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MAAM-010617

RF Driver Amplifier
30 - 4000 MHz

Rev. V1

Features

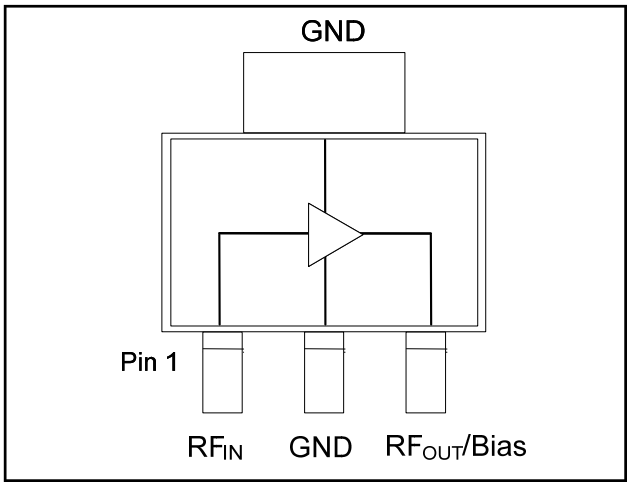
- 42.5 dBm Output IP3
- 31 dBm P1dB
- Gain: 16 dB @ 30 MHz, 13 dB @ 2.1 GHz
- Tunable over Wide Frequency Range
- Class 2 HBM ESD Rating
- Lead-Free SOT-89 Package
- Halogen-Free "Green" Mold Compound
- RoHS* Compliant and 260°C Reflow Compatible

Description

The MAAM-010617 RF driver amplifier is a GaAs MMIC which exhibits high linearity performance over a wide input power range of more than 20 dB. It's tunable over a wide frequency range to optimize the performance based on the end application. The device is biased with a single +5 volt supply and consumes 440 mA typically.

The MAAM-010617 is fabricated using a HBT process to realize low current and high linearity. The process features full passivation for increased performance and reliability.

Functional Schematic



Pin Configuration

Pin No.	Function
1	RF Input
2	Ground
3	RF Output/Bias

Ordering Information [1,2]

Part Number	Package
MAAM-010617-000000	Bulk Packaging
MAAM-010617-TR3000	3000 piece reel
MAAM-010617-001SMB	Sample Board

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

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

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Electrical Specifications: Freq. = 2140 MHz, T_A = 25°C, V_{CC} = +5 V, Z_0 = 50 Ω

Parameter	Units	Min.	Typ.	Max.
Gain	dB	10	13	—
Noise Figure	dB	—	4.5	—
Input Return Loss	dB	—	18	—
Output Return Loss	dB	—	18	—
Output P1dB	dBm	—	31	—
Output IP3 (P_{IN} = +8.5 dBm/Tone, 1 MHz Spacing)	dBm	38	42.5	—
Quiescent Current	mA	—	420	—
Current (P_{IN} = +11.5 dBm)	mA	—	430	550

Maximum Operating Conditions[3]

Parameter	Maximum Operating Conditions
Junction Temperature [4]	170°C
RF Output Power	31 dBm
Operating Temperature	-40°C to +85°C

4. Operating at nominal conditions with $T_J \leq$ +170°C will ensure MTTF > 1 x 10^6 hours.
3. Junction Temperature (T_J) = T_A + Θjc * ((V * I) - (P_{OUT} - P_{IN}))
   Typical thermal resistance (Θjc) = 26° C/W
   a) For T_A = 25°C,
   T_J = 74 °C @ 5 V, 430 mA, P_{OUT} = 24.5 dBm, P_{IN} = 11.5 dBm
   b) For T_A = 85°C,
   T_J = 130 °C @ 5 V, 390 mA, P_{OUT} = 24 dBm, P_{IN} = 11.5 dBm

Absolute Maximum Ratings[5,6]

