



v03.1210

# HMC583LP5 / 583LP5E

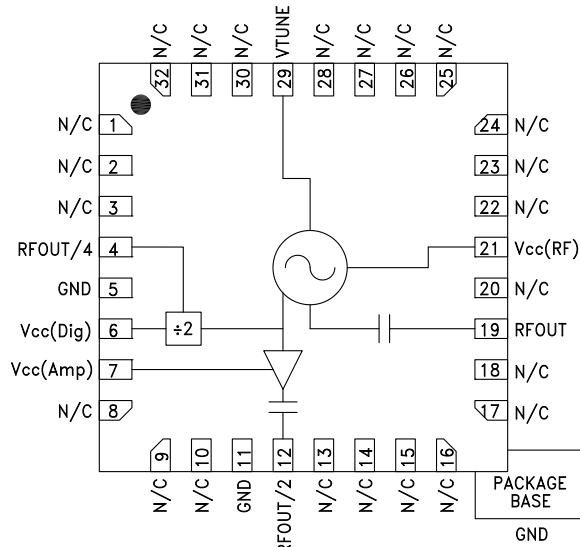
**MMIC VCO w/ HALF FREQUENCY OUTPUT  
& DIVIDE-BY-4, 11.5 - 12.8 GHz**

## Typical Applications

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

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

## Functional Diagram



## Electrical Specifications, $T_A = +25^\circ C$ , $Vcc(Dig)$ , $Vcc(Amp)$ , $Vcc(RF) = +5V$

Parameter	Min.	Typ.	Max.	Units
Frequency Range	$F_o$ $F_o/2$	11.5 - 12.8 5.75 - 6.4		GHz GHz
Power Output	RFOUT RFOUT/2 RFOUT/4	+7 +9 -9	+13 +15 -3	dBm dBm dBm
SSB Phase Noise @ 100 kHz Offset, Vtune= +5V @ RFOUT		-110		dBc/Hz
Tune Voltage	Vtune	2	12	V
Supply Current	$I_{cc(Dig)} + I_{cc(Amp)} + I_{cc(RF)}$	310	350	390
Tune Port Leakage Current (Vtune= 12V)			10	$\mu A$
Output Return Loss		2		dB
Harmonics/Subharmonics	1/2 2nd 3rd	26 22 30		dBc dBc dBc
Pulling (into a 2.0:1 VSWR)		3		MHz pp
Pushing @ Vtune= 5V		20		MHz/V
Frequency Drift Rate		1.0		MHz/ $^\circ C$

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# HMC583\* PRODUCT PAGE QUICK LINKS

Last Content Update: 12/18/2017

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## **COMPARABLE PARTS**

View a parametric search of comparable parts.

## **EVALUATION KITS**

- HMC583LP5 Evaluation Board.

## **DOCUMENTATION**

### **Data Sheet**

- HMC583 Data Sheet

## **REFERENCE MATERIALS**

### **Product Selection Guide**

- RF, Microwave, and Millimeter Wave IC Selection Guide 2017

### **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)

## **DESIGN RESOURCES**

- HMC583 Material Declaration
- PCN-PDN Information
- Quality And Reliability
- Symbols and Footprints

## **DISCUSSIONS**

View all HMC583 EngineerZone Discussions.

