



MMIC VCO w/ BUFFER AMPLIFIER, 3.55 - 3.9 GHz

Typical Applications

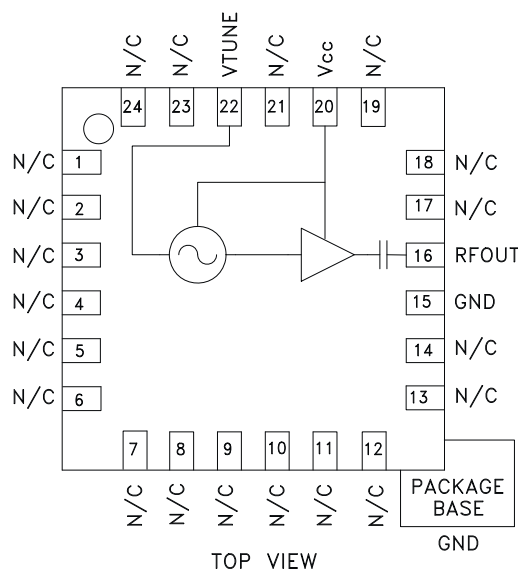
Low noise MMIC VCO w/Buffer Amplifier for:

- Wireless Local Loop (WLL)
- VSAT & Microwave Radio
- Test Equipment & Industrial Controls
- Military

Features

Pout: +4.7 dBm
Phase Noise: -112 dBc/Hz @100 KHz
No External Resonator Needed
Single Supply: 3V @ 42 mA
QFN Leadless SMT Package, 16 mm²

Functional Diagram



General Description

The HMC390LP4 & HMC390LP4E are GaAs InGaP Heterojunction Bipolar Transistor (HBT) MMIC VCOs with integrated resonators, negative resistance devices, varactor diodes, and buffer amplifiers. Covering 3.55 to 3.9 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 4.7 dBm typical from a single supply of 3V @ 42 mA. The voltage controlled oscillator is packaged in a low cost leadless QFN 4 x 4 mm surface mount package.

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

Parameter	Min.	Typ.	Max.	Units
Frequency Range		3.55 - 3.9		GHz
Power Output	1.5	4.7		dBm
SSB Phase Noise @ 100 kHz Offset, $V_{tune} = +5V$ @ RF Output		-112		dBc/Hz
Tune Voltage (V_{tune})	0		10	V
Supply Current (I_{CC}) ($V_{CC} = +3.0V$)		42		mA
Tune Port Leakage Current			10	μA
Output Return Loss		6		dB
Harmonics				
2nd		5		dBc
3rd		16		dBc
Pulling (into a 2.0:1 VSWR)		3.3		MHz pp
Pushing @ $V_{tune} = +5V$		-5		MHz/V
Frequency Drift Rate		0.4		MHz/ $^\circ C$

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.

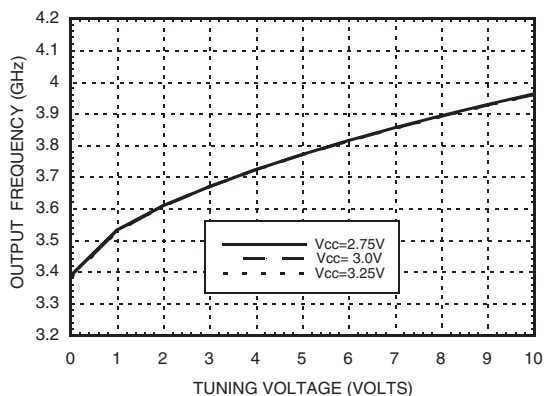
For price, delivery, and to place orders: Analog Devices, Inc., One Technology Way, P.O. Box 9106, Norwood, MA 02062-9106 Phone: 781-329-4700 • Order online at www.analog.com Application Support: Phone: 1-800-ANALOG-D



