



## Voltage Controlled Oscillator 7.4 – 8.2 GHz

Rev. V4

**Electrical Specifications:  $T_A = +25^\circ\text{C}$ ,  $V_{CC} = 5.0\text{V}^3$ ,  $Z_0 = 50 \Omega$**

Parameter	Test Conditions	Units	Min.	Typ.	Max.
Output Power	RF Port, 7.4 - 8.2 GHz RF/2 Port, 3.7 - 4.1 GHz	dBm	6 -2	11 2	—
SSB Phase Noise $V_{CC}=V_{BUFFER}=V_{TUNE}=5\text{V}$	RF Port, 10 KHZ Offset RF Port, 100 KHZ Offset	dBc/Hz	—	-92 -117	—
Harmonics/Subharmonics $V_{CC}=V_{BUFFER}=V_{TUNE}=5\text{V}$	RF Port, $\frac{1}{2} F_0$ RF Port, $2 F_0$	dBc	—	-23 -20	—
Pulling (Sensitivity to Match) $V_{CC}=V_{BUFFER}=V_{TUNE}=5\text{V}$	RF Port, VSWR = 1.95:1 to 2.25:1	MHz pk-pk	—	8.5	—
Pushing (Sensitivity to Supply Voltage)	RF Port, $V_{TUNE} = 5 \text{ V}$ RF/2 Port, $V_{TUNE} = 5 \text{ V}$	MHz/V	—	4 2	—
Frequency Drift Rate (Sensitivity to Temperature)	RF Port, 7.4 - 8.2 GHz RF/2 Port, 3.7 - 4.1 GHz	MHz/ $^\circ\text{C}$	—	0.6 0.3	—
Output Return Loss	RF Port, 7.4 - 8.2 GHz RF/2 Port, 3.7 - 4.1 GHz	dB	—	4 8	—
Tuning Sensitivity @ RF Port	$V_{TUNE} = 5 \text{ V}$	GHz/V	—	0.12	—
Supply Current	$I_{TOTAL} (I_{CC} + I_{BUFFER})$ $I_{CC}$ $I_{BUFFER}$	mA	— — —	170 150 20	205 175 30
Tune Voltage	$V_{TUNE}$	V	1	—	13
Tuning Current Leakage	$V_{TUNE} = 13 \text{ V}$	$\mu\text{A}$	—	5	10

3. VCO can operate over the 4.75 V to 5.25 V supply voltage range.

### Absolute Maximum Ratings <sup>4,5,6</sup>

Parameter	Absolute Maximum
Supply Voltage ( $V_{CC}$ & $V_{BUFFER}$ )	+5.5 Vdc
$V_{TUNE}$	0 to +15 Vdc
Storage Temperature	-55 $^\circ\text{C}$ to +150 $^\circ\text{C}$
Operating Temperature	-40 $^\circ\text{C}$ to +85 $^\circ\text{C}$
Case Temperature ( $T_C$ ) (measured @ exposed pad)	+100 $^\circ\text{C}$
Junction Temperature <sup>7</sup>	+135 $^\circ\text{C}$

- Exceeding any one or combination of these limits may cause permanent damage to this device.
- MACOM does not recommend sustained operation near these survivability limits.
- Operating at nominal conditions with  $T_J \leq +135^\circ\text{C}$  will ensure MTBF >  $2.5 \times 10^6$  hours.
- Junction Temperature ( $T_J$ ) =  $T_C + \Theta_{jc} * (V * I)$   
Typical thermal resistance ( $\Theta_{jc}$ ) = 35 $^\circ\text{C/W}$ .
  - For  $T_C = 25^\circ\text{C}$ ,  $T_J = 55^\circ\text{C}$  @ 5 V, 170 mA
  - For  $T_C = 85^\circ\text{C}$ ,  $T_J = 116^\circ\text{C}$  @ 5 V, 175 mA

### Handling Procedures

Please observe the following precautions to avoid damage:

### Static Sensitivity

Gallium Arsenide Integrated Circuits are sensitive to electrostatic discharge (ESD) and can be damaged by static electricity. Proper ESD control techniques should be used when handling these devices.



