



## MMIC VCO w/ HALF FREQUENCY OUTPUT 6.65 - 7.65 GHz

### Typical Applications

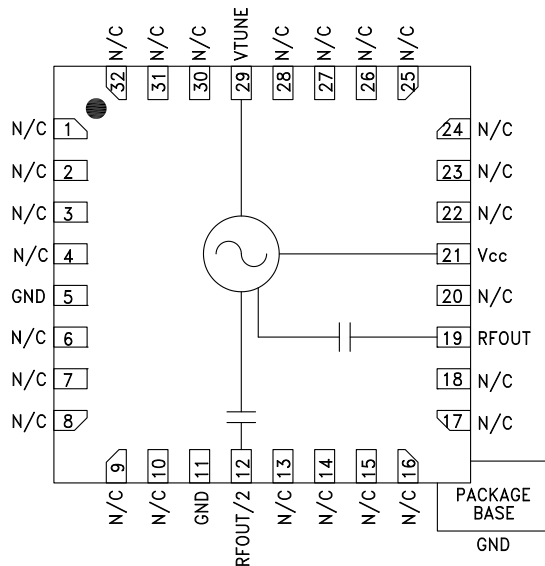
Low noise MMIC VCO w/Half Frequency, for:

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

### Features

- Dual Output:  $F_o = 6.65 - 7.65$  GHz  
 $F_o/2 = 3.325 - 3.825$  GHz
- Pout: +13.5 dBm
- Phase Noise: -115 dBc/Hz @100 kHz Typ.
- No External Resonator Needed
- 32 Lead 5x5mm SMT Package: 25mm<sup>2</sup>

### Functional Diagram



### General Description

The HMC507LP5 & HMC507LP5E are GaAs InGaP Heterojunction Bipolar Transistor (HBT) MMIC VCOs. The HMC507LP5 & HMC507LP5E integrate resonators, negative resistance devices, varactor diodes and feature a half frequency output. The VCO's phase noise performance is excellent over temperature, shock, and process due to the oscillator's monolithic structure. Power output is +13.5 dBm typical from a +5V supply. The voltage controlled oscillator is packaged in a leadless QFN 5x5 mm surface mount package, and requires no external matching components.

### Electrical Specifications, $T_A = +25^\circ C$ , $V_{cc} = +5V$

Parameter	Min.	Typ.	Max.	Units
Frequency Range	$F_o$	6.65 - 7.65		GHz
	$F_o/2$	3.325 - 3.825		GHz
Power Output	RFOUT	+11	+16	dBm
	RFOUT/2	+4	+10	dBm
SSB Phase Noise @ 100 kHz Offset, $V_{tune} = +5V$ @ RFOUT		-115		dBc/Hz
Tune Voltage	$V_{tune}$	2	13	V
Supply Current ( $I_{cc}$ ) ( $V_{cc} = +5.0V$ )		200	270	mA
Tune Port Leakage Current ( $V_{tune} = 13V$ )			10	$\mu A$
Output Return Loss		2		dB
Harmonics/Subharmonics	1/2	35		dBc
	2nd	4		dBc
	3rd	24		dBc
Pulling (into a 2.0:1 VSWR)		8		MHz pp
Pushing @ $V_{tune} = 5V$		15		MHz/V
Frequency Drift Rate		0.9		MHz/ $^\circ C$

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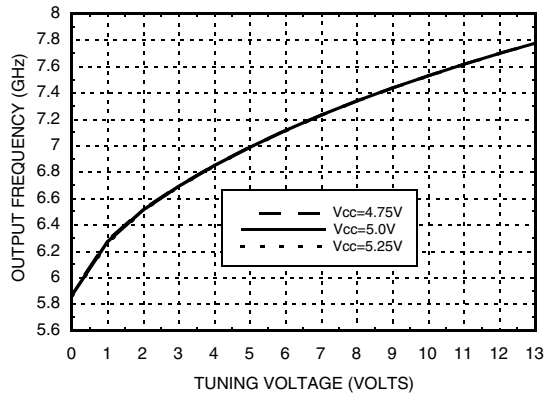
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Application Support: Phone: 1-800-ANALOG-D



