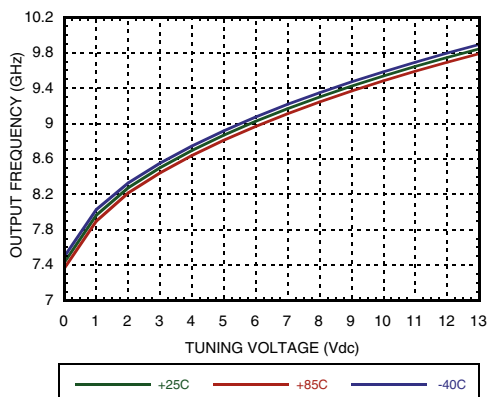
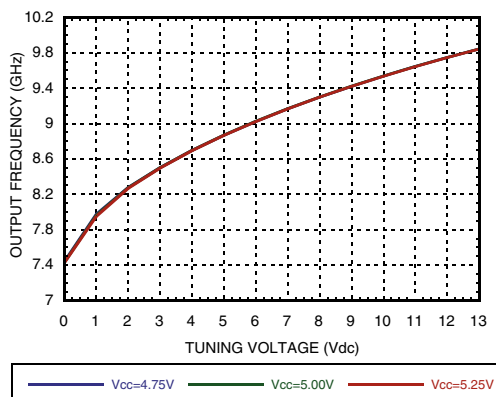
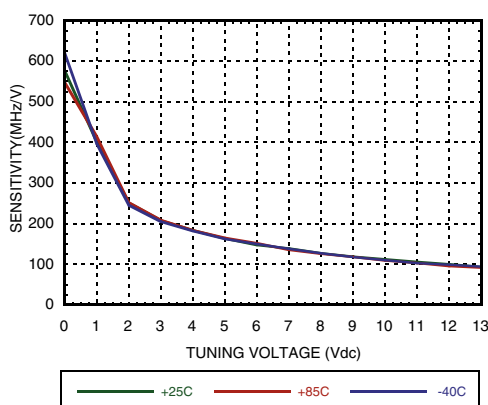
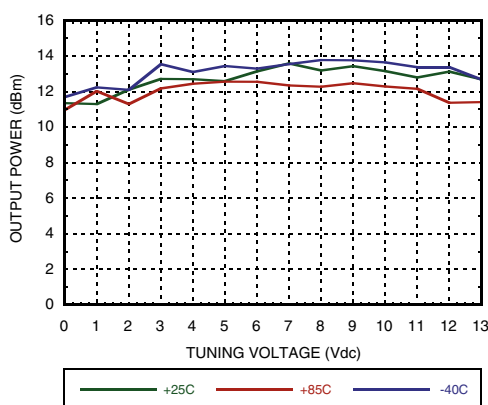
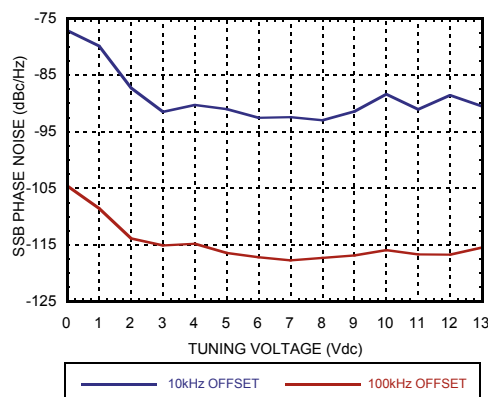
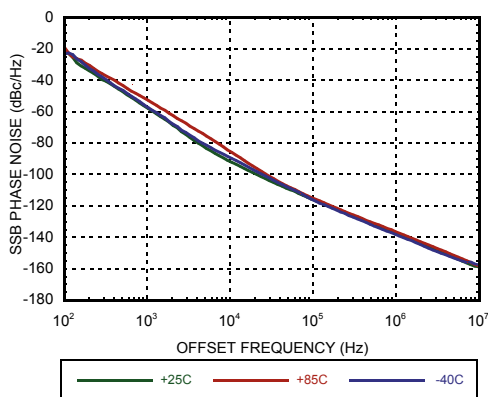
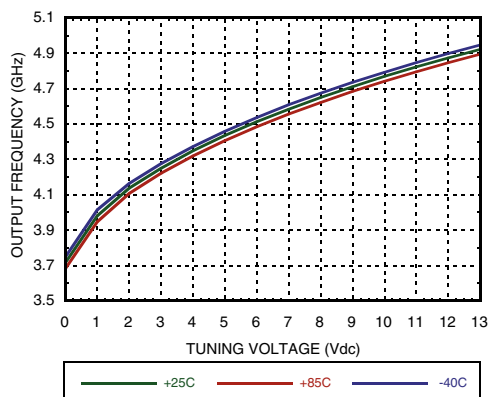


