Driver Amplifier
5 - 20 GHz

MAAM-011290
Rev. V3

Features

- Gain: 20 dB
- Saturated Power: 20 dBm
- Output IP3: 32 dBm
- High Reverse Isolation: 47 dB
- 50 Ω Matched Input and Output
- +5 V Supply @ 107 mA
- Integrated Capacitors on RF Input and Output
- 3 mm 12-Lead AQFN Package
- RoHS* Compliant

Applications

- Microwave Radio
- VSAT
- Aerospace & Defense
- Test & Measurement

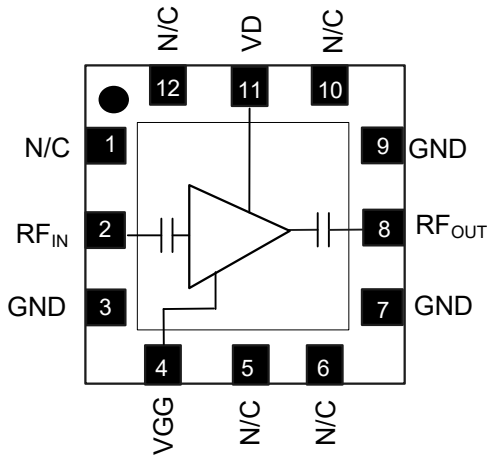
Description

The MAAM-011290 is a 5 - 20 GHz MMIC amplifier with 20 dB small signal gain, P_{SAT} of 20 dBm and high reverse isolation of 47 dB. The component requires only a single positive power supply.

Ordering Information

Part Number	Package
MAAM-011290-TR0500	500 piece reel
MAAM-011290-001SMB	Sample Board

Functional Schematic



Pin Configuration[1,2]

Pin #	Function
1, 5, 6, 10, 12	No Connection
2	RF Input
3, 7, 9	Ground
4	Gate Voltage Not Used
8	RF Output
11	Drain Voltage

1. MACOM recommends connecting all no connection pins to ground.
2. The exposed pad centered on the package bottom must be connected to RF, DC and thermal ground.

* Restrictions on Hazardous Substances, compliant to current RoHS EU directive.

Electrical Specifications: Freq. = 5 - 20 GHz, T_A = 25°C, V_{DD} = 5 V, Z_0 = 50 Ω

Parameter	Test Condition	Units	Min.	Typ.	Max.
Small Signal Gain	5 GHz 10 GHz 15 GHz 18 GHz 20 GHz	dB	17.5 18.5 — 17.0 —	19.5 20.5 20.0 19.0 18.0	—
Small Signal Gain Variation	—	dB	—	±2.5	—
Input Return Loss	—	dB	—	10	—
Output Return Loss	—	dB	—	13	—
P1dB	5 GHz 10 GHz 15 GHz 18 GHz 20 GHz	dBm	18.0 18.0 — 18.0 —	19.5 20.0 20.0 20.0 20.0	—
P_{SAT}	5 GHz 10 GHz 15 GHz 20 GHz	dBm	—	19.5 20.0 20.0 19.0	—
Output IP3	10 dBm Pout per Tone 5 GHz 10 GHz 15 GHz 20 GHz	dBm	—	 32 29 28 30	—
Noise Figure	5 GHz 10 GHz 15 GHz 20 GHz	dB	—	4 4 4 5	—
V_{DD} Drain Supply	—	V	—	5	—
Supply Current	—	mA	—	110	135

Absolute Maximum Ratings[3,4]

Parameter	Absolute Maximum
RF Power In	10 dBm
V_{DD} Supply Voltage	6 V
Supply Current	150 mA
Junction Temperature[5,6]	+150°C
Operating Temperature	-40C to +85°C
Storage Temperature	-65°C to +165°C