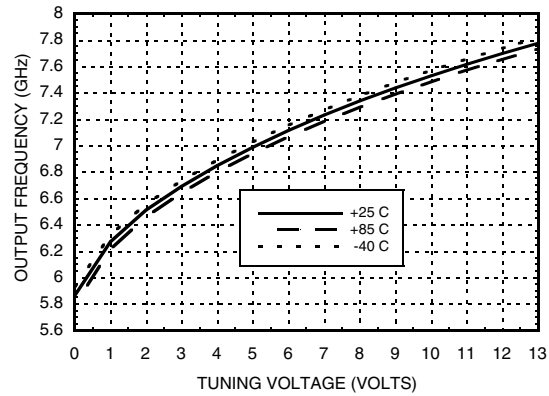
# HMC507LP5 / 507LP5E

## MMIC VCO w/ HALF FREQUENCY OUTPUT 6.65 - 7.65 GHz

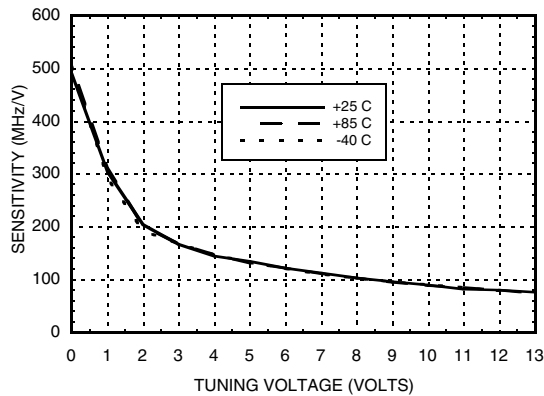
**Frequency vs. Tuning Voltage,  $T = 25^{\circ}\text{C}$**



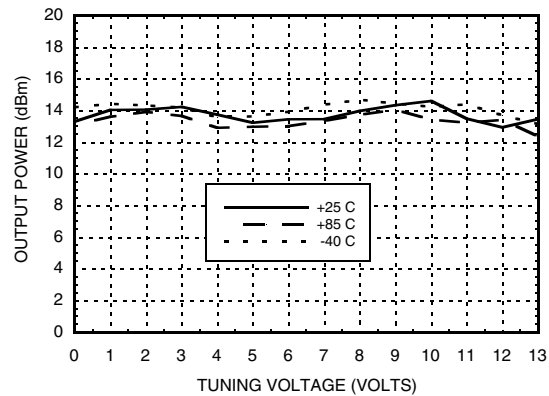
**Frequency vs. Tuning Voltage,  $V_{cc} = +5V$**



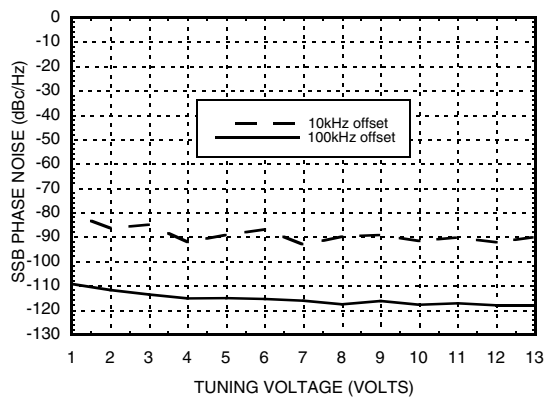
**Sensitivity vs. Tuning Voltage,  $V_{cc} = +5V$**



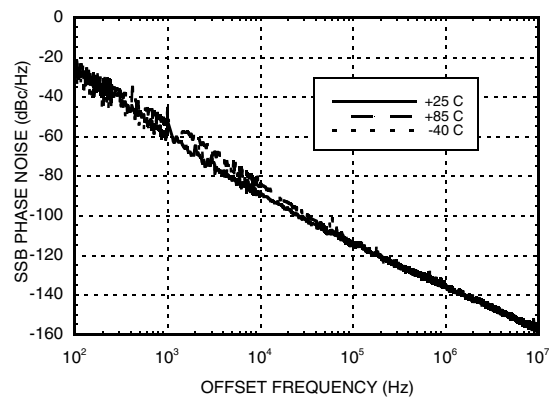
**Output Power vs. Tuning Voltage,  $V_{cc} = +5V$**



**SSB Phase Noise vs. Tuning Voltage**



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



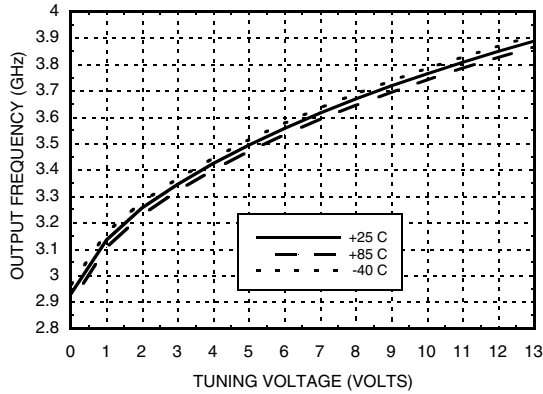
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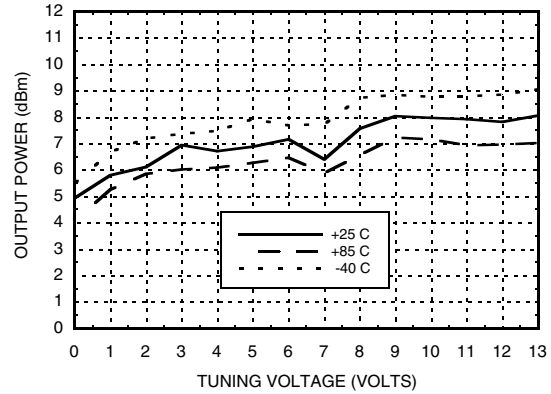


