OH-173

Harsh Environment, Ultra-Low Phase Noise Oven-Controlled Crystal Oscillator (OCXO)



Summary

The OH-173 is an ultra-low phase noise, low g-sensitivity OCXO in a 28 × 38 mm package with a phase noise floor as low as −175 dbc/Hz and g-sensitivity of 0.05 ppb/g. The OH-173 achieves a temperature stability of ±10 ppb over the wide temperature range of −55°C to +90°C and an aging rate of ±0.2 ppb/day. This device uses active g-sensitivity cancellation to achieve low g-sensitivity and can operate in harsh environments.

Features

- Temperature stability to 10 ppb
- Frequency range of 10 to 20 MHz
- Standard frequency of10 MHz
- CMOS and sine wave options
- Ultra-low phase noise
- Excellent shock and vibration performance

Applications

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

Performance Specifications

Phase Noise Ordering Codes at 10 MHz, Sine Wave Output				
Frequency Offset (Hz)	**A (12V only)**	**B (5V only)**	**Unit**	**Condition**
1	−105	−105	dBc/Hz	Maximum values All EFC settings
10	−135	−135	dBc/Hz	
100	−157	−157	dBc/Hz	
1000	−167	−167	dBc/Hz	
10,000	−175	−172	dBc/Hz	
100,000	−175	−172	dBc/Hz	

Phase Noise Ordering Codes at 10 MHz, CMOS Output			
Frequency Offset (Hz)	**C (5V only)**	**Unit**	**Condition**
1	−105	dBc/Hz	Maximum values All EFC settings
10	−135	dBc/Hz	
100	−155	dBc/Hz	
1000	−160	dBc/Hz	
10,000	−165	dBc/Hz	
100,000	−165	dBc/Hz	

Frequency Stabilities[1]					
(Stabilities listed for 10 MHz; for stabilities above 10 MHz, values may degrade, so please contact factory)					
Parameter	**Min**	**Typ**	**Max**	**Units**	**Condition**
vs. Operating Temperature Range (referenced to +25°C)	−10		+10	ppb	−55°C to +90°C
Initial Tolerance	−50		+50	ppb	At time of shipment, nominal EFC
vs. Supply Voltage Change	−2		+2	ppb	VS ± 5%
vs. Load Change	−2		+2	ppb	Load ± 5%
vs. Aging/Day	−0.2		+0.2	ppb	After 7 days operation
vs. Aging/1 Year	−100		+100	ppb	After 7 days 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) @25°C
Supply Voltage (Vs)					
Supply Voltage	4.75	5.0	5.25	VDC	Ordering option D
	11.4	12.0	12.6	VDC	Ordering option B
Power Consumption			5.0	Watts	During warm-up, all temperatures
			2.0	Watts	Steady state @ +25°C
		4.0		Watts	Steady state @ −55°C
		0.5		Watts	Steady state @ +90°C
RF Output					
Start Time		2		s	Time required to achieve 90% of amplitude
Signal	Sine Wave				
Load		50		Ohm	
Output Power	+7	+8	+10	dBm	Vs = 12 VDC
	+4	+5	+7	dBm	Vs = 5 VDC
Harmonics			−30	dBc	
Spurious			−80	dBc	
Signal	HCMOS				5V supply only
Load		15		pF	
Signal Level (Vol)			0.5	VDC	
Signal Level (Voh)	3.5			VDC	
Duty Cycle	45		55	%	@ (Voh-Vol)/2
Rise and Fall Time (Tr/Tf)			10	ns	

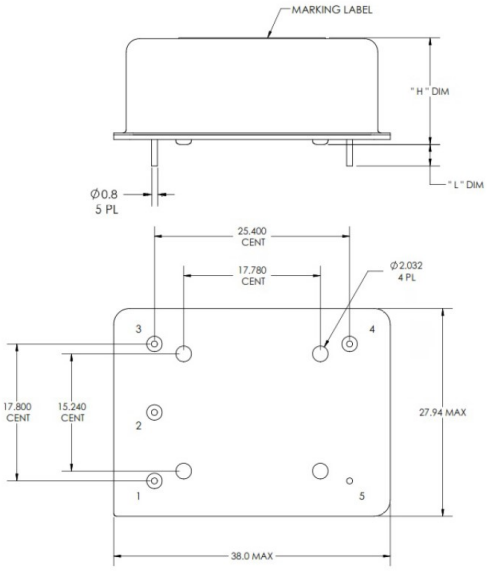
Frequency Tuning (EFC)					
Parameter	**Min**	**Typical**	**Max**	**Units**	**Condition**
Tuning Range	±400		±800	ppb	Fixed frequency option available
Linearity		15		%	
Tuning Slope		Positive			
Input Impedance		100		kOhm	
Control Voltage Range	0.0		4.35	VDC	With Vs = 5.0 VDC
	0.0		10	VDC	With Vs = 12.0 VDC

Additional Parameters						
Parameter	**Min**	**Typical**	**Max**	**Units**	**Condition**	
Allan Deviation		2	5	E−12	0.1 s tau	
		1	3	E−12	1 s tau	
		1.5	4	E−12	10 s tau	@ 10 MHz
		1.8	5	E−12	100 s tau	
		2	5	E−12	1,000 s tau	
g-Sensitivity			0.05	ppb/g	10 Hz to 100 Hz	
			0.075	ppb/g	100 Hz to 200 Hz (Linear slope)	
			0.325	ppb/g	200 Hz to 1 KHz (Linear slope)	
Weight			25	g		

Absolute Maximum Ratings					
Supply Voltage			6.5	VDC	With Vs = 5.0 VDC
			15.0	VDC	With Vs = 12.0 VDC
Output Load	25		Open	Ohms	Sine wave
			50	pF	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 C, 100g, 6 ms
Sine Vibration (Endurance)	MIL-STD-202, Method 201 and 204, Condition D
Random Vibration (Endurance)	MIL-STD-202, Method 214, Condition I-F
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)
Reliability	MTBF = 37,399 Hrs/Ground Mobile
Moisture Sensitive Level	1
RoHS	6 Compliant

Outline Drawing/Enclosure



Dimensions in mm

Through Hole Package configuration A	
Height "H"	**Pin Length "L"**
18.2 mm max	4.5 mm min

Pin Connections	
1	Electronic Frequency Control (EFC) No Connect for fixed-frequency oscillators
2	No connect
3	Supply voltage input (Vs)
4	RF output
5	Ground (case)

Ordering Information[3]

OH 173 0 D E X 108 1 10M0000000

Product Family
OH: Harsh Environment OCXO

Model
173

Height and Package
0: 18.2 mm

Supply Voltage
B: 12V
D: 5V

RF Output Code
A: HCMOS (5V only)
E: Sine Wave

Temperature Range
X: –55°C to +90°C

Stability Code
108 ± 10 ppb

Frequency Control
0: No Tuning, Phase Noise Code A
1: No Tuning, Phase Noise Code B
2: No Tuning, Phase Noise Code C
3: Frequency Tuning, Phase Noise Code A
4: Frequency Tuning, Phase Noise Code B
5: Frequency Tuning, Phase Noise Code C

Frequency

Design Tools

Microchip stocks the following evaluation board for this product:

- OCXO Evaluation Board

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 f1−fo where fo is the reading after the unit has been on power for 24 hours, and f1 is the frequency after it is off for 24 hours followed by on for 60 minutes
3. Not all options and codes available at all frequencies

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