MAOC-109082

Voltage Controlled Oscillator
8714 - 9450MHz

Rev. V1

Features

- Phase Noise: -88/-117dBc/Hz @ 10/100kHz
- Wide Tuning Range
- Low Current Consumption: 90 mA
- Excellent Temperature Stability
- Proven Microphonic Performance
- +5 V Bias
- Lead-Free 5 mm 32-Lead Package
- RoHS* Compliant and 260°C Reflow Compatible

Description

The MAOC-109082 is a voltage controlled oscillator for frequency generation. No external matching components are required. This VCO is easily integrated into a phase lock loop using the divide-by-two output. The extremely low phase noise makes this part ideal for many radio applications including high capacity digital radios.

The MAOC-109082 primary applications are Point-to-Point Radio, Point-to-Multipoint Radio, Communications Systems, and Low Phase Noise applications.

The 5 mm package has a lead-free finish that is RoHS compliant and compatible with a 260ºC reflow temperature. The package features low lead inductance and an excellent thermal path.

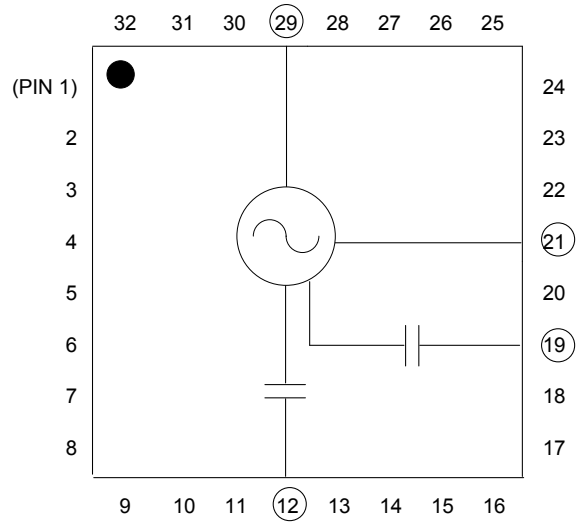
Ordering Information[1]

Part Number	Package
MAOC-109082-TR0500	500 piece reel
MAOC-109082-TR1000	1000 piece reel
MAOC-109082-SMB	Sample Board

1. Reference Application Note M513 for reel size information.

- Restrictions on Hazardous Substances, European Union Directive 2002/95/EC.

Block Diagram



Pin Designations[2]

Pin	Function	Pin	Function
1	N/C	17	N/C
2	N/C	18	N/C
3	N/C	19	RF
4	N/C	20	N/C
5	N/C	21	V_{CC}
6	N/C	22	N/C
7	N/C	23	N/C
8	N/C	24	N/C
9	N/C	25	N/C
10	N/C	26	N/C
11	N/C	27	N/C
12	RF/2	28	N/C
13	N/C	29	V_{TUNE}
14	N/C	30	N/C
15	N/C	31	N/C
16	N/C	32	N/C
		33[3]	GND

2. Connecting all N/C pins to RF/DC ground in the layout is also recommended.
3. The exposed pad centered on the package bottom must be connected to RF, DC and thermal ground.

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Electrical Specifications: T_A = +25°C, V_{CC} = 5.0 V[4], Z_0 = 50 Ω

Parameter	Test Conditions	Units	Min.	Typ.	Max.
Output Power	RF Port, 8714- 9450MHz RF/2 Port, 4357- 4725MHz	dBm	5 -2	9 2	—
SSB Phase Noise	RF Port, 10 kHz Offset, 8714 - 9450MHz RF Port, 100 kHz Offset, 8714 - 9450MHz	dBc/Hz	—	-90 -117	— -115
Harmonics/Subharmonics V_{CC}=V_{TUNE}=5V	RF Port, $^1/_2$ F_o RF Port, $^3/_2$ F_o RF Port, $2F_o$ RF/2 Port, $2F_o$ RF/2 Port, $3F_o$	dBc	—	-28.0 -37.0 -30.0 -15.0 -50.0	—
Pulling (Sensitivity to Match) V_{CC}=V_{TUNE}=5V	RF Port, VSWR = 1.95:1 to 2.25:1	MHz pk-pk	—	6.6	—
Pushing (Sensitivity to Supply Voltage)	RF Port, V_{TUNE} = 5 V RF/2 Port, V_{TUNE} = 5 V	MHz/V	—	10 5	—
Frequency Drift Rate (Sensitivity to Temperature)	RF Port, 8714 - 9450 MHz RF/2 Port, 4357 - 4725 MHz	MHz/ºC	—	1.0 0.5	—
Output Return Loss	RF Port, 8714 - 9450 MHz RF/2 Port, 4357 - 4725 MHz	dB	—	5 15	—
Tuning Sensitivity @ RF Port	V_{TUNE}=5 V	GHz/V	—	0.17	—
Supply Voltage	V_{CC}	Vdc	4.75	5.0	5.25
Supply Current	I_{CC}	mA	—	90	—
Tune Voltage	V_{TUNE}	V	2	—	11.5
Tuning Current Leakage	V_{TUNE}=13 V	µA	—	5	10