## MMIC VCO w/ HALF FREQUENCY OUTPUT 6.65 - 7.65 GHz

**RFOUT/2 Frequency  
vs. Tuning Voltage, Vcc= +5V**



**RFOUT/2 Output Power  
vs. Tuning Voltage, Vcc= +5V**



### Absolute Maximum Ratings

Vcc	+5.5 Vdc
Vtune	0 to +15V
Junction Temperature	135 °C
Continuous Pdiss (T=85 °C) (derate 26.7 mW/C above 85 °C)	1.35 W
Thermal Resistance (junction to ground paddle)	37 °C/W
Storage Temperature	-65 to +150 °C
Operating Temperature	-40 to +85 °C
ESD Sensitivity (HBM)	Class 1A

### Typical Supply Current vs. Vcc

Vcc (V)	Icc (mA)
4.75	210
5.0	225
5.25	242

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

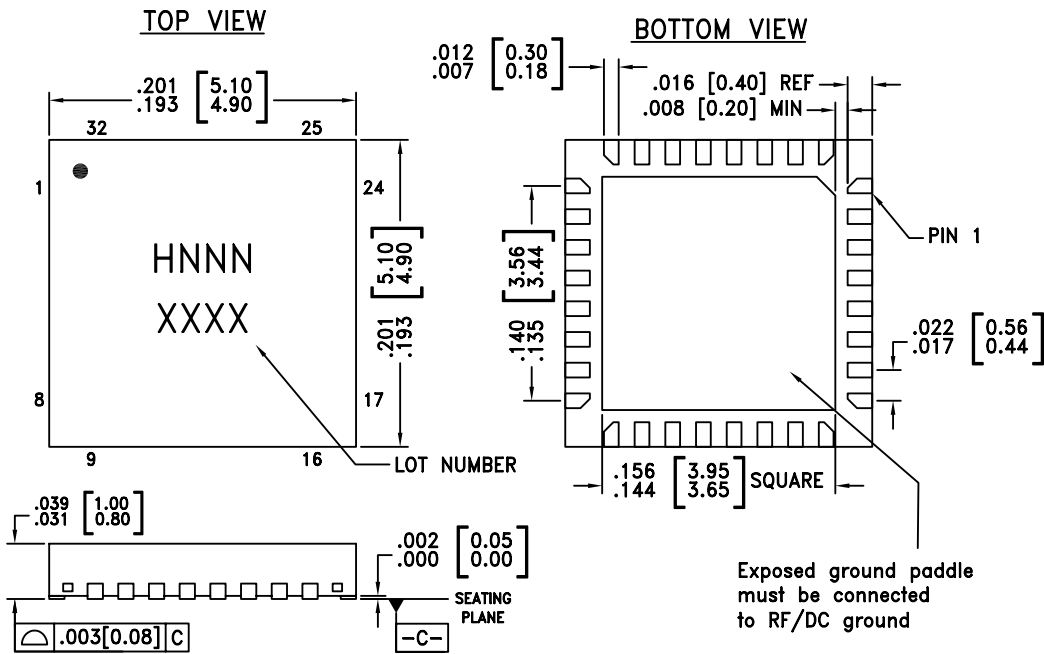


**ELECTROSTATIC SENSITIVE DEVICE  
OBSERVE HANDLING PRECAUTIONS**



## MMIC VCO w/ HALF FREQUENCY OUTPUT 6.65 - 7.65 GHz

### Outline Drawing



- NOTES:
1. LEADFRAME MATERIAL: COPPER ALLOY
  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 NOTE FOR SUGGESTED LAND PATTERN.

### Package Information

Part Number	Package Body Material	Lead Finish	MSL Rating	Package Marking <sup>[3]</sup>
HMC507LP5	Low Stress Injection Molded Plastic	Sn/Pb Solder	MSL3 <sup>[1]</sup>	H507 XXXX
HMC507LP5E	RoHS-compliant Low Stress Injection Molded Plastic	100% matte Sn	MSL3 <sup>[2]</sup>	H507 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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### Pin Descriptions

Pin Number	Function	Description	Interface Schematic
1 - 4, 6 - 10, 13 - 18, 20, 22 - 28, 30 - 32	N/C	No Connection. These pins may be connected to RF/DC ground. Performance will not be affected.	
12	RFOUT/2	Half frequency output (AC coupled).	
19	RFOUT	RF output (AC coupled).	
21	Vcc	Supply Voltage, +5V	
29	VTUNE	Control Voltage Input. Modulation port bandwidth dependent on drive source impedance.	
5, 11, Paddle	GND	Package bottom has an exposed metal paddle that must be connected to RF/DC ground.	