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

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

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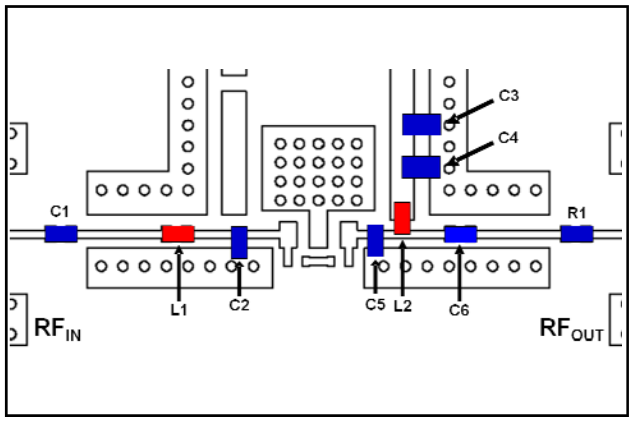
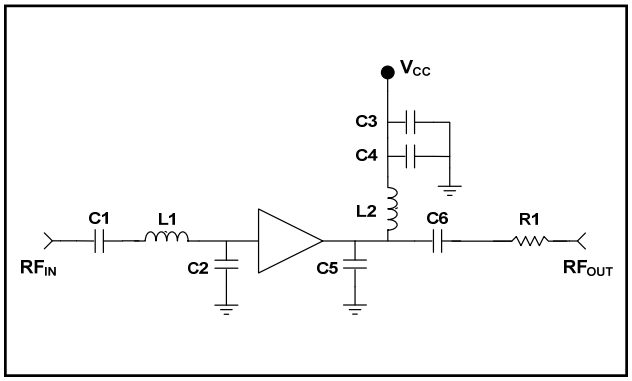
2140 MHz PCB Layout



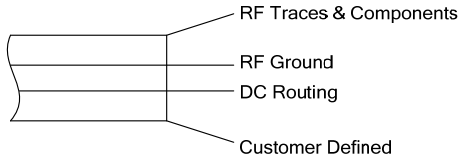
2140 MHz Parts List

Part	Value	Case Style
C1	39 pF	0402
C2	2.2 pF	0402
C3	0.1 µF	0402
C4	1000 pF	0402
C5	3 pF	0402
C6	39 pF	0402
L1	6.8 nH	0402
L2	8.2 nH	0402
R1	0 Ω	0402

2140 MHz Application Schematic



Cross Section View



The PCB dielectric between RF traces and RF ground layers should be chosen to reduce RF discontinuities between 50 Ω lines and package pins. M/A-COM Technologies Solutions recommends an FR-4 dielectric thickness of 0.008" (0.20 mm) yielding a 50 Ω line width of 0.015" (0.38 mm). The recommended RF metalization is 1 ounce copper.

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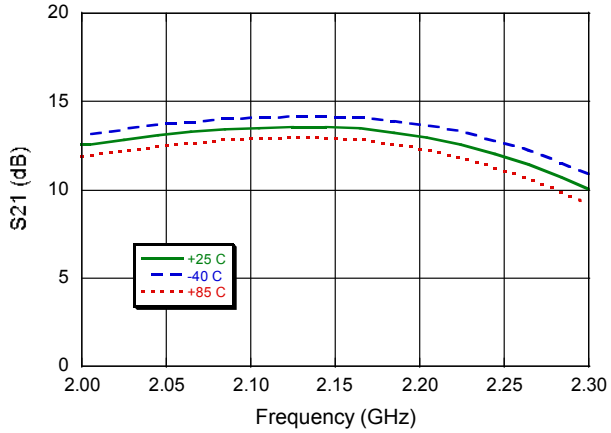
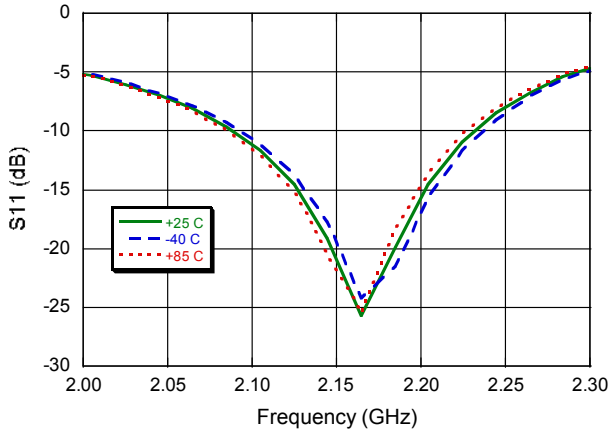
Typical Performance Curves