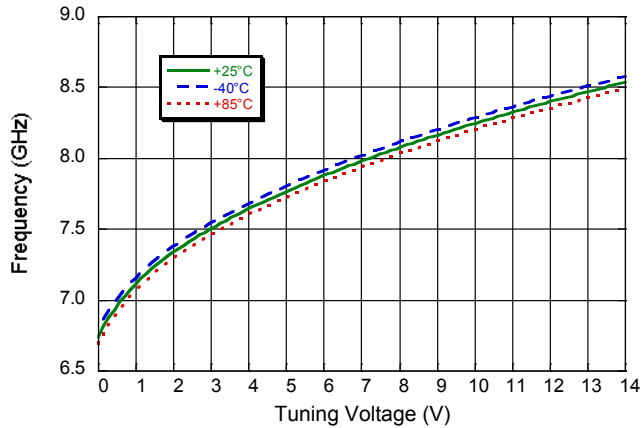
**ESD Rating: Class 1A**

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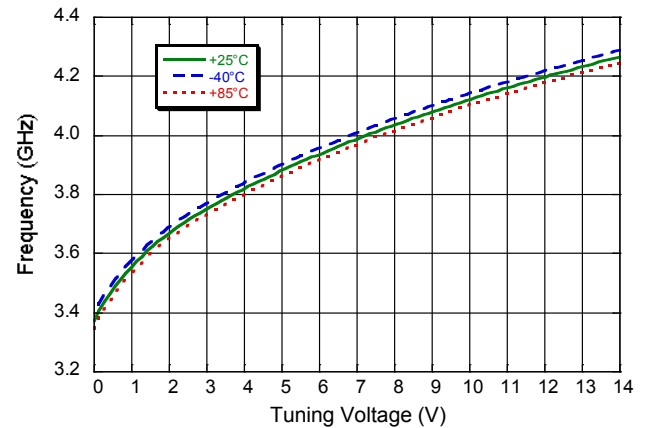
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Typical Performance Curves:  $V_{CC} = V_{BUFFER} = 5V$ ,  $T_A = +25^\circ C$  (unless otherwise indicated)

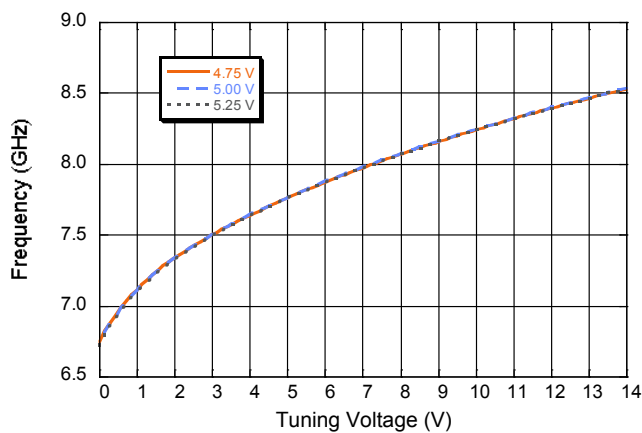
Output Frequency vs. Tuning Voltage - RF Port



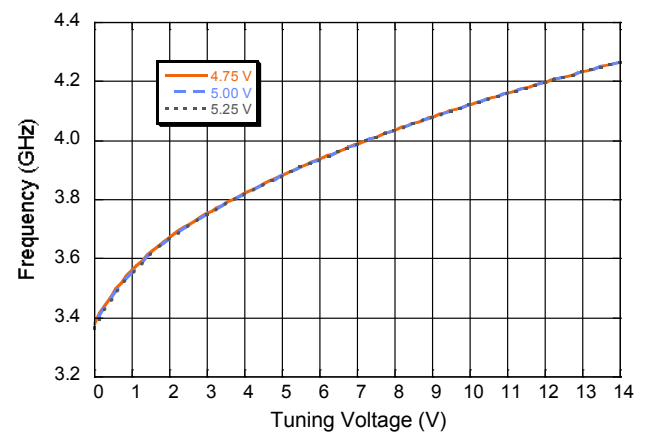
Output Frequency vs. Tuning Voltage - RF/2 Port



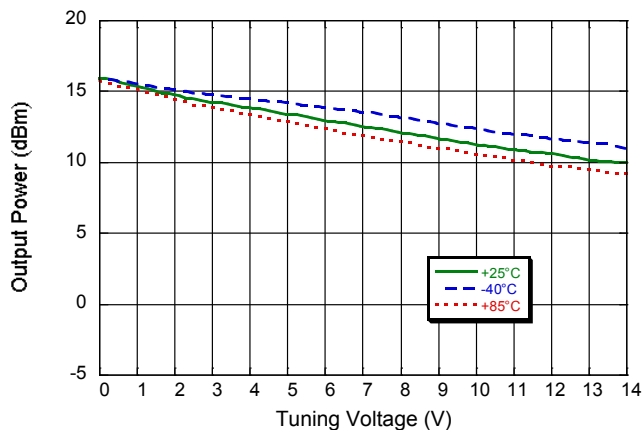
Output Frequency vs. Tuning / Supply Voltage - RF Port