## **SAMPLE AND BUY**

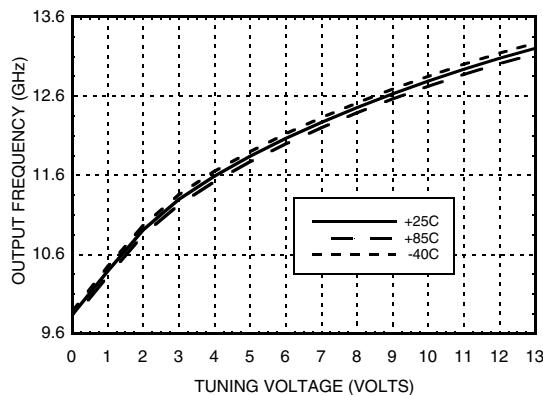
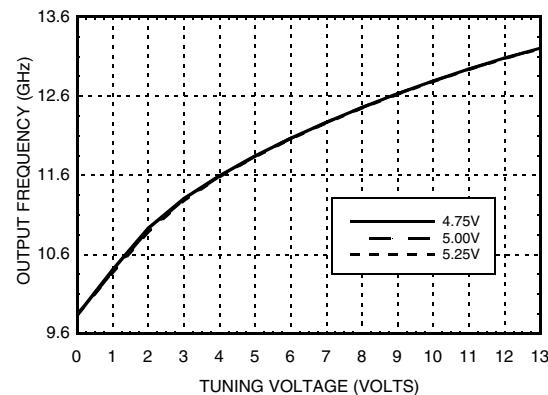
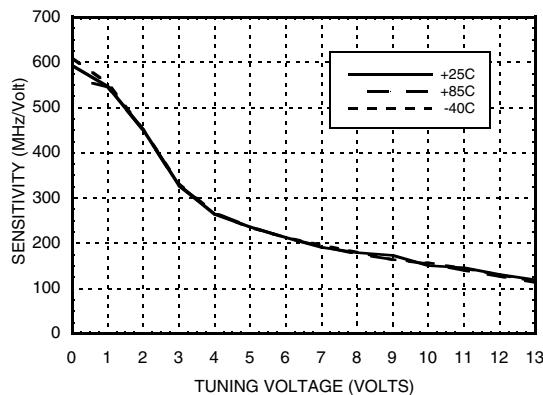
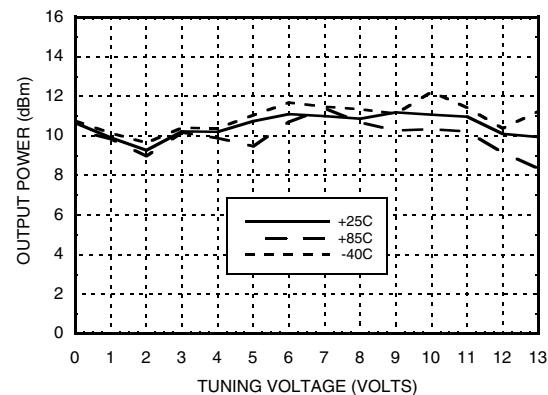
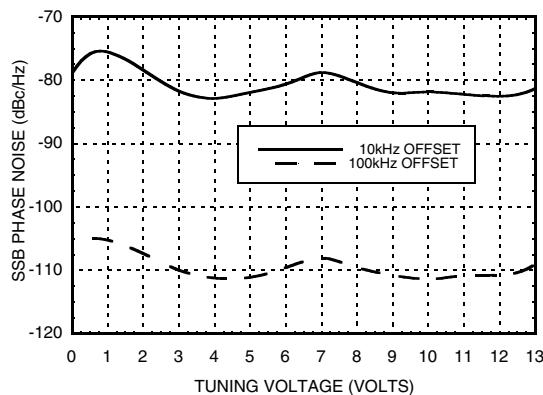
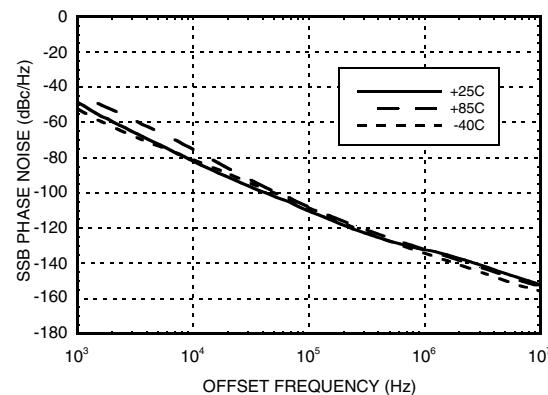
Visit the product page to see pricing options.

