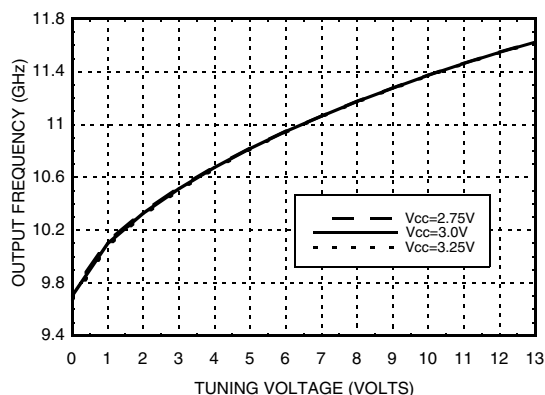
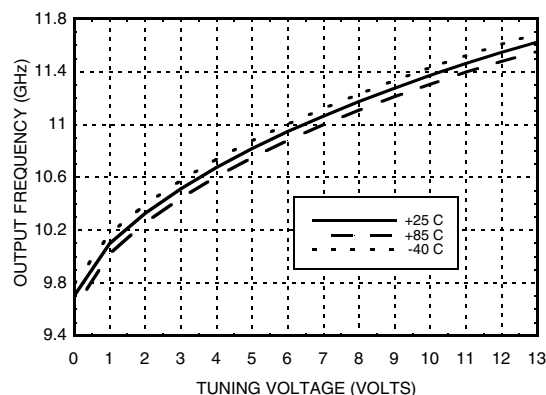
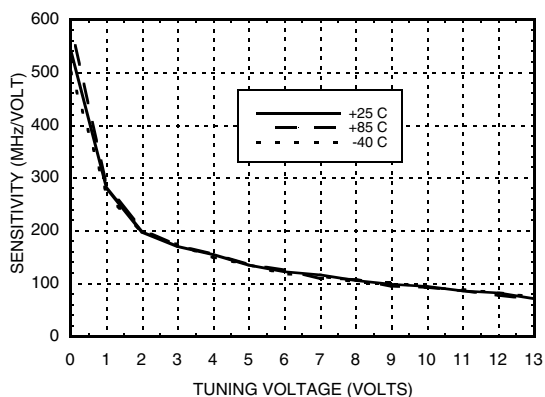
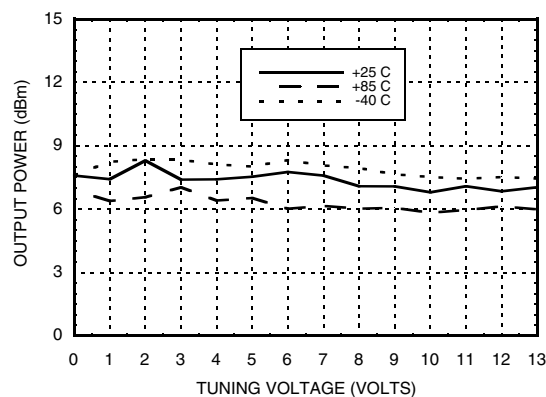
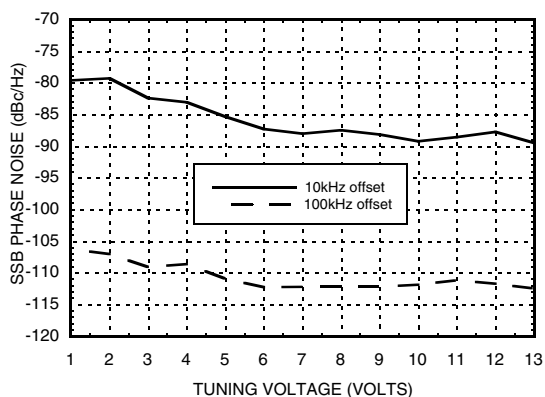
