MAOC-009259-PKG003

Voltage Controlled Oscillator
5.7 - 6.4 GHz

Preliminary: Rev. V3P

Features

- Low Phase Noise
- Wide Tuning Range
- Divide-by-Two Output
- Integrated Buffer Amplifier
- Excellent Temperature Stability
- +5V Bias Supply
- Lead-Free 5 mm 32-Lead PQFN Package
- Halogen-Free "Green" Mold Compound
- RoHS* Compliant and 260°C Reflow Compatible

Description

The MAOC-009259 is an InGaP HBT-based 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-009259 primary applications are Point-to-Point Radio, Point-to-Multipoint Radio, Communications Systems, and Low Phase Noise applications.

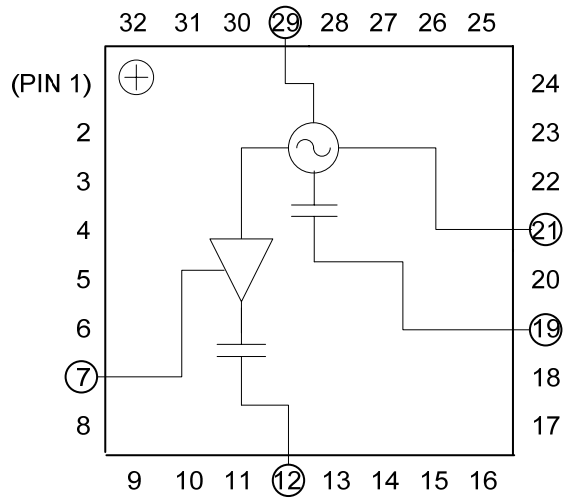
The 5 mm PQFN package has a lead-free finish that is RoHS compliant and compatible with a 260ºC reflow temperature. The package also features low lead inductance and an excellent thermal path. The MTTF is 1,000,000 hours at a 150ºC junction temperature.

Ordering Information[1,2]

Part Number	Package
MAOC-009259-TR0500	500 piece reel
MAOC-009259-TR1000	1000 piece reel
MAOC-009259-SMB003	Sample Board

1. Reference Application Note M513 for reel size information.
2. All sample boards include 5 loose parts.

Block Diagram



Pin Designations[3]

Pin	Function	Pin	Function
1	N/C	17	N/C
2	N/C	18	N/C
3	N/C	19	Fo
4	N/C	20	N/C
5	N/C	21	V_{CC}
6	N/C	22	N/C
7	V_{BUFFER}	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	Fo/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

3. The exposed pad centered on the package bottom must be connected to RF and DC ground.

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

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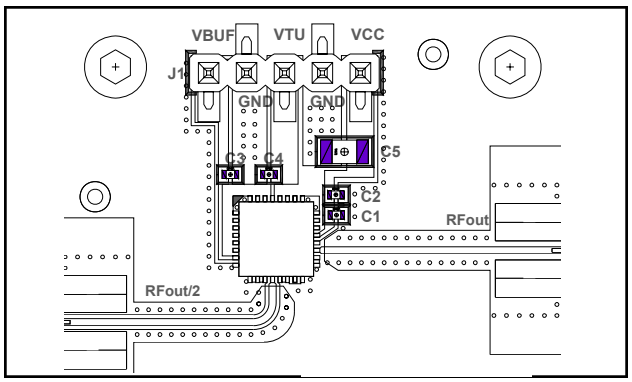
Voltage Controlled Oscillator
5.7 - 6.4 GHz

