

MMIC VCO w/ HALF FREQUENCY OUTPUT & DIVIDE-BY-4, 11.1 - 12.4 GHz

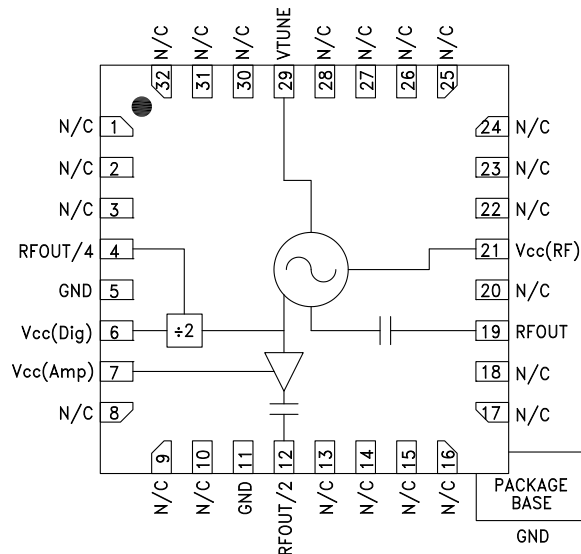


Typical Applications

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



Features

Triple Output: $F_o = 11.1 - 12.4$ GHz
 $F_o/2 = 5.55 - 6.2$ GHz
 $F_o/4 = 2.78 - 3.1$ GHz

Pout: +9 dBm

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

No External Resonator Needed

32 Lead 5x5mm SMT Package: 25mm²

General Description

The HMC582LP5 & HMC582LP5E are GaAs InGaP Heterojunction Bipolar Transistor (HBT) MMIC VCOs. The HMC582LP5 & HMC582LP5E 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 +9 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, $T_A = +25^\circ\text{C}$, $V_{cc}(\text{Dig})$, $V_{cc}(\text{Amp})$, $V_{cc}(\text{RF}) = +5\text{V}$

Parameter	Min.	Typ.	Max.	Units	
Frequency Range	F_o	11.1 - 12.4		GHz	
	$F_o/2$	5.55 - 6.2		GHz	
Power Output	RFOUT	+5	+12	dBm	
	RFOUT/2	+8	+14	dBm	
	RFOUT/4	-9	-3	dBm	
SSB Phase Noise @ 100 kHz Offset, Vtune= +5V @ RFOUT		-110		dBc/Hz	
Tune Voltage	Vtune	2	12	V	
Supply Current	$I_{cc}(\text{Dig}) + I_{cc}(\text{Amp}) + I_{cc}(\text{RF})$	290	350	390	mA
Tune Port Leakage Current (Vtune= 13V)			10	μA	
Output Return Loss		2		dB	
Harmonics/Subharmonics	1/2	32		dBc	
	2nd	25		dBc	
	3rd	30		dBc	
Pulling (into a 2.0:1 VSWR)		5		MHz pp	
Pushing @ Vtune= 5V		30		MHz/V	
Frequency Drift Rate		1.2		MHz/ $^\circ\text{C}$	

