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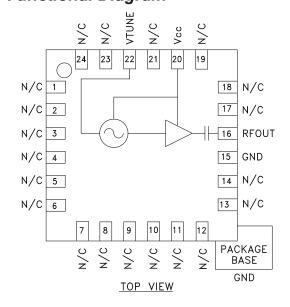


### **Typical Applications**

Low noise MMIC VCO w/Buffer Amplifier for:

- VSAT Radio
- Point to Point/Multipoint Radio
- Test Equipment & Industrial Controls
- Military End-Use

### Functional Diagram



# HMC506LP4 / 506LP4E

### MMIC VCO w/ BUFFER AMPLIFIER, 7.8 - 8.7 GHz

#### Features

Pout: +14 dBm Phase Noise: -103 dBc/Hz @100 KHz No External Resonator Needed Single Supply: +3V @ 77 mA QFN Leadless SMT Package, 16 mm<sup>2</sup>

#### **General Description**

The HMC506LP4 & HMC506LP4E are GaAs InGaP Heterojunction Bipolar Transistor (HBT) MMIC VCOs with integrated resonators, negative resistance devices, varactor diodes, and buffer amplifiers. Covering 7.8 to 8.7 GHz, the VCO's phase noise performance is excellent over temperature, shock and vibration due to the oscillator's monolithic structure. Power output is +14 dBm typical from a single supply of +3.0V @ 77 mA. The voltage controlled oscillator is packaged in a leadless QFN 4 x 4 mm surface mount package.

#### Electrical Specifications, $T_{A} = +25^{\circ}$ C, Vcc = +3V

Parameter	Min.	Тур.	Max.	Units
Frequency Range		7.8 - 8.7		
Power Output	11.0	14.0		dBm
SSB Phase Noise @ 100 kHz Offset, Vtune= +5V @ RF Output		-103		dBc/Hz
Tune Voltage (Vtune)	1		11	V
Supply Current (Icc) (Vcc = +3.0V)		77		mA
Tune Port Leakage Current			10	μΑ
Output Return Loss		7		dB
Harmonics 2nd 3rd		-16 -28		dBc dBc
Pulling (into a 2.0:1 VSWR)		28		MHz pp
Pushing @ Vtune= +5V		78		MHz/V
Frequency Drift Rate		0.85		MHz/°C

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VCOs & PLOs - SMT

# HMC506\* PRODUCT PAGE QUICK LINKS

Last Content Update: 02/23/2017

### COMPARABLE PARTS

View a parametric search of comparable parts.

#### EVALUATION KITS

• HMC506LP4 Evaluation Board

#### **DOCUMENTATION**

#### **Application Notes**

 Determining the FM Bandwidth of a Wideband Varactor Tuned VCO

#### **Data Sheet**

HMC506 Data Sheet

#### REFERENCE MATERIALS

#### **Quality Documentation**

- Package/Assembly Qualification Test Report: LP4, LP4B, LP4C, LP4K (QTR: 2013-00487 REV: 04)
- Package/Assembly Qualification Test Report: Plastic Encapsulated QFN (QTR: 05006 REV: 02)
- Semiconductor Qualification Test Report: GaAs HBT-A (QTR: 2013-00228)

### DESIGN RESOURCES

- HMC506 Material Declaration
- PCN-PDN Information
- Quality And Reliability
- Symbols and Footprints

### DISCUSSIONS

View all HMC506 EngineerZone Discussions.

#### SAMPLE AND BUY

Visit the product page to see pricing options.

### TECHNICAL SUPPORT

Submit a technical question or find your regional support number.

### DOCUMENT FEEDBACK

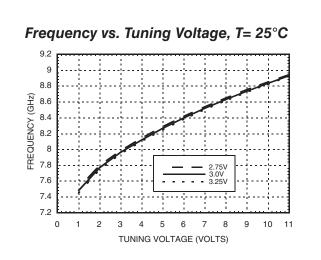
Submit feedback for this data sheet.



RoHS√

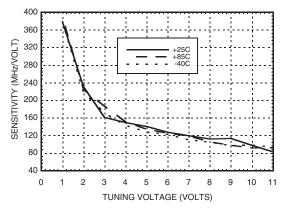
## HMC506LP4 / 506LP4E

### MMIC VCO w/ BUFFER AMPLIFIER, 7.8 - 8.7 GHz

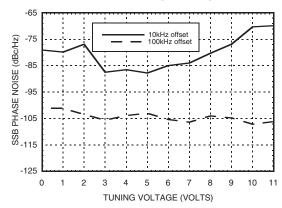


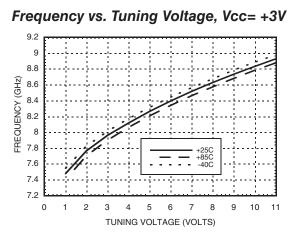
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Sensitivity vs. Tuning Voltage, Vcc= +3V