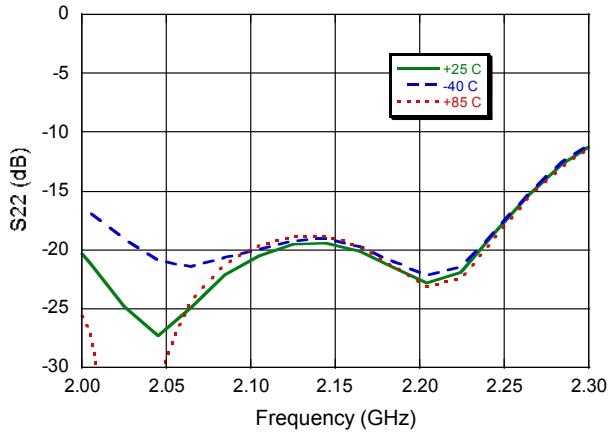
Gain



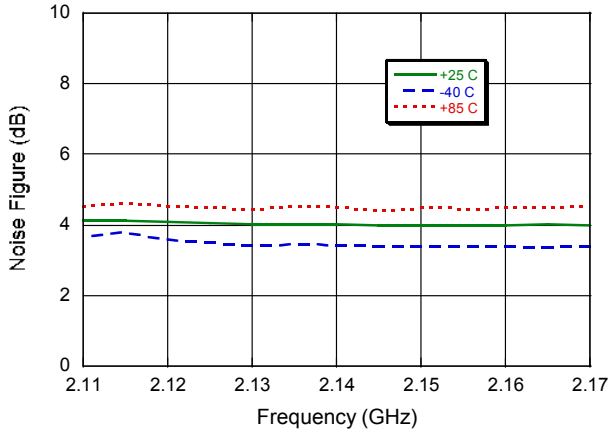
Input Return Loss



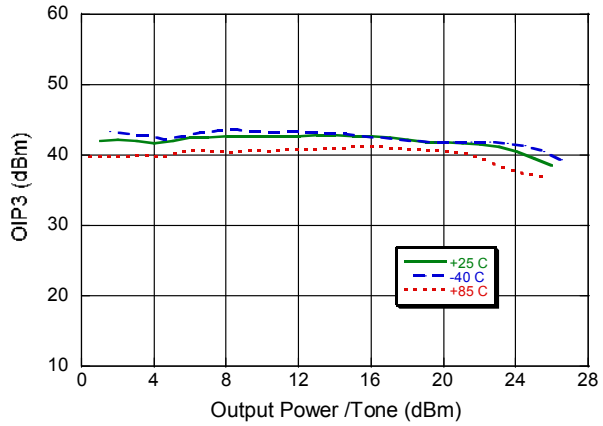
Output Return Loss



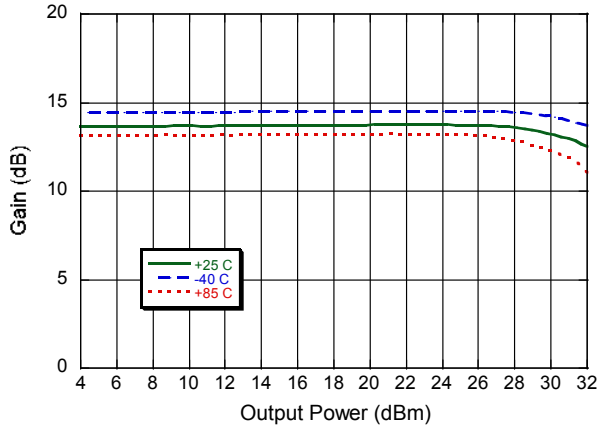
Noise Figure



Output IP3



P1dB



