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HMC529LP5 / 529LP5E

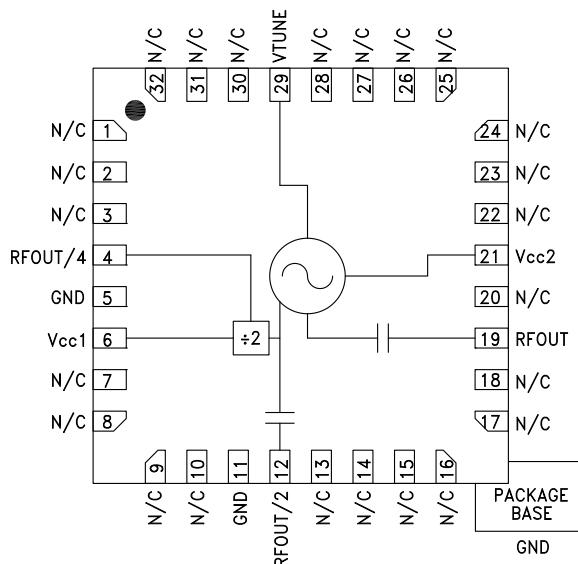
**MMIC VCO w/ HALF FREQUENCY OUTPUT
& DIVIDE-BY-4, 12.4 - 13.4 GHz**

Typical Applications

Low noise MMIC VCO w/Half Frequency, Divide-by-4 Outputs for:

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

Functional Diagram



Electrical Specifications, $T_A = +25^\circ C$, $Vcc1, Vcc2 = +5V$

Parameter	Min.	Typ.	Max.	Units
Frequency Range	Fo $Fo/2$	12.4 - 13.4 6.2 - 6.7		GHz GHz
Power Output	RFOUT RFOUT/2 RFOUT/4	+4 +6 -9	+10 +11 -3	dBm dBm dBm
SSB Phase Noise @ 100 kHz Offset, $Vtune = +5V$ @ RFOUT		-110		dBc/Hz
Tune Voltage	$Vtune$	2	13	V
Supply Current	$Icc1 & Icc2$	220	260	300
Tune Port Leakage Current ($Vtune = 13V$)			10	μA
Output Return Loss		8		dB
Harmonics/Subharmonics	1/2 3/2 2nd 3rd		25 34 18 35	dBc dBc dBc dBc
Pulling (into a 2.0:1 VSWR)		5		MHz pp
Pushing @ $Vtune = 5V$		6		MHz/V
Frequency Drift Rate		1.2		MHz/ $^\circ C$

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HMC529* PRODUCT PAGE QUICK LINKS

Last Content Update: 02/23/2017

COMPARABLE PARTS

View a parametric search of comparable parts.

EVALUATION KITS

- HMC529LP5 Evaluation Board

DOCUMENTATION

Data Sheet

- HMC529 Data Sheet

REFERENCE MATERIALS

Quality Documentation

- Package/Assembly Qualification Test Report: 32L 5x5mm QFN Package (QTR: 10009 REV: 05)
- Package/Assembly Qualification Test Report: LP3, LP4, LP5 & LP5G (QTR: 2014-00145)
- Package/Assembly Qualification Test Report: Plastic Encapsulated QFN (QTR: 05006 REV: 02)
- Semiconductor Qualification Test Report: GaAs HBT-A (QTR: 2013-00228)

Technical Articles

- High Performance SiGe PLLs Pair with Low Phase Noise GaAs VCOs for Microwave Radio

DESIGN RESOURCES

- HMC529 Material Declaration
- PCN-PDN Information
- Quality And Reliability
- Symbols and Footprints

DISCUSSIONS

View all HMC529 EngineerZone Discussions.