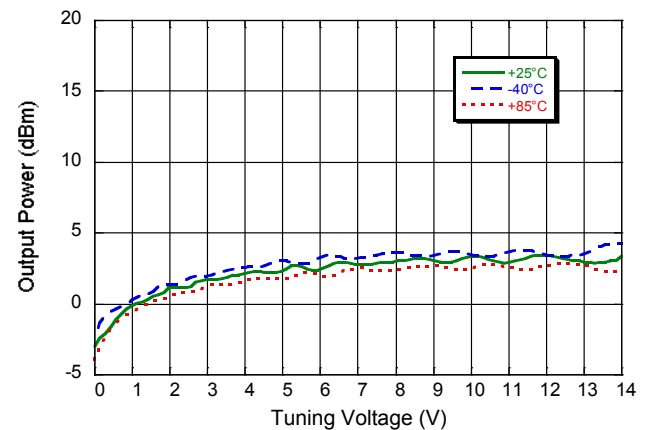
Output Frequency vs. Tuning / Supply Voltage - RF/2 Port



Output Power vs. Tuning Voltage - RF Port



Output Power vs. Tuning Voltage - RF/2 Port

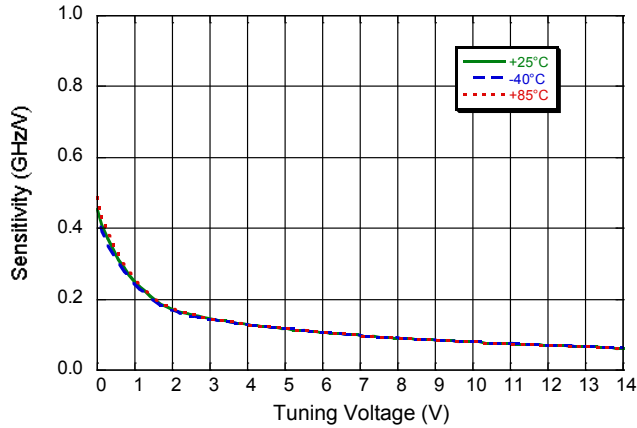


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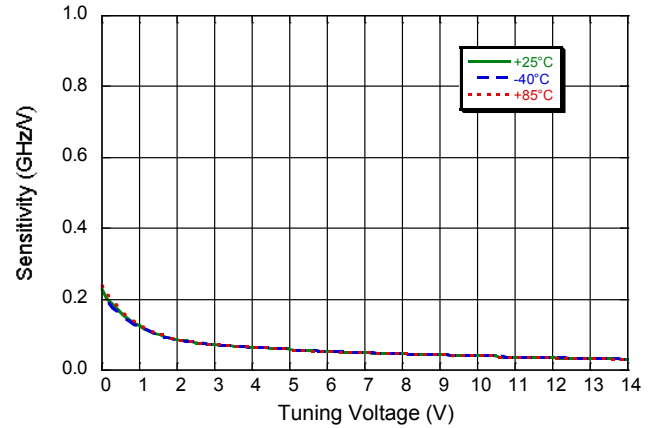
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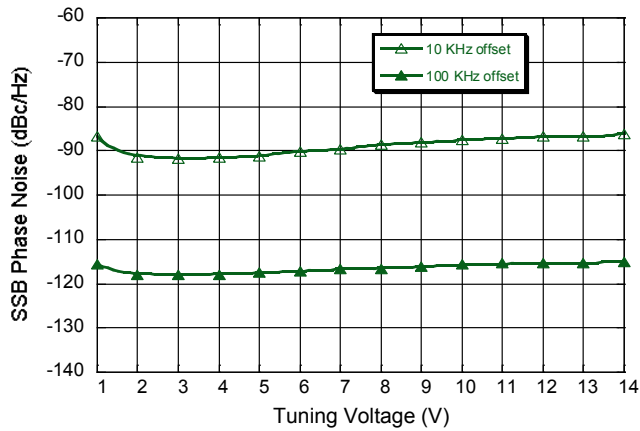
Frequency Sensitivity vs. Tuning Voltage - RF Port



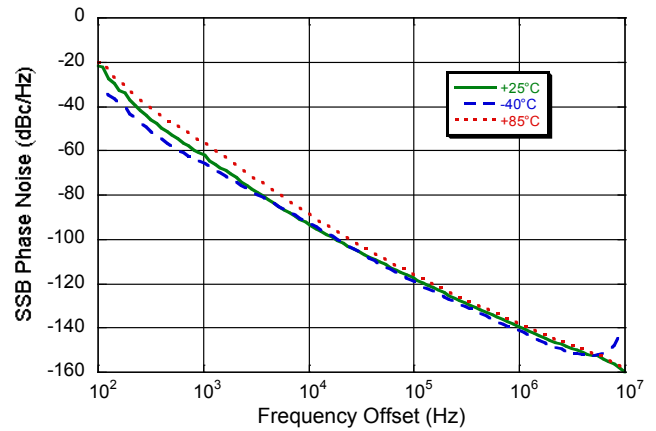
Frequency Sensitivity vs. Tuning Voltage - RF/2 Port



