



EX-245 Series

Hi-Reliability Evacuated Miniature Crystal Oscillator  
EMXO™



Features

- Radiation Tolerant to > 100krad (SI) total dose
- Low power consumption: <math>-0.7W</math> @ 25°C, <math>-1.1W</math> @ -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\* per MIL-PRF-55310
- Patented Technique\*\*

Applications

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

Note: \* Limit upper temperature to 85°C and Constant Acceleration to 1000Gs  
 \* Fine Leak test is not applicable due to the package seal under vacuum  
 \*\* U.S. Patent 5,917,272

Performance Characteristics

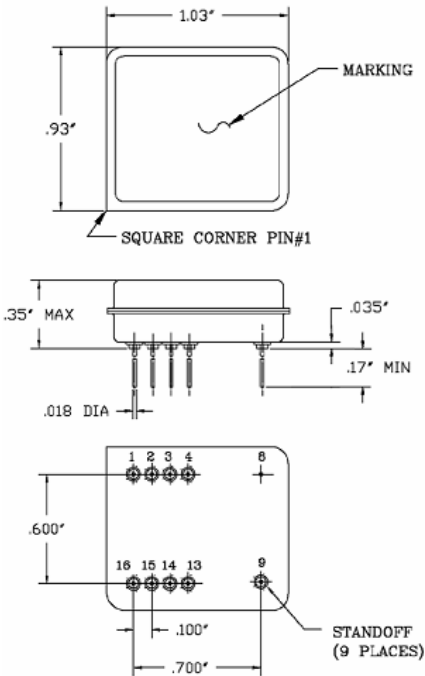
Parameters	Options	Conditions	units	Minimum	Typical	Maximum	
Frequency			MHz	10		20	
Supply Voltage	<b>C</b>		V	4.75	5.0	5.25	
Power Consumption		Turn-on Power for 2 minutes @ 25°C	W			2	
		Steady State @ 25°C	W			0.70	
		Steady State @ -40°C	W			1.10	
Warm-up Time @ 25°C		<math><1 \times 10^{-6}</math>	Sec			120	
		<math><1 \times 10^{-7}</math>	Sec			180	
Temperature		Operating	°C	-40		+85	
		Storage	°C	-55		+85	
CMOS Output	<b>A</b>	Duty Cycle	%	40		60	
		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	<b>G</b>	Sine into 50Ohms Load	dBm	0.0	1.5	3	
	<b>H</b>	Sine into 50Ohms Load	dBm	3.0	4.5	6	
		Harmonics	dBc			-25	
		Spurious	dBc			-60	
Stability	<b>C-308</b>	0°C to +70°C Reference to Frequency @ 25°C	ppb			+/-30	
	<b>D-508</b>	-20°C to +70°C Reference to Frequency @ 25°C	ppb			+/-50	
	<b>F-107</b>	-40°C to +85°C Reference to Frequency @ 25°C	ppb			+/-100	
		+/-5% of Supply Voltage	ppb			+/-10	
		+/-5% of Load Change	ppb			+/-10	
Aging		After 7 days of operation	ppb/day			2	
		1 <sup>st</sup> Year	ppb/year			200	
		10 to <12MHz	ppb/10year			1000	
		12 to <16MHz	ppb/10year			1500	
	16 to 20MHz	ppb/10year			2000		
Allan Deviation		Tau = 1 second				2 x 10 <sup>-10</sup>	
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)	<b>A</b>	Reference to nominal frequency		Sufficient to compensate 10 years aging			
Fixed Frequency	<b>F</b>	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 <sup>-9</sup>	

**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**

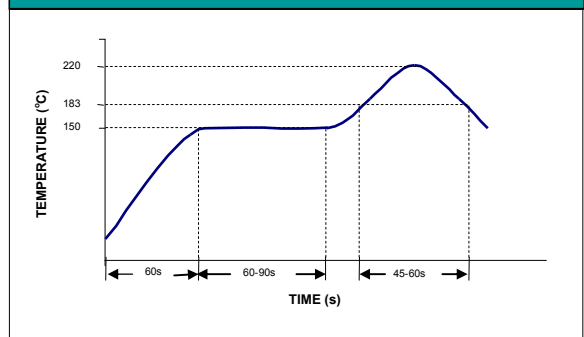


**Pin Function**

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**



**Ordering Information**

