

## 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.

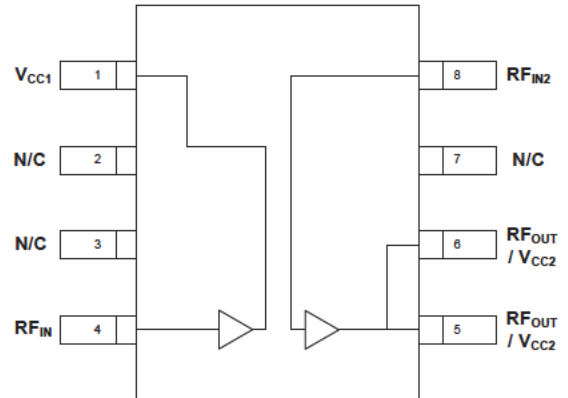
The MAAM-009563 has been designed to be a functional driver amplifier from 250 to 3000 MHz. This broad operation is achieved using external matching components as shown in the PCB layout. Component values are selected to center the 200 MHz instantaneous bandwidth within the overall frequency range.

### Ordering Information<sup>1,2</sup>

| 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 Configuration<sup>3</sup>

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

**Electrical Specifications: Freq. = 2140 MHz, T<sub>A</sub> = 25°C, V<sub>CC</sub> = +5 V, Z<sub>0</sub> = 50 Ω**

| 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<br>P <sub>N</sub> = -4 dBm / tone, 1 MHz spacing | dBm   | 44   | 47   | —    |
| Quiescent Current   | mA    | —    | 500  | —    |
| Current (P <sub>IN</sub> = -1 dBm)                          | mA    | —    | 510  | 640  |

### Absolute Maximum Ratings<sup>4,5</sup>

| 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 Conditions<sup>6</sup>

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

6. These operating conditions will ensure MTTF > 1 x 10<sup>6</sup> hours.
7. Junction Temperature (T<sub>J</sub>) = T<sub>A</sub> + Θ<sub>JC</sub> \* ((V \* I) - (P<sub>OUT</sub> - P<sub>IN</sub>))  
Typical thermal resistance (Θ<sub>JC</sub>) = 20° C/W
  - a) For T<sub>A</sub> = 25°C,  
T<sub>J</sub> = 74 °C @ 5 V, 535 mA, P<sub>OUT</sub> = 24 dBm, P<sub>IN</sub> = 4.5 dBm
  - b) For T<sub>A</sub> = 85°C,  
T<sub>J</sub> = 123 °C @ 5 V, 430 mA, P<sub>OUT</sub> = 24 dBm, P<sub>IN</sub> = 5.5 dBm

