



MODEL FE-444A

**OVEN-CONTROLLED CRYSTAL OSCILLATOR WITH
PATENTED ACTIVE VIBRATION COMPENSATION,
LOW AGING, LOW PHASE NOISE UNDER VIBRATION
AND EXCELLENT STABILITY**



APPLICATIONS

- Civil and Military
- Stationary Through High Dynamic Environments Including Towed, Tracked and Wheeled Ground Mobile Platforms, Fixed and Rotary Wing Aircraft, Unmanned Aerial Vehicles, Shipboard, Submarine, Unmanned Submersible Vehicles, and Satellites
- Disciplined Clock in GPS-based Assured Position, Navigation and Timing (A-PNT) References
- Signals Intelligence (SIGINT) Systems Requiring Compliance to JASA v3 Annex 1: Time, Frequency, Navigation and Geodesy (TFNG)(U)
- Spread Spectrum Frequency Hopping
- Reference Oscillator for Radar, Software-Defined Radios (SDR), Guidance Systems and Secure Communications Systems
- Clean-up Oscillator for Applications Requiring Low Phase Noise When Paired With a Rubidium Atomic Clock for Long-Term Holdover and Stability

FEATURES

- Rugged Oscillator for High Vibration Applications in a Small, Lightweight Package
- Low g-Sensitivity Quartz Crystal Oscillator with Acceleration Sensitivity Options to 5.0E-12/g at 6g RMS (From DC to 250 Hz Without External Vibration Isolators)
- Output Frequencies from 10 to 100 MHz Available
- Operating Temperature Ranges from -20°C to 85°C
- Low Power Consumption ($\leq 2.9W$ Steady State)
- Fast Warm-up Time to Rated Accuracy
- Built-In Test (BIT) Monitoring Output

PARAMETER		UNIT
Standard Frequency	10.0	MHz
Output Signal Into 50 ohms	7.0 ± 2.0	dBm
Return Loss	15	dB
Harmonics	-30	dBc
Spurs	-90	dBc
DC Input Voltage	$+12.0 \pm 5\%$	VDC
VCO Range	$\pm 3E-7$	
VCO Input Voltage (Negative Slope)	0 to 5	VDC

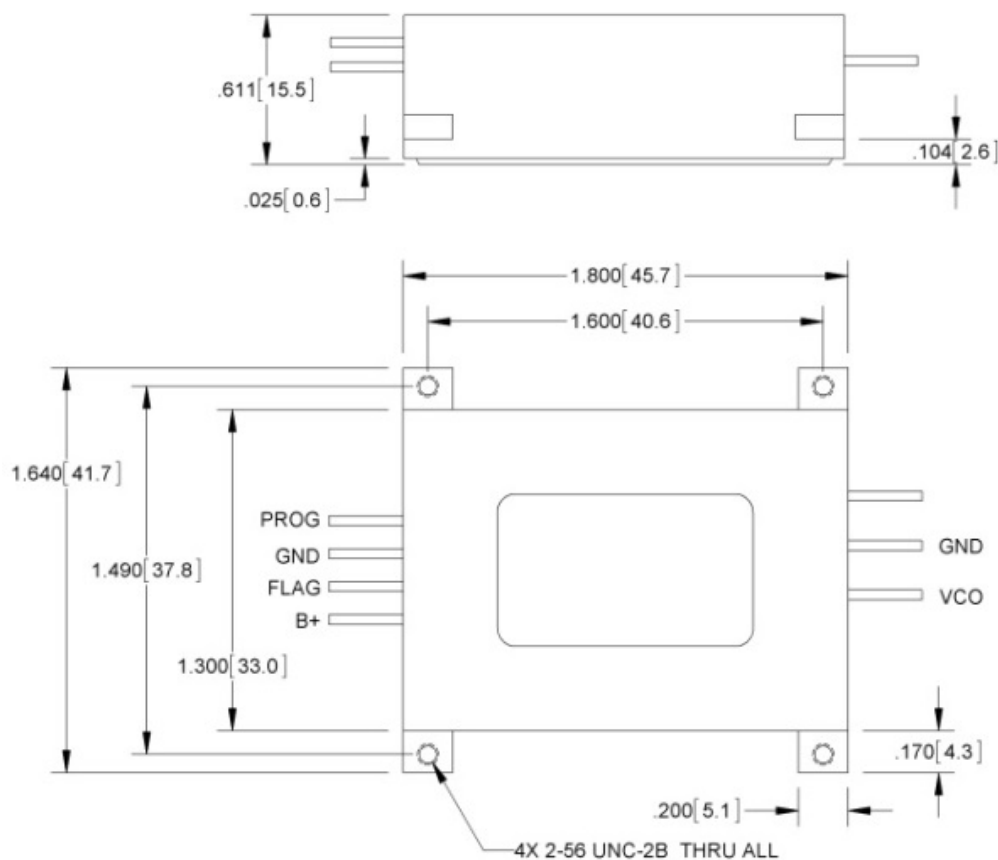
PERFORMANCE SPECIFICATIONS:

PARAMETER		UNIT
Current Draw (Maximum @ 25°C)	550	mA
Current Draw (Steady State @ 25°C)	230	mA
Operating Temperature Range	-20 to +75	°C
Warm-up time @ 25°C (to meet $\pm 2E-8$)	3	min
Power Interruption - Shall meet requirements one minute later	10	sec
Storage Temperature Range MIL-STD-810G, Methods 501.4 & 502.4	-40 to +85	°C
Aging (per year including temperature)	$\pm 3E-8$	
Frequency Stability vs. Temperature		
0 °C to +60 °C	$\pm 5E-10$	
-20 °C to +70 °C	$\pm 1E-9$	
Short Term Stability ($\tau = 1$ to 10 secs)	$2.0E-12$	
Static Phase Noise (Stationary):		
@ 1 Hz offset	-105	dBc/Hz
@ 10 Hz offset	-130	dBc/Hz
@ 100 Hz offset	-145	dBc/Hz
@ 1 kHz offset	-155	dBc/Hz
@ 10 kHz offset	-155	dBc/Hz
g-Sensitivity per Axis (DC-250 Hz) without external vibration isolation		
- Model FE-444A-1	$\leq 2.5E-10$	/g
- Model FE-444A-2	$\leq 5.0E-11$	/g
- Model FE-444A-3	$\leq 2.0E-11$	/g
- Model FE-444A-4	$\leq 5.0E-12$	/g
Weight	2.5	oz.

PARAMETER	ENVIRONMENTAL COMPLIANCE
Shock	Per MIL-STD-202, Method 213B @ 35g, 37ms, half sine pulse
Vibration	$\leq 6g$ RMS
Fungus Resistance	Will not support fungus growth
Humidity	Hermetically sealed package. Testing per MIL-STD-810G, Method 507.3 Procedure II.
Altitude Transportation Non-pressurized	to 70,000 ft
MTBF	$\approx 200,000$ hrs



FE-444A PACKAGE OUTLINE DRAWING:



PINOUT: B+ = +12V IN, GND = 12V RETURN, FLAG = HEATER MON.,
CONTROL (NEG. SLOPE 0-5V) PROG FACTORY, VCO = 0 TO 5V
($F_0 \approx 2.5V$), GND = VCO & RF RTN., RF = 10MHz SINE WAVE OUTPUT

