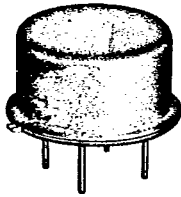


T-50-15



**VCO-116**  
Voltage Controlled  
Oscillator  
150-300 MHz



**DESCRIPTION**

The VCO-116 Voltage Controlled Oscillator\* combines film circuit technology with a custom, stable high-Q varactor design. A unique, low-noise bipolar transistor and a proprietary output coupling circuit are utilized to provide flat power output, wide tuning range and low FM noise.

Good linearity and low tuning voltage lend these devices to straightforward circuit application while the low internal power dissipation allows continuous operation over the full military temperature range.

Mechanically, these encapsulated oscillators have the usual Vari-L attention to design for application in demanding environments.

\*U.S. Patent #4621241, Canadian Patent #1267941, E.P.O. Patent Pending.

**GUARANTEED MINIMUM PERFORMANCE DATA**

Test Condition:  
D.C. Power + 15V @ 15 mA, max.  
Tuning Range 150-300 MHz min.  
Power Output + 10 dBm

Frequency Pushing 1.5 MHz/V max., (15 ± 1 Volt)  
Frequency Pulling 8.0 MHz peak to peak max., through all phases, 12 dB load return loss

Modulation Sensitivity 3.0 MHz/V min.  
Harmonics 10 dBc min.  
Frequency Drift -0.030 MHz/° C max.  
Temperature Range 0 to +70° C

**ABSOLUTE MAXIMUM RATINGS**

Maximum DC Supply Voltage, +20V  
Maximum DC Tuning Voltage, +20V  
Minimum DC Tuning Voltage, 0V

**TYPICAL PERFORMANCE**

Linear Tuning Range 150-300 MHz  
Control Voltage 1 to 18 Volts  
Modulation Sensitivity 9.00 MHz/V  
Power Supply + 15V at 12.5 mA  
Power Output + 13.0 dBm

FM Noise:  
100 KHz Offset 125 dBc/Hz.  
1 MHz Offset 145 dBc/Hz

Harmonics 12 dBc

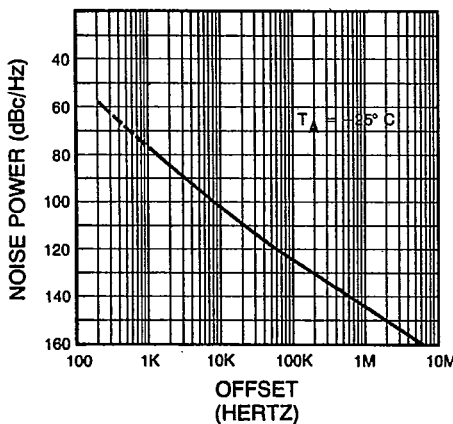
Frequency Pushing 0.8 MHz/V (15 ± 1 Volt)  
Frequency Drift -0.020 MHz/°C

Power Flatness:  
0 to +70° C ± .5 dB

3dB Modulation Bandwidth:  
Zg = 50 Ω, 0.35 MHz  
Zg = 600 Ω, 0.30 MHz

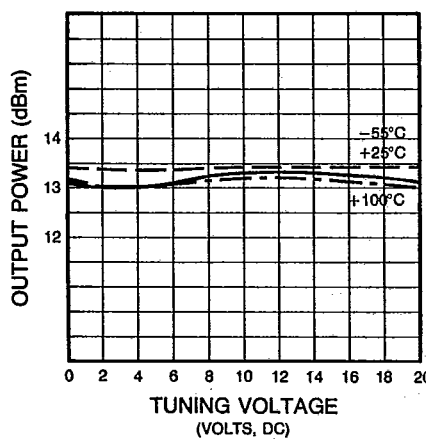
Higher Modulation Bandwidth available on special order.

**TYPICAL \*PHASE NOISE vs. OFFSET (1), (2)**

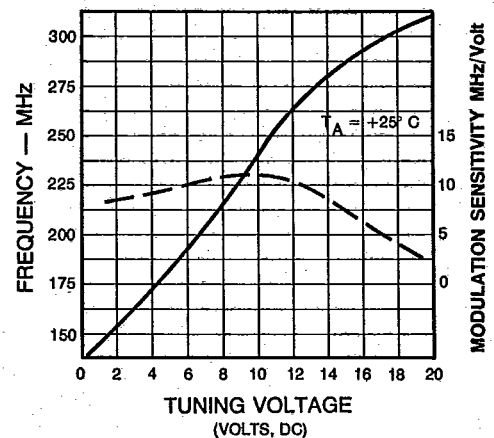


- (1) Phase Noise at temperature extremes degrades less than 6 dB from the 25° C values
- (2) Typical Phase Noise was measured with tuning voltage source impedance of 50 Ohms.

