



MMIC VCO w/ BUFFER AMPLIFIER, 3.9 - 4.45 GHz

Typical Applications

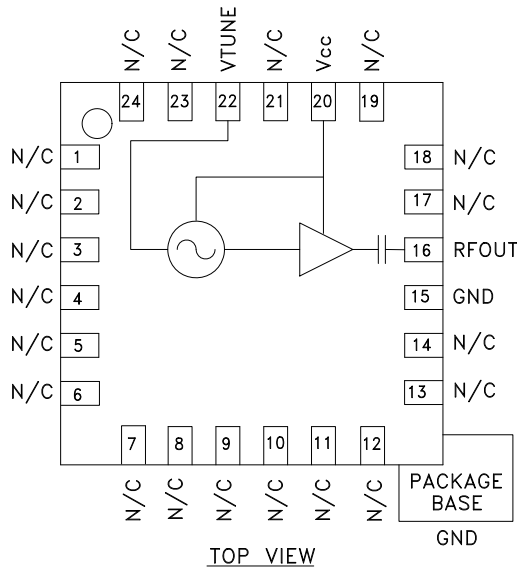
Low noise MMIC VCO w/Buffer Amplifier for:

- VSAT & Microwave Radio
- Radio Altimetry
- Test Equipment & Industrial Controls
- Military

Features

- Pout: +5.0 dBm
- Phase Noise: -106 dBc/Hz @100 KHz
- No External Resonator Needed
- Single Supply: +3V @ 30 mA
- 24 Lead 4x4mm QFN Package: 9 mm²

Functional Diagram



General Description

The HMC391LP4 & HMC391LP4E are GaAs InGaP Heterojunction Bipolar Transistor (HBT) MMIC VCOs with integrated resonators, negative resistance devices, varactor diodes, and buffer amplifiers. Covering 3.9 to 4.45 GHz, the VCO's phase noise performance is excellent over temperature, shock, vibration and process due to the oscillator's monolithic structure. Power output is 5.0 dBm typical from a single supply of +3V @ 30 mA. The voltage controlled oscillator is packaged in a low cost leadless QFN 4 x 4 mm surface mount package.

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

Parameter	Min.	Typ.	Max.	Units
Frequency Range	3.9 - 4.45			GHz
Power Output	1.5	5.0		dBm
SSB Phase Noise @ 100 kHz Offset, $V_{tune} = +5\text{V}$ @ RF Output		-106		dBc/Hz
Tune Voltage (V_{tune})	0		10	V
Supply Current (I_{cc}) ($V_{cc} = +3\text{V}$)		30	40	mA
Tune Port Leakage Current			10	μA
Output Return Loss		7		dB
Harmonics				
2nd		-9		dBc
3rd		-23		dBc
Pulling (into a 2.0:1 VSWR)		8.0		MHz pp
Pushing @ $V_{tune} = +5\text{V}$		16		MHz/V
Frequency Drift Rate		0.5		MHz/ $^\circ\text{C}$

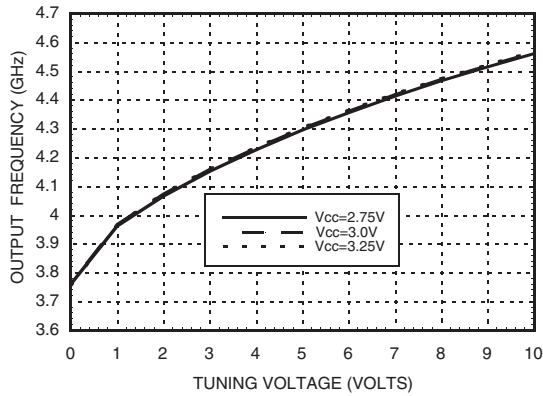
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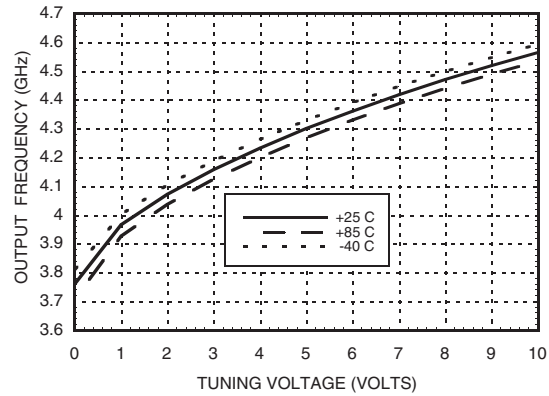


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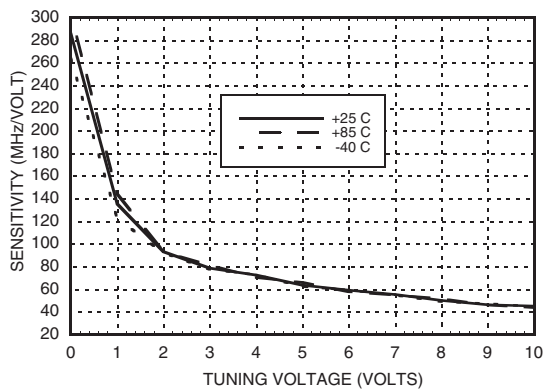
Frequency vs. Tuning Voltage, T= 25°C



