



### Typical Applications

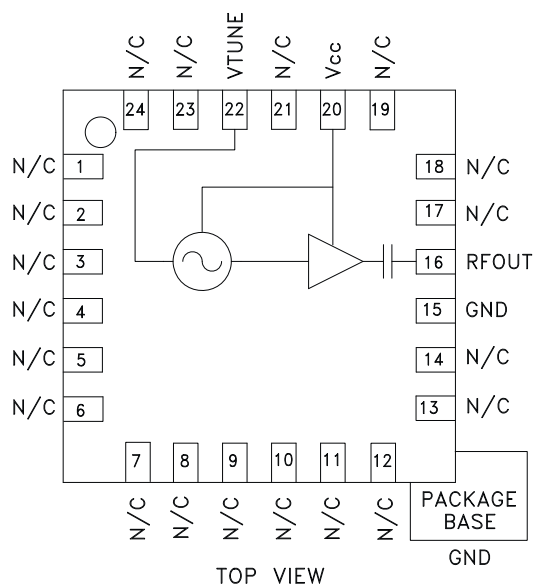
Low noise MMIC VCO w/Buffer Amplifier for C-Band applications such as:

- 802.11a & HiperLAN WLAN
- VSAT Radios
- UNII & Point-to-Point Radios

### Features

- Pout: +2 dBm
- Phase Noise: -102 dBc/Hz @100 kHz
- No External Resonator Needed
- Single Supply: 3V @ 27 mA
- 16mm<sup>2</sup> Leadless SMT Package

### Functional Diagram



### General Description

The HMC431LP4 & HMC431LP4E are GaAs InGaP Heterojunction Bipolar Transistor (HBT) MMIC VCOs with integrated resonators, negative resistance devices, varactor diodes, and buffer amplifiers. The VCO's phase noise performance is excellent over temperature, shock, vibration and process due to the oscillator's monolithic structure. Power output is 2 dBm typical from a 3V supply voltage. The voltage controlled oscillator is packaged in a low cost leadless QFN 4 x 4 mm surface mount package.

### Electrical Specifications, $T_A = +25^\circ\text{C}$ , $V_{CC} = +3V$

| Parameter  | Min.      | Typ. | Max. | Units                 |
|--|-----------|------|------|-----------------------|
| Frequency Range  | 5.5 - 6.1 |      |      | GHz                   |
| Power Output   | -1        | 2    |      | dBm                   |
| SSB Phase Noise @ 100 kHz Offset, $V_{tune} = +5V$ @ RF Output |           | -102 |      | dBc/Hz                |
| Tune Voltage ( $V_{tune}$ )                                    | 0         |      | 10   | V                     |
| Supply Current ( $I_{CC}$ ) ( $V_{CC} = 3.0V$ )                |           | 27   |      | mA                    |
| Tune Port Leakage Current                                      |           |      | 10   | $\mu\text{A}$         |
| Output Return Loss   |           | 6    |      | dB                    |
| Harmonics  |           |      |      |                       |
| 2nd  |           | -15  |      | dBc                   |
| 3rd  |           | -30  |      | dBc                   |
| Pulling (into a 2.0:1 VSWR)                                    |           | 9    |      | MHz pp                |
| Pushing @ $V_{tune} = +5V$                                     |           | 12   |      | MHz/V                 |
| Frequency Drift Rate   |           | 0.8  |      | MHz/ $^\circ\text{C}$ |

Information furnished by Analog Devices is believed to be accurate and reliable. However, no responsibility is assumed by Analog Devices for its use, nor for any infringements of patents or other rights of third parties that may result from its use. Specifications subject to change without notice. No license is granted by implication or otherwise under any patent or patent rights of Analog Devices. Trademarks and registered trademarks are the property of their respective owners.

