

Voltage Controlled Oscillator

11.0 – 11.82 GHz

Rev. V5

Electrical Specifications: $T_A = +25^\circ\text{C}$, $V_{CC} = V_{BUFFER} = 5\text{ V}^3$, $Z_0 = 50\ \Omega$

| Parameter | Test Conditions | Units | Min. | Typ. | Max. |
|---|--|---------------|-------------|------------------|------------------|
| Output Power | RF Port, 11.0 - 11.82 GHz RF/2 Port, 5.5 - 5.91 GHz | dBm | 5 2 | 7 5 | — |
| SSB Phase Noise | RF Port, 10 kHz Offset RF Port, 100 kHz Offset | dBc/Hz | — | -83 -112 | — -108 |
| Harmonics/Subharmonics $V_{CC}=V_{BUFFER}=V_{TUNE}=5\text{V}$ | RF Port, $\frac{1}{2} F_o$ RF/2 Port, $2F_o$ | dBc | — | -20 -9 | — |
| 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 | — | 11.0 | — |
| Pushing (Sensitivity to Supply Voltage) | RF Port, $V_{TUNE} = 5\text{ V}$ RF/2 Port, $V_{TUNE} = 5\text{ V}$ | MHz/V | — | 5 2.5 | — |
| Frequency Drift Rate (Sensitivity to Temperature) | RF Port, 11.0 - 11.82 GHz RF/2 Port, 5.5 - 5.91 GHz | MHz/°C | — | 0.8 0.5 | — |
| Output Return Loss | RF Port, 11.0 - 11.82 GHz RF/2 Port, 5.5 - 5.91 GHz | dB | — | 3 5 | — |
| Tuning Sensitivity @ RF Port | $V_{TUNE}=5\text{ V}$ | GHz/V | — | 0.19 | — |
| Supply Current | $I_{TOTAL} (I_{CC} + I_{BUFFER})$ I_{CC} I_{BUFFER} | mA | — — — | 165 145 20 | 195 165 30 |
| Tune Voltage | V_{TUNE} | V | 2 | — | 13 |
| Tuning Current Leakage | $V_{TUNE}=13\text{ V}$ | μA | — | 5 | 10 |

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

Absolute Maximum Ratings^{4,5}

| Parameter | Absolute Maximum |
|--|------------------|
| Supply Voltage (V_{CC} & V_{BUFFER}) | +5.5 Vdc |
| V_{TUNE} | 0 to +15 Vdc |
| Storage Temperature | -55°C to +150°C |
| Operating Temperature ⁶ | -40°C to +85°C |
| Case Temperature (T_C) (measured @ exposed pad) | +100°C |
| Junction Temperature ⁷ | +135°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 $\text{MTTF} > 1 \times 10^6$ hours.
- Junction Temperature (T_J) = $T_C + \Theta_{jc} * (V * I)$
Typical thermal resistance (Θ_{jc}) = 35°C/W .
 - For $T_C = 25^\circ\text{C}$, $T_J = 53.9^\circ\text{C}$ @ 5 V, 165 mA
 - For $T_C = 85^\circ\text{C}$, $T_J = 114.8^\circ\text{C}$ @ 5 V, 170 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 Class 1B devices.