SAMPLE AND BUY

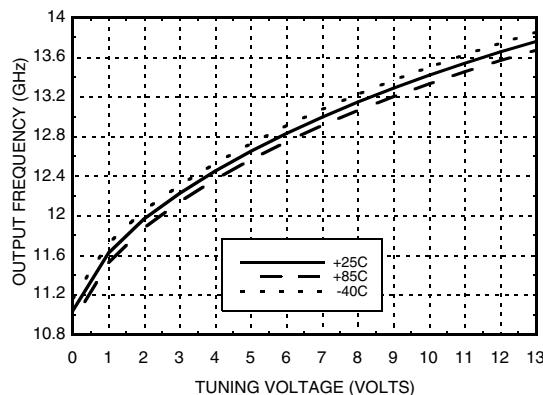
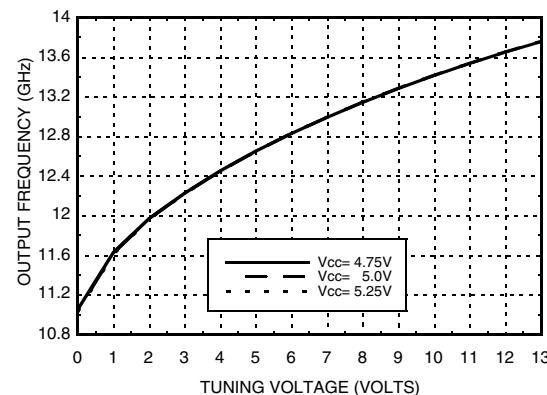
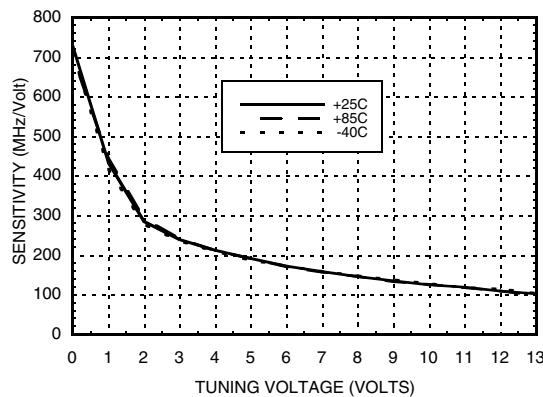
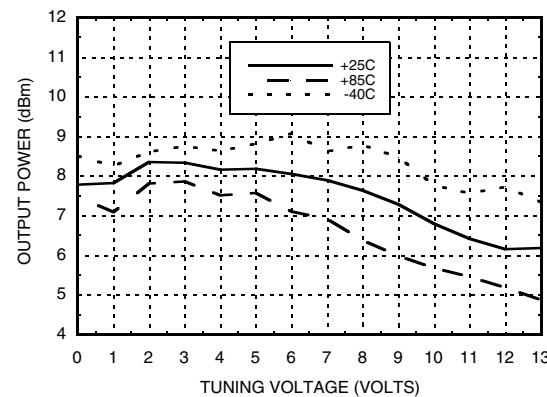
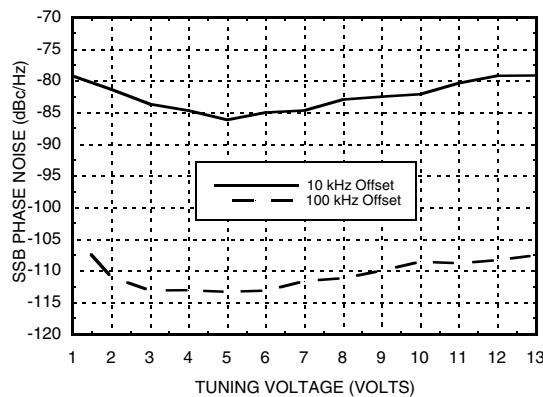
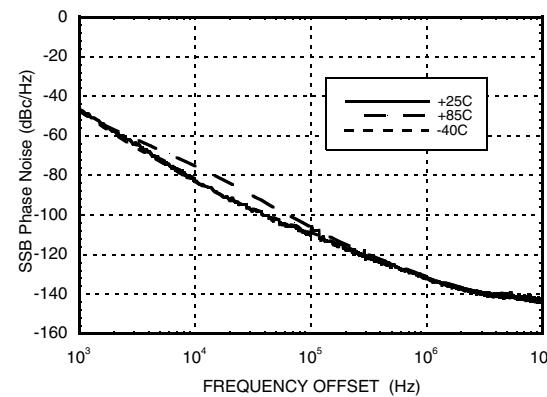
Visit the product page to see pricing options.