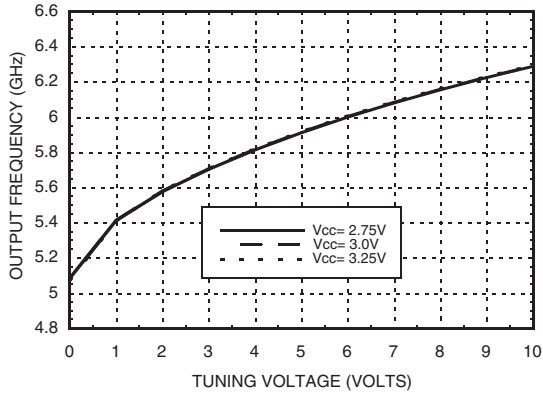
For price, delivery, and to place orders: Analog Devices, Inc., One Technology Way, P.O. Box 9106, Norwood, MA 02062-9106 Phone: 781-329-4700 • Order online at [www.analog.com](http://www.analog.com) Application Support: Phone: 1-800-ANALOG-D



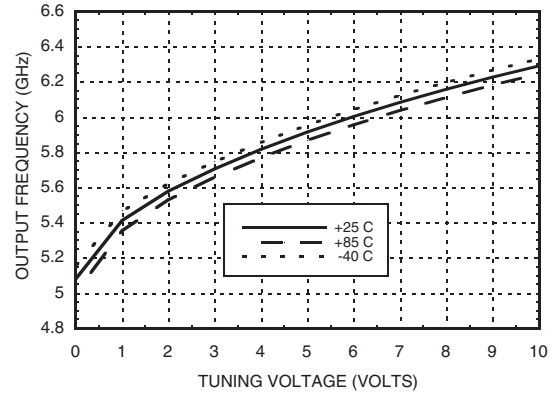
# HMC431LP4 / 431LP4E

## MMIC VCO w/ BUFFER AMPLIFIER, 5.5 - 6.1 GHz

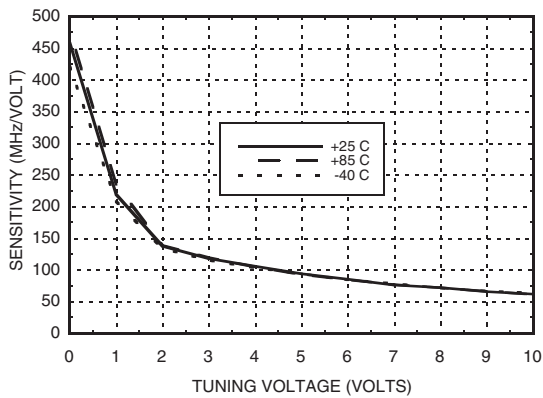
**Frequency vs. Tuning Voltage,  $T = 25^\circ\text{C}$**



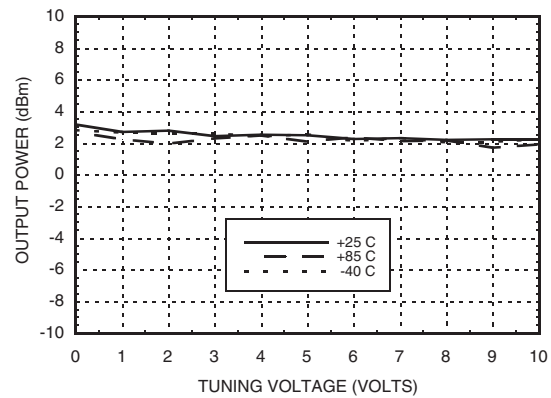
**Frequency vs. Tuning Voltage,  $V_{cc} = +3V$**



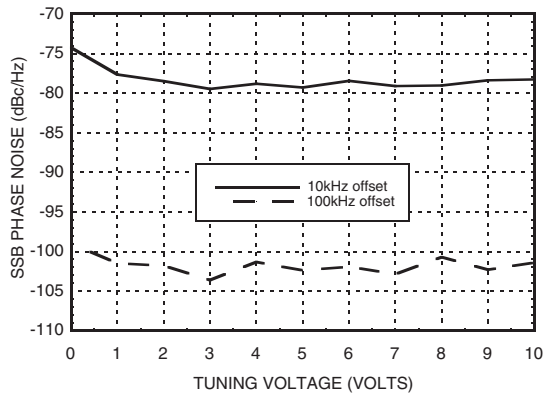
**Sensitivity vs. Tuning Voltage,  $V_{cc} = +3V$**



