



## WIDEBAND MMIC VCO WITH BUFFER AMPLIFIER 3.90 - 7.50 GHz

### Typical Applications

Low Noise wideband MMIC VCO is ideal for:

- Industrial/Medical Equipment
- Test & Measurement Equipment
- Satcom
- Military Radar, EW, & ECM

### Features

Wide Tuning Bandwidth

Pout: +5 dBm

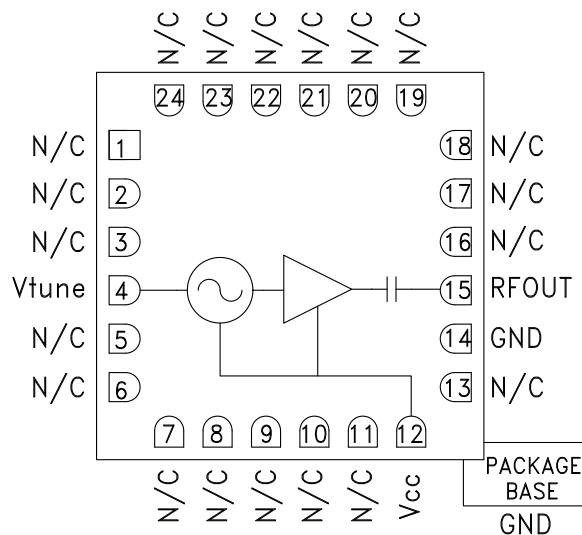
Low SSB Phase Noise: -106 dBc/Hz @100 kHz

No External Resonator Needed

Single Positive Supply: +5V @ 53 mA

Ceramic Leadless SMT Package: 16 mm<sup>2</sup>

### Functional Diagram



### General Description

The HMC6475LC4B is a wideband MMIC Voltage Controlled Oscillator which incorporates the resonator, negative resistance device, and varactor diode. Output power and phase noise performance are excellent over temperature due to the oscillator's monolithic construction. The Vtune port accepts an analog tuning voltage from 0 to +23V. The HMC6475LC4B VCO operates from a single +5V supply, consumes only 53 mA of current, and is housed in a RoHS compliant SMT package. This wideband VCO uniquely combines the attributes of ultra small size, low phase noise, low power consumption, and wide tuning range.

### Electrical Specifications, $T_A = -40\text{ }^\circ\text{C to }+85\text{ }^\circ\text{C}$ , $V_{cc} = +5\text{V}$

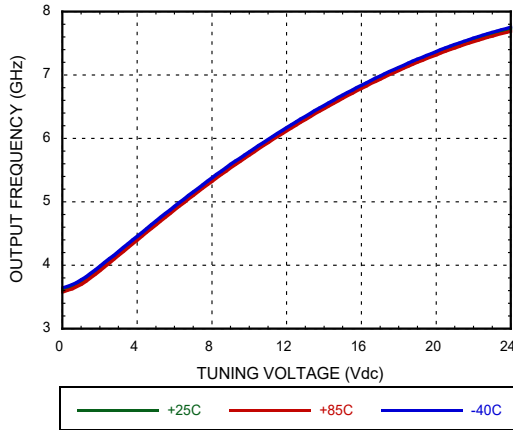
| Parameter                                | Min. | Typ.        | Max. | Units                 |
|--|------|-------------|------|-----------------------|
| Frequency Range                          |      | 3.90 - 7.50 |      | GHz                   |
| Power Output                             | -1   | 5           |      | dBm                   |
| SSB Phase Noise @ 100 kHz Offset         |      | -106        |      | dBc/Hz                |
| SSB Phase Noise @ 1 MHz Offset           |      | -130        |      | dBc/Hz                |
| Supply Current (Icc) (Vcc = +5V)         |      | 53          | 70   | mA                    |
| Tune Voltage (Vtune)                     | 0    |             | 23   | V                     |
| Tune Port Leakage Current (Vtune = +23V) |      |             | 100  | $\mu\text{A}$         |
| Output Return Loss                       |      | 7           |      | dB                    |
| 2nd Harmonic                             |      | -11         |      | dBc                   |
| 3rd Harmonic                             |      | -22         |      | dBc                   |
| Pulling (into a 2.0:1 VSWR)              |      | 7           |      | MHz pp                |
| Pushing                                  |      | 10          |      | MHz/V                 |
| Frequency Drift Rate                     |      | 0.45        |      | MHz/ $^\circ\text{C}$ |



