

## Helping Customers Innovate, Improve & Grow



**OX-171**

The OX-171 is a high-stability ovenized crystal oscillator in a 28 x 38 mm package, capable of aging rates of 0.06 ppb/day and temperature stabilities of 1ppb over an industrial temperature range. Driven by an SC-cut crystal, the oscillator provides excellent phase noise and Allan Deviation. The OX-171 is a member of the OX-17 oscillator series. Other oscillators in the series include the OX-170 standard oscillator, OX-172 optimized for 1588 solutions, and the OX-174 and OX-175 low phase noise oscillators. 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
- SC-Cut resonator
- Temperature stability to 0.4 ppb
- Aging rate options to 0.06 ppb/day
- Frequency range 5 to 20 MHz
- Standard frequencies: 5, 10, 12.8, 20 MHz

### Applications

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

## Performance Specifications

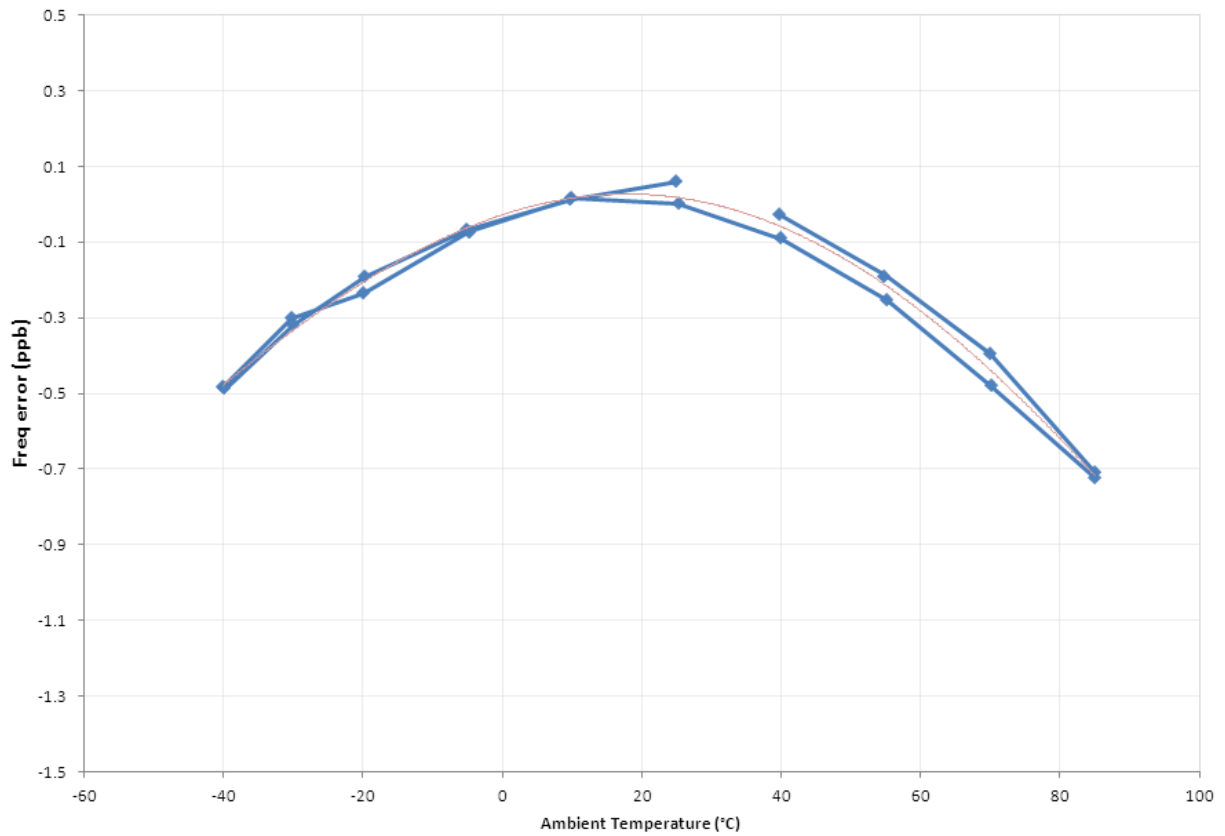
Frequency Stabilities <sup>1</sup> (Stabilities listed for 10 MHz. For stabilities above 10 MHz values may degrade. Please contact factory)					
Parameter	Min	Typical	Max	Units	Condition
vs. Operating Temperature Range (referenced to +25°C)	-0.4		+0.4	ppb	0 to +70°C
	-0.6		+0.6	ppb	-20 to +70°C
	-0.8		+0.8	ppb	-40 to +85°C
For better stability refer to the MX-060, MX-041 or MX-042 datasheets.					
Initial Tolerance	-25		+25	ppb	at time of shipment, nominal EFC
vs. Supply Voltage Change	-0.5		+0.5	ppb	V <sub>s</sub> ±5%
vs. Load Change	-0.2		+0.2	ppb	Load ±5%
vs. Aging / Day	-1		+1	ppb	after 24 hours operation
vs. Aging / Day	-0.1		+0.1	ppb	after 72 hours operation
vs. Aging/ Day	-0.06		+0.06	ppb	after 7 days operation
vs. Aging / 1 <sup>st</sup> Year	-15		+15	ppb	after 72 hours operation
vs. Aging / Year (following year)	-10		+10	ppb	
vs. Aging/ 10 years	-75		+75	ppb	after 72 hours operation
Retrace <sup>2</sup>	-10		+10	ppb	
Warm-up Time			5	minutes	to ±10ppb 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
	11.4	12.0	12.6	VDC	Ordering code B , temp stability T and J only
Power Consumption			4	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	2	s	time required to achieve 90% of amplitude
Signal [standard]	HCMOS				
Load		15		pF	
Signal Level (Vol)			0.4	VDC	with Vs=3.3V and 15pF Load
Signal Level (Vol)			0.5		with Vs=5.0V & 12V and 15pF Load
Signal Level (Voh)	2.4			VDC	with Vs=3.3V and 15pF Load
Signal Level (Voh)	3.5				with Vs=5.0V & 12V 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,12 V	+5	+8	+11	dBm	
Harmonics			-40	dBc	
Subharmonics			-40	dBc	frequencies >= 10 MHz
Frequency Tuning (EFC)					
Tuning range	±150		±250	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
	0.0	2.5	5	VDC	with Vs=12.0V
Reference Voltage Output (Vref)					
the OX-171 can be configured with a reference voltage on pin 2. This configuration requires a custom part number, and may degrade the stability of the part. Please contact the factory for ordering information.					
Reference Voltage (Vref) - when specified for custom units.	2.75	2.8	2.85	VDC	with Vs = 3.3 VDC
	3.92	4.0	4.08	VDC	with Vs = 5.0 VDC
	4.9	5	5.1	VDC	with Vs =12 VDC