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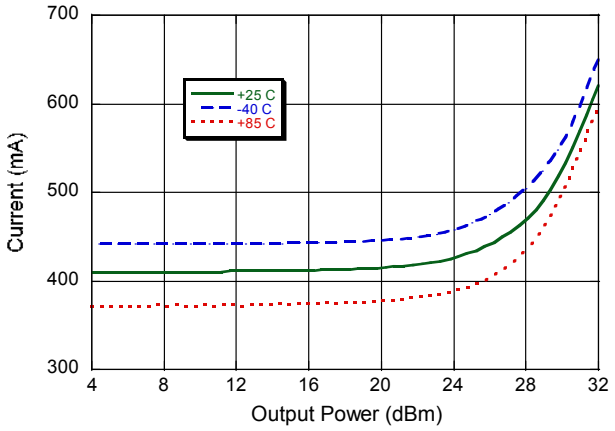
Typical Performance Curves

Current



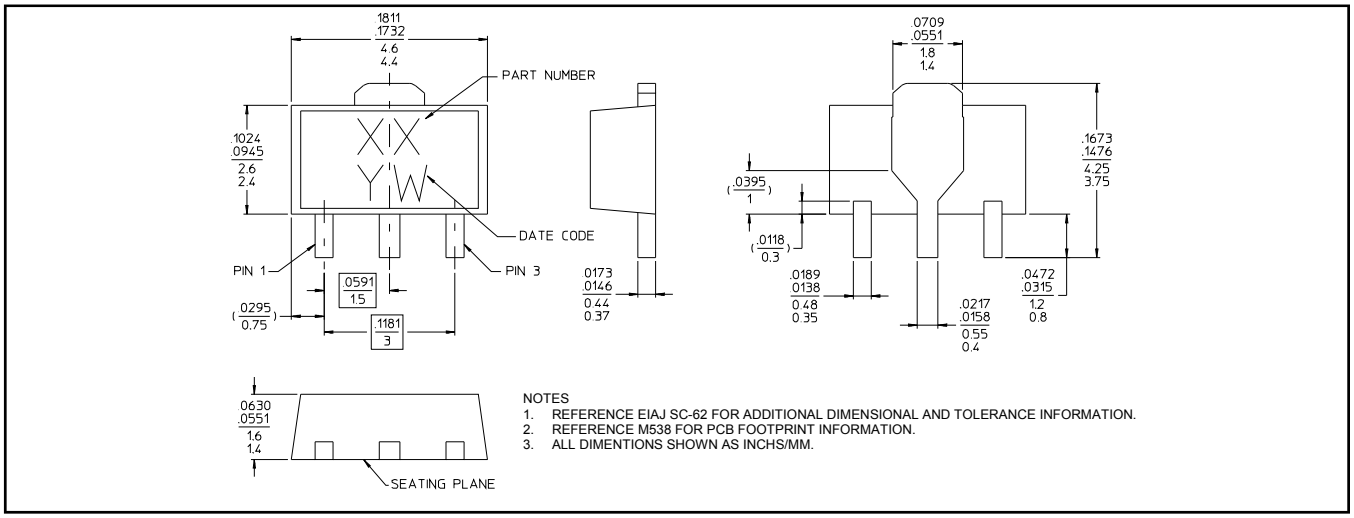
Handling Procedures

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 HBM Class 2 devices.

