

Helping Customers Innovate, Improve &amp; Grow



OX-249

**Common Characteristics [all frequencies and options]**

Parameter	Min	Typ	Max.	Units	Condition
Supply voltage	4.75	5.0	5.25	VDC	
Power consumption (in air)			3.8 1.5 2.8	Watts Watts Watts	Peak warm-up power steady state @ +25°C steady state @ -40°C
Frequency vs. Temperature (ref. frequency at 60 minutes)	-100		+100	ppb	-40 .. +85°C
Warm-up Accuracy @+25°C, (ref. frequency at 60 minutes.)			±100	ppb	75 seconds after turn-on
Warm-up Accuracy @-40°C, (ref. frequency at 60 minutes.)			±100	ppb	150 seconds after turn-on
Frequency vs. supply voltage change ± 5%	-30		+30	ppb	
Frequency vs. load change ± 10%	-20		+20	ppb	
ADEV		8x10 <sup>-12</sup>	1x10 <sup>-11</sup>		1 second tau
G-Sensitivity (total gamma)		0.5	1	ppb/g	Measured with 10g sine vibration at 100Hz; met by design
Mass		13.4	14	grams	

**Sinewave Output Parameters [40MHz to 125MHz]**

Parameter	Min	Typ	Max.	Units	Condition
Load		50		Ohm	
Output Power	+5	+7.5	+10	dBm	50 Ohm load
Output VSWR			2:1	---	Across F <sub>nom</sub> ± 500 kHz, ref. to 50Ω; met by design
Harmonics			-35	dBc	
Subharmonics			none	dBc	
Spurious			-80	dBc	

**Squarewave Output Parameters [10MHz to 100MHz]**

Load		15	50	pF	ACMOS (load in parallel with 10kΩ)
"Low" Output Level (Vol)			0.1	V <sub>s</sub>	V <sub>s</sub> = actual supply voltage
"High" Output Level (Voh)	0.9			V <sub>s</sub>	V <sub>s</sub> = actual supply voltage
Rise/Fall Time			5	ns	(10-90%)
Duty cycle	40		60	%	(Voh-Vol)/2

**Frequency Tuning (EFC) [when present]**

Parameter	Min	Typ	Max.	Units	Condition
Tuning Voltage	0		4	volts	
Tuning Range	Sufficient to tune to nominal freq for 15 years				Positive slope
EFC Input DC Resistance	100			kOhm	
Vref (when present)	+3.8	+4.0	+4.2	VDC	source impedance = 1kΩ

Additional Parameters [ $\leq 50\text{MHz}$ ]					
Parameter	Min	Typ	Max.	Units	Condition
Initial tolerance for fixed frequency	-100		+100	ppb	at time of shipment, non-EFC models.
Initial tolerance, EFC = 2.00 volts	-150		+150	ppb	at time of shipment, when EFC is present.
vs. aging /1 day	-2		+2	ppb	after 7 days of operation, constant ambient conditions and supply voltage.
vs. aging /1st year	-200		+200	ppb	
vs. aging /15 years	-1000		+1000	ppb	
Typical Phase Noise @ 50MHz (Sinewave Output). Maximum performance is Sinewave only. For AC MOS performance, contact factory.		-78	-72	dBc/Hz	1 Hz
		-108	-103	dBc/Hz	10 Hz
		-135	-130	dBc/Hz	100 Hz
		-153	-148	dBc/Hz	1 KHz
		-162	-157	dBc/Hz	10 KHz
		-163	-160	dBc/Hz	100 KHz
		-165	-163	dBc/Hz	1 MHz

Additional Parameters [ $> 50\text{MHz to } \leq 80\text{MHz}$ ]					
Parameter	Min	Typ	Max.	Units	Condition
Initial tolerance for fixed frequency	-120		+120	ppb	at time of shipment, non-EFC models.
Initial tolerance, EFC = 2.00 volts	-200		+200	ppb	at time of shipment, when EFC is present.
vs. aging /1 day	-3		+3	ppb	after 7 days of operation, constant ambient conditions and supply voltage.
vs. aging /1st year	-400		+400	ppb	
vs. aging /15 years	-1500		+1500	ppb	
Typical Phase Noise @ 80MHz (Sinewave Output). Maximum performance is Sinewave only. For AC MOS performance, contact factory.		-74	-68	dBc/Hz	1 Hz
		-105	-100	dBc/Hz	10 Hz
		-132	-127	dBc/Hz	100 Hz
		-152	-147	dBc/Hz	1 KHz
		-162	-157	dBc/Hz	10 KHz
		-163	-160	dBc/Hz	100 KHz
		-165	-163	dBc/Hz	1 MHz

