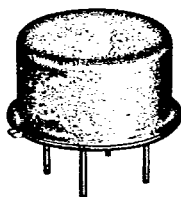




# VCO-105 Voltage Controlled Oscillator 200-400 MHz



## DESCRIPTION

The VCO-105 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 @ 16 mA, max.  
 Tuning Range 200-400 MHz min.  
 Power Output + 10 dBm

Frequency Pushing 2.0 MHz/V max., (15 ± 1 Volt)  
 Frequency Pulling 10 MHz peak to peak max., through all phases, 12dB load return loss.

Modulation Sensitivity 4.0 MHz/V min.  
 Harmonics 10 dBc min.  
 Frequency Drift -0.05 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

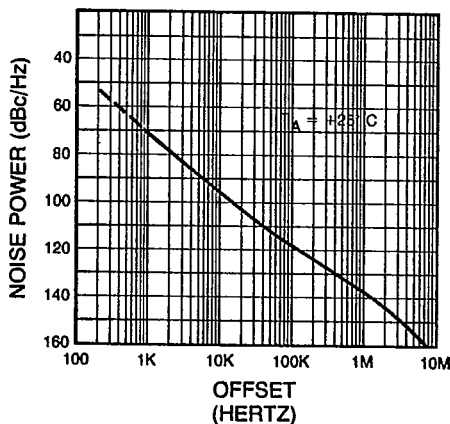
Linear Tuning Range 200-400 MHz  
 Control Voltage 1 to 17 Volts  
 Modulation Sensitivity 12.0 MHz/V  
 Power Supply + 15V at 14.0 mA  
 Power Output + 13.0 dBm

FM Noise:  
 100 KHz Offset 120 dBc/Hz  
 1 MHz Offset 135 dBc/Hz

Harmonics 14 dBc  
 Frequency Pushing 1.0 MHz/V (15 ± 1 Volt)  
 Frequency Drift -0.02 MHz/°C  
 Power Flatness: 0 to +70° C ± .5 dB

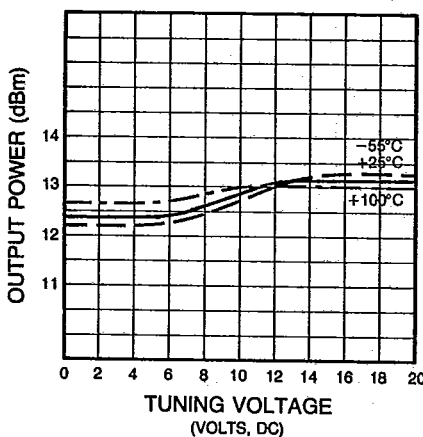
3dB Modulation Bandwidth:  
 Z<sub>g</sub> = 50 Ω, 0.25 MHz  
 Z<sub>g</sub> = 600 Ω, 0.20 MHz  
 Higher Modulation Bandwidth available on special order.

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

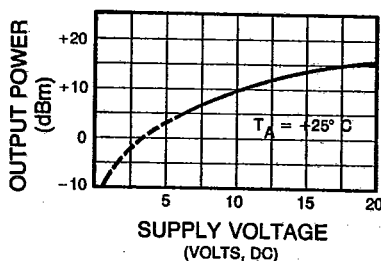


- (1) Phase Noise at temperature extremes degrades less than 6 dB from the 25° C values
- (2) Typical Phase Noise was measured with tuning voltage source impedance of 50 Ohms.

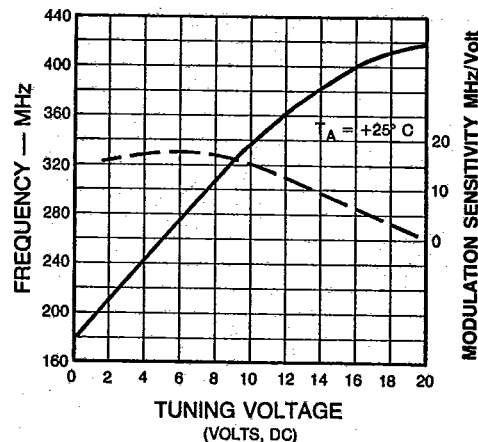
TYPICAL OUTPUT POWER vs. TUNING VOLTAGE



TYPICAL OUTPUT POWER vs. SUPPLY VOLTAGE



TYPICAL FREQUENCY / MODULATION SENSITIVITY vs. TUNING 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:**

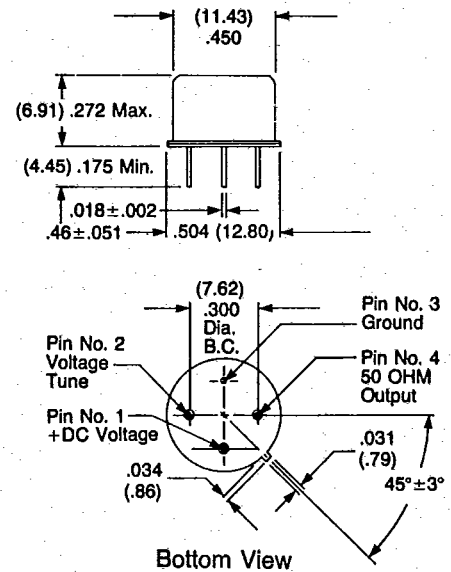
**Material:**

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.

