

## 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
- 100% Matte Tin Plating over Copper
- Halogen-Free “Green” Mold Compound
- RoHS\* Compliant and 260°C Reflow Compatible

## Description

The MAOC-009263-PKG003 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 5 mm PQFN package has a lead-free finish that is RoHS compliant and compatible with a 260°C reflow temperature. The package also features low lead inductance and an excellent thermal path. The MTTF is 1,000,000 hours at a 150°C junction temperature.

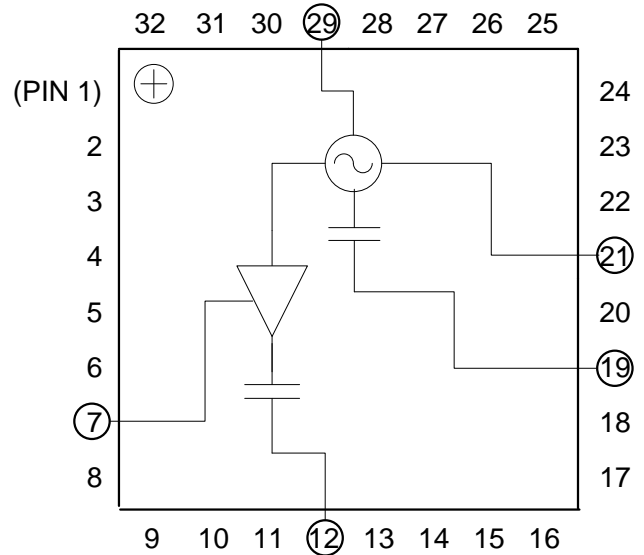
## Primary Applications

- Point-to-Point Radio
- Point-to-Multipoint Radio
- Communications Systems
- Low Phase Noise Applications

## Ordering Information

Part Number	Package
MAOC-009263-TR0500	Tape & Reel, 500 pieces
MAOC-009263-TR1000	Tape & Reel, 1000 pieces
MAOC-009263-SMB003	Sample Board

## Block Diagram



## Pin Designations <sup>1</sup>

Pin	Function	Pin	Function
1	N/C	17	N/C
2	N/C	18	N/C
3	N/C	19	F <sub>o</sub>
4	N/C	20	N/C
5	N/C	21	V <sub>CC</sub>
6	N/C	22	N/C
7	V <sub>BUFFER</sub>	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	F <sub>o/2</sub>	28	N/C
13	N/C	29	V <sub>TUNE</sub>
14	N/C	30	N/C
15	N/C	31	N/C
16	N/C	32	N/C

1. 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 7.8 – 8.7 GHz

Preliminary: Rev. V2P

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

Parameter	Min.	Typ.	Max.	Units
Frequency Range	$F_o$			GHz
	7.8 - 8.7			
Output Power across operating frequency range	$F_o/2$			dBm
	3.9 - 4.35			
SSB Phase Noise $V_{CC}=V_{BUFFER}=V_{TUNE}=5\text{V}$	RF Port, 10KHz Offset	-90		dBc/Hz
	RF Port, 100KHz Offset	-115		
Tune Voltage	$V_{TUNE}$	1	13	V
Supply Current	$I_{CC} + I_{BUFFER}$	190		mA
Control Current Leakage	$V_{TUNE}=13\text{V}$	-2		$\mu\text{A}$
Output Return Loss	RF Port	-6		dB
	RF/2 Port	-7		
Harmonics/Subharmonics $V_{CC}=V_{BUFFER}=V_{TUNE}=5\text{V}$	RF Port, $1/2 F_o$	26		dBc
	RF Port, $3/2 F_o$	45		
	RF Port, $2 F_o$	22		
	RF/2 Port, $2 F_o$	5		
	RF/2 Port, $3 F_o$	19		
Pulling (Sensitivity to Match)	RF Port, VSWR = 1.95:1 to 2.25:1 $V_{CC}=V_{BUFFER}=V_{TUNE}=5\text{V}$	10.3		MHz pk-pk
Pushing (Sensitivity to Supply Voltage)	RF Port	20		MHz/V
	RF/2 Port	2		
Frequency Drift Rate (Sensitivity to Temperature)	RF Port	0.75		MHz/ $^\circ\text{C}$
	RF/2 Port	0.3		

### Absolute Maximum Ratings <sup>2,3</sup>

Parameter	Absolute Maximum
$V_{CC}$ (VCO & Buffer)	+6V
Storage Temperature	-55 $^\circ\text{C}$ to +150 $^\circ\text{C}$
Operating Temperature	-40 $^\circ\text{C}$ to +85 $^\circ\text{C}$

