

RF Driver Amplifier 250 - 3000 MHz

Rev. V2

Features

- OIP3: 47 dBm
- Broadband Operation
- High Efficiency
- Class 2 ESD Rating
- Lead-Free SOIC-8EP Package
- Halogen-Free "Green" Mold Compound
- RoHS* Compliant and 260°C Reflow Compatible

Description

The MAAM-009563 RF driver amplifier is a two stage GaAs MMIC which exhibits exceptional linearity performance as well as featuring high gain in a lead-free SOIC-8EP surface mount plastic package.

The MAAM-009563 is fabricated using a GaAs HBT process to realize low current and high power functionality. The process features full passivation for increased performance and reliability.

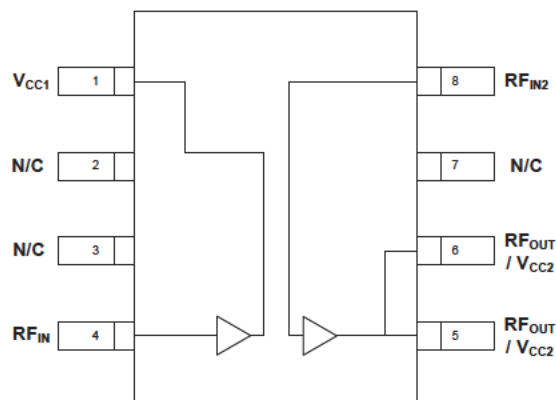
The MAAM-009563 has been designed to be a functional driver amplifier from 250 to 3000 MHz. This broad operation is achieved using external matching components as shown in the PCB layout. Component values are selected to center the 200 MHz instantaneous bandwidth within the overall frequency range.

Ordering Information^{1,2}

Part Number	Package
MAAM-009563-000000	Bulk
MAAM-009563-TR3000	3000 piece reel
MAAM-009563-001SMB	Sample Board

1. Reference Application Note M513 for reel size information.
2. Sample board includes 5 loose parts.

Functional Block Diagram



Pin Configuration³

Pin No.	Pin Name	Description
1	V _{CC1}	1st Stage V _{CC} & RF Output
2	N/C	No Connection
3	N/C	No Connection
4	RF _{IN}	Amplifier Input
5	RF _{OUT} / V _{CC2}	Amplifier Output & 2nd Stage V _{CC}
6	RF _{OUT} / V _{CC2}	Amplifier Output & 2nd Stage V _{CC}
7	N/C	No Connection
8	RF _{IN2}	2nd Stage RF Input

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

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

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Electrical Specifications: Freq. = 2140 MHz, $T_A = 25^\circ\text{C}$, $V_{CC} = +5\text{ V}$, $Z_0 = 50\ \Omega$

Parameter	Units	Min.	Typ.	Max.
Gain	dB	17	19.5	—
Noise Figure	dB	—	6.25	—
Input Return Loss	dB	—	13	—
Output Return Loss	dB	—	13	—
Output P1dB	dBm	—	31	—
Output IP3 $P_N = -4\text{ dBm / tone, 1 MHz spacing}$	dBm	44	47	—
Quiescent Current	mA	—	500	—
Current ($P_{IN} = -1\text{ dBm}$)	mA	—	510	640

Absolute Maximum Ratings^{4,5}

Parameter	Absolute Maximum
RF Output Power	32 dBm
Voltage	6 volts
Storage Temperature	-65°C to +150°C
Junction Temperature	210°C

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

Maximum Operating Conditions⁶

Parameter	Maximum Operating Conditions
Junction Temperature ⁷	170°C
RF Output Power	31 dBm
Operating Temperature	-40°C to +85°C

6. These operating conditions will ensure MTTF > 1×10^6 hours.

7. Junction Temperature (T_J) = $T_A + \Theta_{JC} * ((V * I) - (P_{OUT} - P_{IN}))$

Typical thermal resistance (Θ_{JC}) = 20° C/W

a) For $T_A = 25^\circ\text{C}$,

$T_J = 74^\circ\text{C}$ @ 5 V, 535 mA, $P_{OUT} = 24\text{ dBm}$, $P_{IN} = 4.5\text{ dBm}$