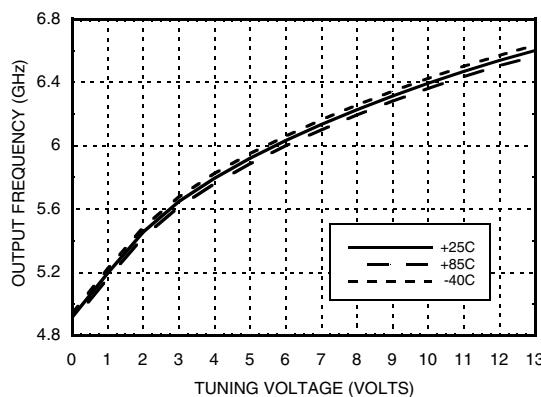
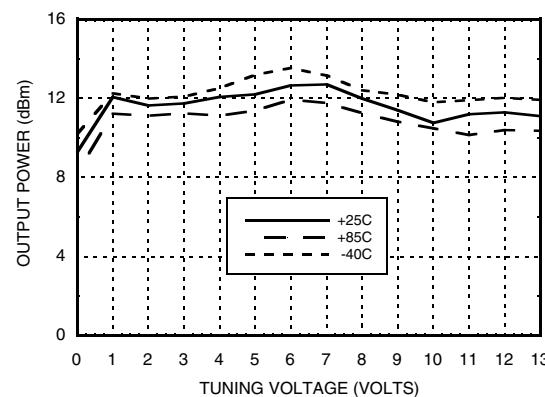
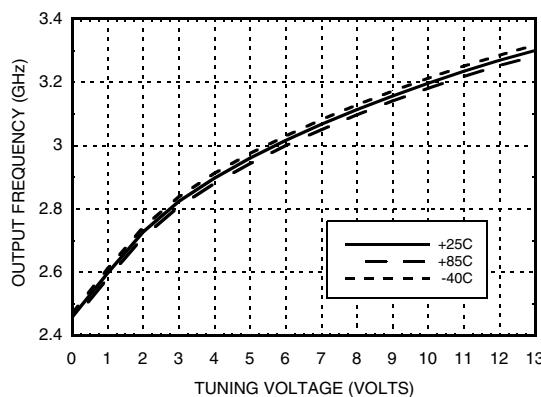
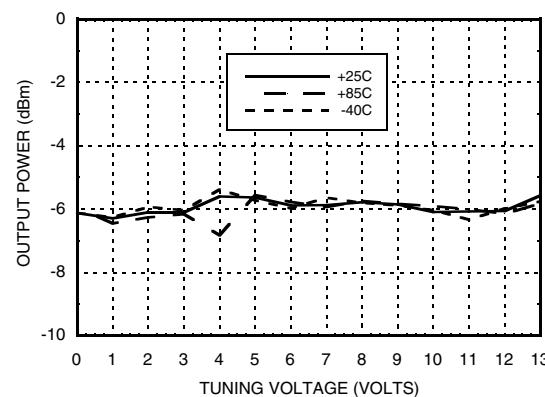
## **TECHNICAL SUPPORT**

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, 11.5 - 12.8 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**

Vcc(Dig), Vcc(Amp), Vcc(RF)	+5.5 Vdc
Vtune	0 to +15V
Junction Temperature	135 °C
Continuous Pdiss (T=85 °C) (derate 43.5 mW/C above 85 °C)	2.17 W
Thermal Resistance (junction to ground paddle)	23 °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	320
5.00	350
5.25	380