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

Absolute Maximum Ratings[5,6,7]

Parameter	Absolute Maximum
V_{CC}	+5.5 V
Storage Temperature	-55ºC to +150ºC
Operating Temperature T_{op}	-40ºC to +85ºC

5. Exceeding any one or combination of these limits may cause permanent damage to this device.
6. MACOM does not recommend sustained operation near these survivability limits.
7. Operating at nominal conditions with T_J ≤ +150°C will ensure MTBF > 1 x 10^6 hours.
8. Typical thermal resistance (Θjc) = 93.8°C/W.

Handling Procedures

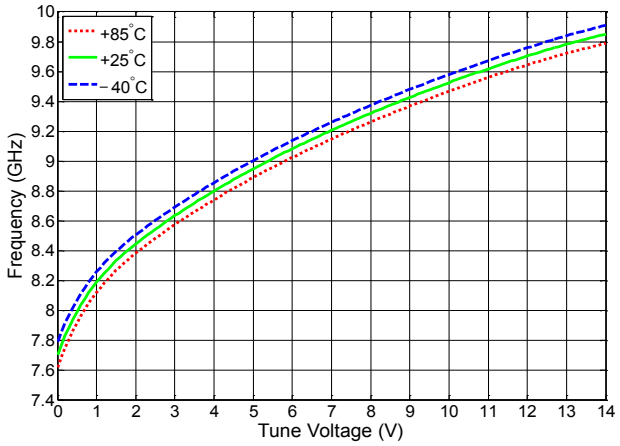
Please observe the following precautions to avoid damage:

Static Sensitivity

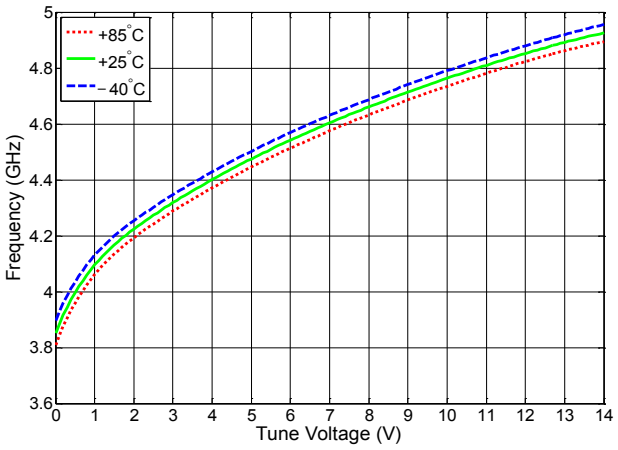
These electronic devices are sensitive to electrostatic discharge (ESD) and can be damaged by static electricity. Proper ESD control techniques should be used when handling these HBM Class 1C devices.

Typical Performance Curves: V_{CC} = 5V, T_A = +25°C (unless otherwise indicated)

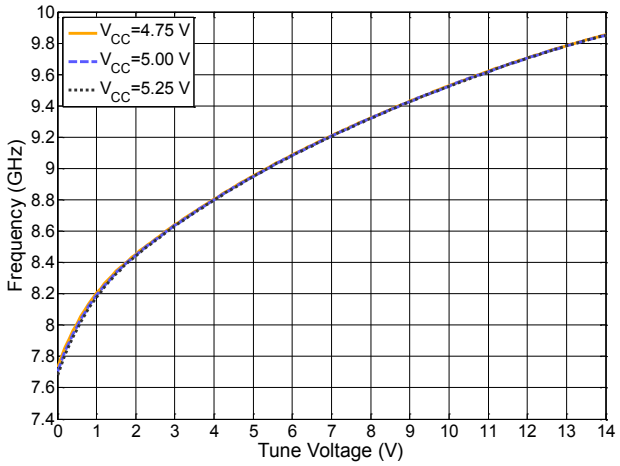
Output Frequency vs. Tune Voltage - RF Port