**MMIC VCO WITH HALF FREQUENCY OUTPUT**  
**8.45 - 9.55 GHz**
**Frequency vs. Tuning Voltage,  $V_{CC} = +5V$** 

**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 @  $V_{tune} = +5V$** 


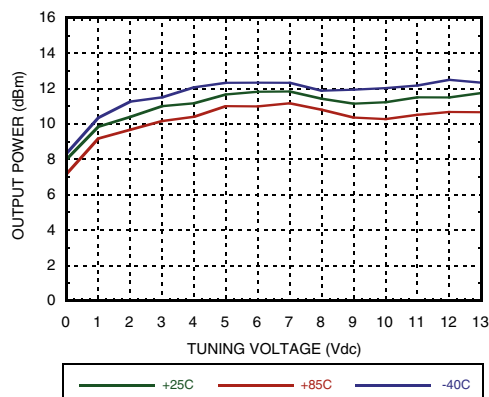


## MMIC VCO WITH HALF FREQUENCY OUTPUT 8.45 - 9.55 GHz

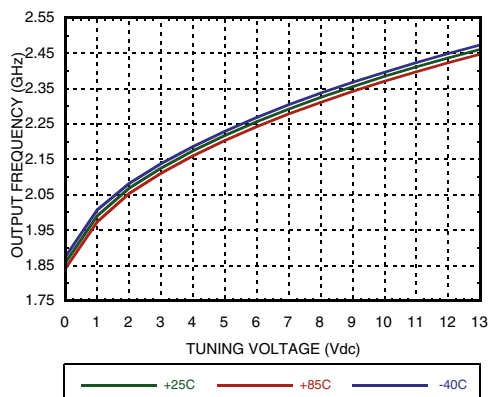
**RFOUT/2 Frequency  
vs. Tuning Voltage, Vcc = +5V**



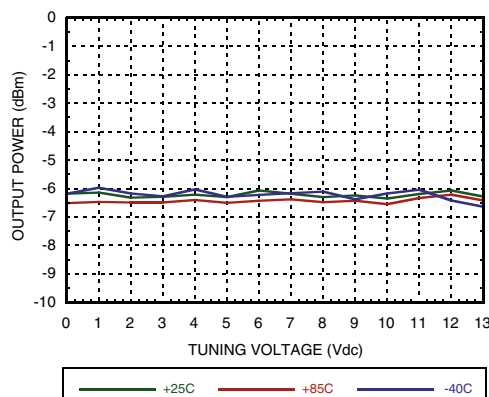
**RFOUT/2 Output Power  
vs. Tuning Voltage, Vcc = +5V**



**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
Storage Temperature	-65 to +150 °C
ESD Sensitivity (HBM)	Class 1A

### Reliability Information

Junction Temperature To Maintain 1 Million Hour MTTF	135 °C
Nominal Junction Temperature (T=85 °C)	121.2 °C
Thermal Resistance (junction to ground paddle)	23 °C/W
Operating Temperature	-40 to +85 °C



