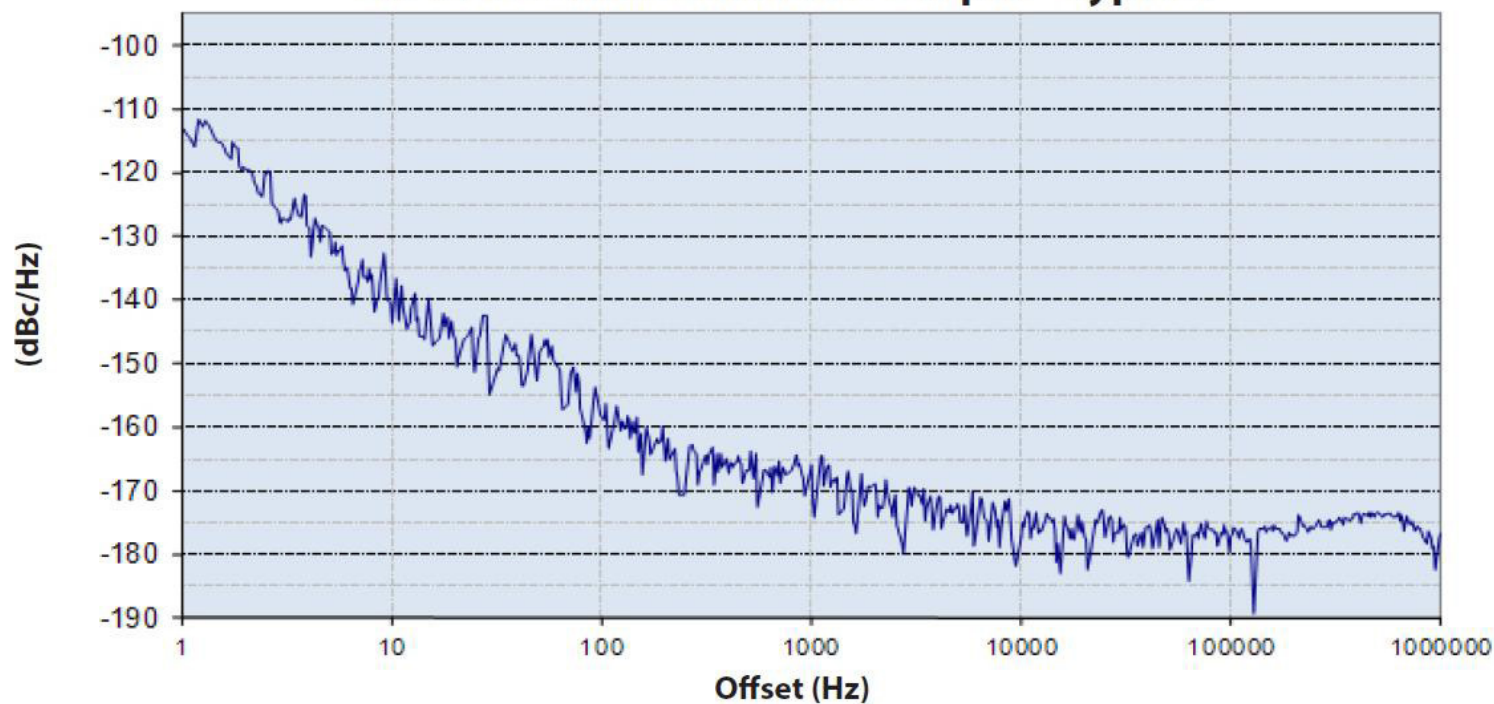
Performance Specifications

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
@ 10MHz					
For oscillators with TDEV and MTIE requirements please review the OX-172 datasheet.					