3. Exceeding any one or combination of these limits may cause permanent damage to this device.
4. MACOM does not recommend sustained operation near these survivability limits.
5. Operating at nominal conditions with $T_J \leq +150°C$ will ensure MTTF > 1 x 10^6 hours.
6. Junction Temperature (T_J) = T_C + Θjc * (V * I)
   Typical thermal resistance (Θjc) = 59°C/W.
   a) For T_C = +25°C,
   T_J = 57°C @ 5 V, 107 mA
   b) For T_C = +85°C,
   T_J = 120°C @ 5 V, 120 mA

Maximum Operation Conditions

Parameter	Maximum
RF Power In	5 dBm
V_{DD} Supply Voltage	4 - 5 V
Supply Current	120 mA
Junction Temperature[5,6]	+150°C
Operating Temperature	-40C to +85°C

Handling Procedures

Please observe the following precautions to avoid damage:

Static Sensitivity

These electronic devices are sensitive to electrostatic discharge (ESD) and can be damaged by static electricity. Proper ESD control techniques should be used when handling these class 1B greater than 500 V HBM devices.

Operating Conditions

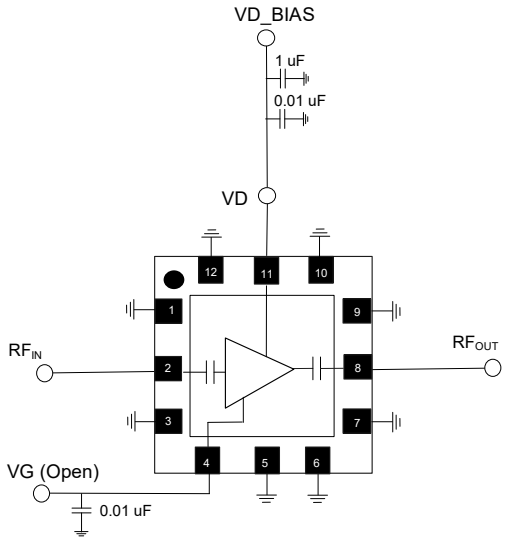
Recommended biasing conditions are V_D = 5 V and V_G = 0 V open circuit.

Simply perform the following for bias:

1. Set V_G = Open Circuit
2. Set V_D = 5 V

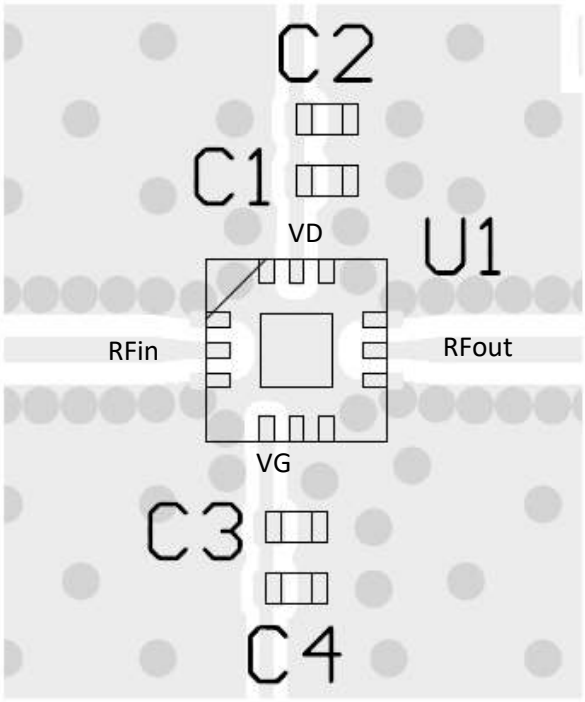
DC blocking is not required on the RF input or RF output since blocking capacitors are provided internally. Use 0.01 µF and 1 µF bypass capacitors on the V_D node and a 0.01 µF capacitor on the V_G node. Place the 0.01 µF bypass capacitors as close as possible to the chip.