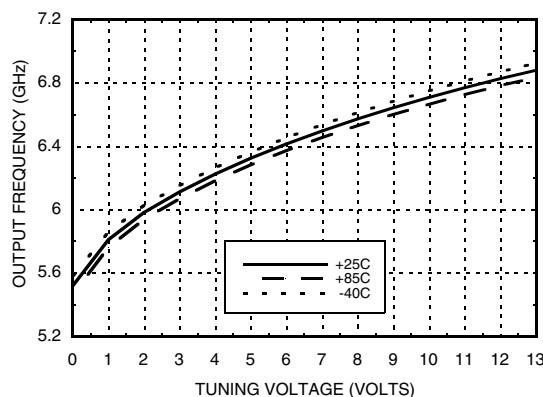
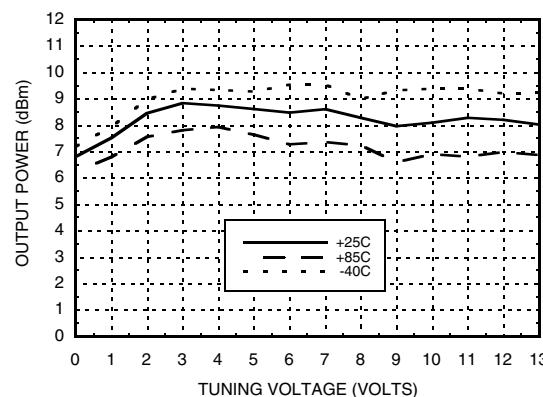
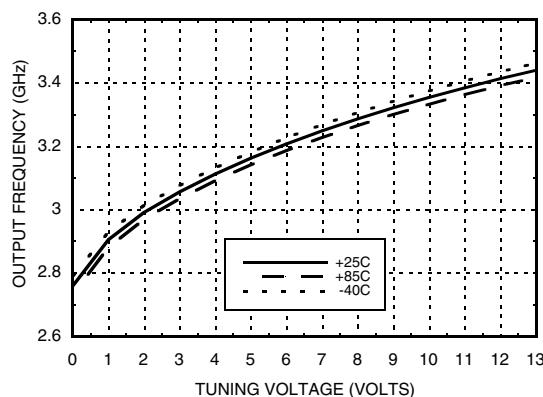
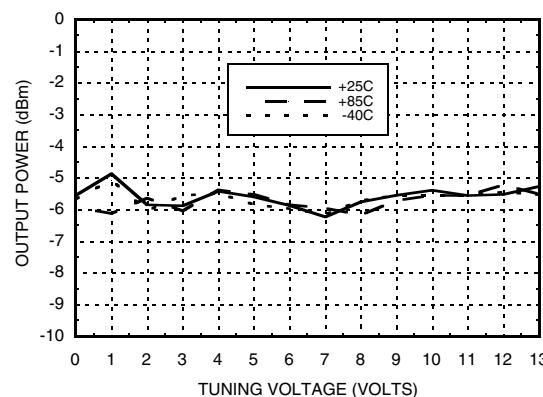
TECHNICAL SUPPORT

Submit a technical question or find your regional support number.

DOCUMENT FEEDBACK

Submit feedback for this data sheet.