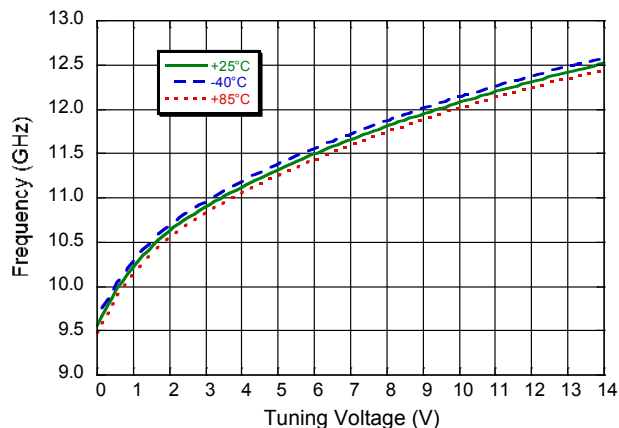
ESD Rating: 1B

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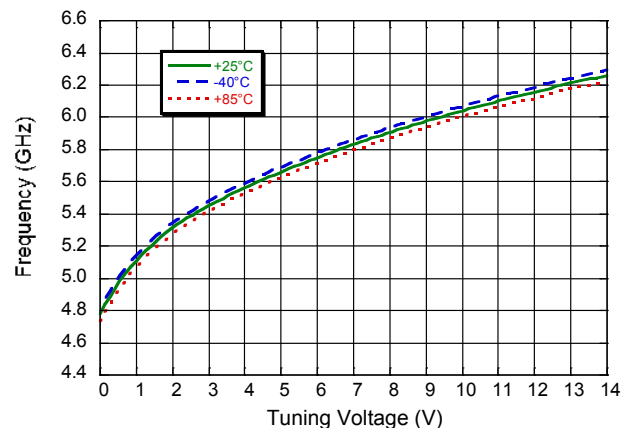
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Typical Performance Curves: $V_{CC} = V_{BUFFER} = 5V$, $T_A = +25^\circ C$ (unless otherwise indicated)

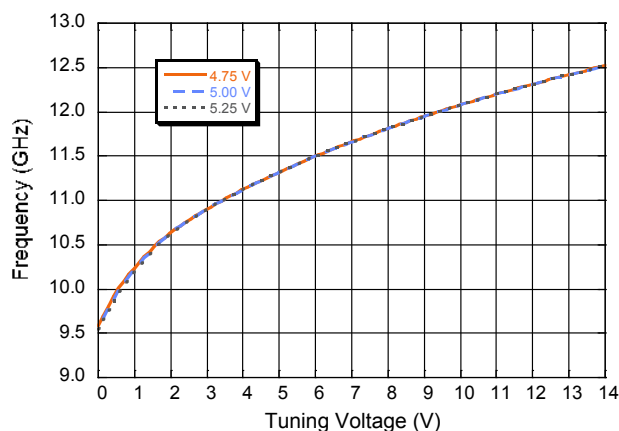
Output Frequency vs. Tuning Voltage - RF Port



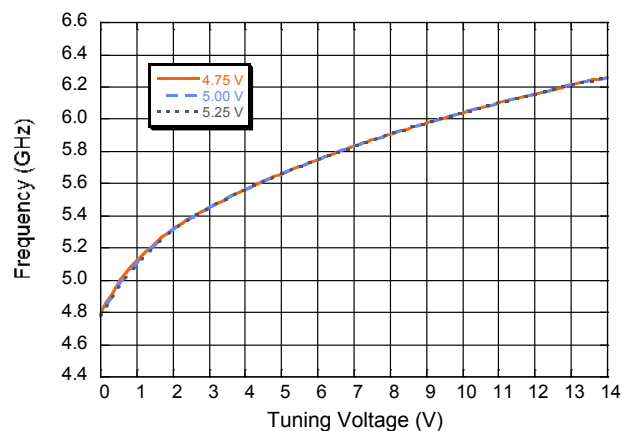
Output Frequency vs. Tuning Voltage - RF/2 Port



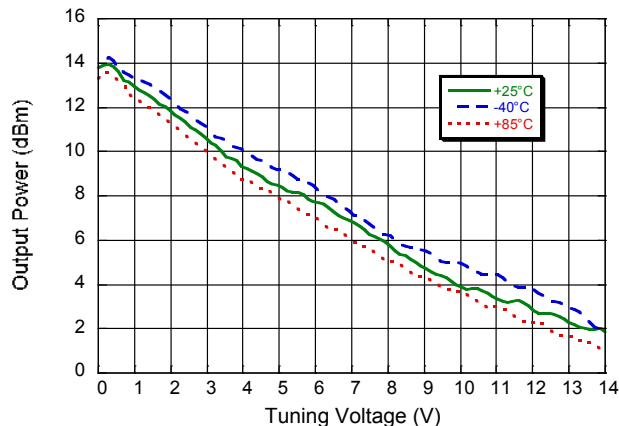
Output Frequency vs. Tuning / Supply Voltage - RF Port