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

Parameter	Test Conditions	Units	Min.	Typ.	Max.
Tune Voltage	V_{TUNE}	V	1	—	13
Output Power	RF Port, 5.7 - 6.4 GHz RF/2 Port, 2.85 - 3.2 GHz	dBm	—	12 2.0	—
SSB Phase Noise V_{CC}=V_{BUFFER}=V_{TUNE}=5V	RF Port, 10KHZ Offset, 5.7 - 6.4 GHz RF Port, 100KHZ Offset, 2.85 - 3.2 GHz	dBc/Hz	—	-90 -117	—
Harmonics/Subharmonics V_{CC}=V_{BUFFER}=V_{TUNE}=5V	RF Port, $^1/_2$ F_o, 5.7 - 6.4 GHz RF Port, $^3/_2$ F_o, 5.7 - 6.4 GHz RF Port, 2 F_o, 5.7 - 6.4 GHz RF Port, $^5/_2$ F_o, 5.7 - 6.4 GHz	dBc	—	27 54 20 53	—
	RF/2 Port, 2F_o, 2.85 - 3.2 GHz RF/2 Port, 3F_o, 2.85 - 3.2 GHz RF/2 Port, 4F_o, 2.85 - 3.2 GHz RF/2 Port, 5F_o, 2.85 - 3.2 GHz	dBc	—	1.3 22 24 40	—
Pulling (Sensitivity to Match) V_{CC}=V_{BUFFER}=V_{TUNE}=5V	RF Port, VSWR = 1.95:1 to 2.25:1	MHz pk-pk	—	6.7	—
Pushing (Sensitivity to Supply Voltage)	RF Port, 5.7 - 6.4 GHz RF/2 Port, 2.85 - 3.2 GHz	MHz/V	—	17.5 1.5	—
Frequency Drift Rate (Sensitivity to Temperature)	RF Port, 5.7 - 6.4 GHz RF/2 Port, 2.85 - 3.2 GHz	MHz/ºC	—	.5 .25	—
Output Return Loss	RF Port, 5.7 - 6.4 GHz RF/2 Port, 2.85 - 3.2 GHz	dB	—	-5 -11	—
Supply Current	I_{CC} + I_{BUFFER}	mA		185	—
Control Current Leakage	V_{TUNE}=13V	µA	—	-6	—

Sample Board



Parts List

Component	Value	Case Size
C1, C3, C4	100 pF	0402
C2	0.1 µF	0402
C5	10 µF Tantalum	1206

Absolute Maximum Ratings[4,5]

Parameter	Absolute Maximum
V_{CC} (VCO & Buffer)	+6V
Storage Temperature	-55ºC to +150ºC
Operating Temperature	-40ºC to +85ºC

4. Exceeding any one or combination of these limits may cause permanent damage to this device.
5. M/A-COM Technology does not recommend sustained operation near these survivability limits.