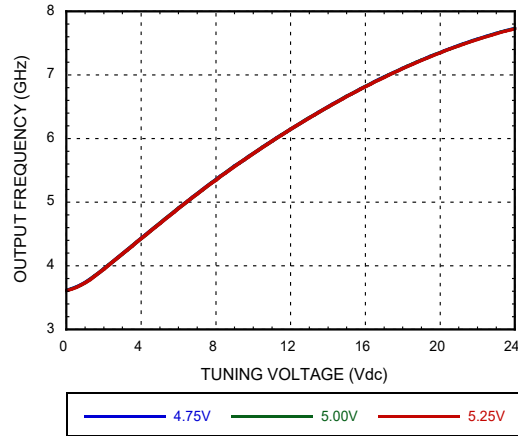
**WIDEBAND MMIC VCO WITH BUFFER AMPLIFIER**  
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VCOS - SMT

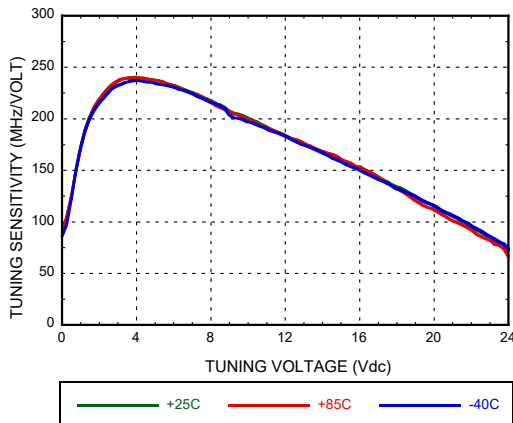
**Frequency vs. Tuning Voltage**



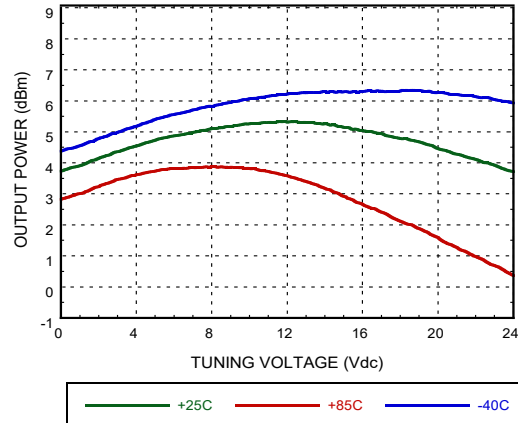
**Frequency vs. Tuning Voltage, T = +25 °C**



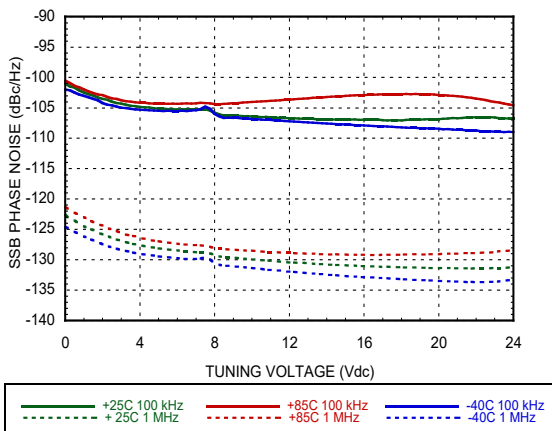
**Sensitivity vs. Tuning Voltage**



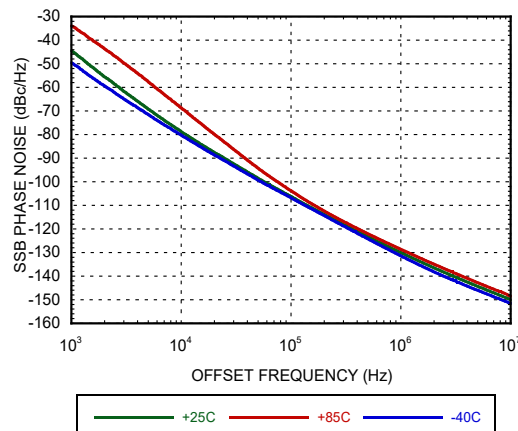
**Output Power vs. Tuning Voltage**



**SSB Phase Noise vs. Tuning Voltage**



**Typical SSB Phase Noise @ Vtune = +10V**

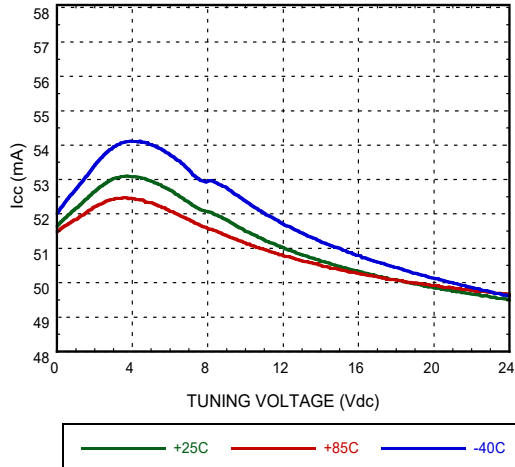




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VCOS - SMT

**Supply Current, Vcc = +5V**



**Absolute Maximum Ratings**

|                       |                   |
|-----------------------|-------------------|
| Vcc                   | +5.5 V            |
| Vtune                 | -1 to +25V        |
| Storage Temperature   | -65 °C to +150 °C |
| ESD Sensitivity (HBM) | Class 1A          |

