



EX-245 Series

**Hi-Reliability Evacuated Miniature Crystal Oscillator
EMXO™**



Features

- Radiation Tolerant to > 100krad (SI) total dose
- Low power consumption: <0.7W @ 25°C, <1.1W @-40°C
- Low profile package: 0.93”(W) x 1.03” (L) x 0.35” (H)
- Fast warm-up: 3 minutes @ 25°C
- Frequencies:10 to 20MHz
- Screen to Class S* or B* per Mil-PRF-55310

Applications

- Reference clock for space application
- Military airborne and Mobile system

Note: * Limit upper temperature to 85°C and Constant Acceleration to 1000Gs
* Leak test is not applicable due to the package sealed under vacuum

Performance Characteristics

Parameters	Ordering Code	Conditions	units	Minimum	Typical	Maximum	
Frequency			MHz	10		20	
Supply Voltage	C		V	4.75	5.0	5.25	
Power Consumption		Turn-on Power for 2 minutes @ 25°C	W			2	
		Steady State @ 25°C	W			0.70	
		Steady State @ -40°C	W			1.10	
Warm-up Time @ 25°C		<1 x 10 ⁻⁶	Sec			120	
		<1 x 10 ⁻⁷	Sec			180	
Temperature		Operating	°C	-40		+85	
		Storage	°C	-55		+85	
		Duty Cycle	%	40		60	
CMOS Output	A	Rise/Fall Time (10% to 90% Vdd) with 15pF Load	nSec			7	
		Logic Level "0"	Volt			0.1Vdd	
		Logic Level "1"	Volt	0.9Vdd			
Sine Output	G	Sine into 500ohms Load	dBm	0.0	1.5	3	
	H	Sine into 500ohms Load	dBm	3.0	4.5	6	
		Harmonics	dBc			-25	
		Spurious	dBc			-60	
Stability	C-308	0°C to +70°C Reference to Frequency @ 25°C	ppb			+/-30	
	D-508	-20°C to +70°C Reference to Frequency @ 25°C	ppb			+/-50	
	F-107	-40°C to +85°C Reference to Frequency @ 25°C	ppb			+/-100	
		+/-5% of Supply Voltage	ppb			+/-10	
Aging		+/-5% of Load Change	ppb			+/-10	
		After 7 days of operation	ppb/day			2	
		1 st Year	ppb/year			200	
		10 to <12MHz	ppb/10year			1000	
		12 to <16MHz	ppb/10year			1500	
Allan Deviation		16 to 20MHz	ppb/10year			2000	
		Tau = 1 second				2 x 10 ⁻¹⁰	
	Phase Noise		@ 10Hz	dBc/Hz			-100
			@ 100Hz	dBc/Hz			-130
			@ 1kHz	dBc/Hz			-140
		@ 10kHz	dBc/Hz			-145	
		@ 100kHz	dBc/Hz			-150	
EFC (0V to 4V)	A	Reference to nominal frequency		Sufficient to compensate 10 years aging			
Fixed Frequency	F	Initial Accuracy reference to nominal frequency	ppm	-1.0		+1.0	
Vref		Source Current 1mA maximum	Vdc	4.0	4.1	4.2	
G-Sensitivity		Test at 10g sine vibration at 100Hz	/g			1 x 10 ⁻⁹	

