



## Low Noise Crystal Oscillators > MXO (Free-Running)

### Features:

- Free-Running OCXO with Integrated Multipliers
- Frequencies from 200 MHz to 12 GHz, fixed
- Ultra Low Phase Noise Performance
- Good Temperature Stability
- Excellent Spectral Purity
- Easily Customized to Specific Frequency

### Applications:

- Military Applications
- Radar Systems
- Test Equipment
- Instruments
- Reference Source



Electrical Specifications	
Output Frequency (fixed; specify within range)	200 MHz to 12 GHz
Output Level	+13 dBm ±2 dB into 50 ohms
Aging	
Per day after 30 days operating, typical	$5 \times 10^{-9}$
Second year, typical	$5 \times 10^{-7}$
Per year thereafter, typical	$3 \times 10^{-7}$
Temperature Stability (consult factory for other ranges)	
Range E: 0 to +50°C (Ref: +25°C)	$\leq \pm 5 \times 10^{-7}$
Range F: -20 to +70°C (Ref: +25°C)	$\leq \pm 1 \times 10^{-6}$
Phase Noise	(Frequency Dependent: See Standard Specifications and Part Numbers table below for details)
Harmonics	$\leq -25$ dBc
Sub-Harmonics	$\leq -60$ dBc
Spurious	$\leq -80$ dBc
Tuning	(MT and ET ranges can be reversed upon request)
- Mechanical Tuning	$\geq \pm 4 \times 10^{-6}$ , typical
- Electrical Tuning	
Tuning A: 0 to +10 VDC	$\geq \pm 5 \times 10^{-7}$ , typical
Tuning B: ±5 VDC	$\geq \pm 5 \times 10^{-7}$ , typical
Slope: Negative	
Supply Voltage	+15 VDC or +12 VDC (±5%)
Warm-up	$\leq 7$ to 17 Watts for 5 minutes at +25°C
Total	$\leq 4$ to 14 Watts at +25°C
Crystal Type	SC-cut
Acceleration Sensitivity	$5 \times 10^{-10}$ /g, typical; to $2 \times 10^{-10}$ /g, available
Mechanical	
Packaging	Nickel-Plated Machined Aluminum
Dimensions	See Mechanical Drawing
Connectors / Mounting	SMA(f) and solder pins on side Threaded Inserts, #2-56, 6 places

### Description:

The Multiplied Crystal Oscillator (MXO-FR) is a fixed frequency industry leading free-running ultra-low noise OCXO highly integrated with one or more low noise multipliers stages to create a high performance frequency signal between 200 MHz and 12 GHz. The MXO-FR also provides good temperature stability and excellent spectral purity. The package varies depending on the number of multiplier stages needed to create the desired frequency and range in size from 2.25" x 4" x 1", 3.21" x 4" x 1" and 4.16" x 4" x 1". The base VHF oscillator frequency and multiple outputs are available as options. (i.e. If ordering a 10 GHz MXO-FR, the 100 MHz, 500 MHz and 5 GHz outputs are available as outputs since they are also being created in the multiplier string.) An internal voltage regulator is provided for excellent power supply line rejection. Please consult the factory if you need any specifications to be modified to better suit your application.





**Low Noise Crystal Oscillators > MXO (Free-Running)**

**500 MHz MXO-FR**

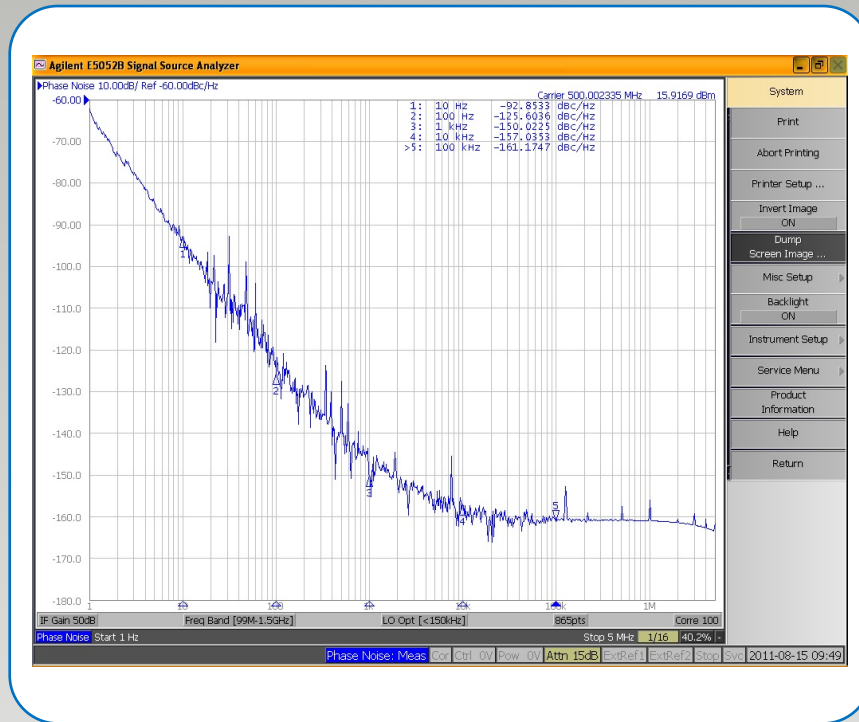


Figure 1: Typical Phase Noise Performance Plot for the 1 GHz MXO-FR, P/N: 501-24145