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

### 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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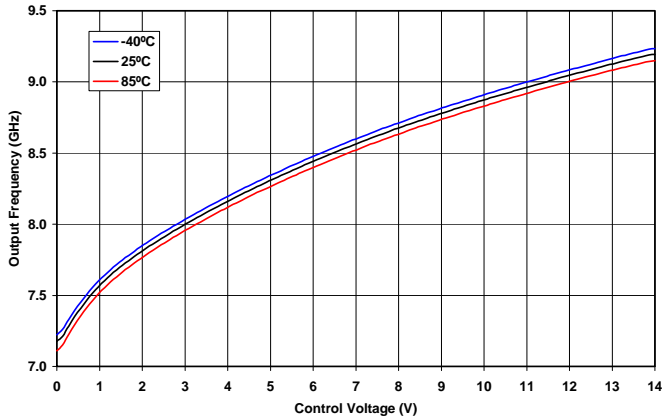


Figure 1: Frequency vs. Control Voltage and Temperature - RF Port

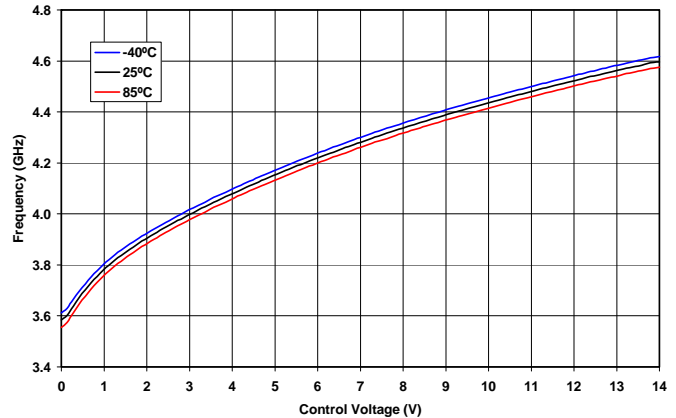


Figure 2: Frequency vs. Control Voltage and Temperature - RF/2 Port

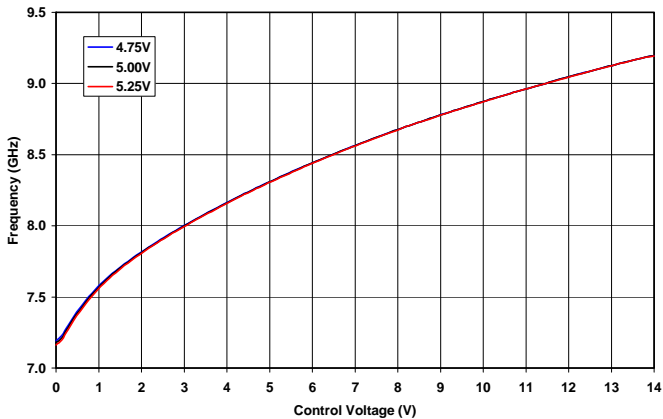


Figure 3: Frequency vs. Control Voltage and Supply Voltage - RF Port