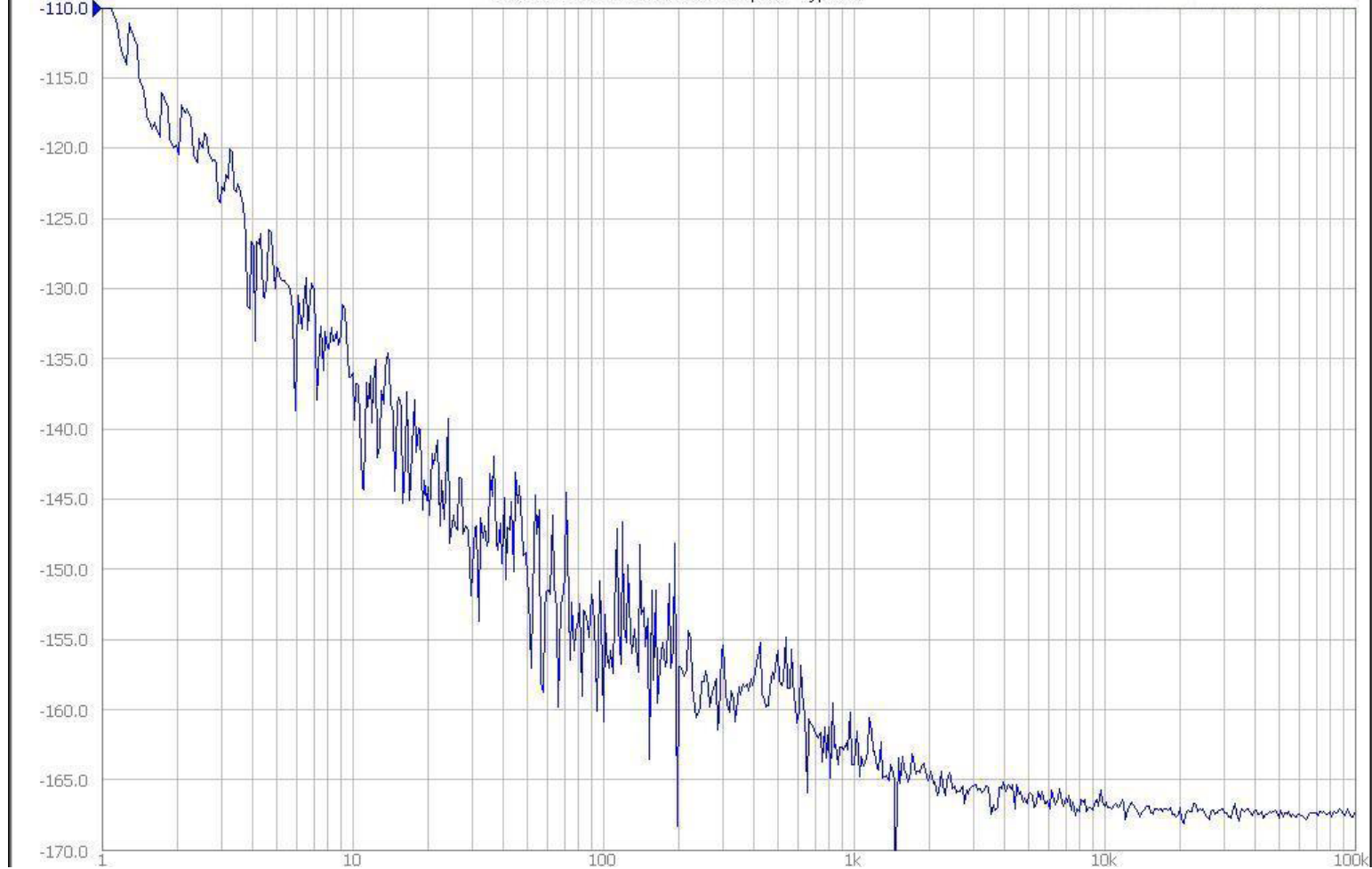
Frequency Stabilities ¹ (Stabilities listed for 10 MHz. For stabilities above 10 MHz values may degrade. Please contact factory)					
Parameter	Min	Typical	Max	Units	Condition
vs. Operating Temperature Range (referenced to +25°C)	-5		+5	ppb	-20 to +70°C
	-10		-10	ppb	-40 to +85°C
For better stability 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				
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	