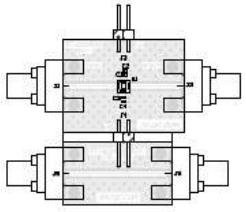
Application Schematic



Evaluation Board

10 mils Rogers RO4350B with 1 oz. copper



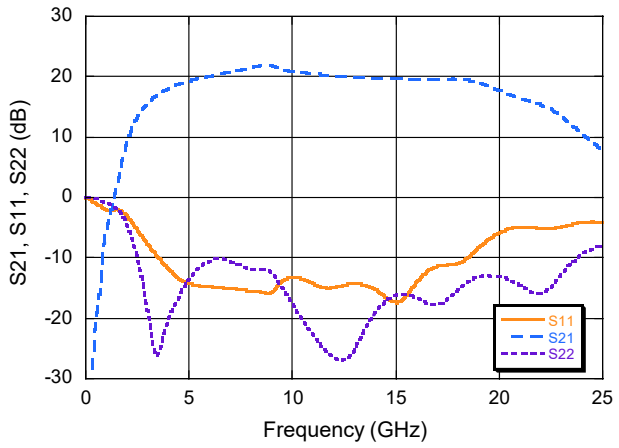


Evaluation Board Parts List

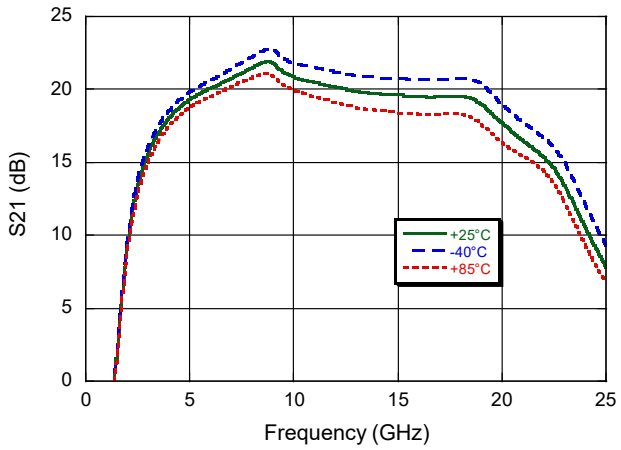
Part	Value	Case Style
C1, C3	0.01 µF	0402
C2	1 µF	0402
C4	NA	NA