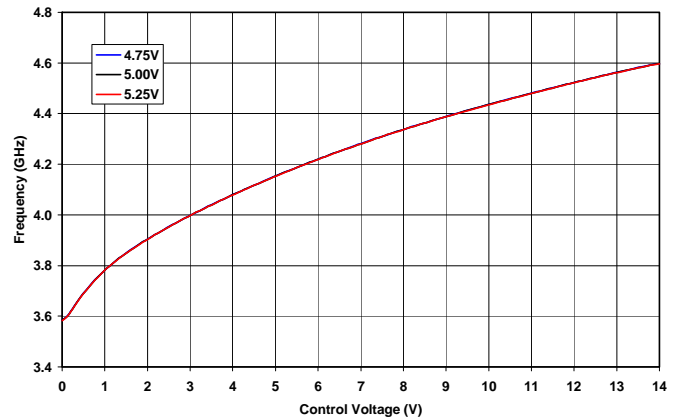


Figure 4: Frequency vs. Control Voltage and Supply Voltage - RF/2 Port

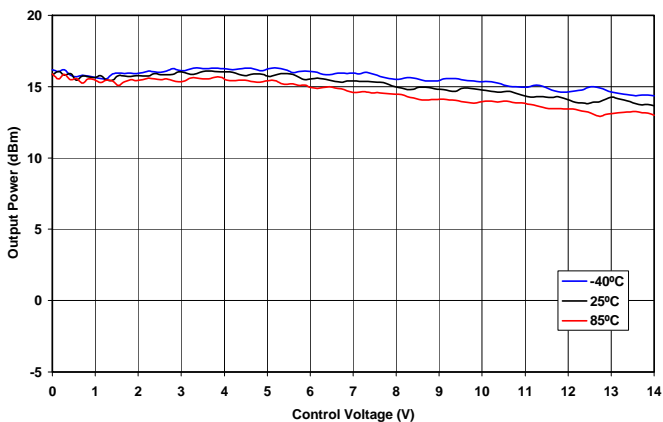


Figure 5: Output Power vs. Control Voltage and Temperature - RF Port

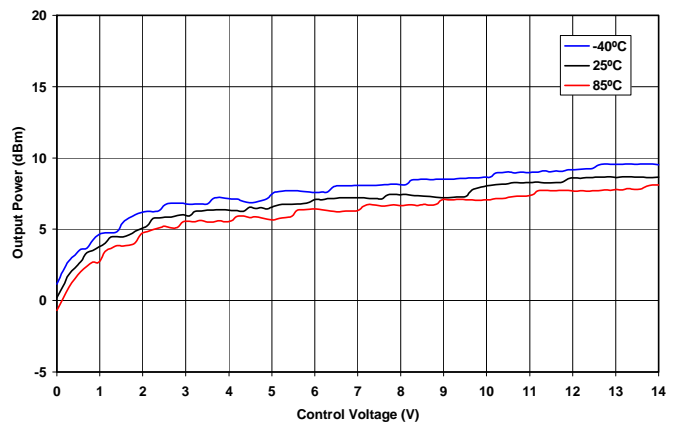


Figure 6: Output Power vs. Control Voltage and Temperature - RF/2 Port

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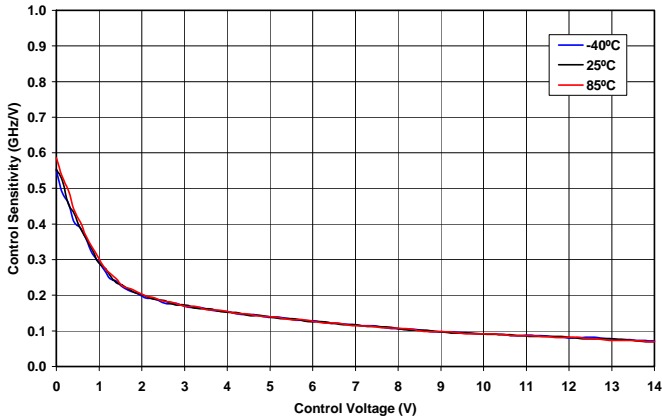