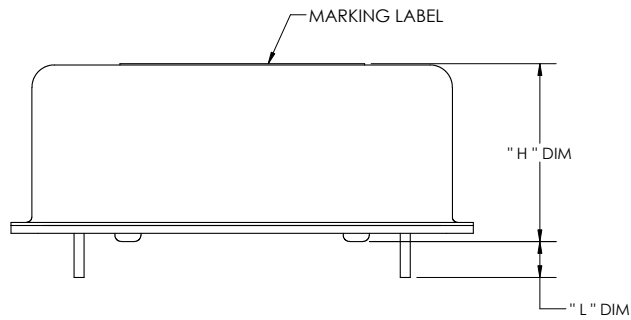
OX-174 10 MHz Sinewave Output - Typical



OX-174 10 MHz CMOS Output - Typical



Outline Drawing / Enclosure

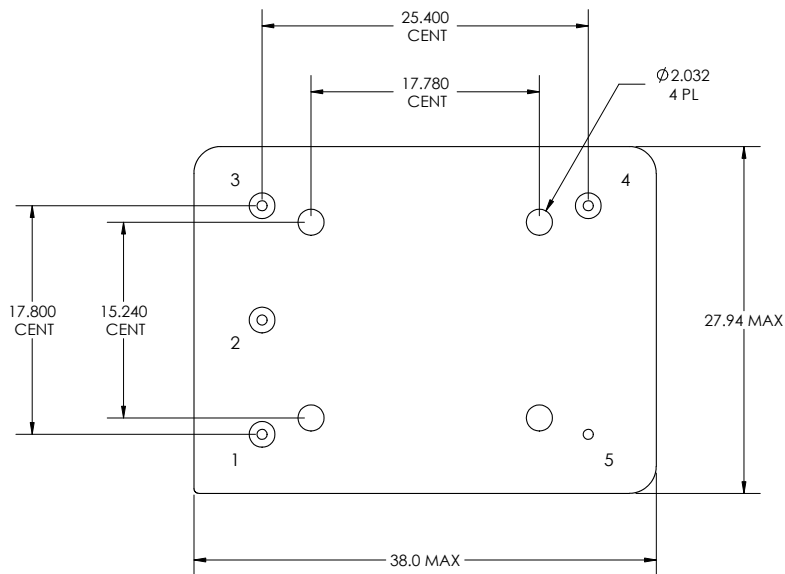


Through hole Package configuration A

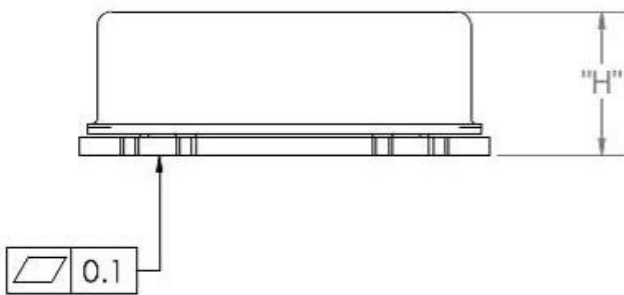
	Height "H"	Pin Length "L"
0	18.2 max	4.5 mm min

Additional height options available - contact factory .

Note - lower height reduces stability



Dimensions in mm

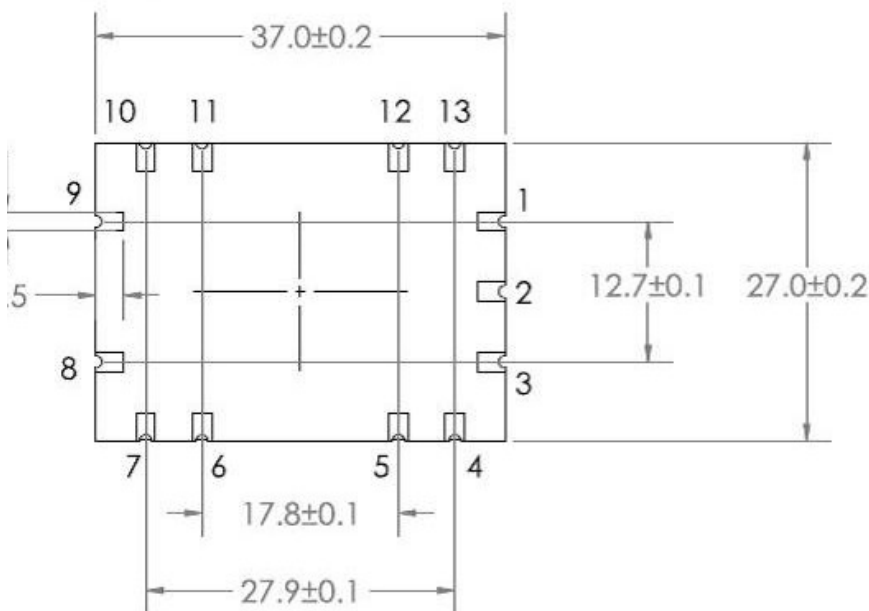


Surface mount Package configuration B

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

Additional height options available - contact factory .