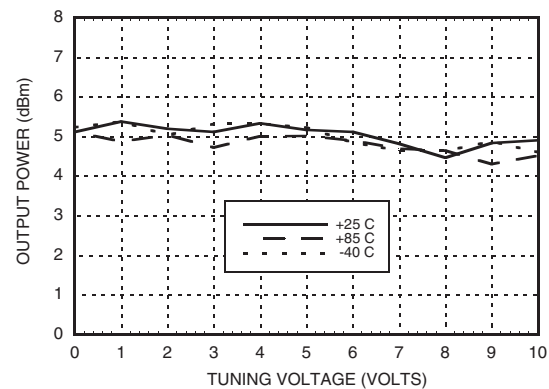
Frequency vs. Tuning Voltage, Vcc= +3V



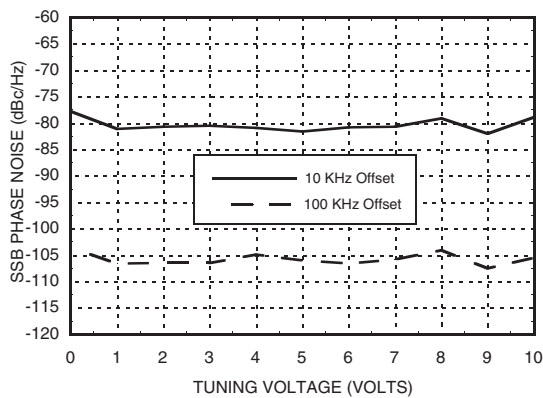
Sensitivity vs. Tuning Voltage, Vcc= +3V



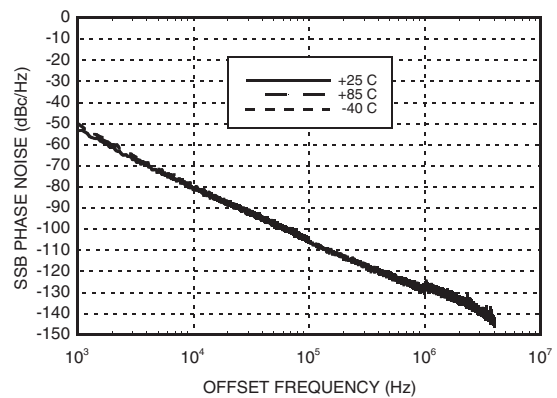
**Output Power vs.
Tuning Voltage, Vcc= +3V**



Phase Noise vs. Tuning Voltage



Typical SSB Phase Noise @ Vtune= +5V



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VCOS - SMT

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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 3 mW/°C above 85°C)	150 mW
Thermal Resistance (junction to ground paddle)	333 °C/W
Storage Temperature	-65 to +150 °C
Operating Temperature	-40 to +85 °C

Typical Supply Current vs. Vcc

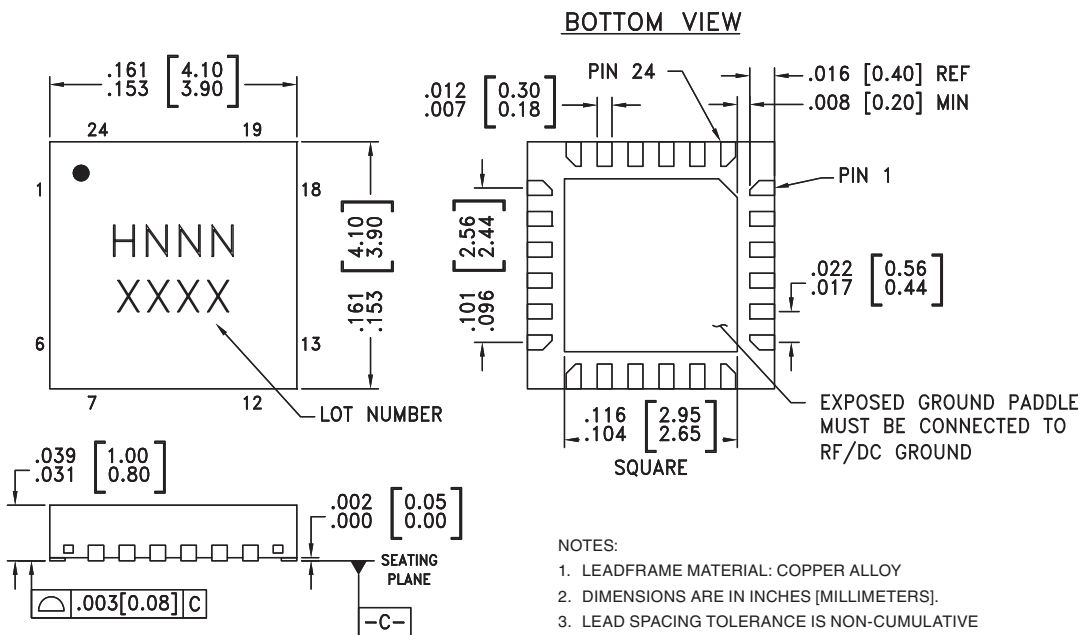
Vcc (V)	Icc (mA)
2.75	22
3.0	30
3.25	39

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



**ELECTROSTATIC SENSITIVE DEVICE
OBSERVE HANDLING PRECAUTIONS**

Outline Drawing



Package Information

Part Number	Package Body Material	Lead Finish	MSL Rating	Package Marking ^[3]
HMC391LP4	Low Stress Injection Molded Plastic	Sn/Pb Solder	MSL1 ^[1]	H391 XXXX
HMC391LP4E	RoHS-compliant Low Stress Injection Molded Plastic	100% matte Sn	MSL1 ^[2]	H391 XXXX

[1] Max peak reflow temperature of 235 °C

[2] Max peak reflow temperature of 260 °C

[3] 4-Digit lot number XXXX