Single Side Band Phase Noise vs. Tuning Voltage  
RF Port



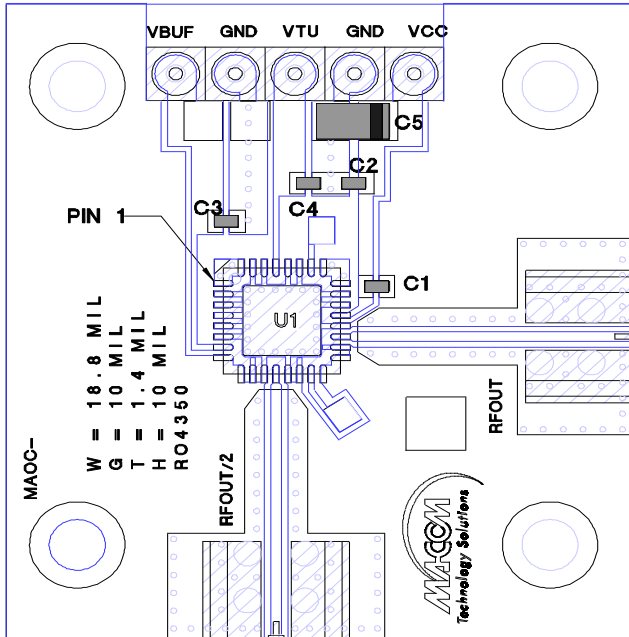
Single Side Band Phase Noise vs. Frequency Offset  
RF Port ( $V_{TUNE} = 5V$ )



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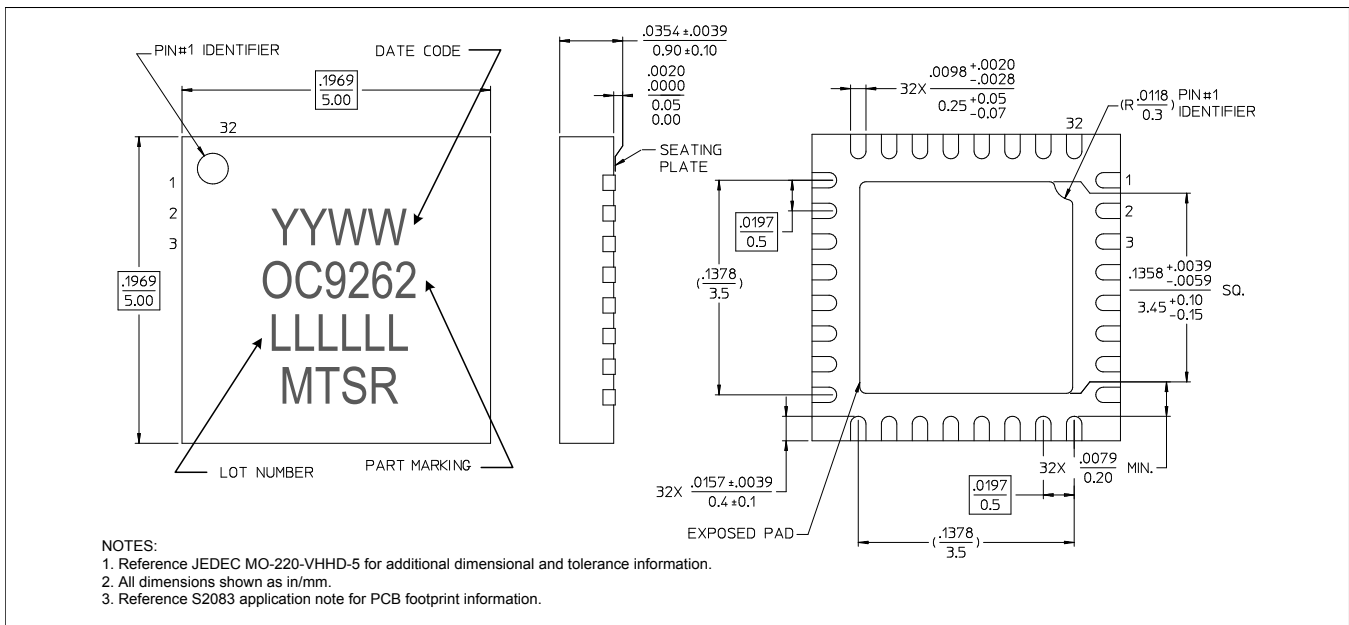
### Sample Board



### Parts List

Component	Value	Case Size
C1	100 pF	0402
C2, C3, C4	0.1 $\mu$ F	0402
C5	10 $\mu$ F Tantalum	1206

### Lead-Free 5 mm 32-Lead PQFN<sup>†</sup>



<sup>†</sup> Reference Application Note S2083 for lead-free solder reflow recommendations.  
Meets JEDEC moisture sensitivity level 3 requirements.  
Plating is 100% matte tin over copper.

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