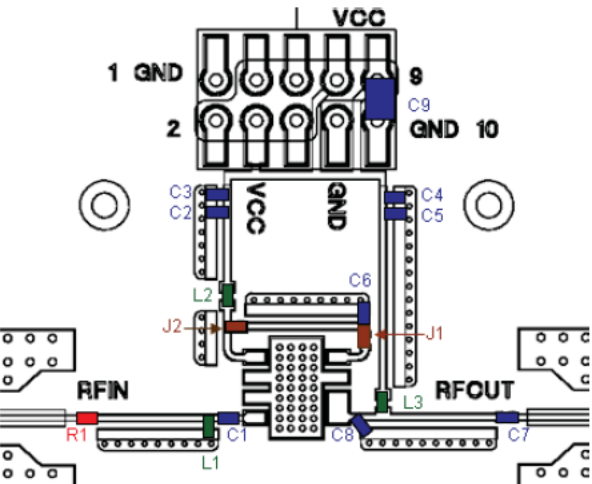
b) For $T_A = 85^\circ\text{C}$,

$T_J = 123^\circ\text{C}$ @ 5 V, 430 mA, $P_{OUT} = 24\text{ dBm}$, $P_{IN} = 5.5\text{ dBm}$

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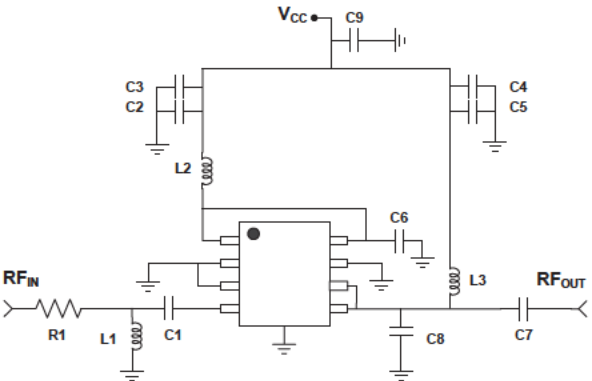
2140 MHz PCB Layout



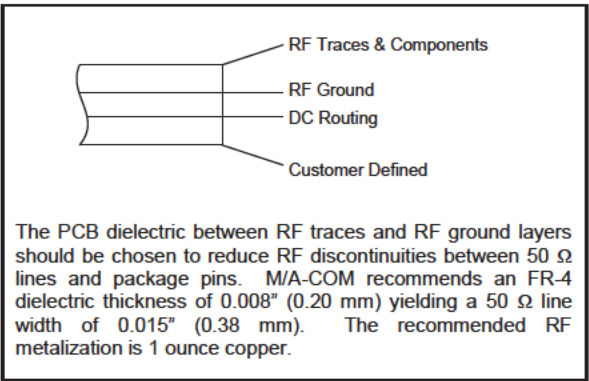
Parts List

Part	Value	Case Style
C1	1.8 pF	0402
C2, C5	1000 pF	0402
C3, C4	0.1 μ F	0402
C6	1.2 pF	0402
C7	39 pF	0402
C8	2.7 pF	0402
C9	3.3 μ F	1206
L1	2.4 nH	0402
L2	7.5 nH	0402
L3	8.2 nH	0402
R1	10 Ω	0402
J1, J2	Jumper	