Screening Option

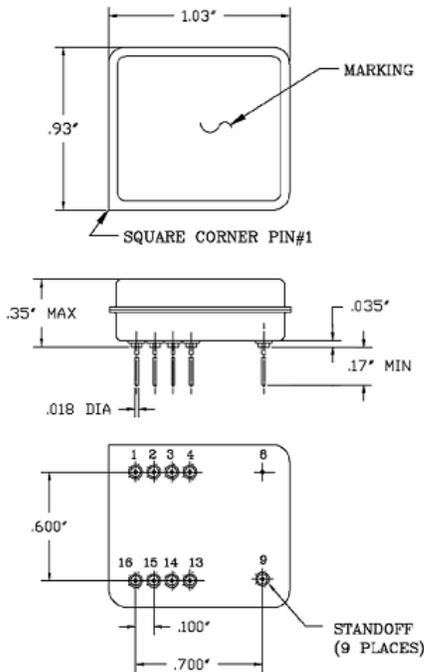
Ordering Code	S	B
Test Inspection	S-Level Screening	B-Level Screening
Nondestructive Bond Pull	MIL-STD-883 Method 2023	N/A
Internal Visual	Per Mil-PRF-55310 Requirement	Per Mil-PRF-55310 Requirement
Stabilization Bake	MIL-STD-883 Method 1008, Condition C	MIL-STD-883 Method 1008, Condition C
	150°C for 48hrs	150°C for 48hrs
Thermal Shock	MIL-STD-883 Method 1011, Condition A	N/A
	0°C to 100°C for 15cycles	
Temperature Cycling ⁽¹⁾	MIL-STD-883 Method 1010, Condition A	MIL-STD-883 Method 1010, Condition A
	-55°C to 85°C ⁽²⁾ for 10cycles	-55°C to 85°C ⁽²⁾ for 10cycles
Constant Acceleration ⁽¹⁾	MIL-STD-883 Method 2001	MIL-STD-883 Method 2001
	1000g's ⁽³⁾ Y1 Only	1000g's ⁽³⁾ Y1 Only
Seal (Fine & Gross Leak) ⁽¹⁾	N/A (Vacuum Seal)	N/A (Vacuum Seal)
PIND	MIL-STD-883 Method 2020, Condition B	N/A
	10g peak at 60Hz minimum	
Electrical Test	Per Mil-PRF-55310 Requirement	Per Mil-PRF-55310 Requirement
Burn-in ⁽¹⁾	85°C ⁽²⁾ for 240hrs	85°C ⁽²⁾ for 160hrs
Electrical Test	Per Mil-PRF-55310 Requirement	Per Mil-PRF-55310 Requirement
Radiographic	MIL-STD-883 Method 2012	N/A
Note: (1) These test inspections deviate from screening requirements for class 2 oscillator in MIL-PRF-55310. (2) The maximum operating and storage temperature of the EX-245 is +85°C. The EX-245 shall not be exposed to temperature higher than +85°C at length of time. (3) The design and construction of the EX-245 can withstand up to 1000g's constant acceleration		

Environmental Conditions (Designed to meet)

- Radiation Tolerant (operating): Active devices are selected from a family of product that is inherently radiation tolerant to meet 100krad (SI) total dose
- Mechanical Shock (survive)***: MIL-STD-202, Test Method 213, Condition E (1000G, 0.5msec)
- Vibration Random (survive)***: MIL-STD-202, Test Method 214, Condition I-F (20Grms, 3 minutes/axis)
- Vibration Sine (survive)***: MIL-STD-202, Test Method 204, Condition D (20Grms, 20 minutes/axis)

Note: *** Met by design, not tested

Package Outline

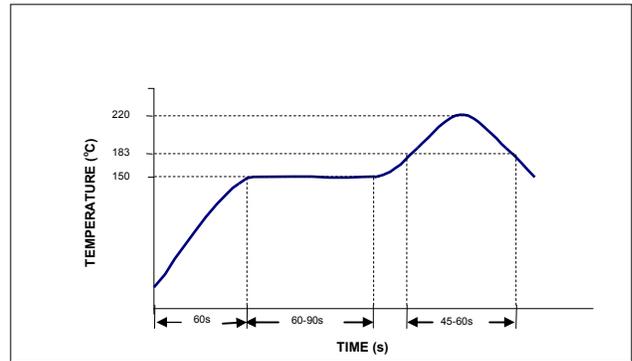


Pin Function

Pin #	With EFC	Fixed Frequency
1	EFC	No Connection
2-4	No Connection	No Connection
8	Case/GND	Case/GND
9	Output	Output
13-14	No Connection	No Connection
15	Vref	No Connection
16	Supply	Supply

Pin numbers are for reference only. They do not appear on unit

Reflow Profile



PRECAUTION: EX-245 Series shall not expose to temperature higher than 230°C during reflow process. If exposing to temperature higher than 230°C, stability and power consumption may permanently degrade.

Ordering Information

