HMC583LP5 / 583LP5E

v03.1210

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

Features

Dual Output: Fo = 11.5 - 12.8 GHz
Fo/2 = 5.75 - 6.4 GHz

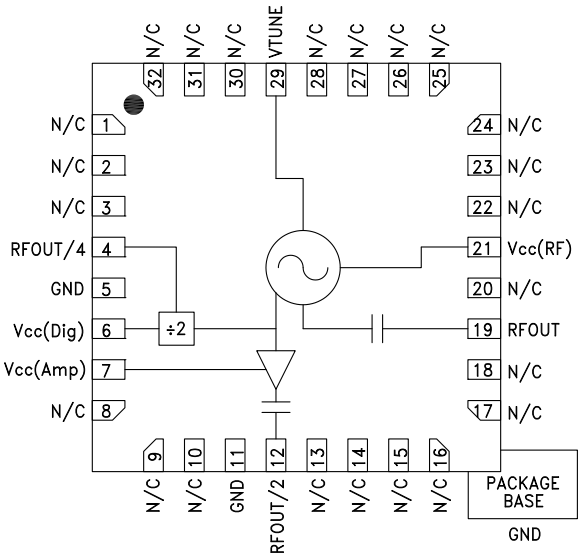
Pout: +11 dBm

Phase Noise: -110 dBc/Hz @100 kHz Typ.

No External Resonator Needed

32 Lead 5x5mm SMT Package: 25mm²

Functional Diagram



General Description

The HMC583LP5 & HMC583LP5E are GaAs InGaP Heterojunction Bipolar Transistor (HBT) MMIC VCOs. The HMC583LP5 & HMC583LP5E integrate resonators, negative resistance devices, varactor diodes and feature half frequency and divide-by-4 outputs. The VCO's phase noise performance is excellent over temperature, shock, and process due to the oscillator's monolithic structure. Power output is +11 dBm typical from a +5V supply voltage. The prescaler and RF/2 functions can be disabled to conserve current if not required. The voltage controlled oscillator is packaged in a leadless QFN 5x5 mm surface mount package, and requires no external matching components.

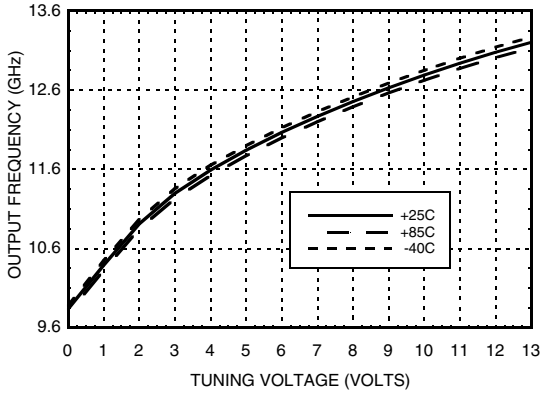
Electrical Specifications, T_A = +25° C, Vcc (Dig), Vcc (Amp), Vcc (RF) = +5V

Parameter		Min.	Typ.	Max.	Units
Frequency Range	Fo Fo/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	Icc(Dig) + Icc(Amp) + Icc(RF)	310	350	390	mA
Tune Port Leakage Current (Vtune= 12V)				10	µA
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/°C

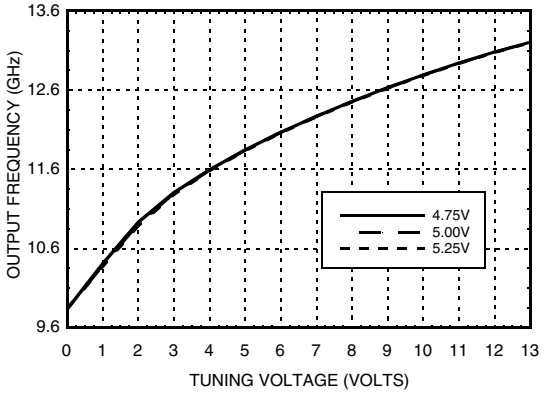
For price, delivery, and to place orders: Analog Devices, Inc., One Technology Way, P.O. Box 9106, Norwood, MA 02062-9106
Phone: 781-329-4700 • Order online at www.analog.com
Application Support: Phone: 1-800-ANALOG-D