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

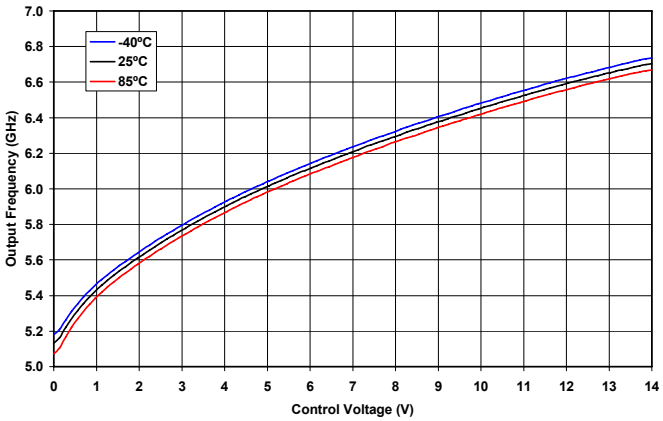

Figure 1: Frequency vs. Control Voltage and Temperature - RF Port

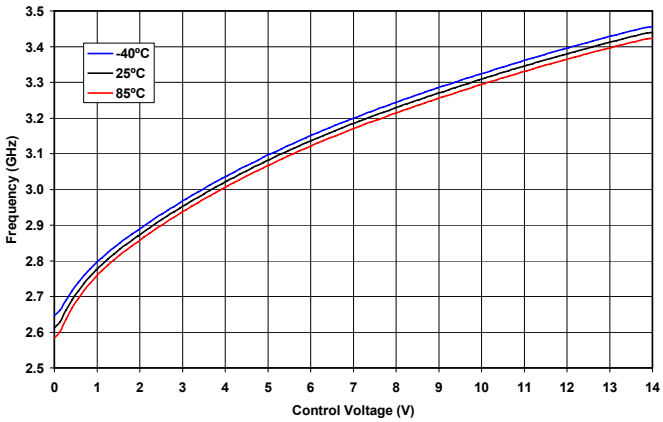

Figure 2: Frequency vs. Control Voltage and Temperature - RF/2 Port

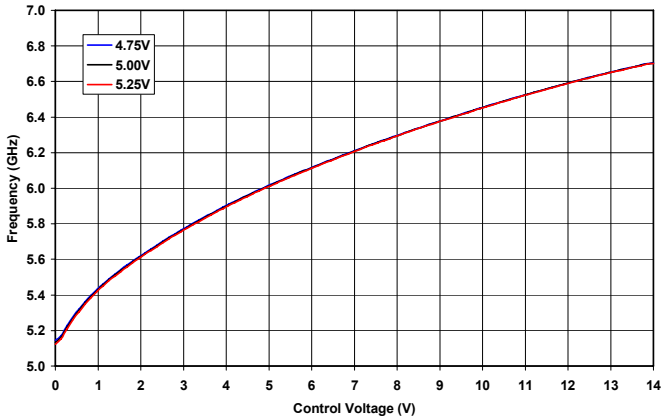

Figure 3: Frequency vs. Control Voltage and Supply Voltage - RF Port

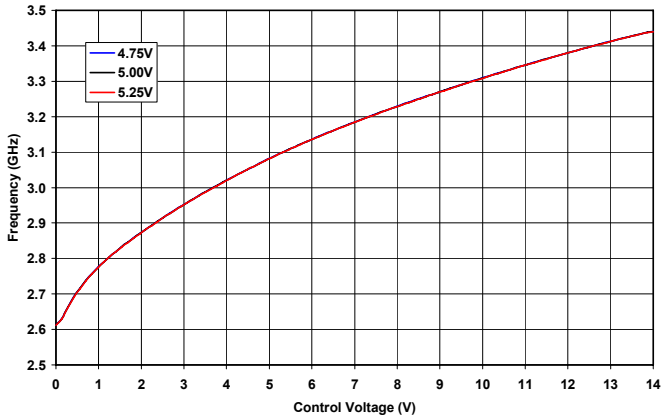

Figure 4: Frequency vs. Control Voltage and Supply Voltage - RF/2 Port