Additional Parameters [ $> 80\text{MHz to } \leq 100\text{MHz}$ ]					
Parameter	Min	Typ	Max.	Units	Condition
Initial tolerance for fixed frequency	-150		+150	ppb	at time of shipment, non-EFC models.
Initial tolerance, EFC = 2.00 volts	-200		+200	ppb	at time of shipment, when EFC is present.
vs. aging /1 day	-4		+4	ppb	after 7 days of operation, constant ambient conditions and supply voltage.
vs. aging /1st year	-500		+500	ppb	
vs. aging /15 years	-2000		+2000	ppb	
Typical Phase Noise @100MHz (Sinewave Output). Maximum performance is Sinewave only. For AC MOS performance, contact factory.		-70	-65	dBc/Hz	1 Hz
		-100	-95	dBc/Hz	10 Hz
		-130	-125	dBc/Hz	100 Hz
		-151	-147	dBc/Hz	1 KHz
		-160	-157	dBc/Hz	10 KHz
		-163	-160	dBc/Hz	100 KHz
		-165	-163	dBc/Hz	1 MHz

Absolute Maximum Ratings <sup>1</sup>	Min	Max.	Units	Condition
Supply Voltage (Vs)		+7	V	Peak value of DC+AC. See Note 2.
EFC voltage	-0.3	+12	V	When EFC input is present
Storage Temperature	-65	+150	°C	No voltage applied to any connection.
Terminal Solder Temperature	---	260	°C	15 seconds maximum.
ESD rating	1000 volts HBM/CDM		---	

## NOTES:

- Stresses beyond those listed under Absolute Maximum Ratings may cause permanent damage to the device. Extended exposure to Absolute Maximum conditions may impact device reliability adversely.
- Operation with supply voltage (Vs) between 0.7 and 3.0 volts may cause an unstable oven heater condition. Prolonged operation in this condition may cause damage.

### Screening Options

Ordering Code	“S”	“B”	“E”
Test Inspection	S-Level Screening	B-Level Screening	Electrical Verification (EM)
Nondestructive Bond Pull	MIL-STD-883 Meth. 2023	N/A	N/A
Internal Visual	IAW MIL-PRF-55310	IAW MIL-PRF-55310	IAW MIL-PRF-55310
Stabilization Bake	MIL-STD-883 Meth. 1008, Cond C 150°C for 48hrs	MIL-STD-883 Meth. 1008, Cond C 150°C for 48hrs	MIL-STD-883 Meth. 1008, Cond C 150°C for 48hrs
Thermal Shock	MIL-STD-883 Meth. 1011, Cond A	N/A	N/A
Temperature Cycling	MIL-STD-883 Meth. 1010, Cond B	MIL-STD-883 Meth. 1010, Cond B	N/A
Constant Acceleration	MIL-STD-883 Meth. 2001, Cond A 5000g's Y1 Only	MIL-STD-883 Meth. 2001, Cond A 5000g's Y1 Only	N/A
Seal (Fine & Gross Leak)	IAW MIL-PRF-55310, MIL-STD-202, Meth. 112, cond C	IAW MIL-PRF-55310, MIL-STD-202, Meth. 112, cond C	IAW MIL-PRF-55310, MIL-STD-202, meth. 112, cond C.
PIND	MIL-STD-883 Meth 2020, Cond B	N/A	N/A
Pre-Burn-in Electrical Test	IAW MIL-PRF-55310	IAW MIL-PRF-55310	IAW MIL-PRF-55310
Powered Burn-in (1) (2)	MIL-STD-883, Meth. 1015, Cond B, except 125°C for 240 hrs	MIL-STD-883, Meth. 1015, Cond B, except 125°C for 160 hrs	N/A
Post-Burn-in Electrical Test	IAW MIL-PRF-55310	IAW MIL-PRF-55310	N/A
Radiographic	MIL-STD-883 Meth. 2012	N/A	N/A

### Group A Inspection (included 100% w/ screening options S and B)

Group A Inspection is performed in accordance with Table V of MIL-PRF-55310:

- Subgroup 1: Electrical test
- Subgroup 2: Visual and Mechanical inspection
- Subgroup 3: Solderability

### Group B Inspection (included 100% w/ screening options S and B)

Group B Inspection consists of frequency aging testing in accordance with MIL-PRF-55310 with the exception of using logarithmic aging projection.

### Group C Inspection (optional, destruct specimens required)

Group C Inspection is optional and must be included on the customer's purchase order when required. By default, Group C Inspection is performed in accordance with Table VII of MIL-PRF-55310; however, Table C-Xc (Condition PI) of MIL-PRF-38534 can be performed by request. Note that all seal tests are performed IAW MIL-STD-202 methods and criteria. MIL-PRF-55310 Group C Inspection will not include Salt Atmosphere. As permitted by MIL-PRF-55310, we will substitute MIL-PRF-38534 Group D (package evaluation) for Salt Atmosphere and will include all resultant LAT data as part of the data book that is included with the flight units.

### Other Notes

1. Contact factory for improved performance or additional performance parameters.
2. Unless stated otherwise, all values are valid after warm-up time and refer to typical conditions for supply voltage, frequency control voltage, load and temperature (25°C).
3. Phase noise degrades with increasing output frequency.
4. Fixed-frequency models will generally exhibit better phase noise, aging rate, and temperature stability than models with EFC.
5. Datasheet subject to technical modification.