Figure 7: Frequency Sensitivity vs. Control Voltage and Temperature - RF Port

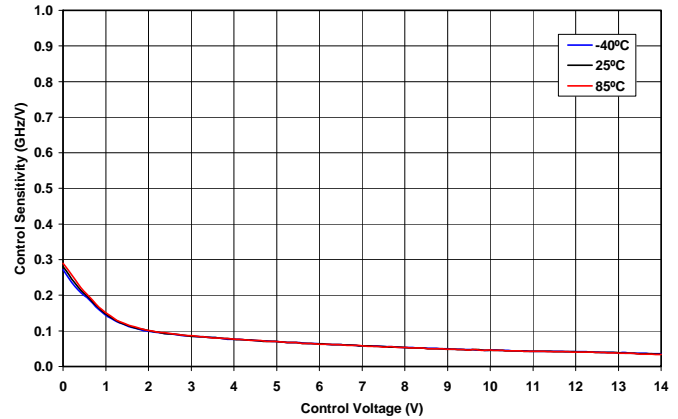


Figure 8: Frequency Sensitivity vs. Control Voltage and Temperature - RF/2 Port

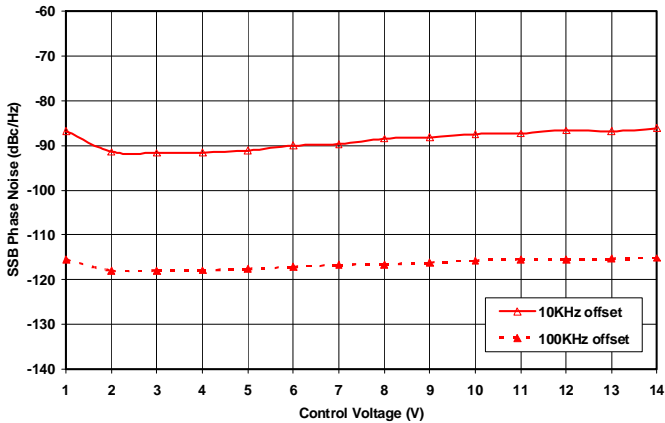


Figure 9: Single Side Band Phase Noise vs. Control Voltage and Offset Frequency

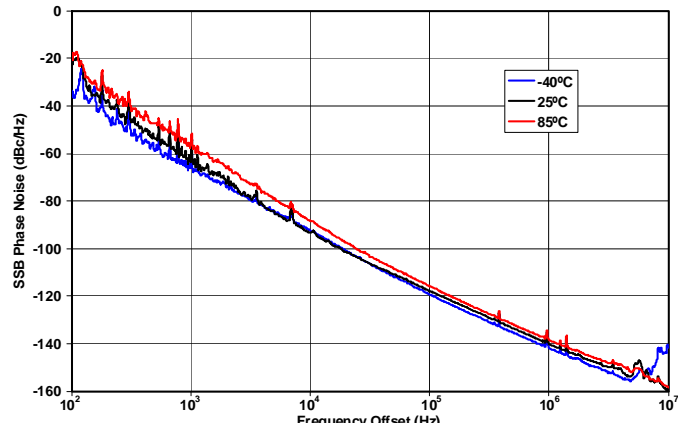


Figure 10: Single Side Band Phase Noise vs. Frequency Offset (Vctrl = 5V)

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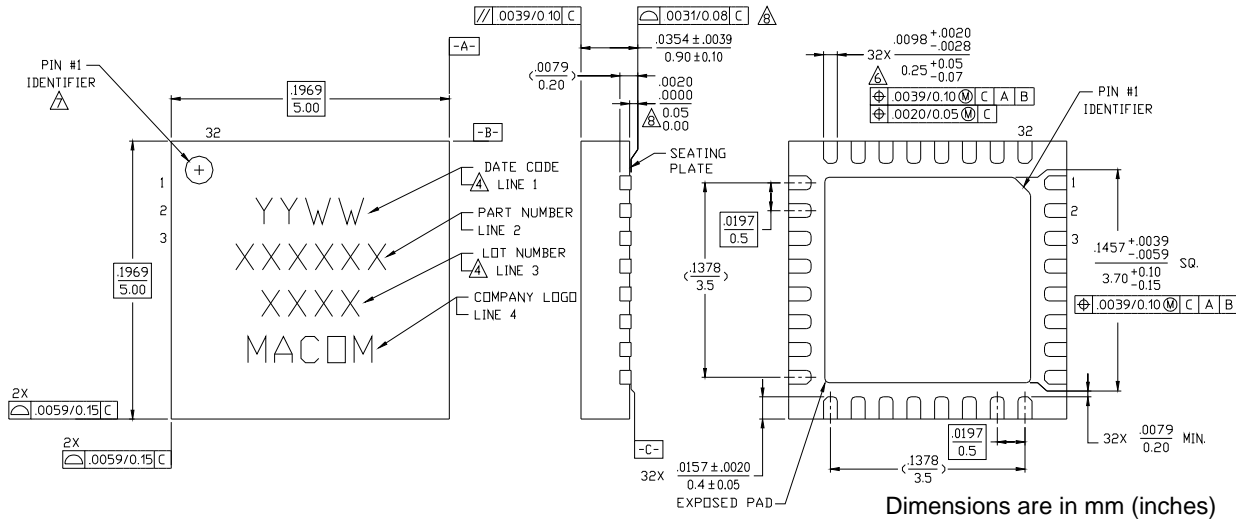
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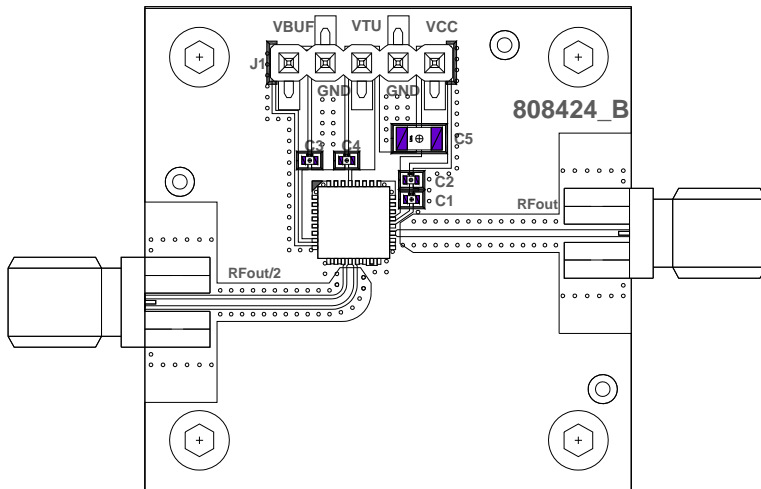
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## Lead Free 5mm 32-Lead PQFN



## Sample Board



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

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