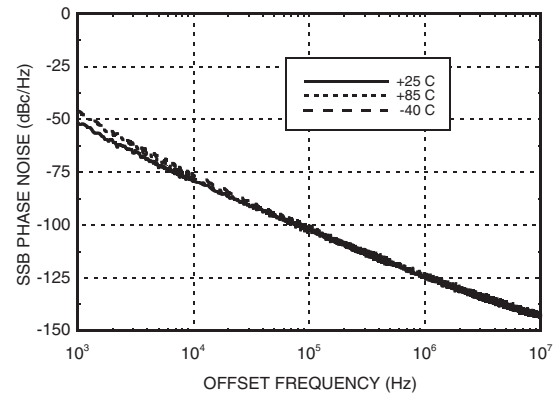
**Output Power vs. Tuning Voltage,  $V_{cc} = +3V$**



**Phase Noise vs. Tuning Voltage**



**Typical SSB Phase Noise @  $V_{tune} = +5V$**




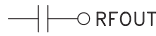
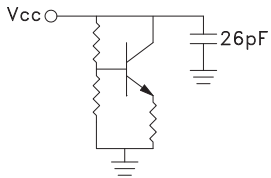
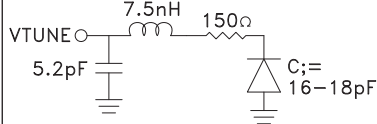

Information furnished by Analog Devices is believed to be accurate and reliable. However, no responsibility is assumed by Analog Devices for its use, nor for any infringements of patents or other rights of third parties that may result from its use. Specifications subject to change without notice. No license is granted by implication or otherwise under any patent or patent rights of Analog Devices. Trademarks and registered trademarks are the property of their respective owners.

For price, delivery, and to place orders: Analog Devices, Inc., One Technology Way, P.O. Box 9106, Norwood, MA 02062-9106 Phone: 781-329-4700 • Order online at [www.analog.com](http://www.analog.com) Application Support: Phone: 1-800-ANALOG-D





### Pin Descriptions

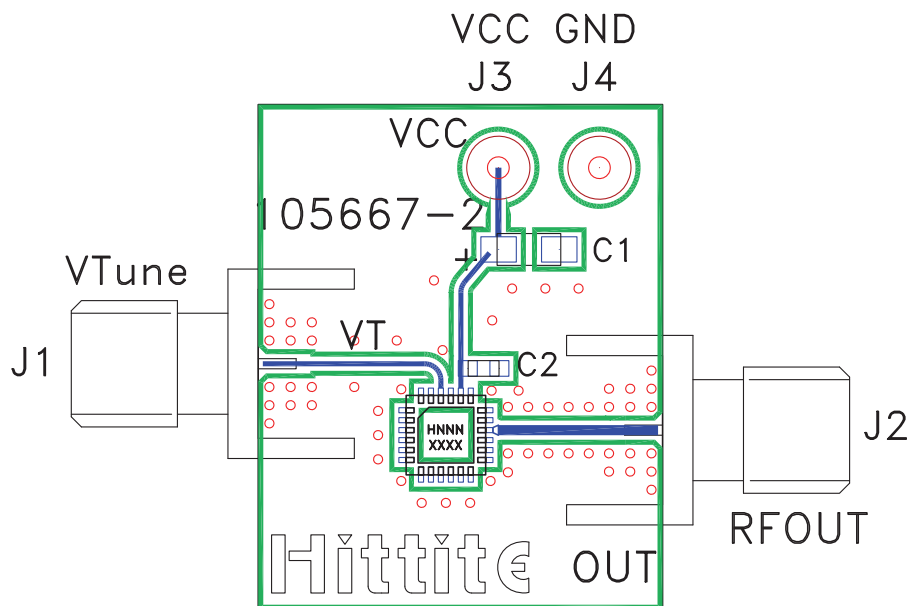
| Pin Number                  | Function | Description   | Interface Schematic   |
|-----------------------------|----------|---|---|
| 1 - 14, 17 - 19, 21, 23, 24 | N/C      | No Connection   |   |
| 15                          | GND      | This pin must be connected to RF & DC ground.   |    |
| 16                          | RFOUT    | RF output (AC coupled)  |    |
| 20                          | Vcc      | Supply Voltage Vcc= 3V  |    |
| 22                          | VTUNE    | Control Voltage Input. Modulation port bandwidth dependent on drive source impedance. |   |
|                             | GND      | Package bottom has an exposed metal paddle that must be RF & DC grounded.             |  |