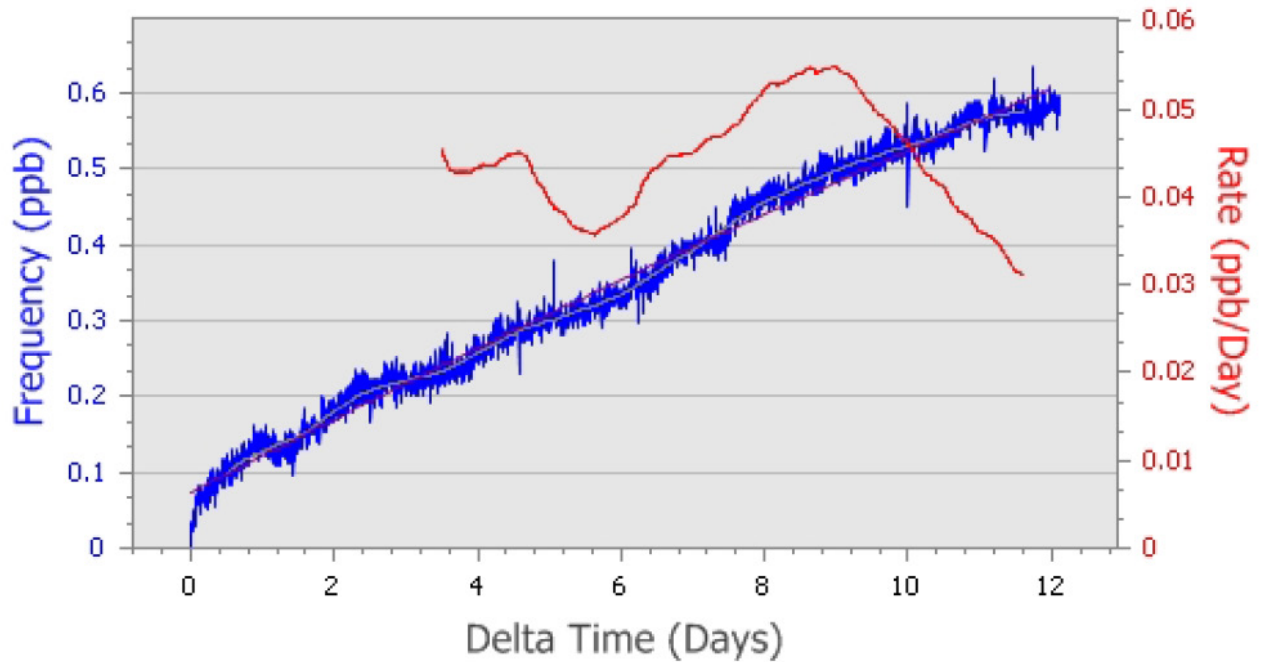
Additional Parameters						
Parameter	Min	Typical	Max	Units	Condition	
Phase noise <sup>3</sup>			-95 -125 -140 -145 -145	dBc/Hz dBc/Hz dBc/Hz dBc/Hz dBc/Hz	1 Hz 10 Hz 100 Hz 1 kHz 10 kHz	@ 10MHz
For lower phase noise, please review the OX-174 datasheet.						
Allan Deviation			5e-12 8e-12 1e-11 5e-11		1 s tau 10 s tau 100 s tau 1000 s tau	@ 10MHz
For oscillators with lower ADEV requirements. Please review the OX-174 datasheet. For oscillators with TDEV and MTIE requirements. Please review the OX-172 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.						
Weight			25	g		
Absolute Maximum Ratings						
			15.0	VDC		
Output load	25		50 open	pF Ohms	CMOS Sine	
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-171 Frequency vs. Temperature**