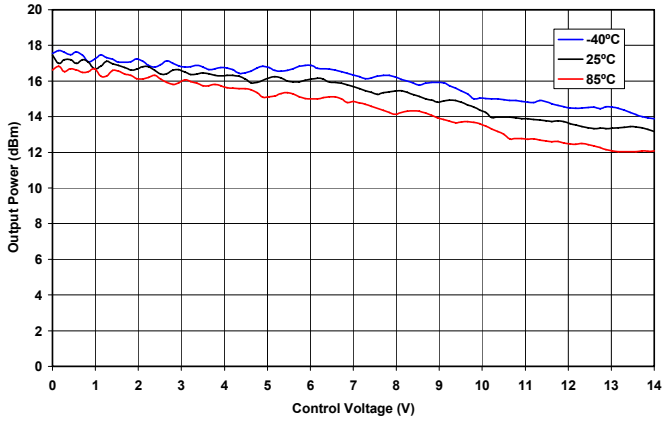

Figure 5: Output Power vs. Control Voltage and Temperature - RF Port

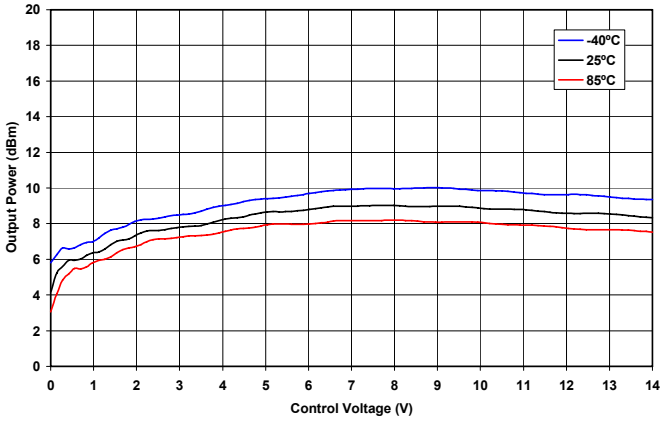

Figure 6: Output Power vs. Control Voltage and Temperature - RF/2 Port

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

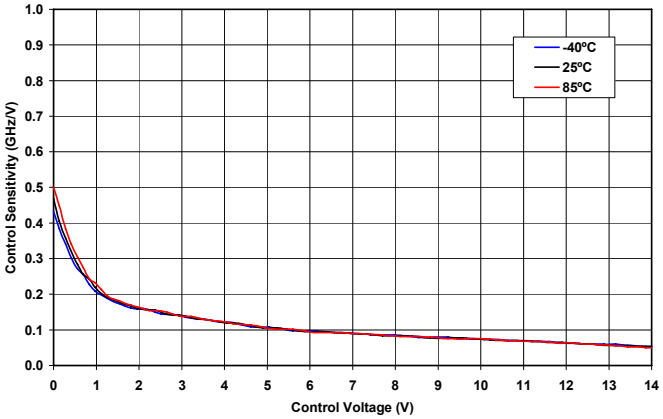

Figure 7: Frequency Sensitivity vs. Control Voltage and Temperature - RF Port

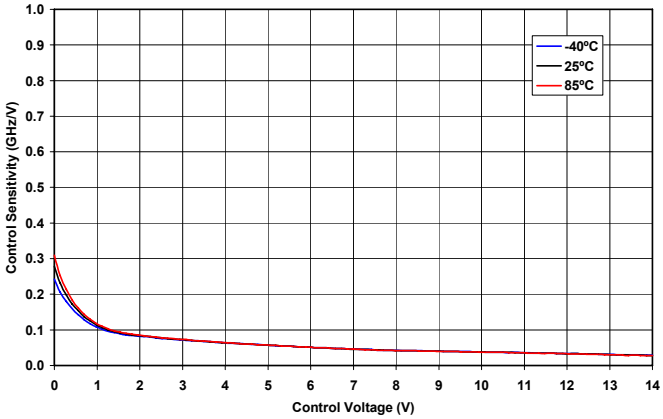

Figure 8: Frequency Sensitivity vs. Control Voltage and Temperature - RF/2 Port