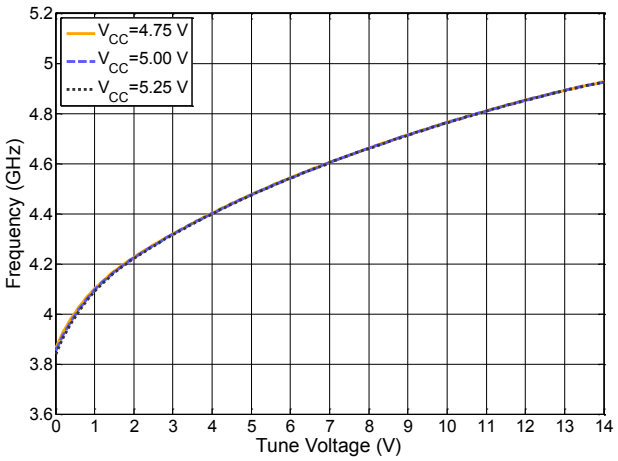
Output Frequency vs. Tune Voltage - RF/2 Port



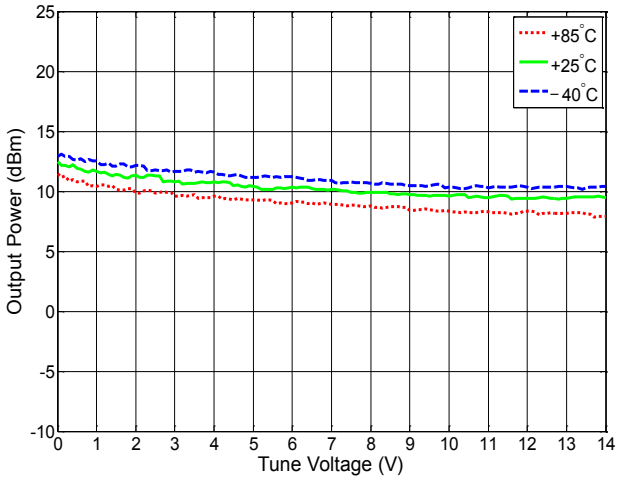
Output Frequency vs. Tune/Supply Voltage - RF Port



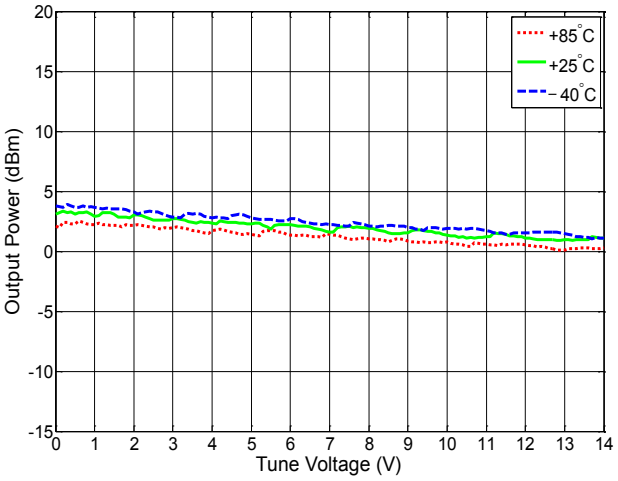
Output Frequency vs. Tune/Supply Voltage - RF/2 Port