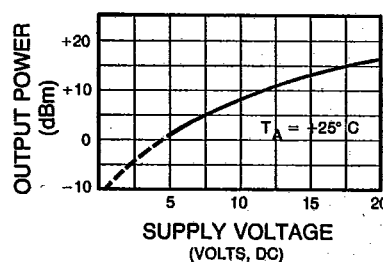
**TYPICAL OUTPUT POWER vs. TUNING VOLTAGE**



**TYPICAL FREQUENCY / MODULATION SENSITIVITY vs. TUNING VOLTAGE**



**TYPICAL OUTPUT POWER vs. SUPPLY VOLTAGE**



**LIMITED WARRANTY**

Vari-L Company, Inc. warrants its products against defects in parts and workmanship for a period of one year.



**ENVIRONMENTAL CONDITIONS**

**Guaranteed Environmental Performance:**

All units are designed to meet their specifications after exposure to any or all of the following tests per MIL-STD-202E.

Exposure	Method	Test Condition
Thermal Shock	107D	B
Altitude	105C	G
H.F. Vibration	204C	D
Mechanical Shock	213B	C
Random Vibration (15 minutes per axis)	214	11F
Solderability	208C	
Terminal Strength	211A	C
Resistance to Soldering Heat	210A	B

These devices are designed to the intent of Mil Standard 883.

Mil Standard 883 screening available at additional cost.

**TO-8 OUTLINE:**

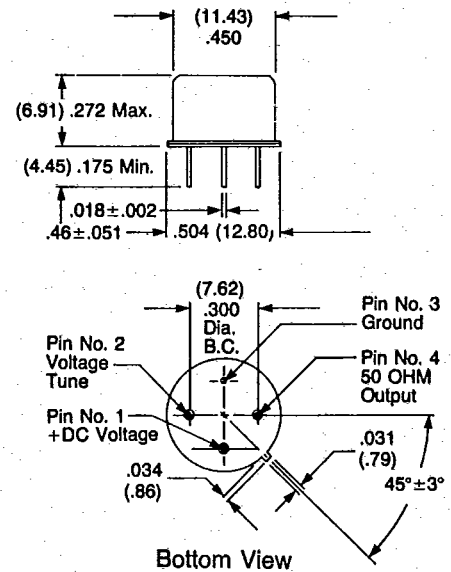
**Material:**

Header: Kovar per ASTM Standard F-15-68 (Chemical Composition per MIL-STD-1276, Type K).  
 Cover: Nickel 200 per ASTM B162-58T.  
 Leads: Kovar, Chemical Composition per MIL-STD-1276, Type K.  
 Seals: Glass

**Finish:**

Header and Leads — Gold plated per MIL-G45204, Type III, Grade A, over electroless Nickel per MIL-C-26074, Class I, (0.00001" thickness).

Note: Tolerances are ± 0.005" unless otherwise noted.

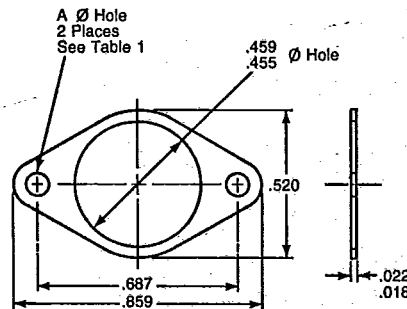
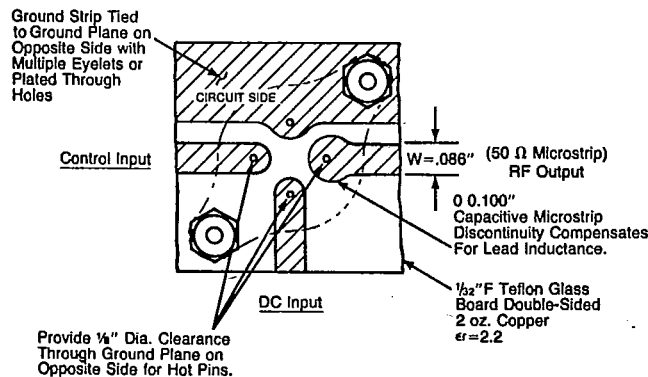


**TO-8 VCO MOUNTING**

Mounting instructions to achieve optimum RF grounding and associated output flatness for VARI-L VCOs.