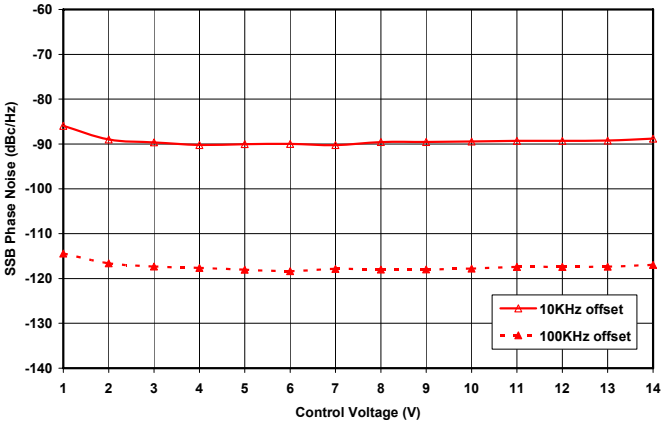

Figure 9: Single Side Band Phase Noise vs. Control Voltage and Offset Frequency

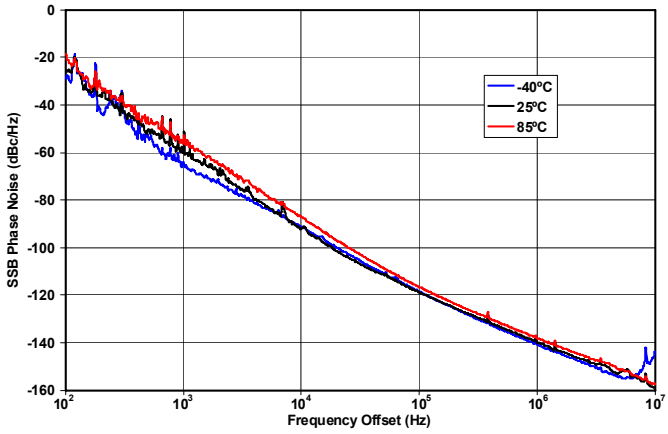

Figure 10: Single Side Band Phase Noise vs. Frequency Offset (Vctrl = 5V)

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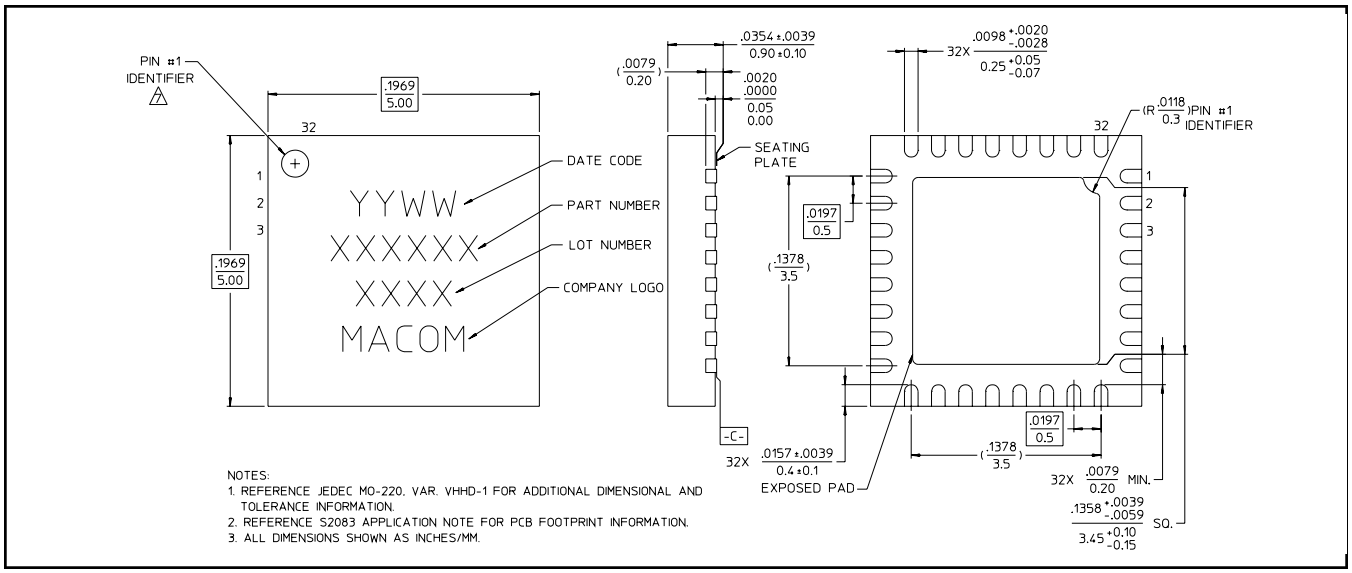
Lead-Free 5 mm 32-Lead PQFN†



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

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: 200 Volts

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