**ELECTROSTATIC SENSITIVE DEVICE  
OBSERVE HANDLING PRECAUTIONS**

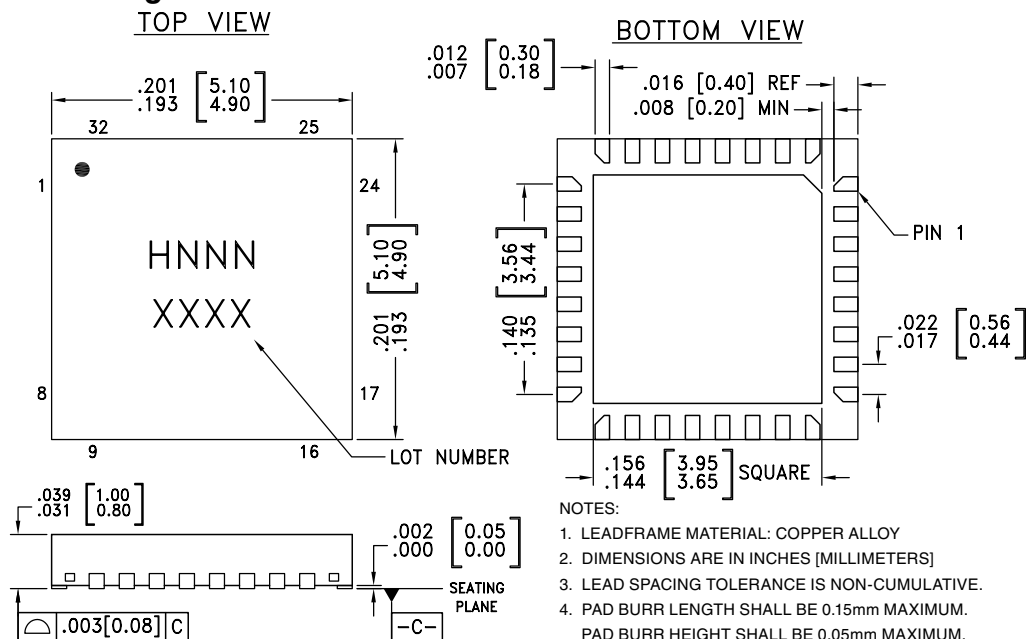
### Typical Supply Current vs. Vcc

Vcc (V)	Icc (mA)
4.75	290
5.00	315
5.25	340

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

## MMIC VCO WITH HALF FREQUENCY OUTPUT 8.45 - 9.55 GHz

### Outline Drawing



### Package Information

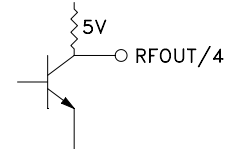
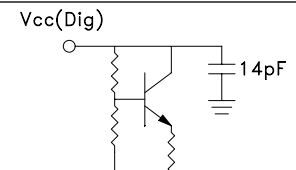
Part Number	Package Body Material	Lead Finish	MSL Rating	Package Marking [3]
HMC510LP5	Low Stress Injection Molded Plastic	Sn/Pb Solder	MSL3 [1]	H510 XXXX
HMC510LP5E	RoHS-compliant Low Stress Injection Molded Plastic	100% matte Sn	MSL3 [2]	H510 XXXX

[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.	

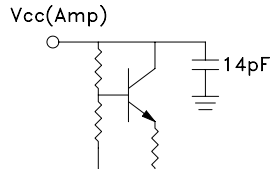
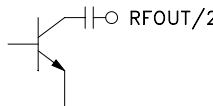
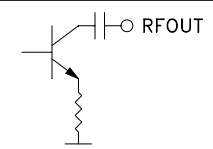
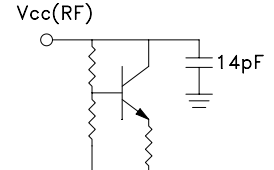
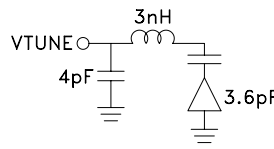