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

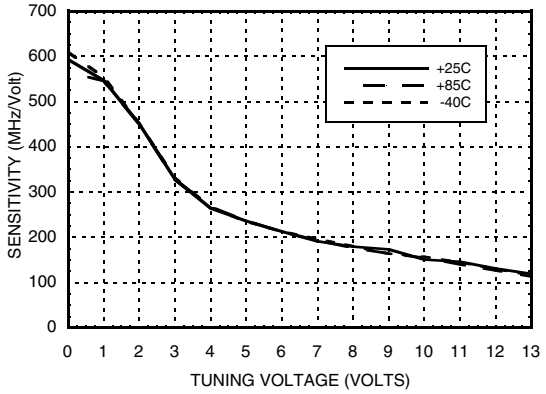
Frequency vs. Tuning Voltage, Vcc = +5V



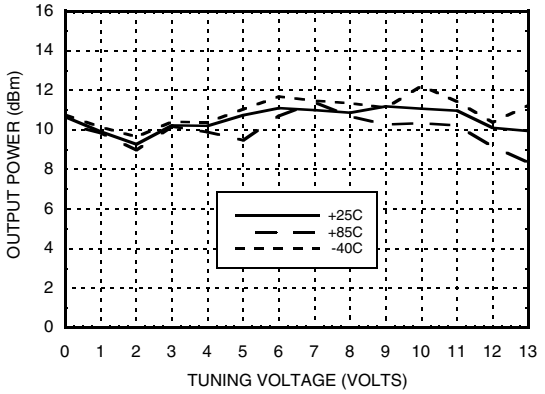
Frequency vs. Tuning Voltage, T= 25°C



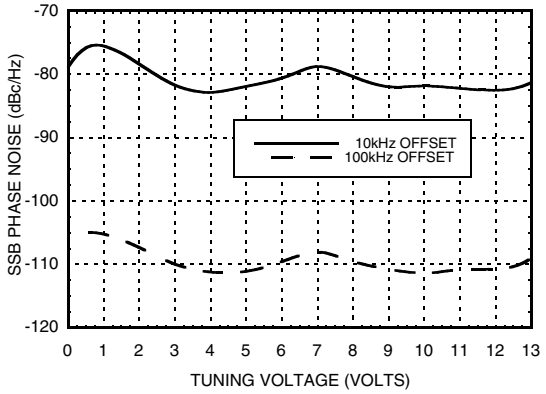
Sensitivity vs. Tuning Voltage, Vcc = +5V



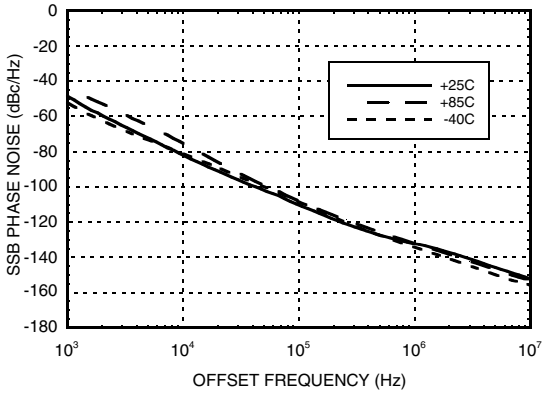
Output Power vs. Tuning Voltage, Vcc = +5V



SSB Phase Noise vs. Tuning Voltage



SSB Phase Noise @ Vtune = +5V

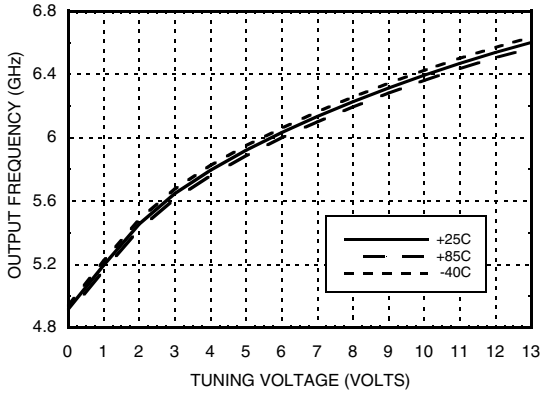


For price, delivery, and to place orders: Analog Devices, Inc., One Technology Way, P.O. Box 9106, Norwood, MA 02062-9106
Phone: 781-329-4700 • Order online at www.analog.com
Application Support: Phone: 1-800-ANALOG-D