**Standard Specifications and Part Numbers \*\***

Part Number	Output Frequency * (MHz)	Typical Phase Noise (dBc/Hz), Static *					Output Level (dBm) * into 50 ohms	Temperature Stability (Ref: +25°C) *	Supply Voltage (VDC)	Acceleration Sensitivity (/g per axis) *	Package / Connectors	Package Size (inches)
		10 Hz	100 Hz	1 kHz	10 kHz	100 kHz						
501-25228	200	-93	-123	-151	-167	-168	+13 ±2	±5E-7, 0 to +50°C	+15	5E-10, typ	SMA(f) & Pins on Side	2.25 x 4 x 1
501-25383	320	-89	-119	-144	-160	-161	+13 ±2	±5E-7, 0 to +50°C	+15	5E-10, typ	SMA(f) & Pins on Side	2.25 x 4 x 1
501-25385	400	-87	-117	-144	-160	-161	+13 ±2	±5E-7, 0 to +50°C	+15	5E-10, typ	SMA(f) & Pins on Side	2.25 x 4 x 1
501-24145	500	-85	-115	-143	-159	-160	+13 ±2	±5E-7, 0 to +50°C	+15	5E-10, typ	SMA(f) & Pins on Side	2.25 x 4 x 1
501-25387	512	-74	-104	-134	-159	-160	+13 ±2	±5E-7, 0 to +50°C	+15	5E-10, typ	SMA(f) & Pins on Side	2.25 x 4 x 1
501-25391	640	-82	-112	-137	-153	-154	+13 ±2	±5E-7, 0 to +50°C	+15	5E-10, typ	SMA(f) & Pins on Side	3.21 x 4 x 1
501-24146	1000	-77	-109	-136	-153	-154	+13 ±2	±5E-7, 0 to +50°C	+15	5E-10, typ	SMA(f) & Pins on Side	2.25 x 4 x 1
501-24797	1280	-76	-106	-131	-148	-149	+13 ±2	±5E-7, 0 to +50°C	+15	5E-10, typ	SMA(f) & Pins on Side	3.21 x 4 x 1
501-25402	5120	-63	-93	-118	-135	-136	+13 ±2	±5E-7, 0 to +50°C	+15	5E-10, typ	SMA(f) & Pins on Side	4.16 x 4 x 1
501-24229	10000	-57	-87	-113	-131	-132	+13 ±2	±5E-7, 0 to +50°C	+15	5E-10, typ	SMA(f) & Pins on Side	4.16 x 4 x 1
501-25412	10240	-57	-87	-112	-129	-130	+13 ±2	±5E-7, 0 to +50°C	+15	5E-10, typ	SMA(f) & Pins on Side	4.16 x 4 x 1
501-24244	12000	-55	-85	-111	-126	-127	+13 ±2	±5E-7, 0 to +50°C	+15	5E-10, typ	SMA(f) & Pins on Side	4.16 x 4 x 1
501-25471	1000/500/100	-77	-109	-136	-153	-154	+13 ±2	±5E-7, 0 to +50°C	+15	5E-10, typ	SMA(f) & Pins on Side	3.21 x 4 x 1
501-25469	500/100	-85	-115	-143	-159	-160	+13 ±2	±5E-7, 0 to +50°C	+15	5E-10, typ	SMA(f) & Pins on Side	2.25 x 4 x 1

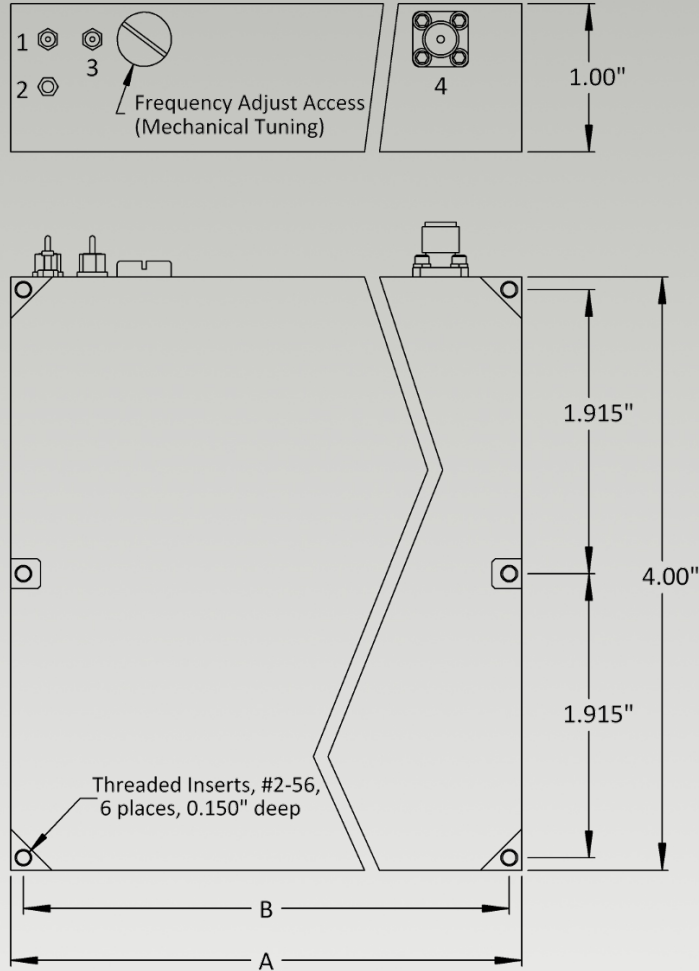
\* Consult factory for custom frequency, phase noise performance, output level, temperature stability and acceleration sensitivity options.

\*\* See website for additional Standard Part Numbers and Specifications.





**Low Noise Crystal Oscillators > MXO (Free-Running)**



**MXO-FR**

Package	Dimension A	Dimension B	Connector	Function
J1	2.25"	2.080"	1	Supply Voltage
J2	3.21"	3.035"	2	Ground, Case
J3	4.16"	3.990"	3	Electrical Tuning
			4	RF Output