Lead Free SOT-89 Plastic Package†



† 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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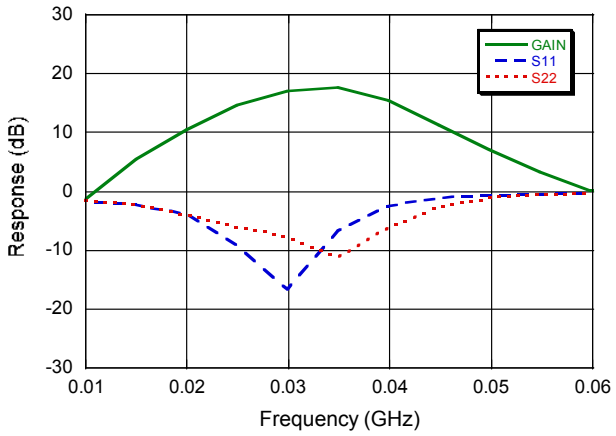
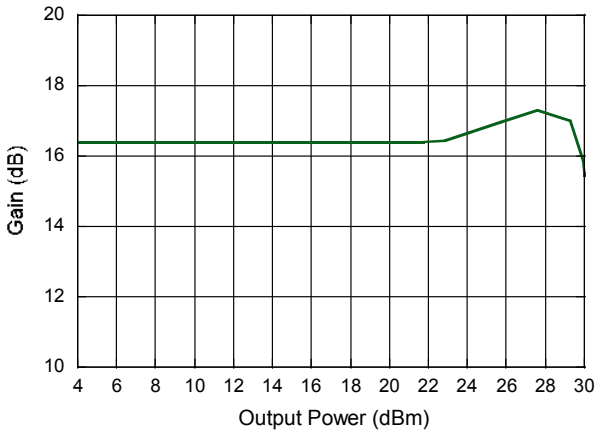
Applications Section

Typical Performance Curves, 30 MHz Configuration

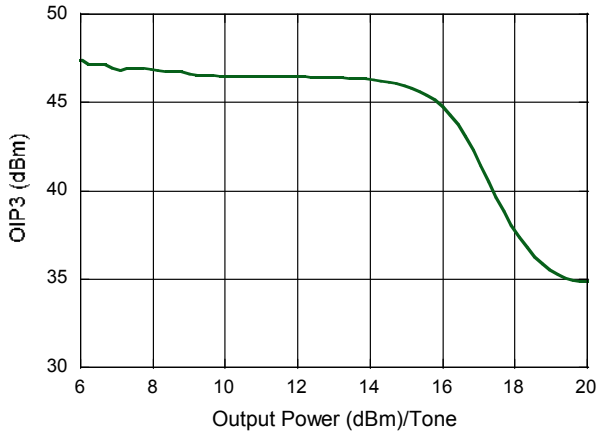
Gain



P1dB



Output IP3



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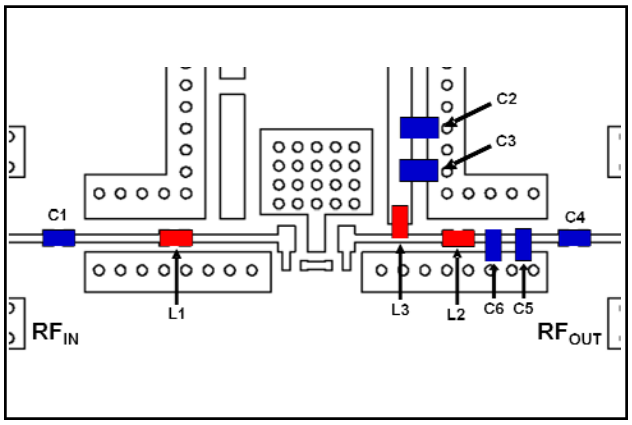
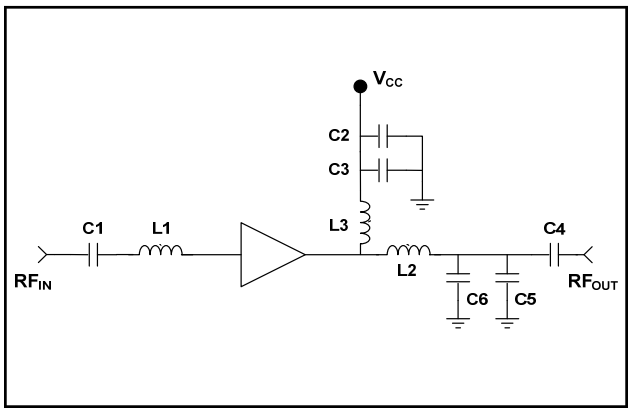
Applications Section

30 MHz PCB Layout



30 MHz Schematic



30 MHz Parts List

Part	Value	Case Style
C1, C2, C4	0.1 µF	0402
C3	1000 pF	0402
C5	120 pF	0402
C6	100 pF	0402
L1	680 nH	0603
L2, L3	82 nH	0402

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