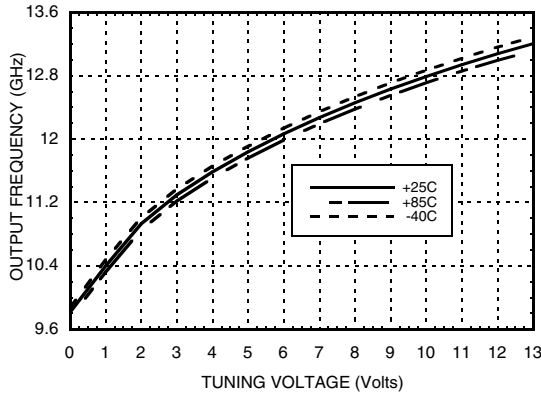
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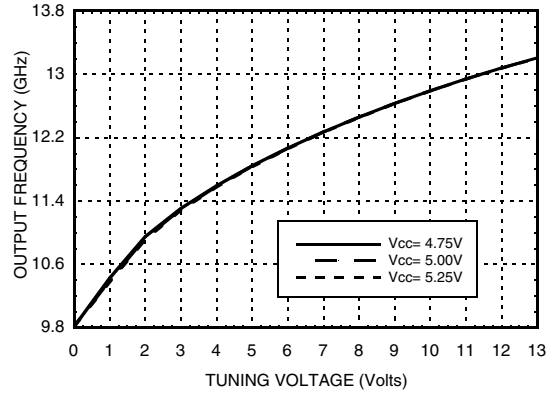
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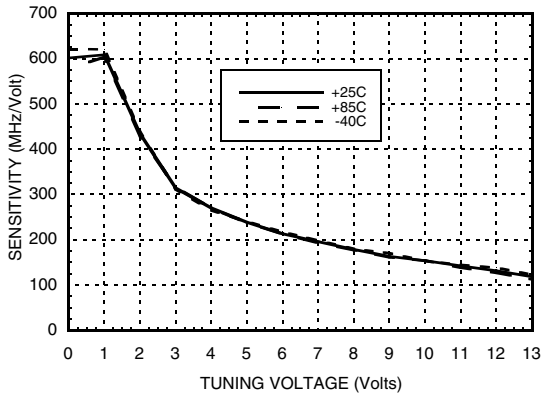
Frequency vs. Tuning Voltage, Vcc = +5V



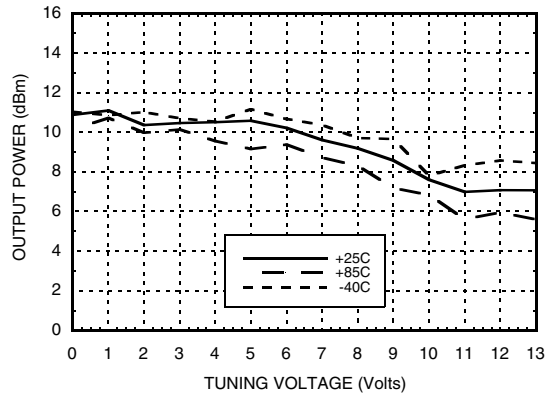
Frequency vs. Tuning Voltage, T = 25°C



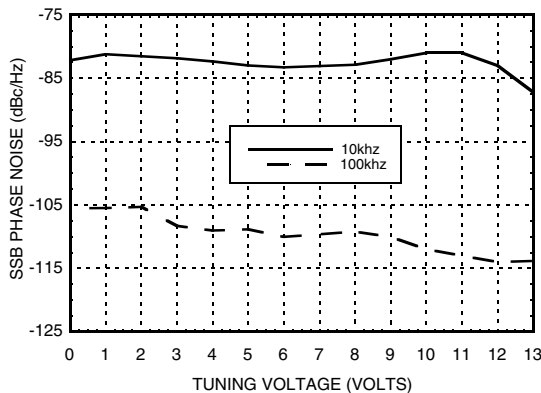
Sensitivity vs. Tuning Voltage, Vcc = +5V



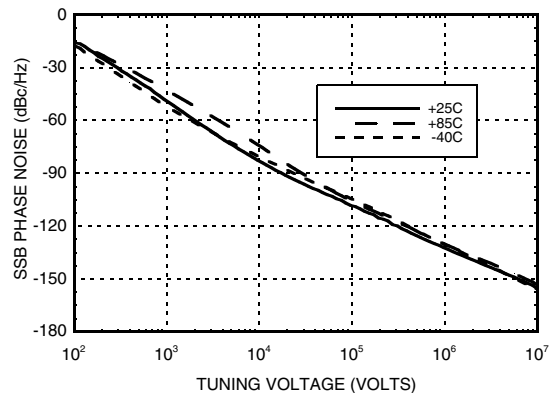
Output Power vs. Tuning Voltage, Vcc = +5V