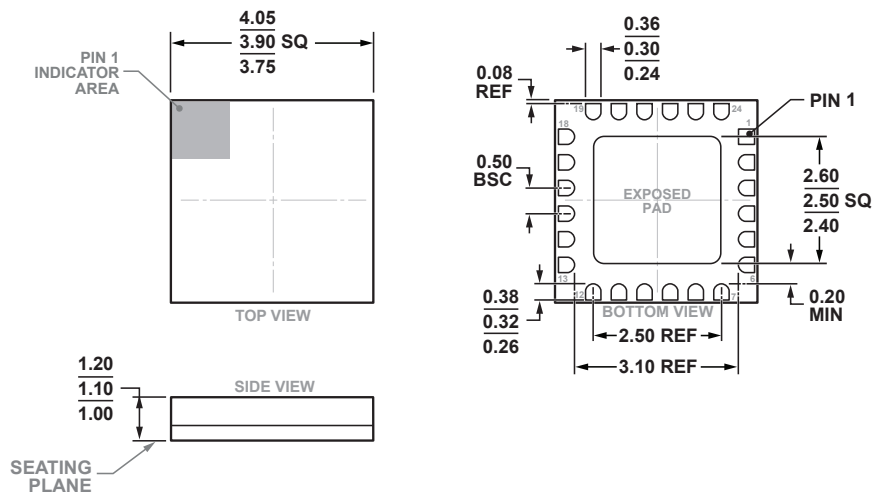
**Reliability Information**

|  |                   |
|--|-------------------|
| Junction Temperature To Maintain 1 Million Hour MTTF   | 135 °C            |
| Nominal Junction Temperature (T = 85 °C)               | 106.2 °C          |
| Thermal Resistance (Junction to GND paddle, 5V supply) | 80 °C/W           |
| Operating Temperature                                  | -40 °C to + 85 °C |



**ELECTROSTATIC SENSITIVE DEVICE  
OBSERVE HANDLING PRECAUTIONS**

**Outline Drawing**



**24-Terminal Ceramic Leadless Chip Carrier (LCC)  
(E-24-2)**

Dimensions shown in millimeters.



## WIDEBAND MMIC VCO WITH BUFFER AMPLIFIER 3.90 - 7.50 GHz

### Ordering Guide

| Model            | Temperature Range | MSL Rating <sup>[1]</sup> | Package Body Material | Lead Finish      | Package Description | Package Option | Qty. | Package Marking <sup>[2]</sup> |
|------------------|-------------------|---------------------------|-----------------------|------------------|---------------------|----------------|------|--------------------------------|
| HMC6475LC4B      | -40C to +85C      | MSL3                      | Alumina, White        | Gold over Nickel | 24-LCC-4X4_MM       | E-24-2         |      | H6475<br>XXXX                  |
| HMC6475LC4BTR    | -40C to +85C      | MSL3                      | Alumina, White        | Gold over Nickel | 24-LCC-4X4_MM       | E-24-2         | 100  | H6475<br>XXXX                  |
| HMC6475LC4BTR-R5 | -40C to +85C      | MSL3                      | Alumina, White        | Gold over Nickel | 24-LCC-4X4_MM       | E-24-2         | 500  | H6475<br>XXXX                  |

[1] Max peak reflow temperature of 260 °C

[2] 4-Digit lot number XXXX

### Pin Descriptions

| Pin Number                 | Function | Description   | Interface Schematic |
|----------------------------|----------|---|---------------------|
| 1 - 3, 5 - 11, 13, 16 - 24 | N/C      | No Connection. These pins may be connected to RF/DC ground. Performance will not be affected.     |                     |
| 4                          | Vtune    | Control Voltage and Modulation Input. Modulation bandwidth dependent on drive source impedance. . |                     |
| 12                         | Vcc      | Supply Voltage, Vcc= +5V  |                     |
| 15                         | RFOUT    | RF output (AC coupled)  |                     |
| 14, 16 Paddle              | GND      | Package bottom has an exposed metal paddle that must be connected to RF & DC ground.              |                     |