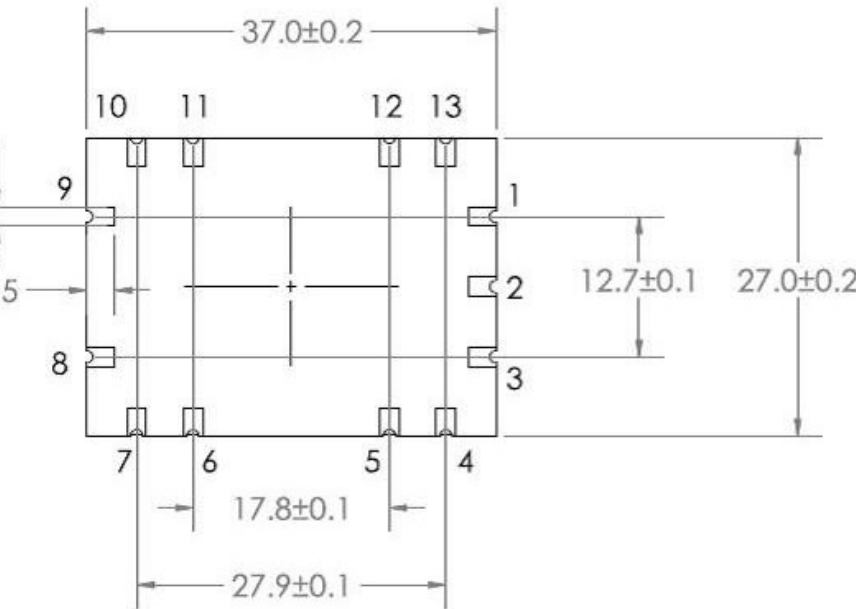
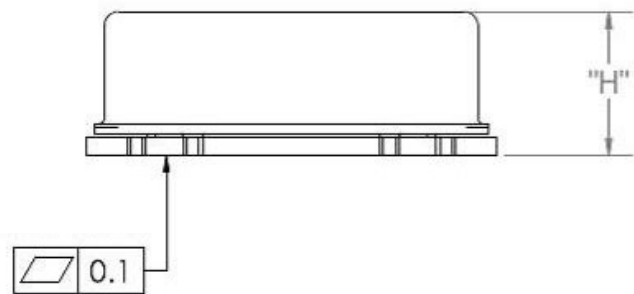
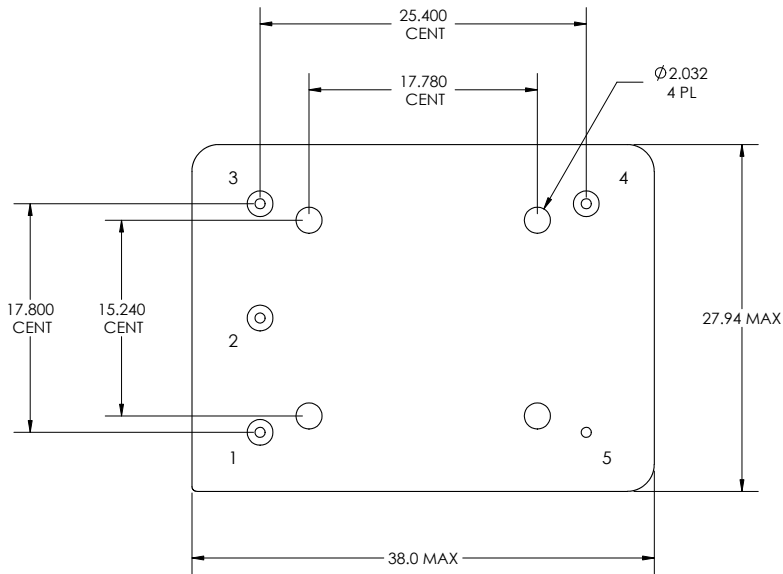
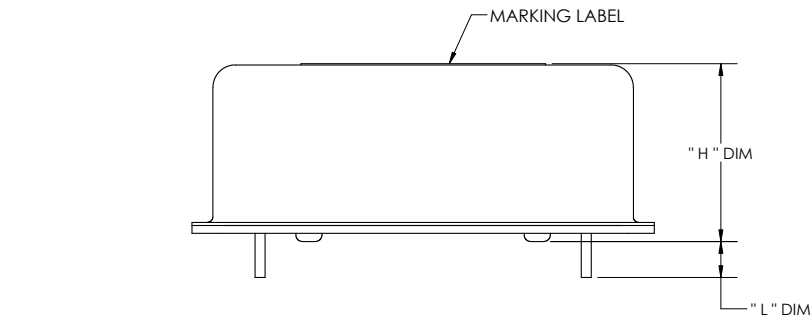