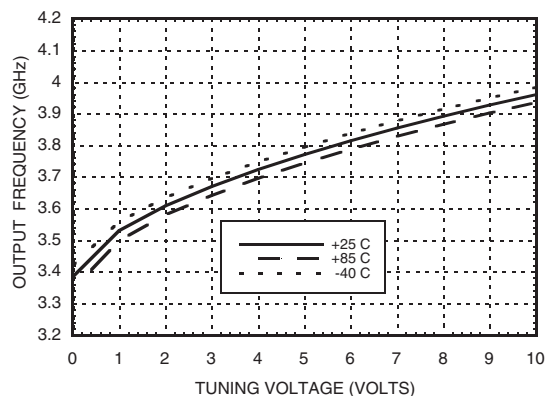
HMC390LP4 / 390LP4E

MMIC VCO w/ BUFFER AMPLIFIER, 3.55 - 3.9 GHz

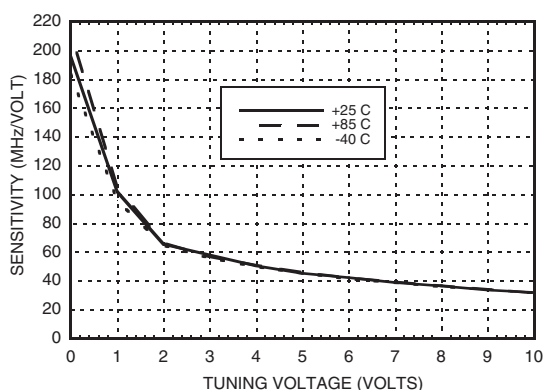
Frequency vs. Tuning Voltage, $T = 25^{\circ}\text{C}$



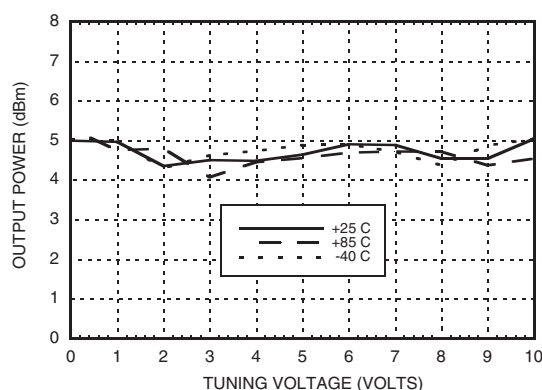
Frequency vs. Tuning Voltage, $V_{cc} = +3V$



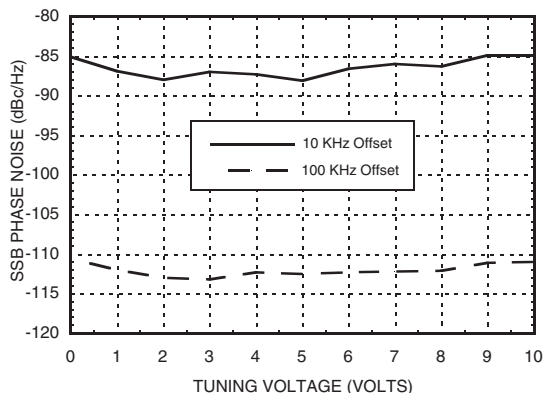
Sensitivity vs. Tuning Voltage, $V_{cc} = +3V$



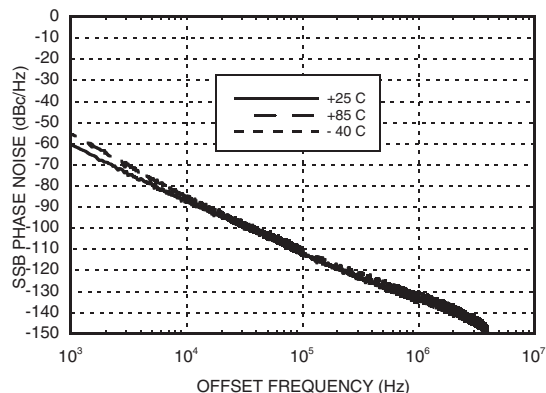
**Output Power vs.
Tuning Voltage, $V_{cc} = +3V$**