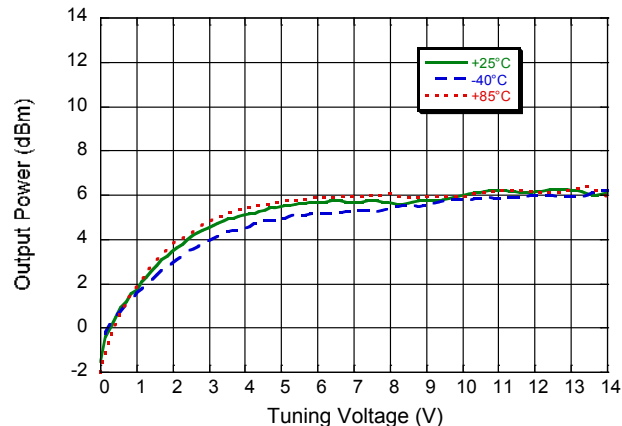
Output Frequency vs. Tuning / Supply Voltage - RF2 Port



Output Power vs. Tuning Voltage - RF Port



Output Power vs. Tuning Voltage - RF2 Port

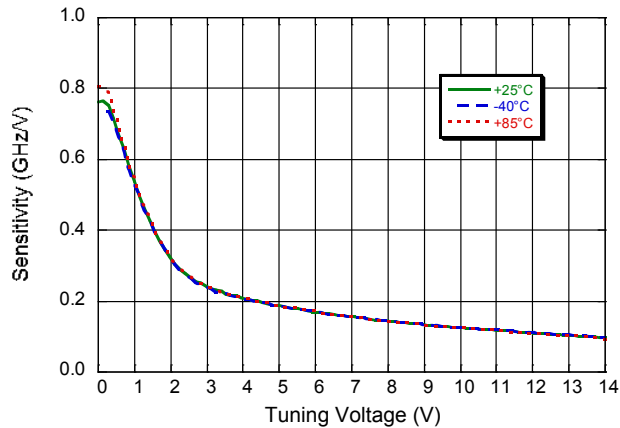


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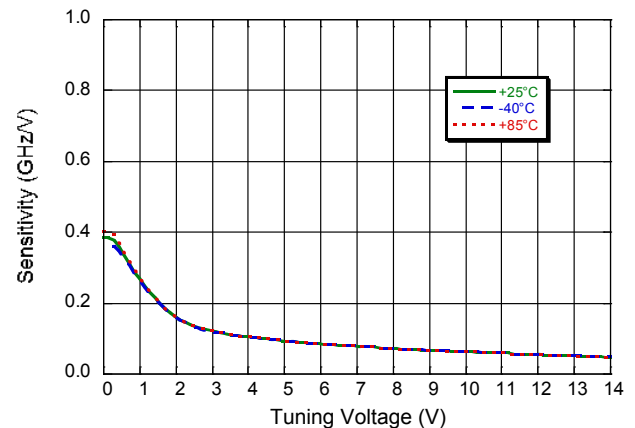
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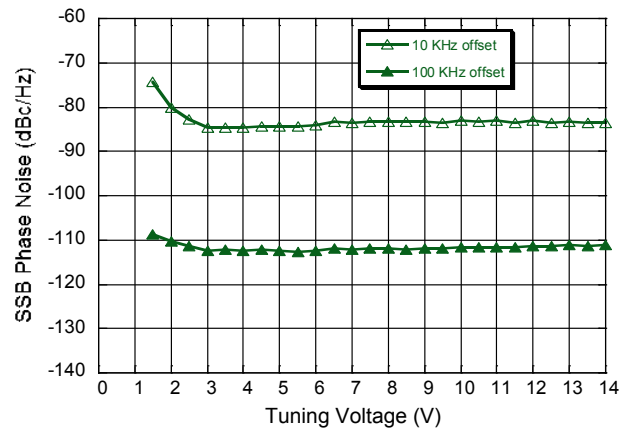
Frequency Sensitivity vs. Tuning Voltage - RF Port