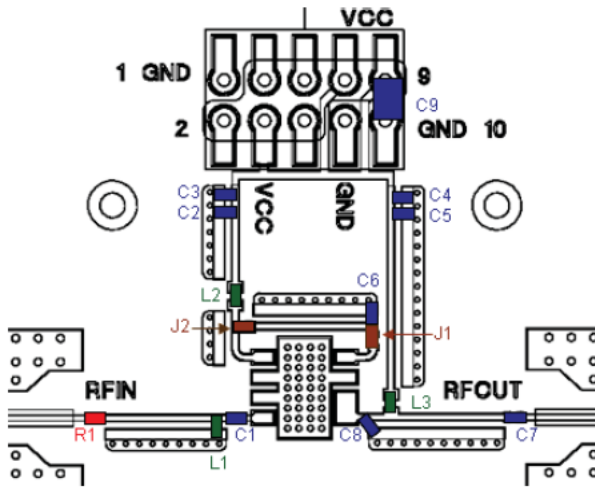
# MAAM-009563



RF Driver Amplifier  
250 - 3000 MHz

Rev. V2

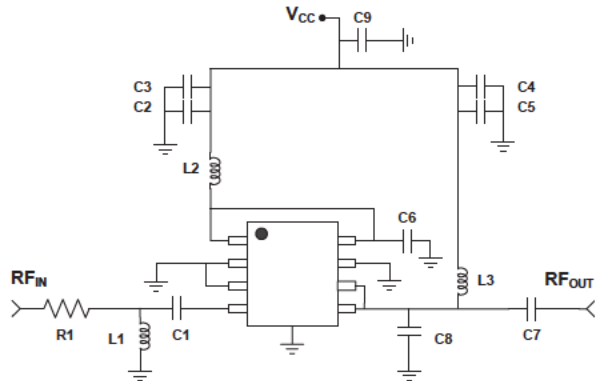
## 2140 MHz PCB Layout



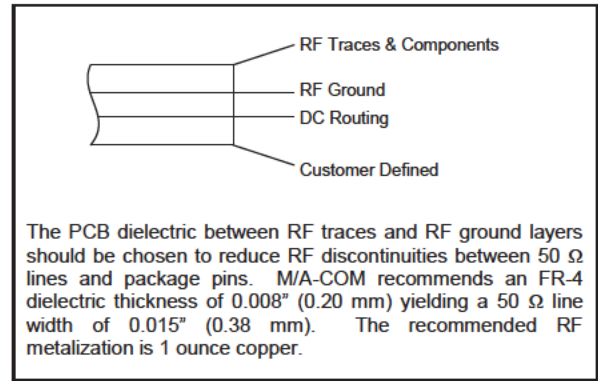
## Parts List

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

## 2140 Schematic

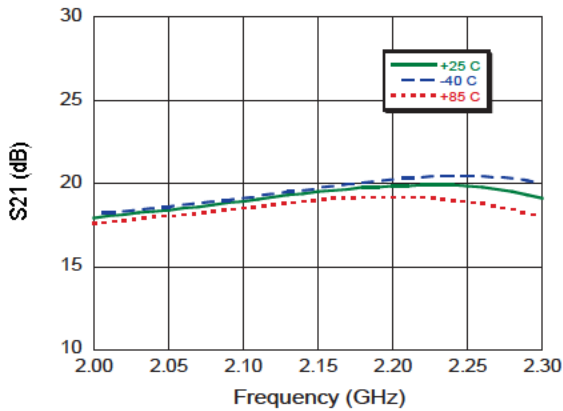


## Cross Section View

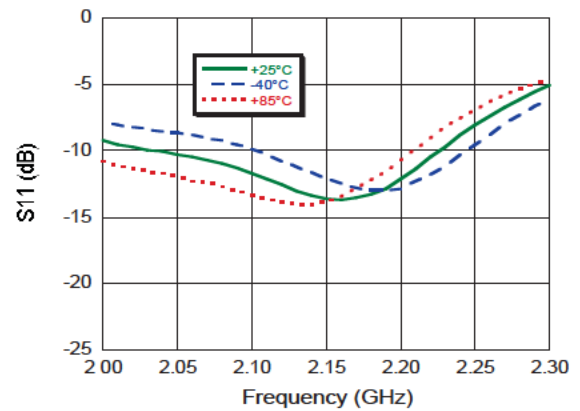


## Typical Performance Curves: 2140 MHz Configuration

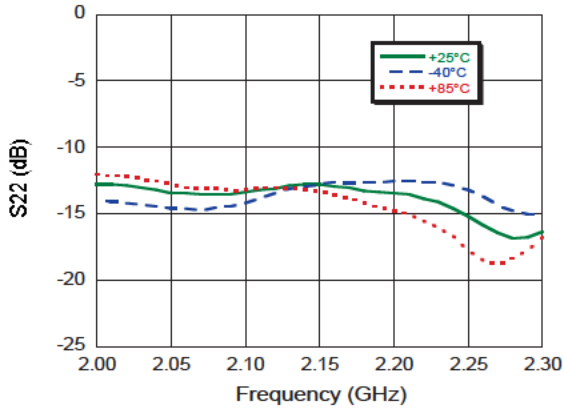