Phase Noise vs. Tuning Voltage



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





**MMIC VCO w/ BUFFER
AMPLIFIER, 3.55 - 3.9 GHz**

Absolute Maximum Ratings

Vcc	+3.5 Vdc
Vtune	0 to +11V
Channel Temperature	135 °C
Continuous Pdiss (T = 85°C) (derate 6.28 mW/°C above 85°C)	565 W
Storage Temperature	-65 to +150 °C
Operating Temperature	-40 to +85 °C

Typical Supply Current vs. Vcc

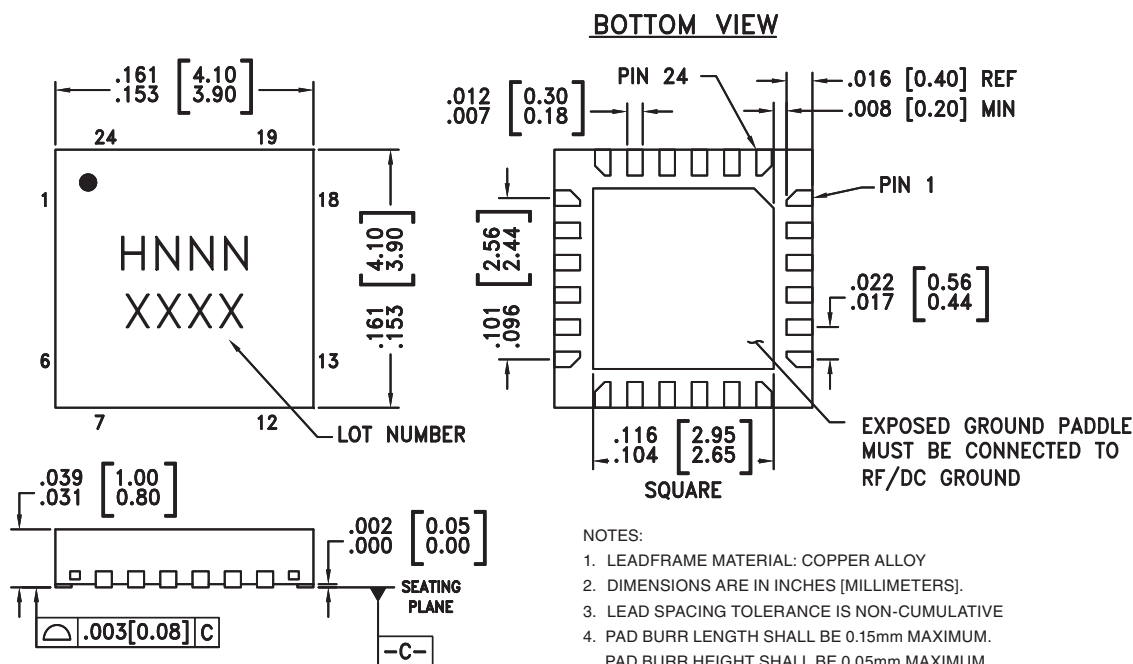
Vcc (V)	Icc (mA)
2.75	35
3.0	42
3.25	47

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]
HMC390LP4	Low Stress Injection Molded Plastic	Sn/Pb Solder	MSL1 ^[1]	H390 XXXX
HMC390LP4E	RoHS-compliant Low Stress Injection Molded Plastic	100% matte Sn	MSL1 ^[2]	<u>H390</u> XXXX

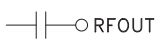
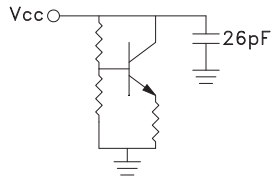
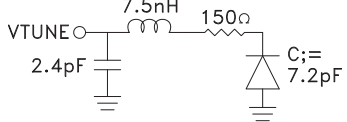
[1] Max peak reflow temperature of 235 °C