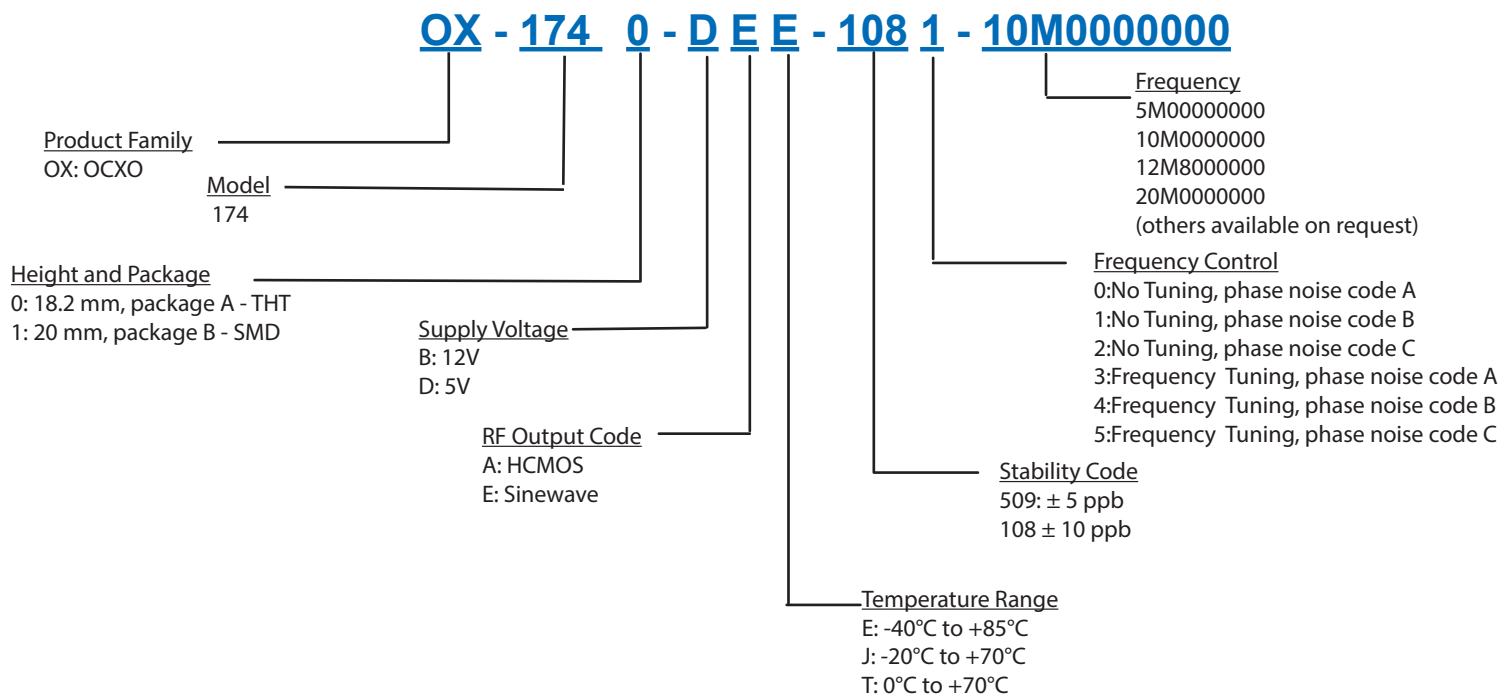
Note - lower height reduces stability



Pin Connections

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

Vectron stocks the following items for small orders and prototype development:
OX-1740-DEE-1085-10M00000000
Vectron stocks the following evaluation board for this product:
OCXO Evaluation Board
Application Notes:
None

Notes:

- 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).
- 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.
- Not all options and codes available at all frequencies.

For Additional Information, Please Contact

USA:

Vectron International
267 Lowell Road, Unit 102
Hudson, NH 03051
Tel: 1.888.328.7661
Fax: 1.888.329.8328

Europe:

Vectron International
Landstrasse, D-74924
Neckarbischofsheim, Germany
Tel: +49 (0) 3328.4784.17
Fax: +49 (0) 3328.4784.30

Asia:

Vectron International
68 Yin Cheng Road(C), 22nd Floor
One LuJiaZui
Pudong, Shanghai 200120, China
Tel: +86 21 6194 6886
Fax: +86 21 6194 6699

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