**Gain**



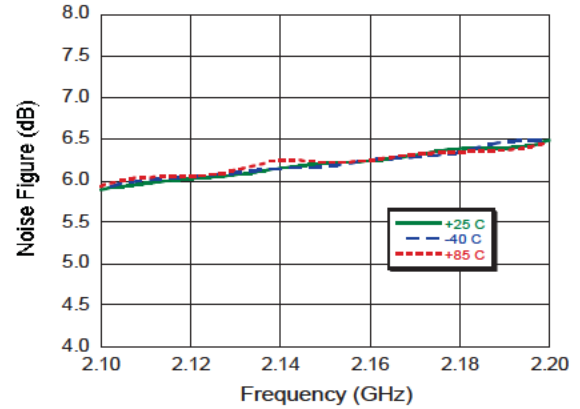
**Input Return Loss**



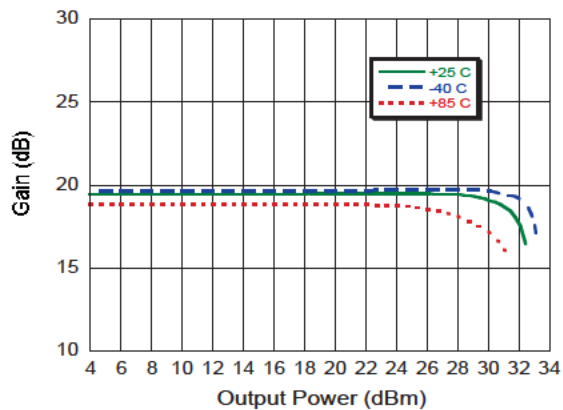
**Output Return Loss**



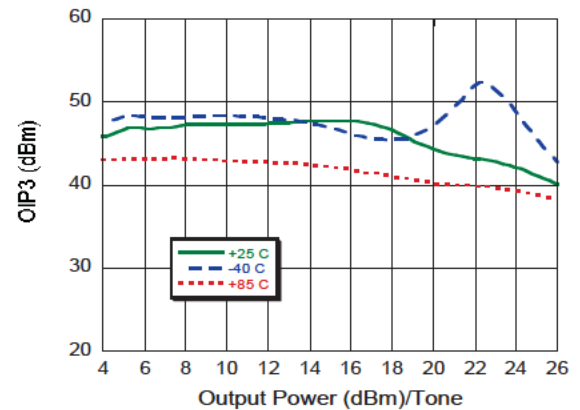
**Noise Figure**



**P1dB**

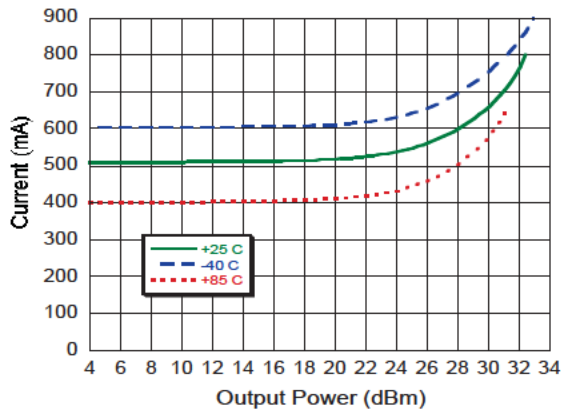


**Output IP3**



## Typical Performance Curves, 2140 MHz Configuration

### Current



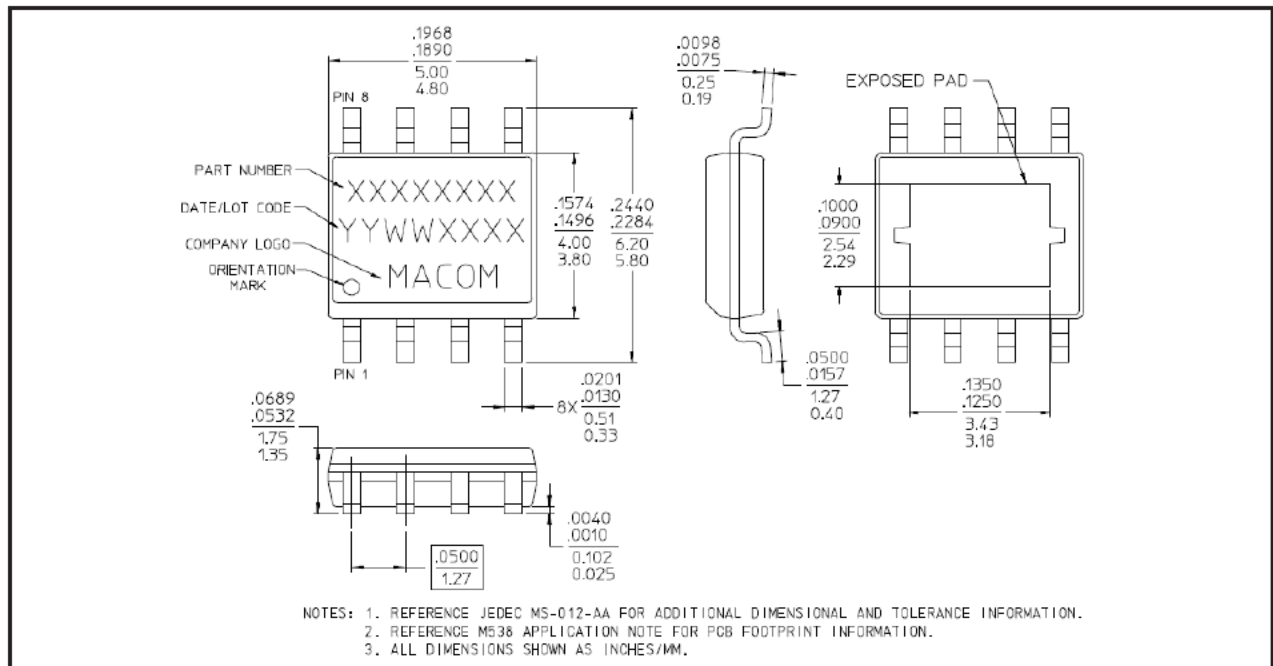
### Handling Procedures

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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