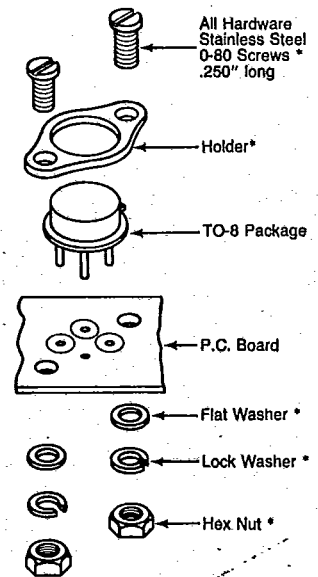
To achieve maximum performance and to realize the inherent stability provided in each unit, it is very important to assure good RF grounding between the case and the ground plate. The entire bottom surface of the case should make good contact with ground.

Use VARI-L Mounting Kit, SA-456, as shown prior to soldering leads into the PC board to prevent seal damage.



Note 1: Unless Otherwise Specified: Material: Plate, Corrosion Resistant Steel, 300 Series Per Fed-STD-66. Finish: Passivate Per MIL-S-5002.

Note 2: Tolerances are ± 0.005" unless otherwise noted.



\*Denotes Hardware Included in SA-456 Mounting Kit All Hardware Stainless Steel



**ALTERNATIVE PACKAGES**

**Material:**

Package: Kovar per ASTM Standard F-15-68 (Chemical Composition per MIL-STD-1276, Type K).

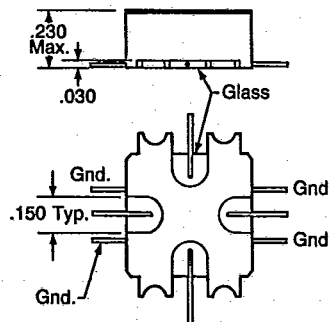
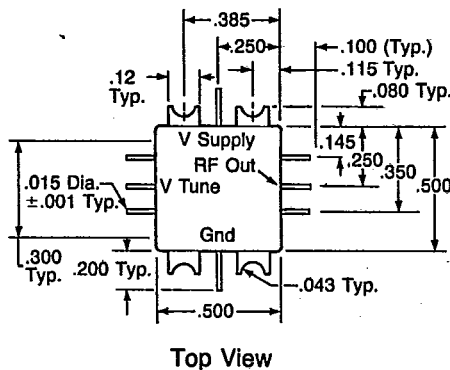
Leads: Kovar, Chemical Composition per MIL-STD-1276, Type K.

Seals: Glass.

**Finish:**

Header and Leads — Gold plated per MIL-G45204, Type III, Grade A, over electroless Nickel per MIL-C-26074, Class I, (0.00001" thickness).

**SURFACE MOUNT OUTLINE:**



**Material:**

Package: Kovar per ASTM Standard F-15-68 (Chemical Composition per MIL-STD-1276, Type K).

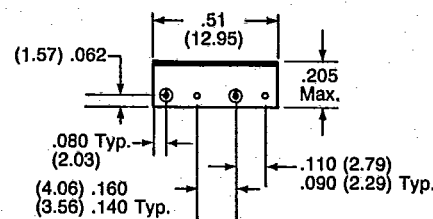
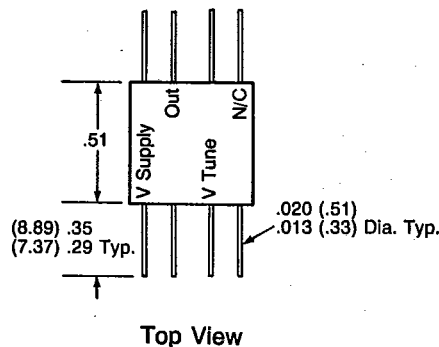
Leads: Kovar, Chemical Composition per MIL-STD-1276, Type K.

Seals: Glass.

**Finish:**

Header and Leads — Gold plated per MIL-G45204, Type III, Grade A, over electroless Nickel per MIL-C-26074, Class I, (0.00001" thickness).

**FLATPAK OUTLINE:**



**SMA CONNECTOR OUTLINE:**

**Material:**

Housing: Aluminum 6061-T6.

Note: This Housing is not hermetically sealed. However, the Hybrid Oscillator within the package is hermetically sealed.

**Finish:**

.0004 Inch Minimum Bright Nickel per QQ-N-290, Class I, Grade F, Form SB. Connectors: SMA Stainless Steel.