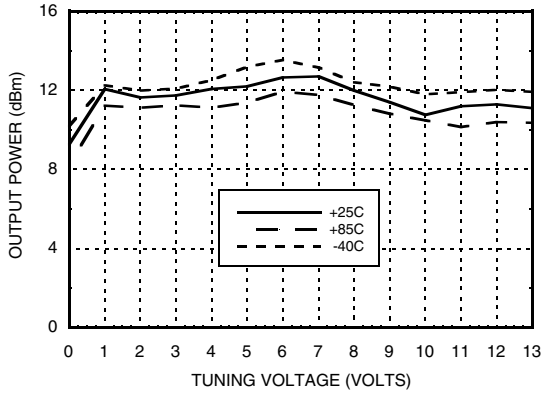
RoHS✓ EARTH FRIENDLY

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

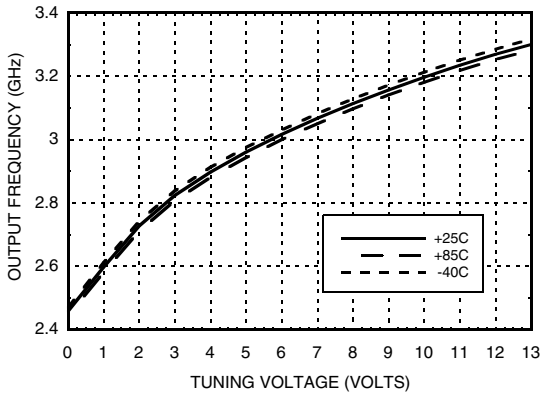
RFOUT/2 Frequency vs. Tuning Voltage, Vcc = +5V



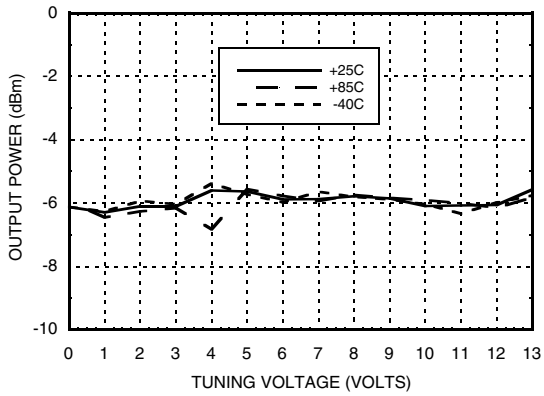
RFOUT/2 Output Power vs. Tuning Voltage, Vcc = +5V



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

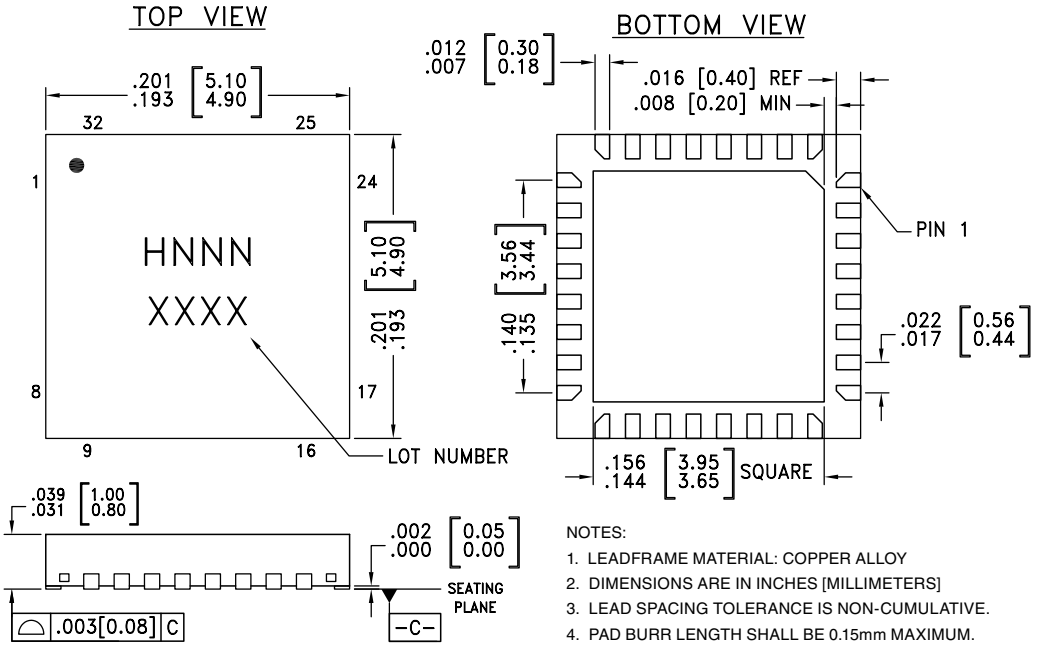
Vcc (V)	Icc (mA)
4.75	320
5.00	350
5.25	380

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

ELECTROSTATIC SENSITIVE DEVICE
OBSERVE HANDLING PRECAUTIONS

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

Outline Drawing



NOTES:

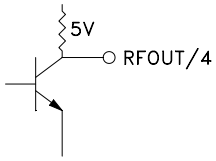
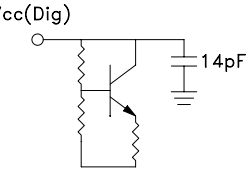
1. LEADFRAME MATERIAL: COPPER ALLOY
2. DIMENSIONS ARE IN INCHES [MILLIMETERS]
3. LEAD SPACING TOLERANCE IS NON-CUMULATIVE.
4. PAD BURR LENGTH SHALL BE 0.15mm MAXIMUM. PAD BURR HEIGHT SHALL BE 0.05mm MAXIMUM.
5. PACKAGE WARP SHALL NOT EXCEED 0.05mm.
6. ALL GROUND LEADS AND GROUND PADDLE MUST BE SOLDERED 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 [3]
HMC583LP5	Low Stress Injection Molded Plastic	Sn/Pb Solder	MSL3 [1]	H583 XXXX
HMC583LP5E	RoHS-compliant Low Stress Injection Molded Plastic	100% matte Sn	MSL3 [2]	H583 XXXX

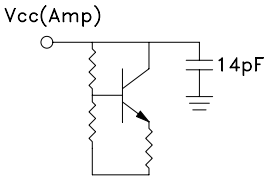
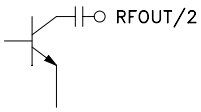
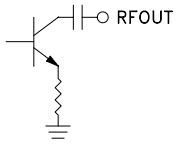
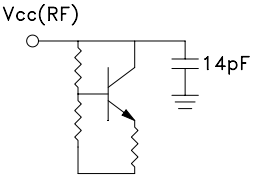
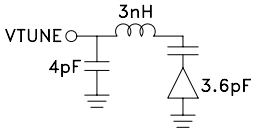
[1] Max peak reflow temperature of 235 °C
[2] Max peak reflow temperature of 260 °C
[3] 4-Digit lot number XXXX

Pin Descriptions

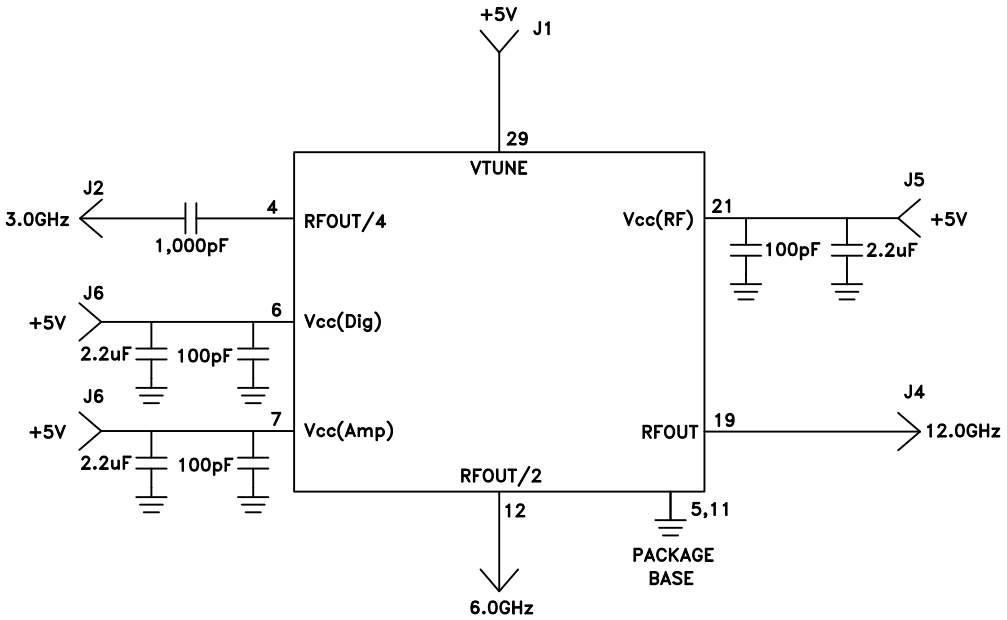
Pin Number	Function	Description	Interface Schematic
1 - 3, 8 - 10, 13 - 18, 20, 22 - 28, 30 - 32	N/C	No Connection. These pins may be connected to RF/ DC ground. Performance will not be affected.	
4	RFOUT/4	Divide-by-4 output. DC block required.	
6	Vcc (Dig)	Supply voltage for prescaler. If prescaler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

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
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



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