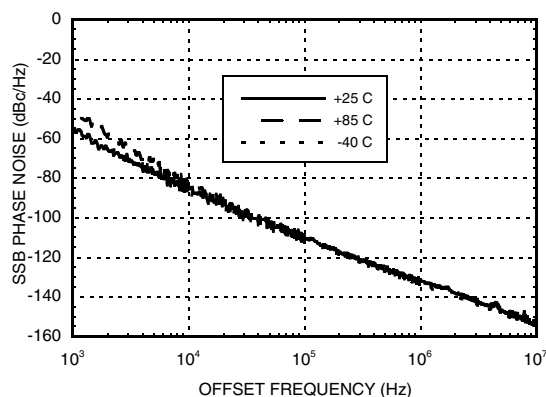
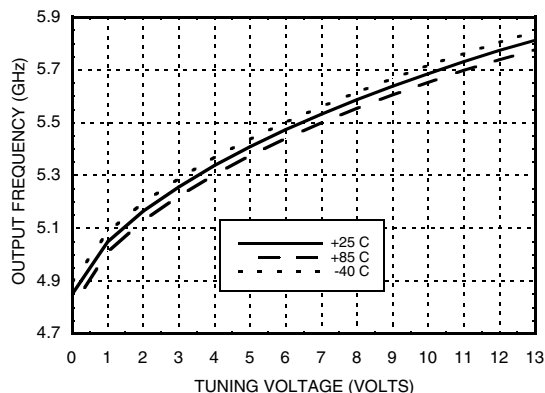
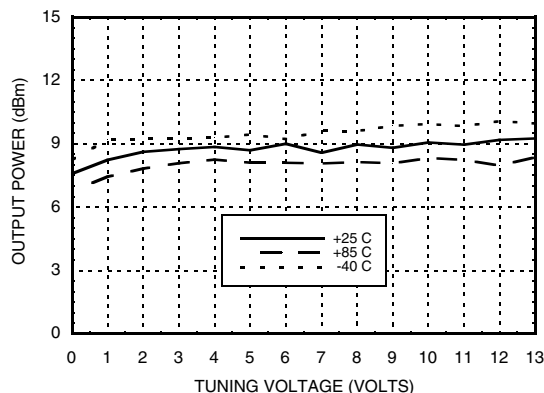
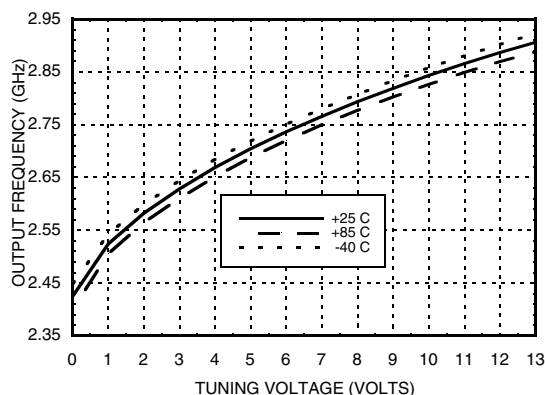
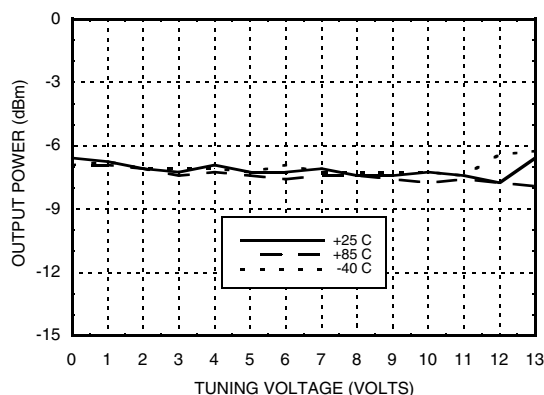