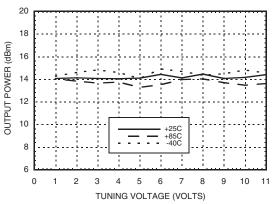


Phase Noise vs. Tuning Voltage

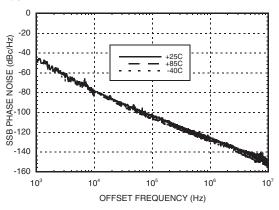




#### Output Power vs. Tuning Voltage, Vcc= +3V



#### Typical SSB Phase Noise @ Vtune= +5V



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#### Absolute Maximum Ratings

Vcc	+3.5 Vdc
Vtune	0 to +11V
Channel Temperature	135 °C
Continuous Pdiss (T = 85°C) (derate 6.07 mW/°C above 85°C)	303 mW
Thermal Resistance (junction to ground paddle)	165 °C/W
Storage Temperature	-65 to +150 °C
Operating Temperature	-40 to +85 °C

## HMC506LP4 / 506LP4E

### **MMIC VCO w/ BUFFER** AMPLIFIER, 7.8 - 8.7 GHz

#### Typical Supply Current vs. Vcc

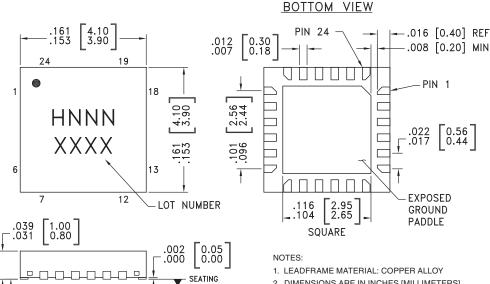
Vcc (V)	Icc (mA)	
2.75	66	
3.0	77	
3.25	88	

Note: VCO will operate over full voltage range shown above.



ELECTROSTATIC SENSITIVE DEVICE **OBSERVE HANDLING PRECAUTIONS** 

## **Outline Drawing**



PLANE

-C-

- 2. DIMENSIONS ARE IN INCHES [MILLIMETERS]
- 3. LEAD SPACING TOLERANCE IS NON-CUMULATIVE.
- 4. PAD BURR LENGTH SHALL BE 0.15mm MAXIMUM. PAD BURR HEIGHT SHALL BE 0.05mm MAXIMUM.
- 5. PACKAGE WARP SHALL NOT EXCEED 0.05mm. 6. ALL GROUND LEADS AND GROUND PADDLE MUST BE
- SOLDERED TO PCB RF GROUND. 7. REFER TO HITTITE APPLICATION NOT FOR SUGGESTED

LAND PATTERN.

#### Package Information

.003[0.08] C

Part Number	Package Body Material	Lead Finish	MSL Rating	Package Marking [3]
HMC506LP4	Low Stress Injection Molded Plastic	Sn/Pb Solder	MSL1 <sup>[1]</sup>	H506 XXXX
HMC506LP4E	RoHS-compliant Low Stress Injection Molded Plastic	100% matte Sn	MSL1 <sup>[2]</sup>	<u>H506</u> XXXX

[1] Max peak reflow temperature of 235 °C

[2] Max peak reflow temperature of 260 °C

[3] 4-Digit lot number XXXX

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## HMC506LP4 / 506LP4E

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### MMIC VCO w/ BUFFER AMPLIFIER, 7.8 - 8.7 GHz



#### **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.	⊖ GND 
16	RFOUT	RF output (AC coupled)	
20	Vcc	Supply Voltage Vcc= 3V	VccO = 26pF
22	VTUNE	Control Voltage Input. Modulation port bandwidth dependent on drive source impedance.	VTUNE $\bigcirc$
	GND	Package bottom has an exposed metal paddle that must be RF & DC grounded.	

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## HMC506LP4 / 506LP4E

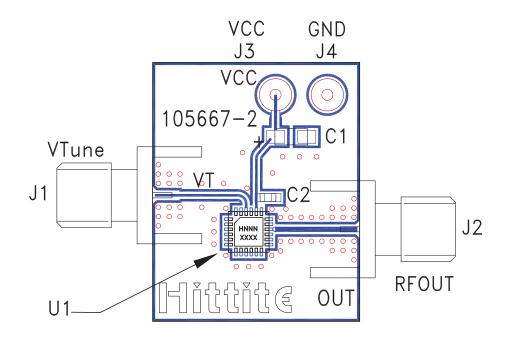
**MMIC VCO w/ BUFFER** 

AMPLIFIER, 7.8 - 8.7 GHz

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## ROHS EARTH FRIENDL

#### **Evaluation PCB**



#### List of Materials for Evaluation PCB 105706<sup>[1]</sup>

Item	Description
J1 - J2	PCB Mount SMA RF Connector
J3 - J4	DC Pin
C1	4.7 µF Tantalum Capacitor
C2	10,000 pF Capacitor, 0603 Pkg.
U1	HMC506LP4 / HMC506LP4E VCO
PCB [2]	105667 Eval Board

Reference this number when ordering complete evaluation PCB
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.

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## ROHS EARTH FRIENDL

Notes:

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