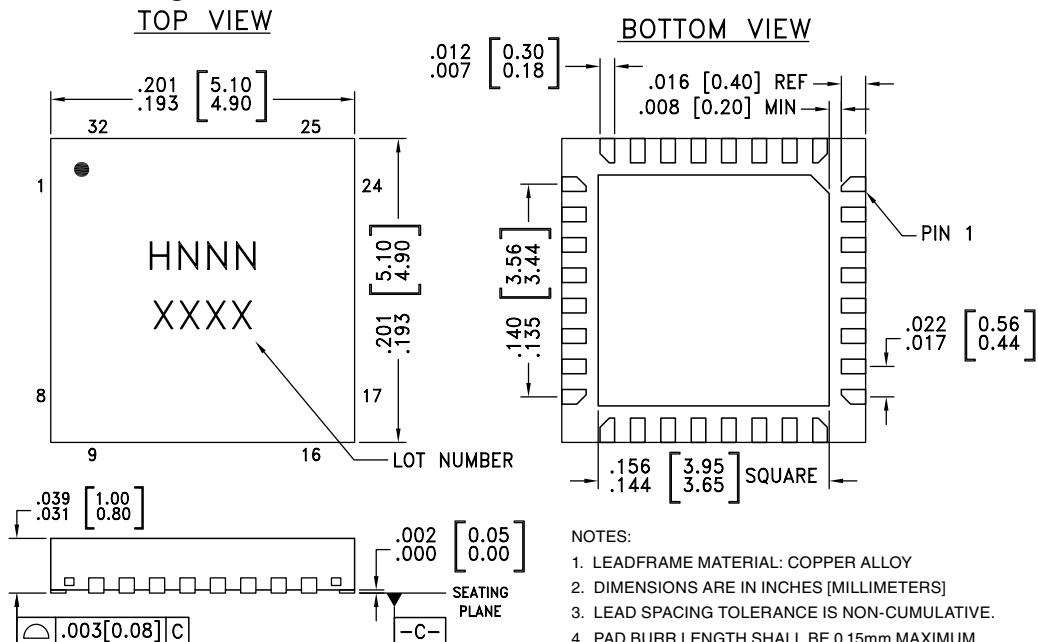
Note: VCO will operate over full voltage range shown above.



ELECTROSTATIC SENSITIVE DEVICE  
OBSERVE HANDLING PRECAUTIONS



v03.1210

**MMIC VCO w/ HALF FREQUENCY OUTPUT  
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**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>
HMC583LP5	Low Stress Injection Molded Plastic	Sn/Pb Solder	MSL3 <sup>[1]</sup>	H583 XXXX
HMC583LP5E	RoHS-compliant Low Stress Injection Molded Plastic	100% matte Sn	MSL3 <sup>[2]</sup>	H583 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**

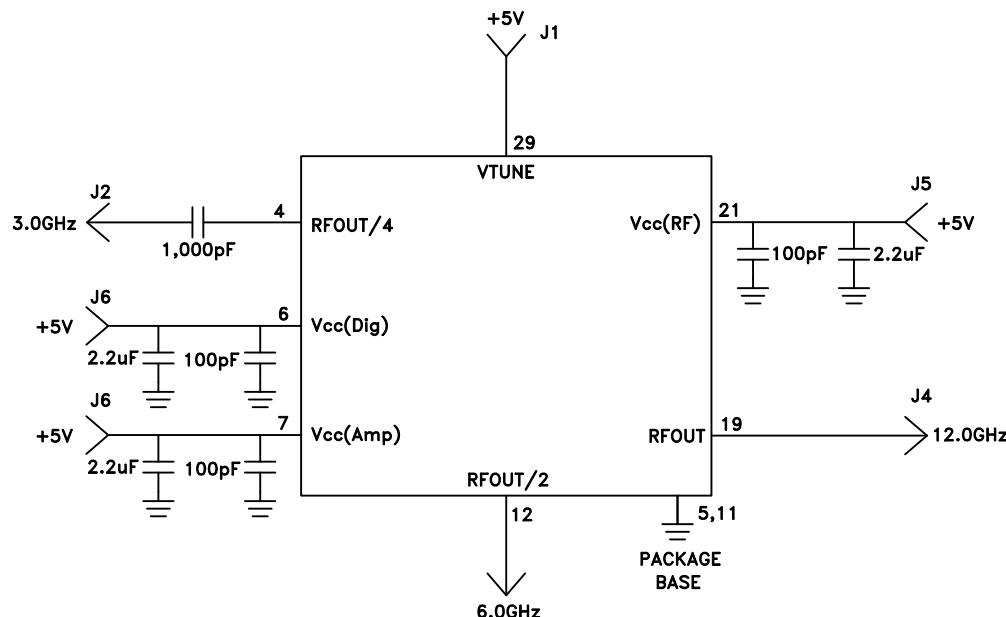
Pin Number	Function	Description	Interface Schematic
1 - 3, 8 - 10, 13 - 18, 20, 22 - 28, 30 - 32	N/C	No Connection. These pins may be connected to RF/DC ground. Performance will not be affected.	
4	RFOUT/4	Divide-by-4 output. DC block required.	
6	Vcc (Dig)	Supply voltage for prescaler. If prescaler is not required, this pin may be left open to conserve approximately 65 mA of current.	