**MMIC VCO w/ HALF FREQUENCY OUTPUT  
& DIVIDE-BY-4, 10.43 - 11.46 GHz**
**Frequency vs. Tuning Voltage,  $T = 25^{\circ}\text{C}$** 

**Frequency vs. Tuning Voltage,  $V_{cc} = +3\text{V}$** 

**Sensitivity vs. Tuning Voltage,  $V_{cc} = +3\text{V}$** 

**Output Power  
vs. Tuning Voltage,  $V_{cc} = +3\text{V}$** 

**SSB Phase Noise vs. Tuning Voltage**

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



**MMIC VCO w/ HALF FREQUENCY OUTPUT  
& DIVIDE-BY-4, 10.43 - 11.46 GHz**
**RFOUT/2 Frequency  
vs. Tuning Voltage, Vcc= +3V**

**RFOUT/2 Output Power  
vs. Tuning Voltage, Vcc= +3V**

**Divide-by-4 Frequency  
vs. Tuning Voltage, Vcc= +3V**

**Divide-by-4 Output Power  
vs. Tuning Voltage, Vcc= +3V**

**Absolute Maximum Ratings**

Vcc1, Vcc2	+3.5 Vdc
Vtune	0 to +15V
Junction Temperature	135 °C
Continuous P <sub>diss</sub> (T=85 °C) (derate 27 mW/C above 85 °C)	1.3 W
Thermal Resistance (junction to ground paddle)	37.5 °C/W
Storage Temperature	-65 to +150 °C
Operating Temperature	-40 to +85 °C

**Typical Supply Current vs. Vcc**

Vcc (V)	I <sub>cc</sub> (mA)
2.75	230
3.0	275
3.25	320

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

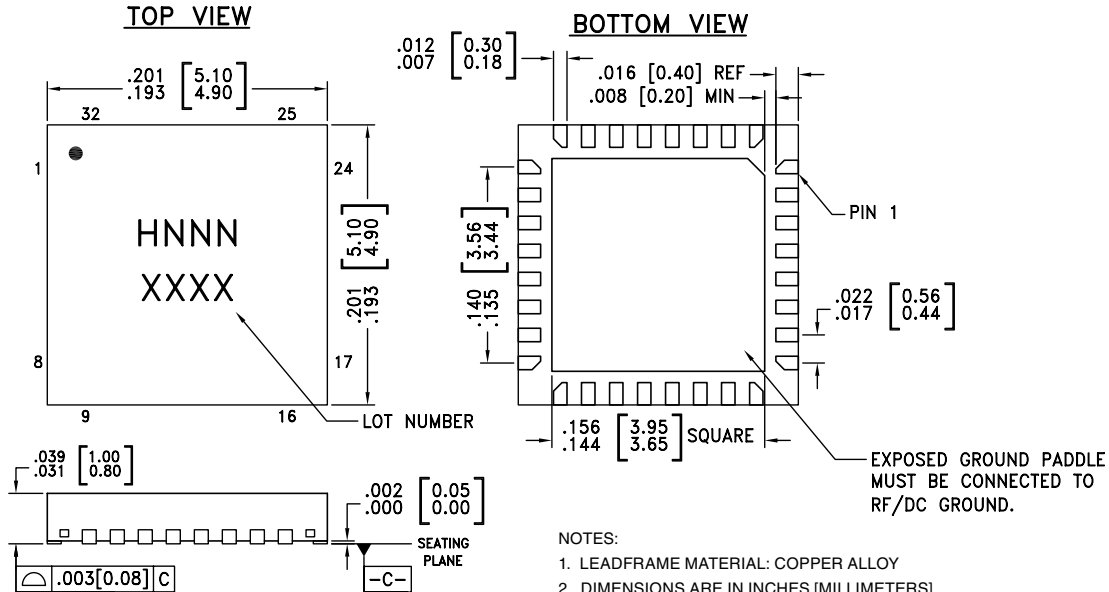


**ELECTROSTATIC SENSITIVE DEVICE  
OBSERVE HANDLING PRECAUTIONS**



## MMIC VCO w/ HALF FREQUENCY OUTPUT & DIVIDE-BY-4, 10.43 - 11.46 GHz

### Outline Drawing



### Package Information

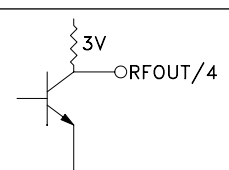
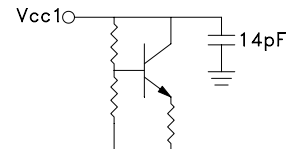
Part Number	Package Body Material	Lead Finish	MSL Rating	Package Marking <sup>[3]</sup>
HMC513LP5	Low Stress Injection Molded Plastic	Sn/Pb Solder	MSL3 <sup>[1]</sup>	H513 XXXX
HMC513LP5E	RoHS-compliant Low Stress Injection Molded Plastic	100% matte Sn	MSL3 <sup>[2]</sup>	H513 XXXX