[2] Max peak reflow temperature of 260 °C

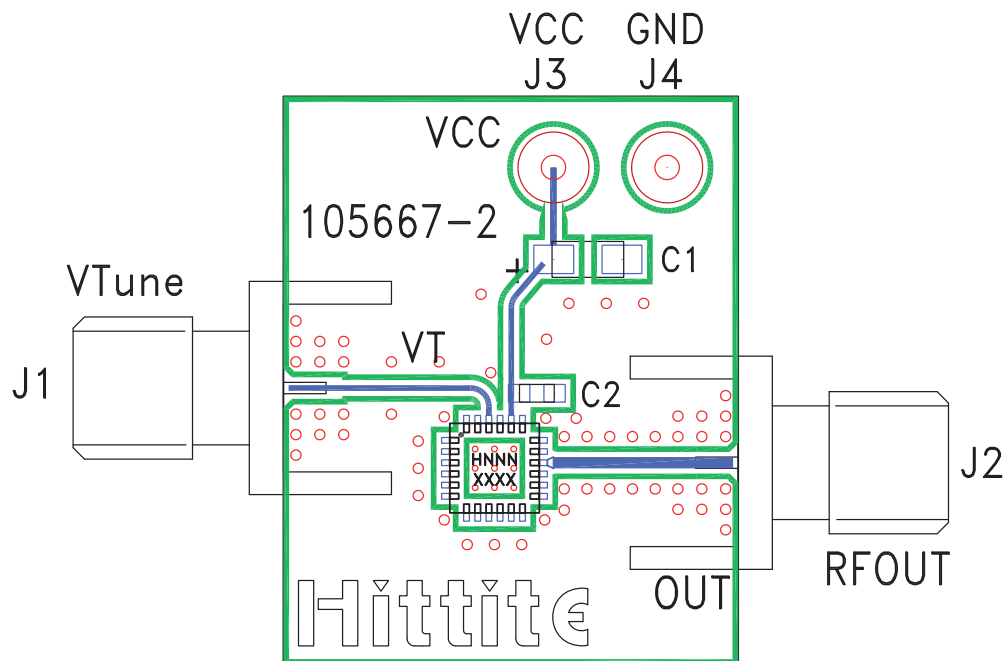
[3] 4-Digit lot number XXXX

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
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.	

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 μ F Tantalum Capacitor
C2	10,000 pF Capacitor, 0603 Pkg.
U1	HMC390LP4 / HMC390LP4E VCO
PCB*	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:

HMC390LP4 / 390LP4E

v02.0505

**MMIC VCO w/ BUFFER
AMPLIFIER, 3.55 - 3.9 GHz**

11

VCOs & PLOs - SMT

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

Данный компонент на территории Российской Федерации

Вы можете приобрести в компании MosChip.

Для оперативного оформления запроса Вам необходимо перейти по данной ссылке:

<http://moschip.ru/get-element>

Вы можете разместить у нас заказ для любого Вашего проекта, будь то серийное производство или разработка единичного прибора.

В нашем ассортименте представлены ведущие мировые производители активных и пассивных электронных компонентов.

Нашей специализацией является поставка электронной компонентной базы двойного назначения, продукции таких производителей как XILINX, Intel (ex.ALTERA), Vicor, Microchip, Texas Instruments, Analog Devices, Mini-Circuits, Amphenol, Glenair.

Сотрудничество с глобальными дистрибьюторами электронных компонентов, предоставляет возможность заказывать и получать с международных складов практически любой перечень компонентов в оптимальные для Вас сроки.

На всех этапах разработки и производства наши партнеры могут получить квалифицированную поддержку опытных инженеров.

Система менеджмента качества компании отвечает требованиям в соответствии с ГОСТ Р ИСО 9001, ГОСТ РВ 0015-002 и ЭС РД 009

Офис по работе с юридическими лицами:

105318, г.Москва, ул.Щербаковская д.3, офис 1107, 1118, ДЦ «Щербаковский»

Телефон: +7 495 668-12-70 (многоканальный)

Факс: +7 495 668-12-70 (доб.304)

E-mail: info@moschip.ru

Skype отдела продаж:

moschip.ru

moschip.ru_4

moschip.ru_6

moschip.ru_9