2140 Schematic



Cross Section View

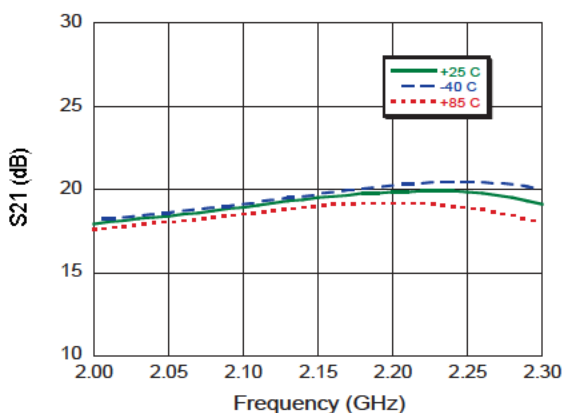


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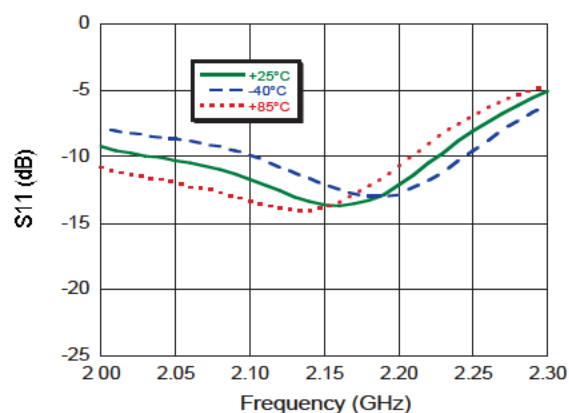
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Typical Performance Curves: 2140 MHz Configuration