[1] Max peak reflow temperature of 235 °C

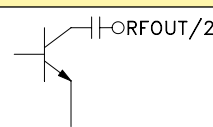
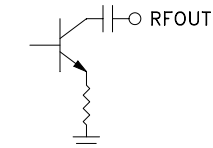
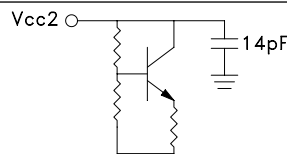
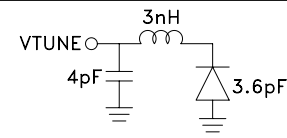

[2] Max peak reflow temperature of 260 °C

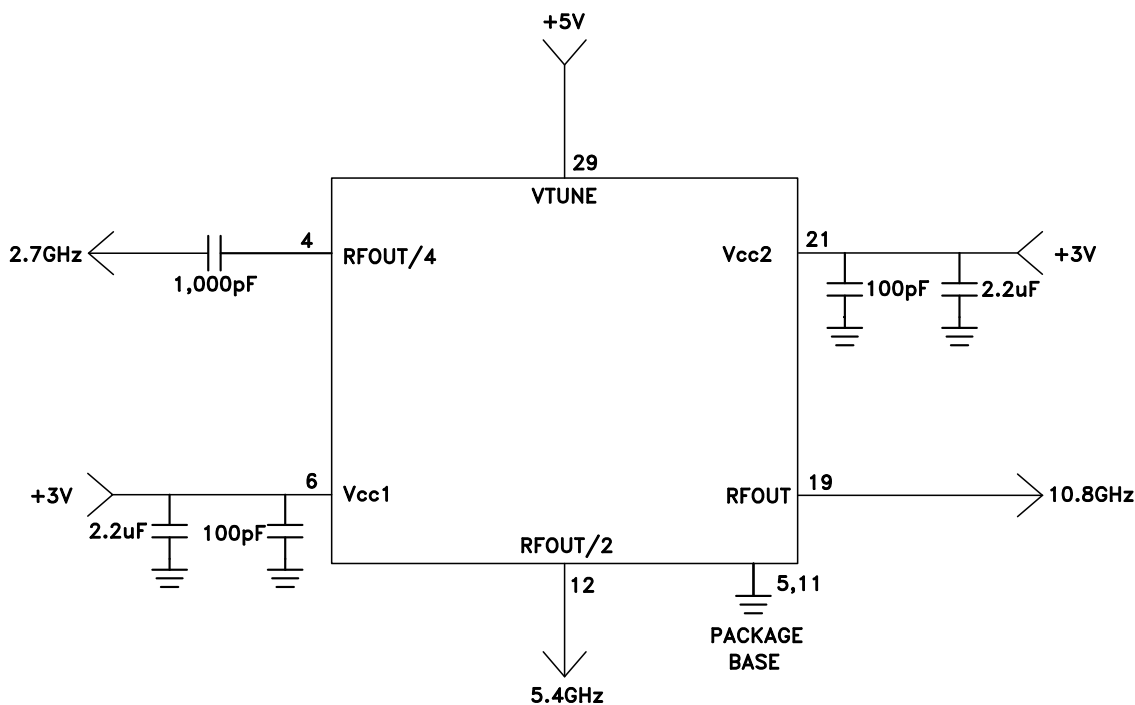
[3] 4-Digit lot number XXXX

### 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 40 mA of current.	


**MMIC VCO w/ HALF FREQUENCY OUTPUT  
& DIVIDE-BY-4, 10.43 - 11.46 GHz**
**Pin Descriptions**

Pin Number	Function	Description	Interface Schematic
12	RFOUT/2	Half frequency output (AC coupled).	
19	RFOUT	RF output (AC coupled).	
21	VCC2	Supply Voltage, +3V	
29	VTUNE	Control Voltage Input. Modulation port bandwidth dependent on drive source impedance.	
5, 11, Paddle	GND	Package bottom has an exposed metal paddle that must be connected to RF/DC ground.	