**MMIC VCO w/ HALF FREQUENCY OUTPUT
& DIVIDE-BY-4, 12.4 - 13.4 GHz**
Frequency vs. Tuning Voltage, $V_{cc} = +5V$

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

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

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

SSB Phase Noise vs. Tuning Voltage

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



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

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

**Divide-by-4 Frequency
vs. Tuning Voltage, Vcc= +5V**

**Divide-by-4 Output Power
vs. Tuning Voltage, Vcc= +5V**

Absolute Maximum Ratings

Vcc1, Vcc2	+5.5 Vdc
Vtune	0 to +15V
Junction Temperature	135 °C
Continuous Pdiss (T=85 °C) (derate 37 mW/C above 85 °C)	1.85 W
Thermal Resistance (junction to ground paddle)	27 °C/W
Storage Temperature	-65 to +150 °C
Operating Temperature	-40 to +85 °C
ESD Sensitivity (HBM)	Class 1A

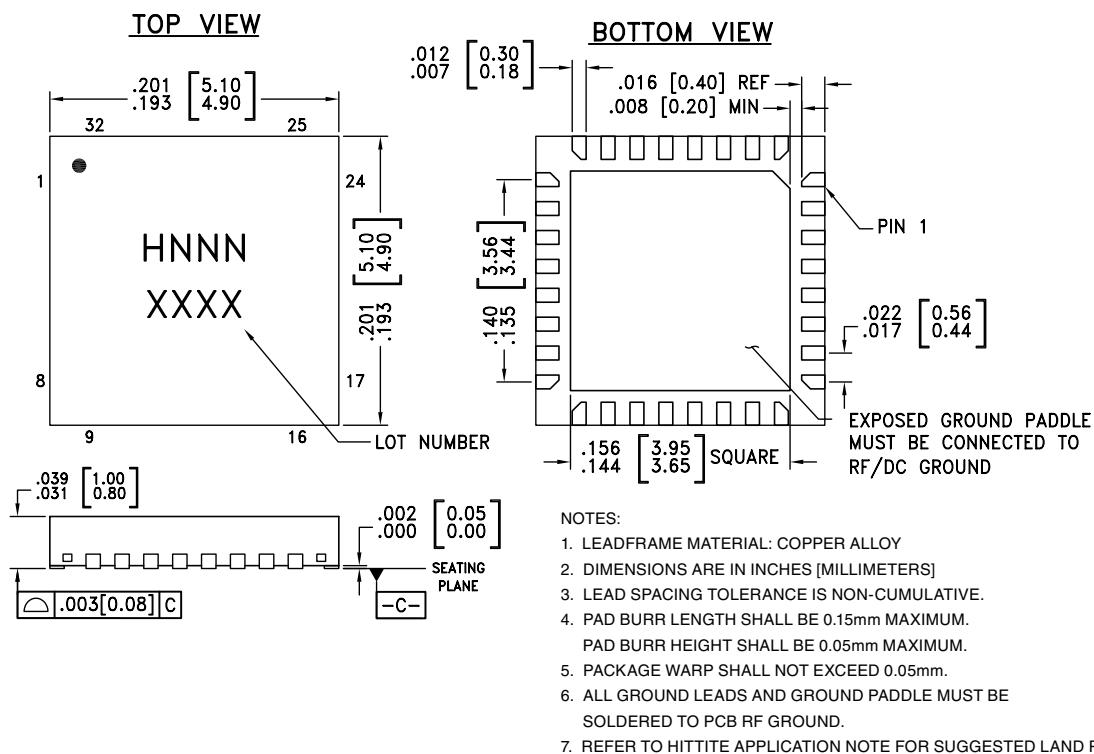
Typical Supply Current vs. Vcc

Vcc (V)	Icc (mA)
4.75	235
5.00	260
5.25	275

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



ELECTROSTATIC SENSITIVE DEVICE
OBSERVE HANDLING PRECAUTIONS


**MMIC VCO w/ HALF FREQUENCY OUTPUT
& DIVIDE-BY-4, 12.4 - 13.4 GHz**
Outline Drawing

Package Information

Part Number	Package Body Material	Lead Finish	MSL Rating	Package Marking ^[3]
HMC529LP5	Low Stress Injection Molded Plastic	Sn/Pb Solder	MSL3 ^[1]	H529 XXXX
HMC529LP5E	RoHS-compliant Low Stress Injection Molded Plastic	100% matte Sn	MSL3 ^[2]	H529 XXXX