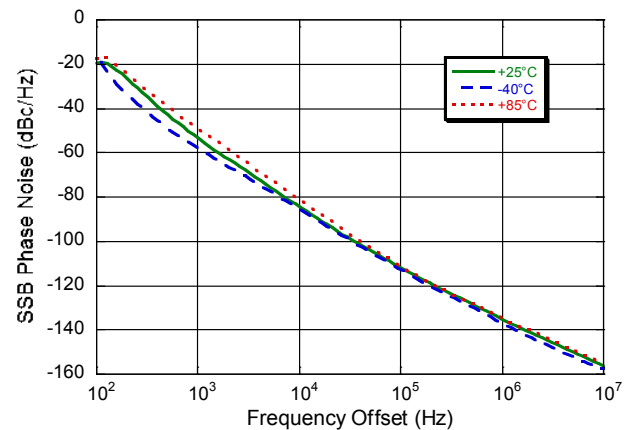
Frequency Sensitivity vs. Tuning Voltage - RF2 Port



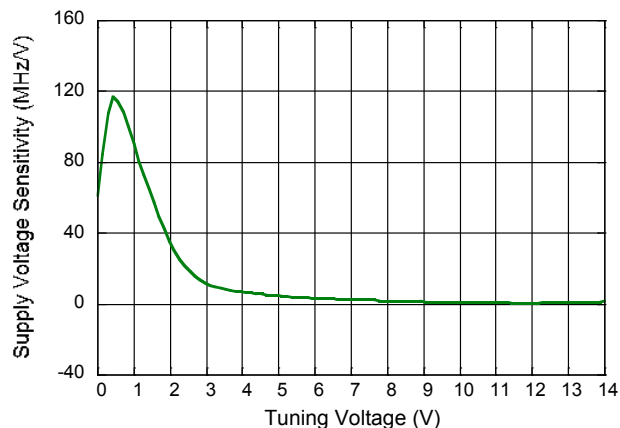
**Single Side Band Phase Noise vs. Tuning Voltage
RF Port**



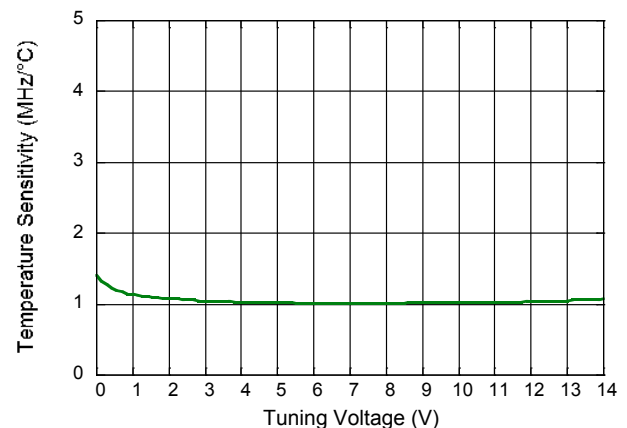
**Single Side Band Phase Noise vs. Frequency Offset
RF Port ($V_{TUNE} = 5V$)**