**Typical Application Circuit**


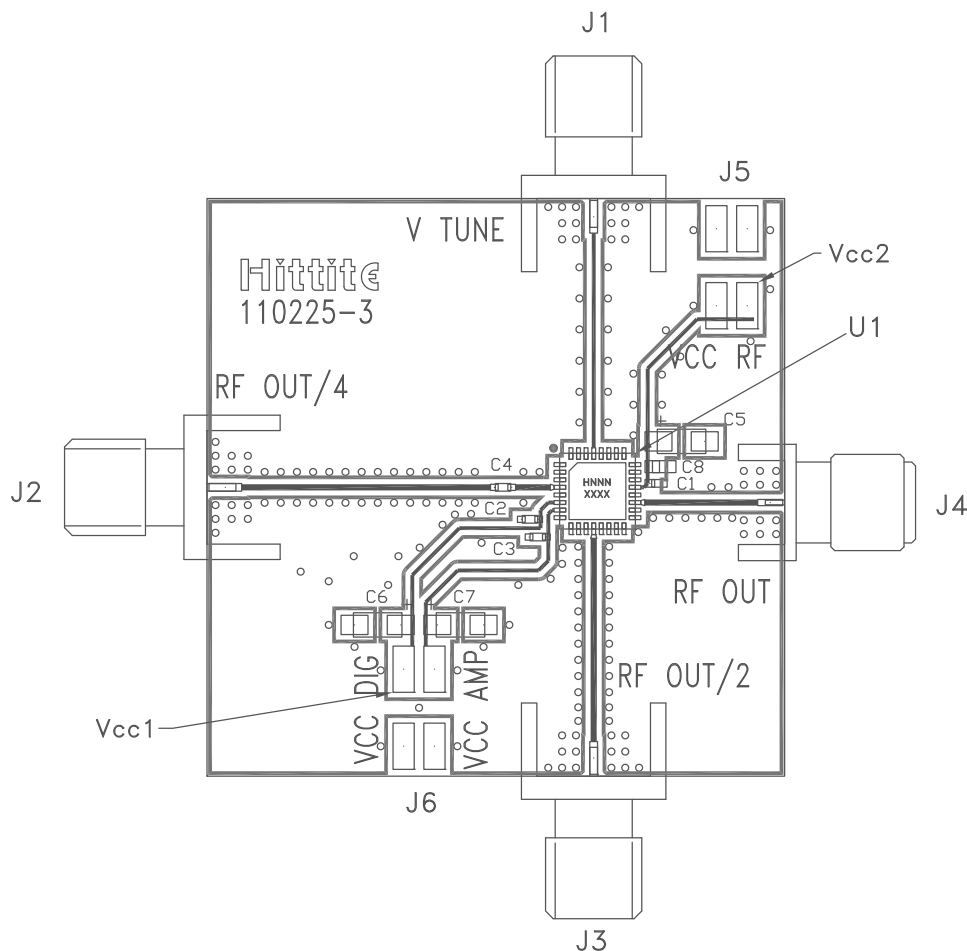
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## **MMIC VCO w/ HALF FREQUENCY OUTPUT & DIVIDE-BY-4, 10.43 - 11.46 GHz**

## 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	HMC513LP5(E) VCO
PCB <sup>[2]</sup>	110225 Eval Board

[1] Reference this number when ordering complete evaluation PCB

[2] Circuit Board Material: Arlon 25FR

The circuit board used in the final 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.