Frequency vs temperature plot -  
Blue line - measured data -  
Red line - curve fit of data.

**OX-171 Aging**



# Outline Drawing / Enclosure



## Through hole Package configuration A

	Height "H"	Pin Length "L"
0	14 max	4.5 mm min

Additional height options available - contact factory .

Note - lower height reduces stability

## Pin Connections

1	Electronic Frequency Control Input (EFC) No Connect for Fixed frequency Oscillators
2	No Connect Reference Voltage for custom models
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	4.5 mm min

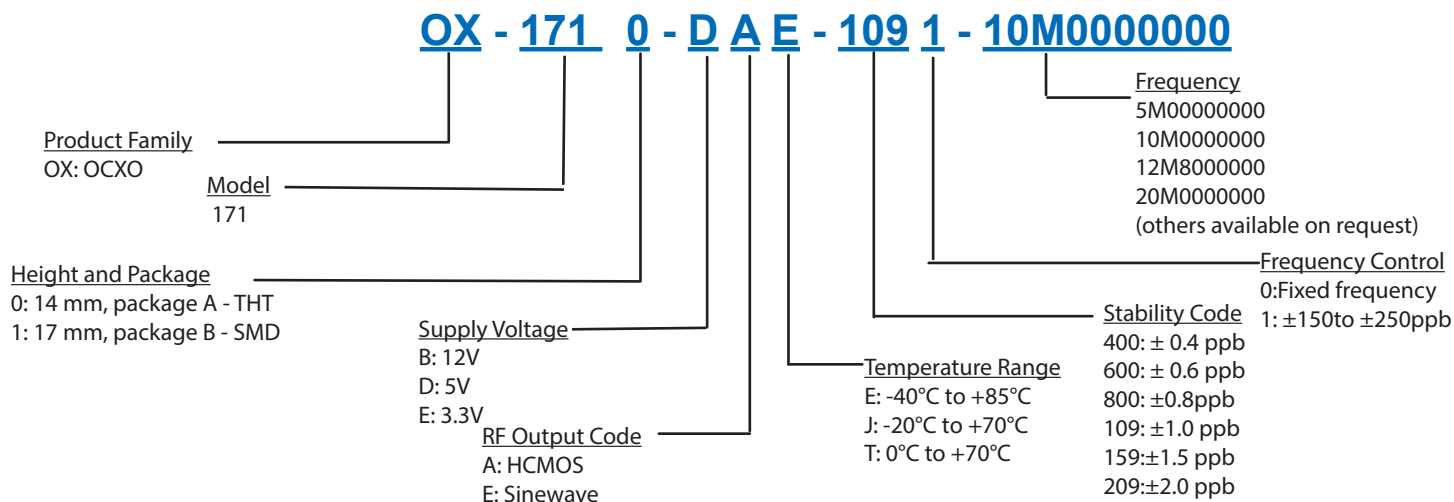
Additional height options available - contact factory .

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	No Connect - Reference Voltage for custom models
3	Supply Voltage Input (Vs)
8	RF Output
9,10	Ground (Case)

## Ordering Information<sup>4</sup>



**Stability code - Temperature and Frequency Options**

Frequency	0 to +70 °C	-20 to +70 °C	-40 to +85°C
5 to 10 MHz	400	600	800
> 10 MHz	109	159	209

## 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 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-1710-DEE-8001-10M00000000
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 defined as f1-fo where fo is the reading after the unit has been on power for 24 hours, and f1 is the frequency after 24 hours off followed by 60 minutes on.
- Phase noise degrades with increasing output frequency.
- Not all options and codes available at all frequencies.

## For Additional Information, Please Contact

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