Output Power vs. Tune Voltage - RF Port

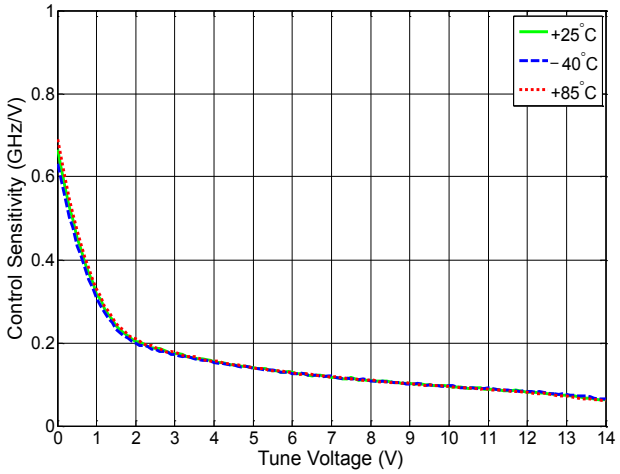


Output Power vs. Tune Voltage - RF/2 Port

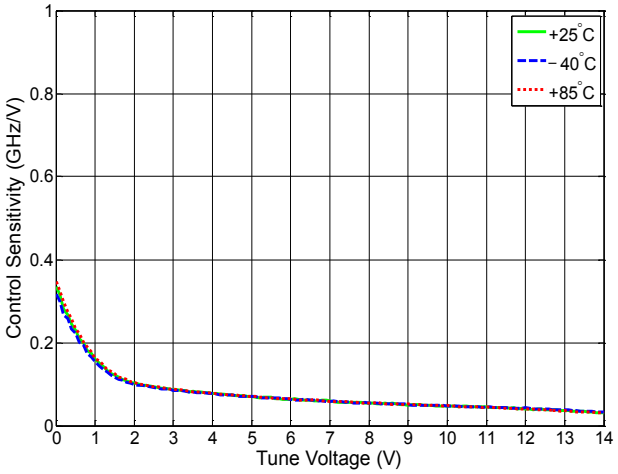


Typical Performance Curves: V_{CC} = 5V, T_A = +25°C (unless otherwise indicated)

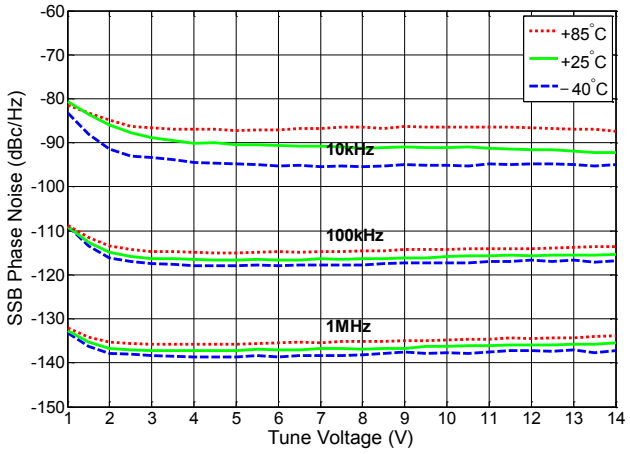
Frequency Sensitivity vs. Tune Voltage - RF Port



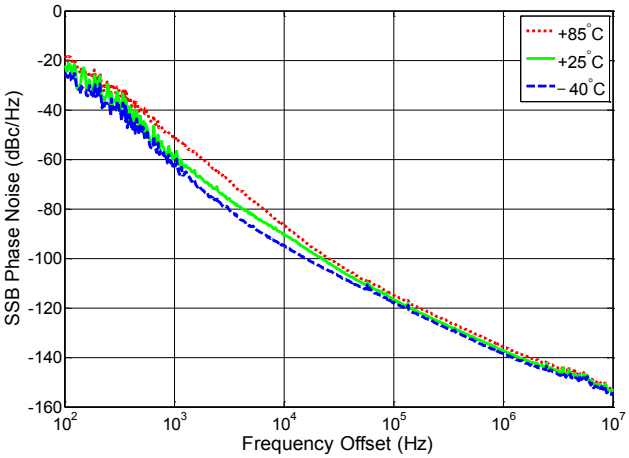
Frequency Sensitivity vs. Tune Voltage - RF/2 Port



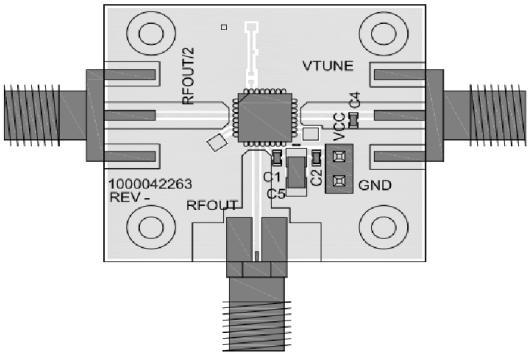
Phase Noise vs. Tune Voltage - RF Port



Phase Noise vs. Frequency Offset - RF Port (V_{TUNE}=5V)