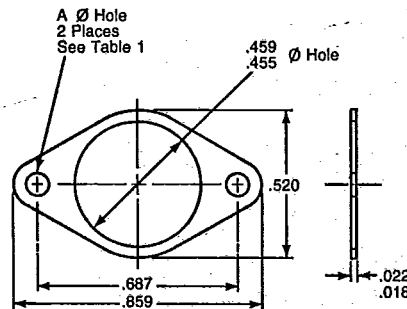
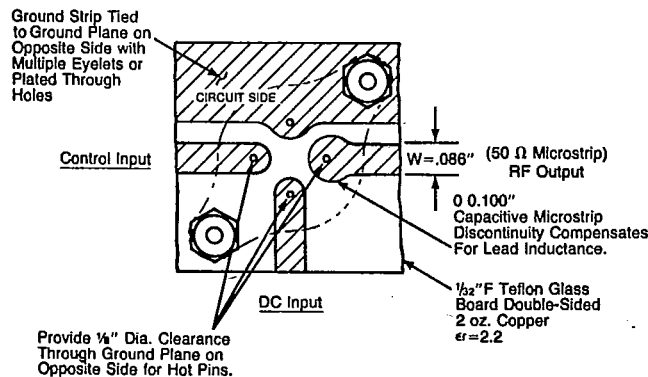


**TO-8 VCO MOUNTING**

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

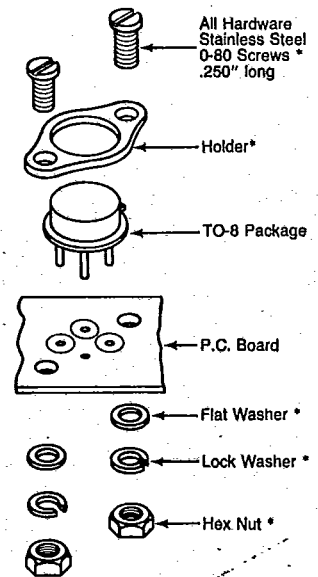
To achieve maximum performance and to realize the inherent stability provided in each unit, it is very important to assure good RF grounding between the case and the ground plate. The entire bottom surface of the case should make good contact with ground.

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).

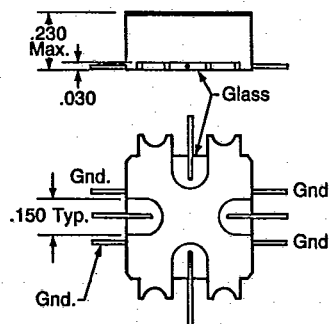
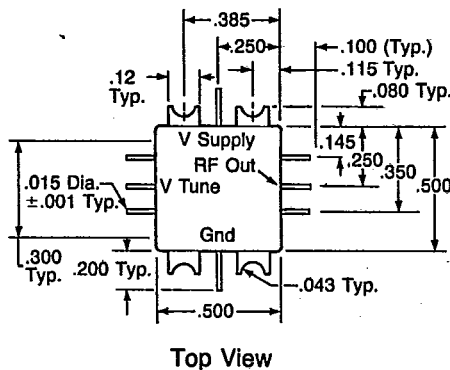
Leads: Kovar, Chemical Composition per MIL-STD-1276, Type K.

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).

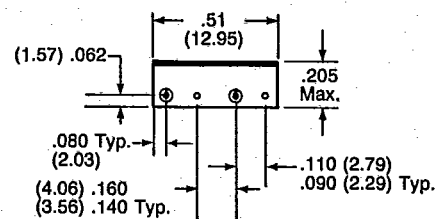
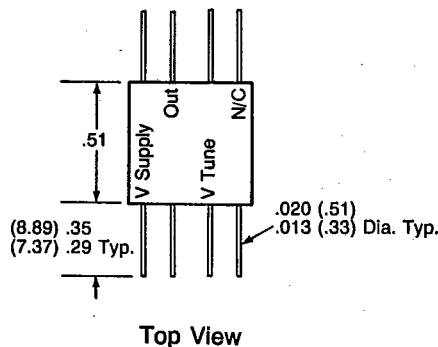
Leads: Kovar, Chemical Composition per MIL-STD-1276, Type K.

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.