Pushing - RF Port



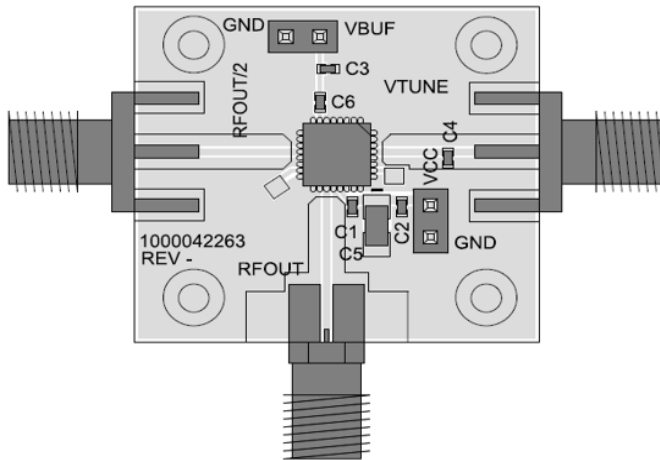
Temperature Drift - RF Port



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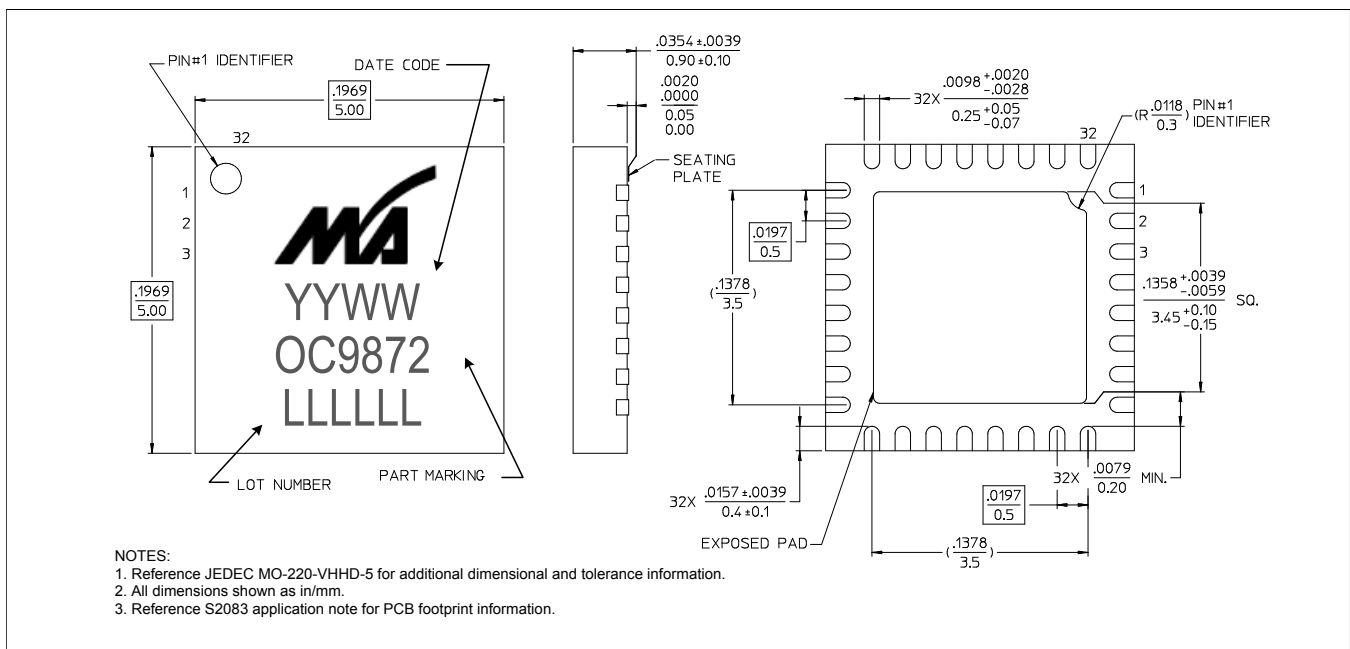
Sample Board



Parts List

| Component | Value | Case Size |
|------------|---------------------|-----------|
| C1 | 100 pF | 0402 |
| C2, C3, C4 | 0.1 μ F | 0402 |
| C5 | 10 μ F Tantalum | 1206 |
| C6 | 0 Ω | 0402 |

Lead-Free 5 mm 32-Lead PQFN[†]



[†] Reference Application Note S2083 for lead-free solder reflow recommendations.
Meets JEDEC moisture sensitivity level 1 requirements.
Plating is 100% matte tin over copper.

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