Information furnished by Analog Devices is believed to be accurate and reliable. However, no responsibility is assumed by Analog Devices for its use, nor for any infringements of patents or other rights of third parties that may result from its use. Specifications subject to change without notice. No license is granted by implication or otherwise under any patent or patent rights of Analog Devices. Trademarks and registered trademarks are the property of their respective owners.

For price, delivery, and to place orders: Analog Devices, Inc., One Technology Way, P.O. Box 9106, Norwood, MA 02062-9106 Phone: 781-329-4700 • Order online at [www.analog.com](http://www.analog.com) Application Support: Phone: 1-800-ANALOG-D



**Evaluation PCB**



**List of Materials for Evaluation PCB 105706 [1]**

| Item    | Description                    |
|---------|--------------------------------|
| J1 - J2 | PCB Mount SMA RF Connector     |
| J3 - J4 | DC Pin                         |
| C1      | 4.7 $\mu$ F Tantalum Capacitor |
| C2      | 10,000 pF Capacitor, 0603 Pkg. |
| U1      | HMC431LP4 / HMC431LP4E VCO     |
| PCB [2] | 105667 Eval Board              |

[1] Reference this number when ordering complete evaluation PCB

[2] Circuit Board Material: Rogers 4350

The circuit board used in the final application should use RF circuit design techniques. Signal lines should have 50 ohm impedance while the package ground leads and exposed paddle should be connected directly to the ground plane similar to that shown. A sufficient number of via holes should be used to connect the top and bottom ground planes. The evaluation circuit board shown is available from Hittite upon request.



**Notes:**

## HMC431LP4 / 431LP4E

v04.1106

**MMIC VCO w/ BUFFER  
AMPLIFIER, 5.5 - 6.1 GHz**

Компания «Океан Электроники» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Поставка оригинальных импортных электронных компонентов напрямую с производств Америки, Европы и Азии, а так же с крупнейших складов мира;
- Широкая линейка поставок активных и пассивных импортных электронных компонентов (более 30 млн. наименований);
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Помощь Конструкторского Отдела и консультации квалифицированных инженеров;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Поставка электронных компонентов под контролем ВП;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- При необходимости вся продукция военного и аэрокосмического назначения проходит испытания и сертификацию в лаборатории (по согласованию с заказчиком);
- Поставка специализированных компонентов военного и аэрокосмического уровня качества (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Actel, Aeroflex, Peregrine, VPT, Syfer, Eurofarad, Texas Instruments, MS Kennedy, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Компания «Океан Электроники» является официальным дистрибьютором и эксклюзивным представителем в России одного из крупнейших производителей разъемов военного и аэрокосмического назначения «JONHON», а так же официальным дистрибьютором и эксклюзивным представителем в России производителя высокотехнологичных и надежных решений для передачи СВЧ сигналов «FORSTAR».



## JONHON

«JONHON» (основан в 1970 г.)

Разъемы специального, военного и аэрокосмического назначения:

(Применяются в военной, авиационной, аэрокосмической, морской, железнодорожной, горно- и нефтедобывающей отраслях промышленности)

«FORSTAR» (основан в 1998 г.)

ВЧ соединители, коаксиальные кабели, кабельные сборки и микроволновые компоненты:

(Применяются в телекоммуникациях гражданского и специального назначения, в средствах связи, РЛС, а так же военной, авиационной и аэрокосмической отраслях промышленности).



Телефон: 8 (812) 309-75-97 (многоканальный)

Факс: 8 (812) 320-03-32

Электронная почта: [ocean@oceanchips.ru](mailto:ocean@oceanchips.ru)

Web: <http://oceanchips.ru/>

Адрес: 198099, г. Санкт-Петербург, ул. Калинина, д. 2, корп. 4, лит. А