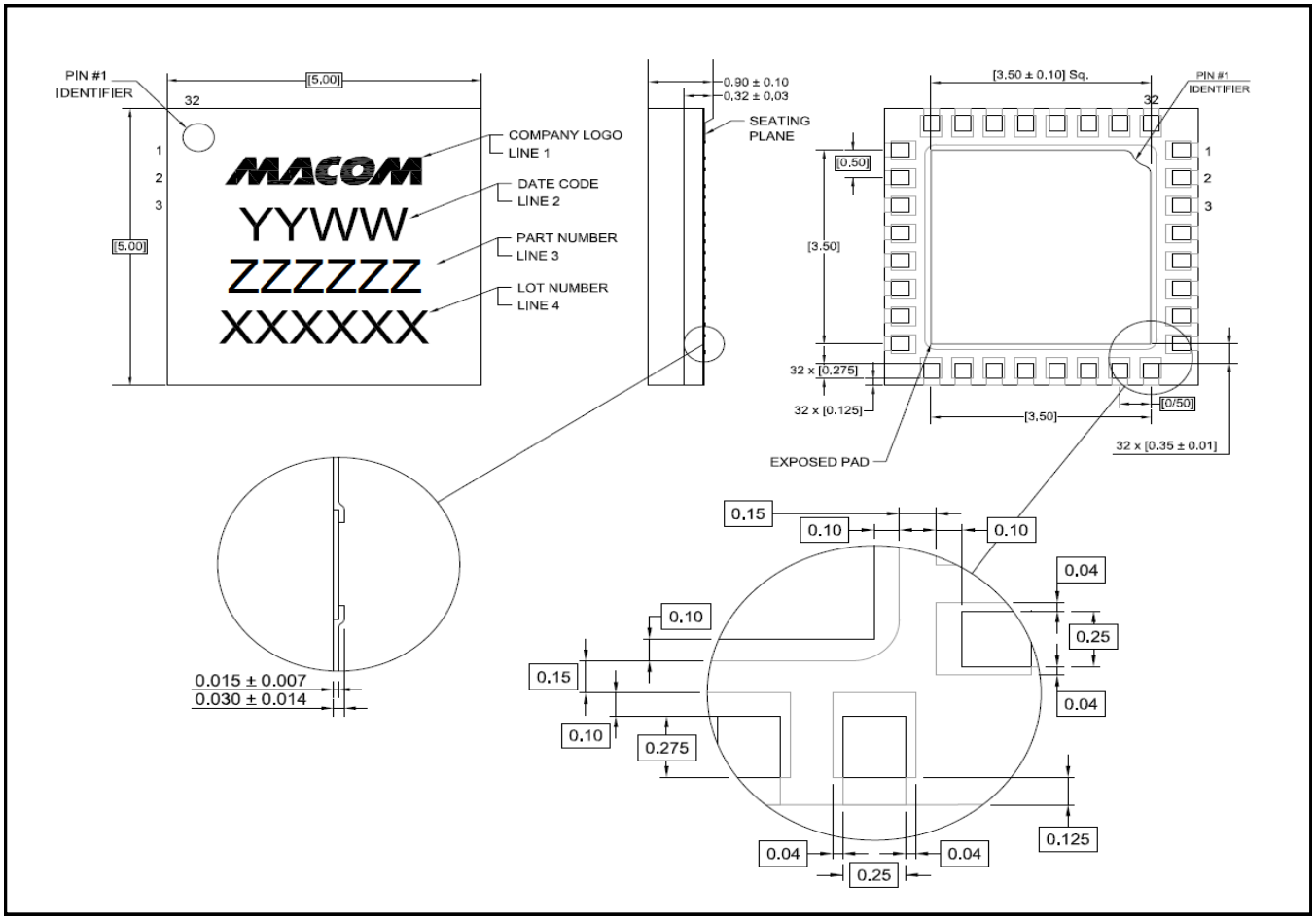
Sample Board



Parts List

Component	Value	Case Size
C1	100 pF	0402
C2, C4	0.1 µF	0402
C5	10 µF Tantalum	1206

Lead-Free 5 mm 32-Lead Package†



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