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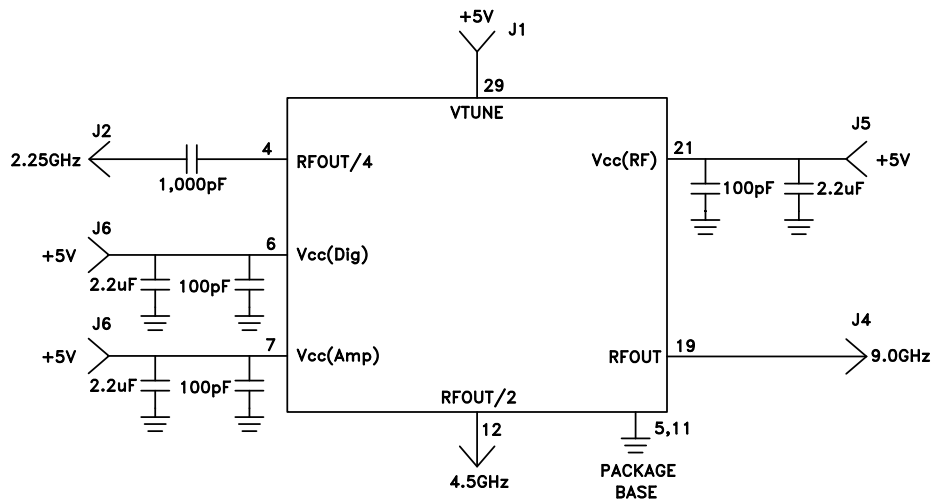
## MMIC VCO WITH HALF FREQUENCY OUTPUT 8.45 - 9.55 GHz



### 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

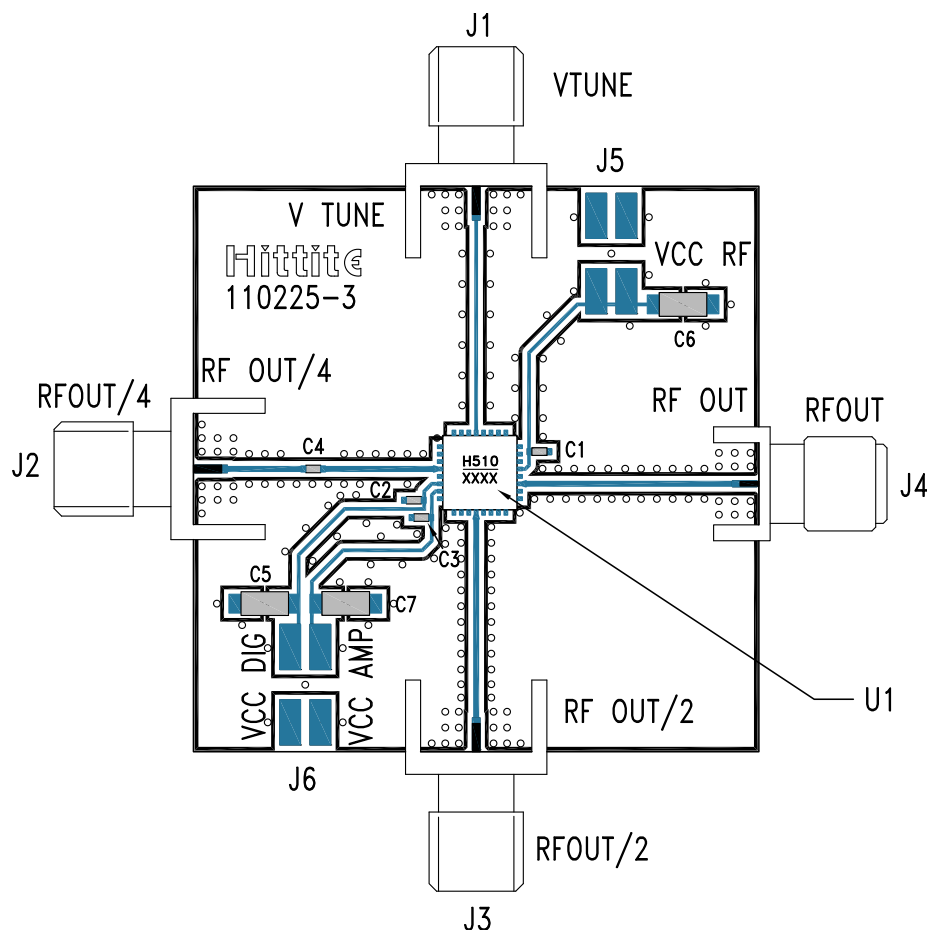


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## MMIC VCO WITH HALF FREQUENCY OUTPUT 8.45 - 9.55 GHz

### 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	HMC510LP5 / HMC510LP5E VCO
PCB <sup>[2]</sup>	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.