SSB Phase Noise vs. Tuning Voltage



SSB Phase Noise @ Vtune = +5V



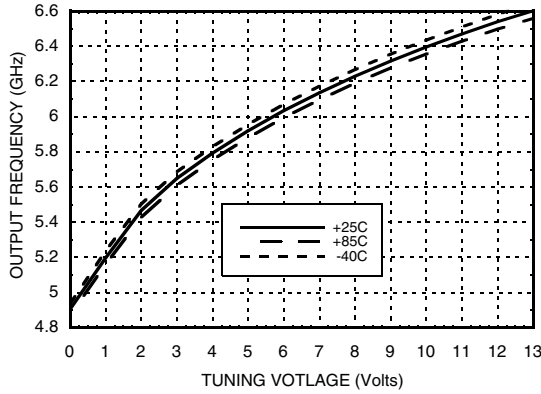
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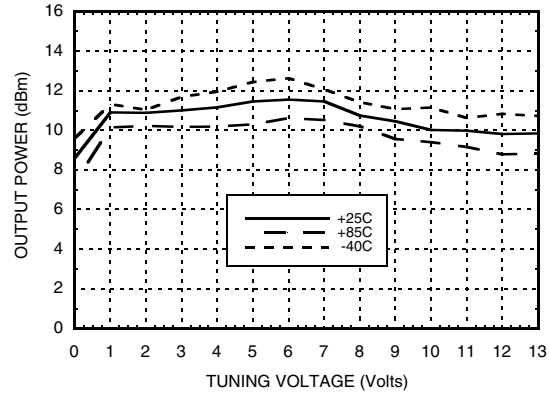
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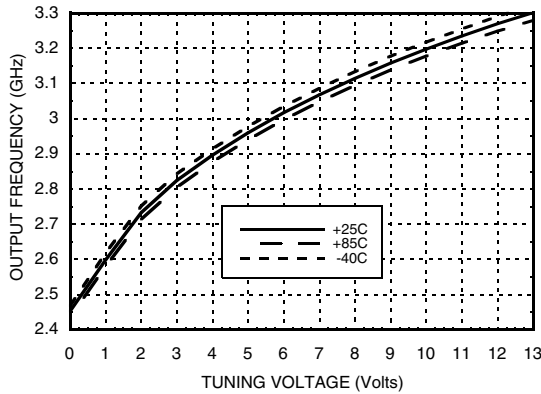
RFOUT/2 Frequency vs. Tuning Voltage, Vcc = +5V



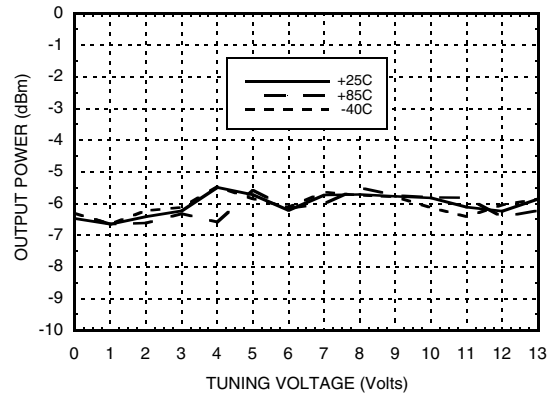
RFOUT/2 Output Power vs. Tuning Voltage, Vcc = +5V



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 P _{diss} (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)	I _{cc} (mA)
4.75	320
5.00	350
5.25	380