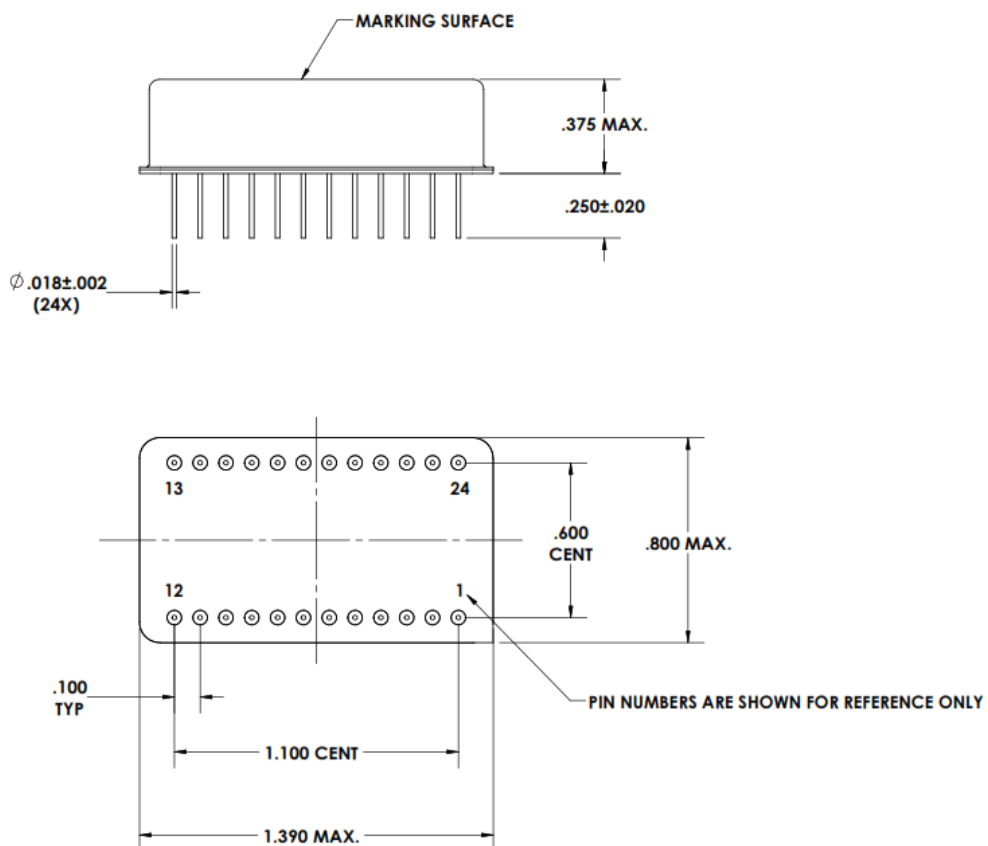
### Environmental Conditions (Qualified to meet)

Radiation Tolerant (operating)***	Active devices are selected from product families that are inherently radiation tolerant to meet 100krad (Si) Total Ionizing Dose ****
Mechanical Shock (non operating)***	MIL-STD-202, Test Method 213, Condition E (1000 G, 0.5msec)
Vibration Random (non operating)***	MIL-STD-202, Test Method 214, Condition I-J (37.8 Grms, 3 minutes/axis)
Vibration Sine (non operating)***	MIL-STD-202, Test Method 204, Condition D (20Gpk, 20 minutes/axis)
Storage Temperature***	-65°C minimum and +150°C maximum

Notes: \*\*\* Met during qualification

\*\*\*\* Passed 300Krad (Si) Total Ionizing Dose (50-300rad/s) during qualification. Test report is available upon request.

### Outline Drawing



Pin Connections	
Pin # <sup>1</sup>	Function
1	EFC Input or N/C
6	GND
7	GND
12	GND
13	RF OUT
15 <sup>2</sup>	Vref or N/C
24	VCC

**Notes:**

1. Pin numbers are for reference only and not marked on parts.
2. Vref = +4V if Pin1 = EFC. Vref = N/C if Pin1 = N/C.

### Ordering Information

**OX - 249 - C J F - 107 A S S - 100M000000**

**Product Family**

OX: OCXO

**Package**

249: 20x35x10 mm

**Supply Voltage**

C: 5 Vdc

**RF Output**

A: CMOS  
J: Sinewave

**Temperature Range**

F: -40°C to +85°C

**Stability Code**

107: ±100 ppb

**Frequency**

XXXMXXXXXX

**Crystal Option**

S: Swept Quartz  
N: Non-Swept Quartz

**Screening Option**

S: "S" Level Screening  
B: "B" Level Screening  
E: "EM" Engineering Model

**Frequency Control**

A: Electrical Tuning  
F: Fixed Frequency



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**Microsemi Headquarters**

One Enterprise, Aliso Viejo, CA 92656 USA  
 Within the USA: +1 (800) 713-4113  
 Outside the USA: +1 (949) 380-6100  
 Sales: +1 (949) 380-6136  
 Fax: +1 (949) 215-4996  
 email: [sales.support@microsemi.com](mailto:sales.support@microsemi.com)  
[www.microsemi.com](http://www.microsemi.com)

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