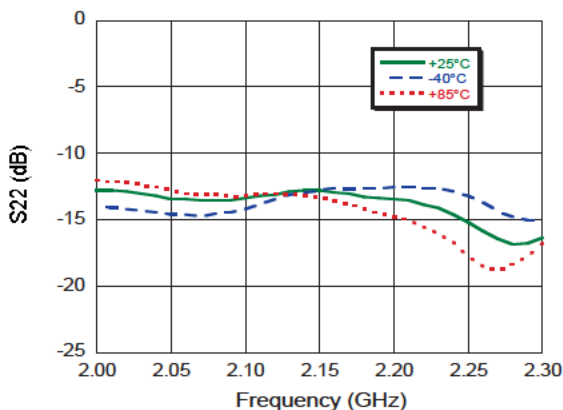
Gain



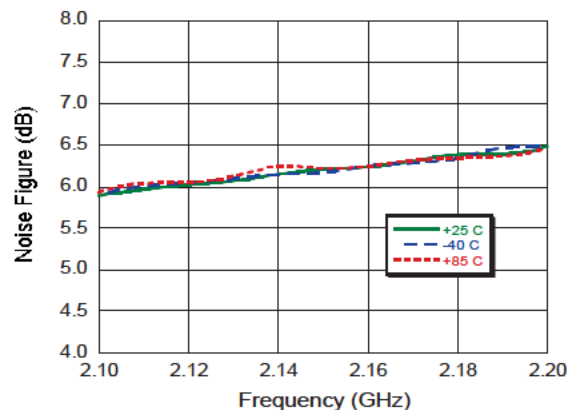
Input Return Loss



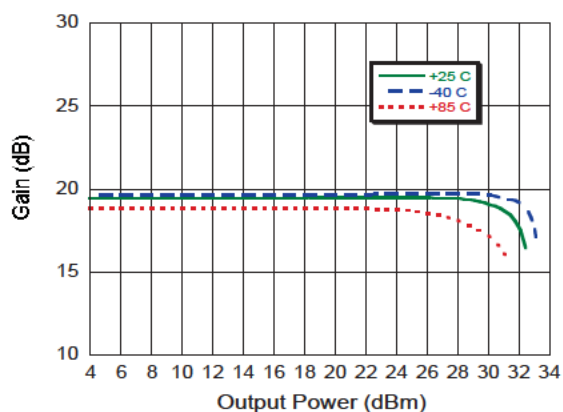
Output Return Loss



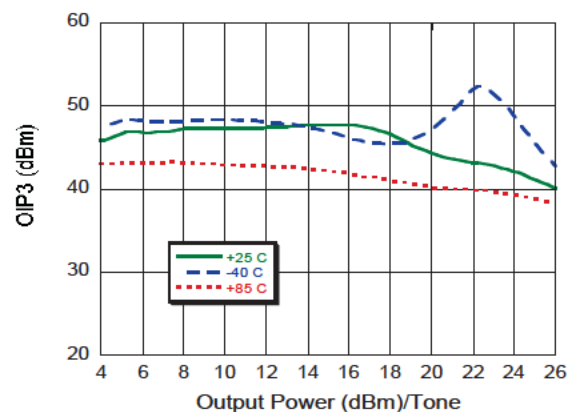
Noise Figure



P1dB



Output IP3

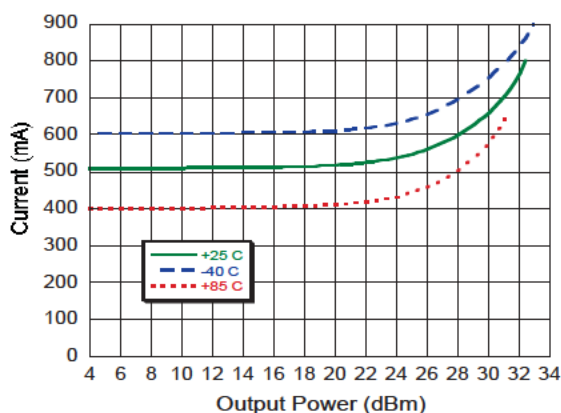


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Typical Performance Curves, 2140 MHz Configuration

Current



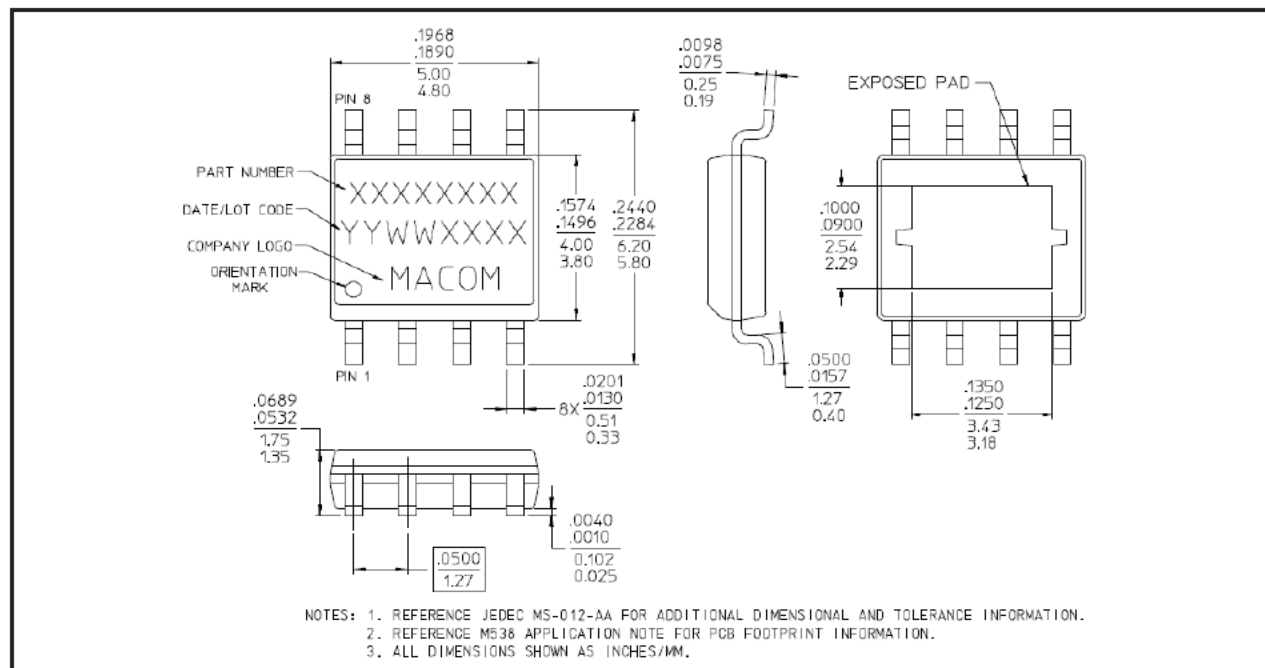
Handling Procedures

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 2 devices.

Lead-Free SOIC-8EP†



† Reference Application Note M538 for lead-free solder reflow recommendations.
Meets JEDEC moisture sensitivity level 1 requirements.
Plating is 100% matte tin over copper.

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