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

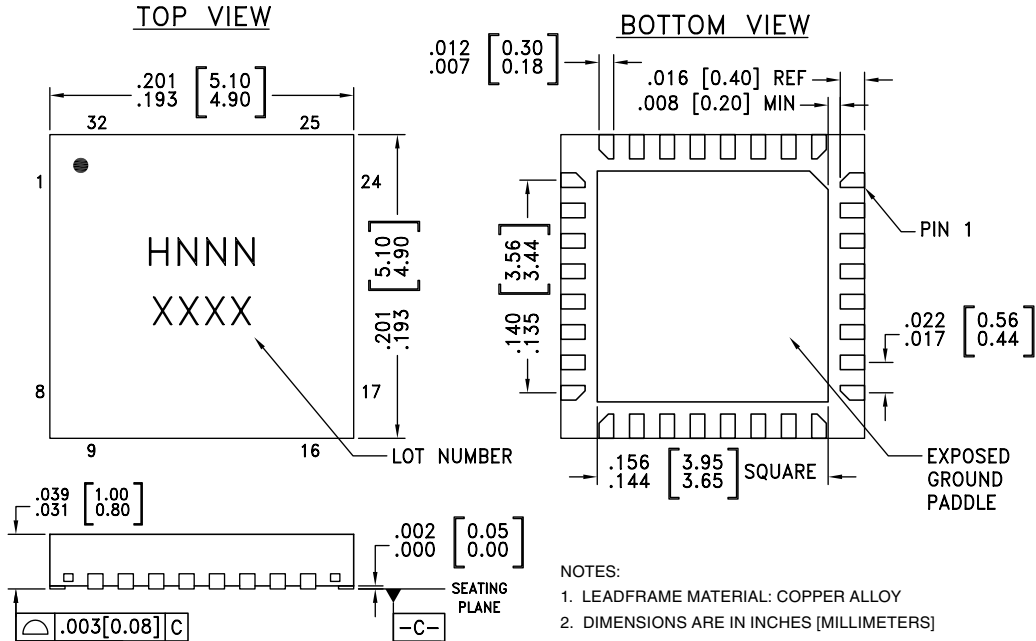


**ELECTROSTATIC SENSITIVE DEVICE
OBSERVE HANDLING PRECAUTIONS**

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Outline Drawing



Package Information

Part Number	Package Body Material	Lead Finish	MSL Rating	Package Marking ^[3]
HMC582LP5	Low Stress Injection Molded Plastic	Sn/Pb Solder	MSL3 ^[1]	H582 XXXX
HMC582LP5E	RoHS-compliant Low Stress Injection Molded Plastic	100% matte Sn	MSL3 ^[2]	H582 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.	

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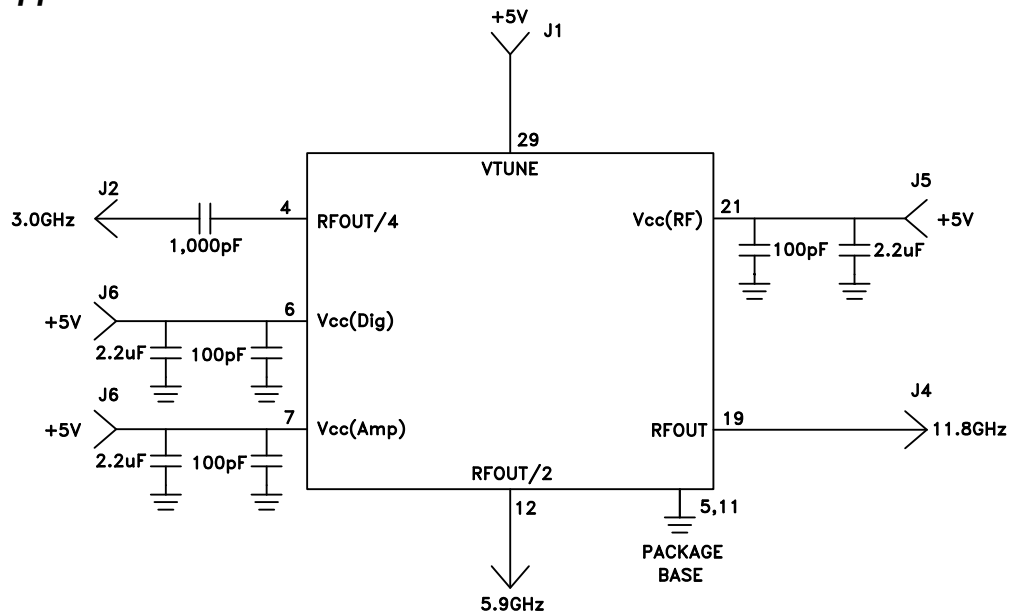
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Pin Descriptions

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



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