[1] Max peak reflow temperature of 235 °C

[2] Max peak reflow temperature of 260 °C

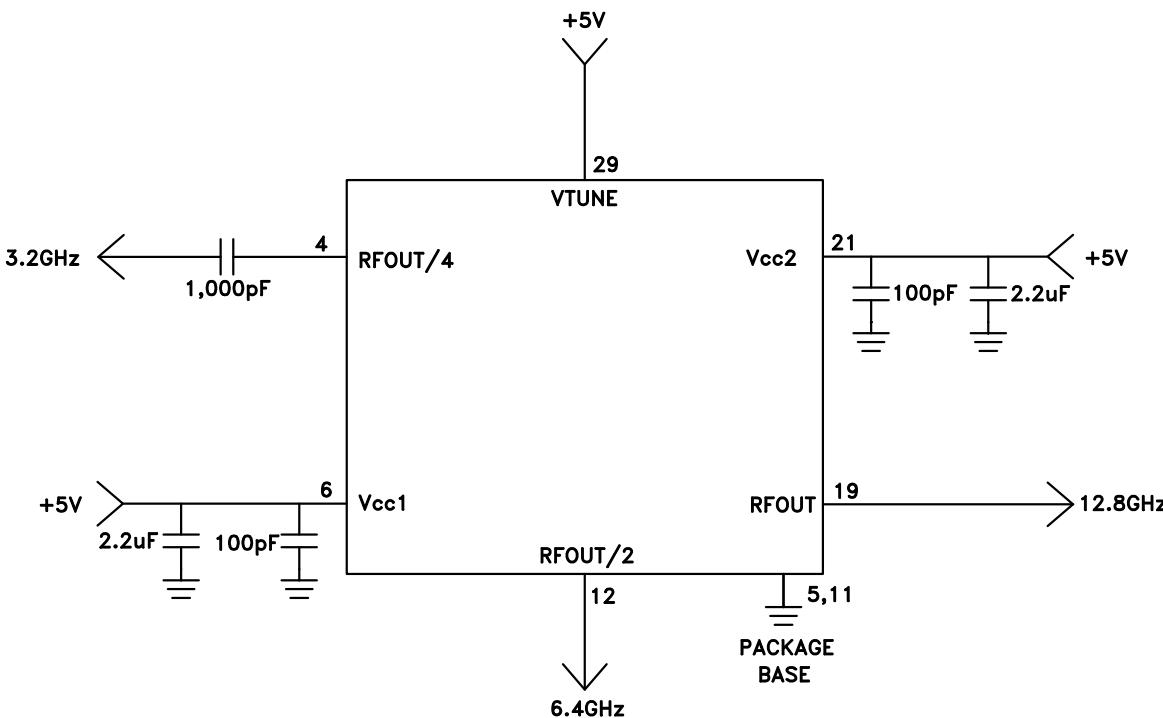
[3] 4-Digit lot number XXXX

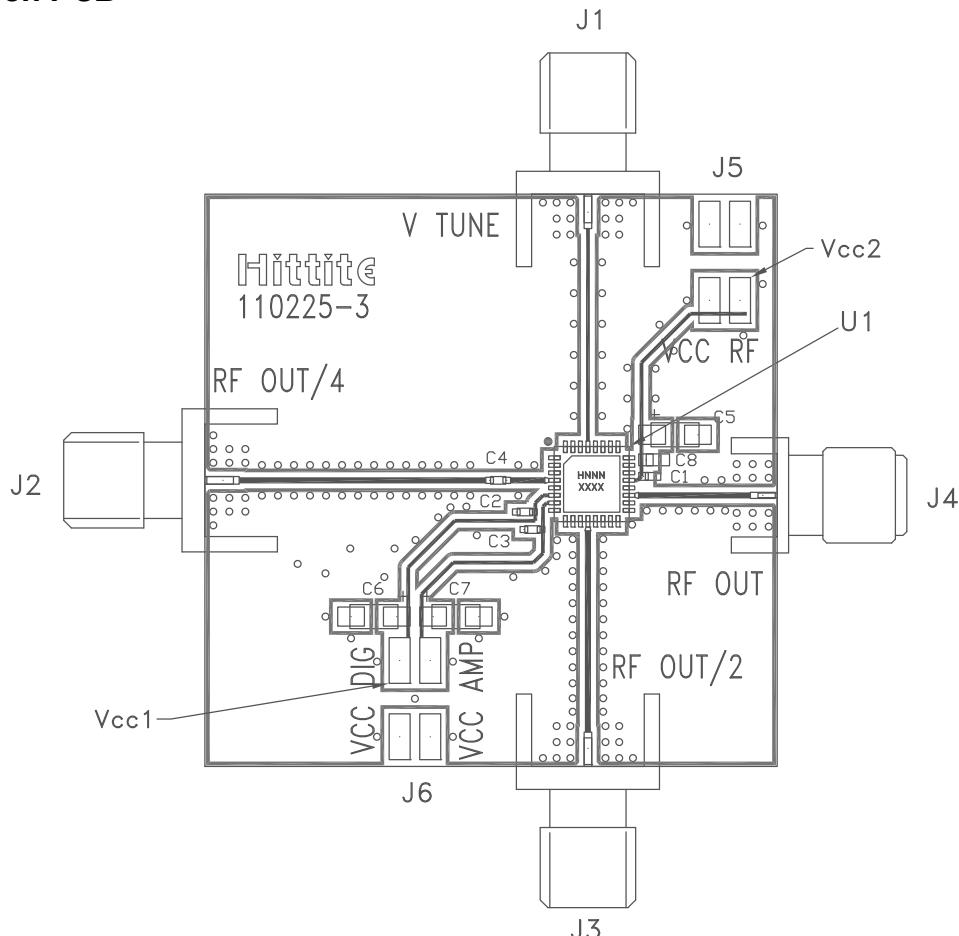
Pin Descriptions

Pin Number	Function	Description	Interface Schematic
1 - 3, 7 - 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.	
4	RFOUT/4	Divide-by-4 Output.	
6	Vcc1	Supply Voltage for prescaler. If prescaler is not required, this pin may be left open to conserve 65 mA of current.	


**MMIC VCO w/ HALF FREQUENCY OUTPUT
& DIVIDE-BY-4, 12.4 - 13.4 GHz**
Pin Descriptions

Pin Number	Function	Description	Interface Schematic
12	RFOUT/2	Half frequency output (AC coupled).	
19	RF OUT	RF output (AC coupled).	
21	Vcc2	Supply Voltage, +5V	
29	VTUNE	Control Voltage and Modulation Input. Modulation bandwidth dependent on drive source impedance. See "Determining the FM Bandwidth of a Wideband Varactor Tuned VCO" application note.	
5, 11, Paddle	GND	Package bottom has an exposed metal paddle that must be connected to RF/DC ground.	

Typical Application Circuit



**MMIC VCO w/ HALF FREQUENCY OUTPUT
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Evaluation PCB

List of Materials for Evaluation PCB 110227^[1]

Item	Description
J1 - J4	PCB Mount SMA RF Connector
J5 - J6	2 mm DC Header
C1 - C3	100 pF Capacitor, 0402 Pkg.
C4	1,000 pF Capacitor, 0402 Pkg.
C5 - C7	2.2 μ F Tantalum Capacitor
U1	HMC529LP5(E) VCO
PCB ^[2]	110225 Eval Board

[1] Reference this number when ordering complete evaluation PCB

[2] Circuit Board Material: Arlon 25FR

The circuit board used in the application should use RF circuit design techniques. Signal lines should have 50 Ohm impedance while the package ground leads and backside ground 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.