v03.1210

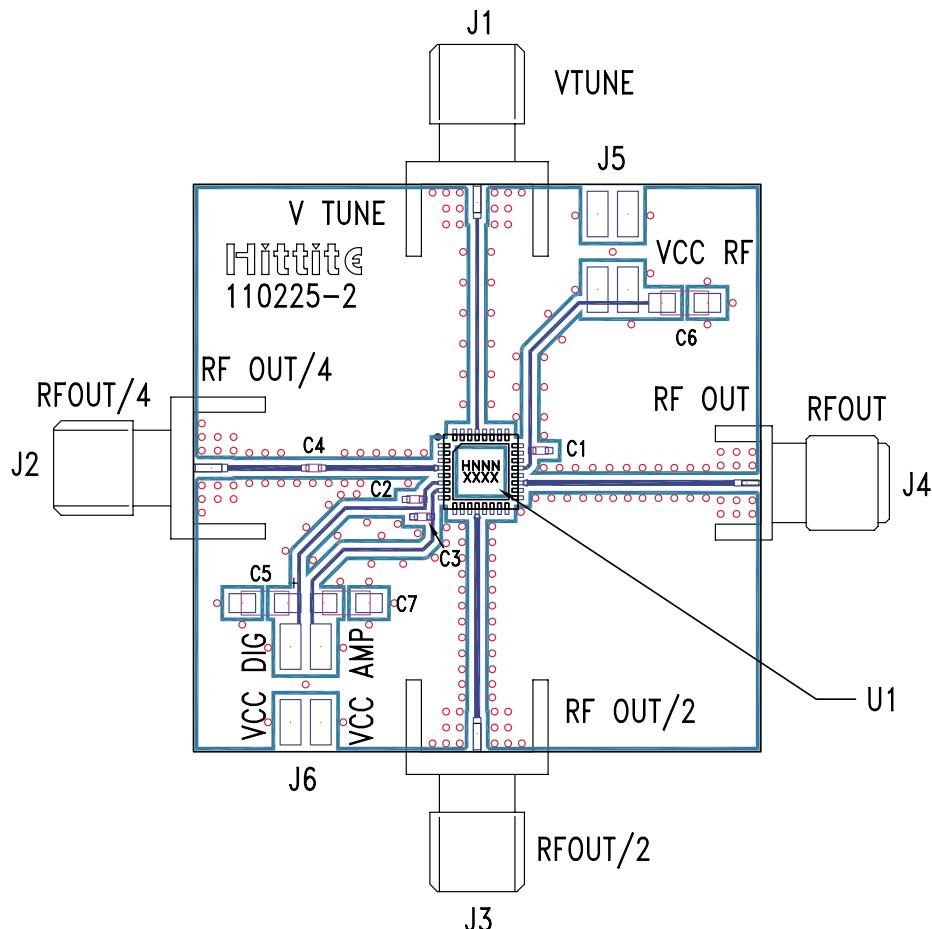
**MMIC VCO w/ HALF FREQUENCY OUTPUT  
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**Pin Descriptions**

Pin Number	Function	Description	Interface Schematic
7	Vcc (Amp)	Supply voltage, for RFOUT/2 output. If RFOUT/2 is not required, this pin may be left open to conserve approximately 30 mA of current.	
12	RFOUT/2	Half frequency output (AC coupled).	
19	RF OUT	RF output (AC coupled).	
21	Vcc (RF)	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**




v03.1210

**MMIC VCO w/ HALF FREQUENCY OUTPUT  
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**Evaluation PCB**

**List of Materials for Evaluation PCB 110227<sup>[1]</sup>**

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 $\mu$ F Tantalum Capacitor
U1	HMC583LP5 / HMC583LP5E VCO
PCB [2]	110225 Eval Board

[1] Reference this number when ordering complete evaluation PCB

[2] Circuit Board Material: Rogers 4350

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.