Typical Performance Curves V_D = 5 V

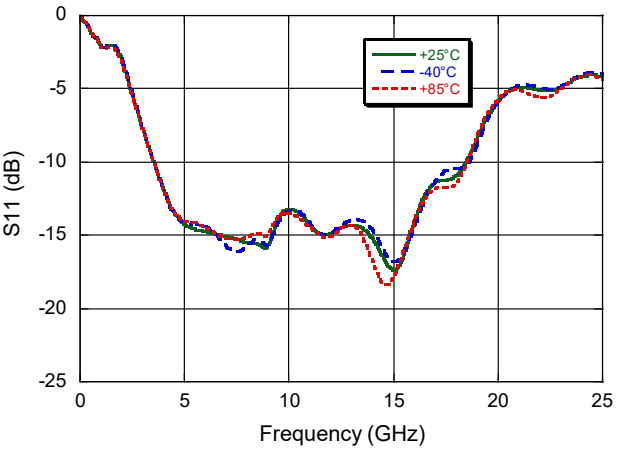
S Parameters



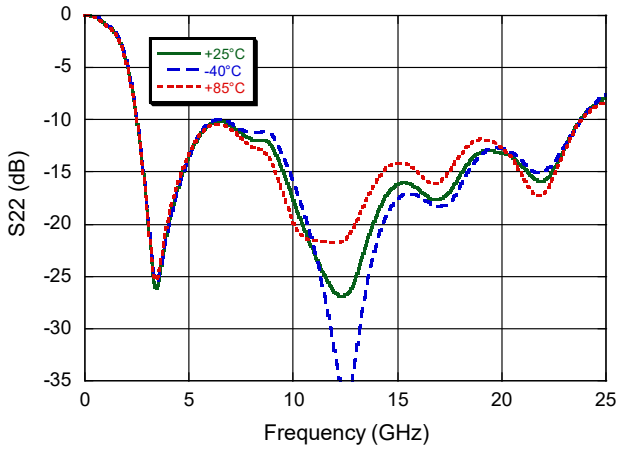
Gain



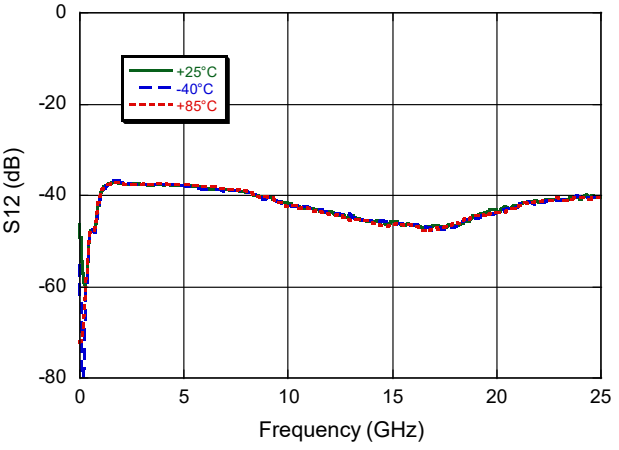
Input Return Loss



Output Return Loss

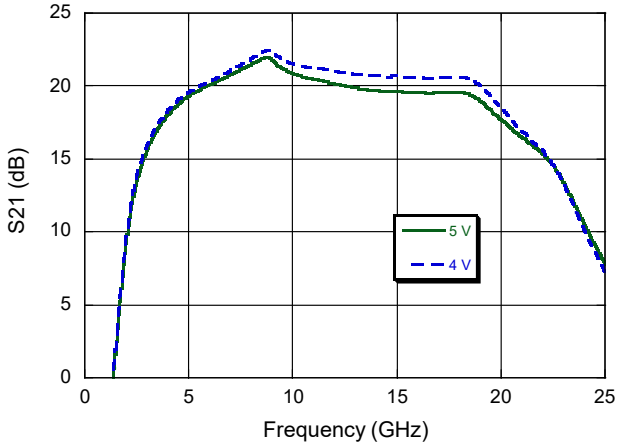


Isolation

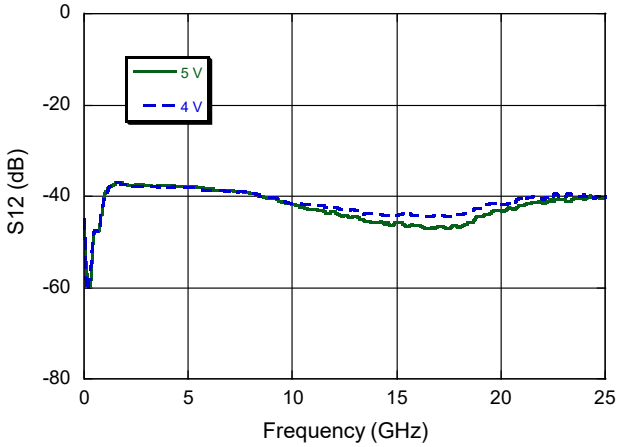


Typical Performance Curves V_D = 4 and 5 V

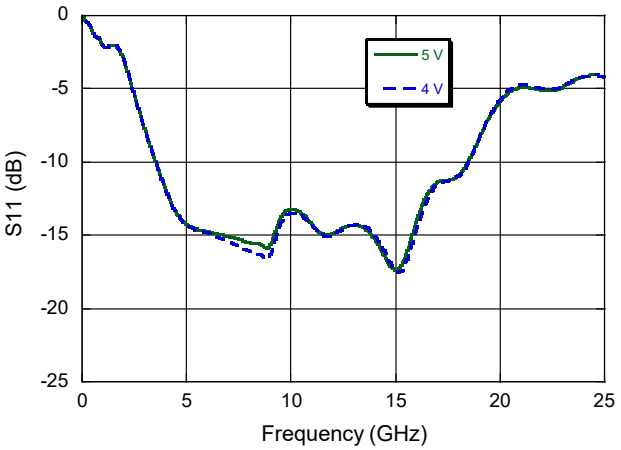
Gain



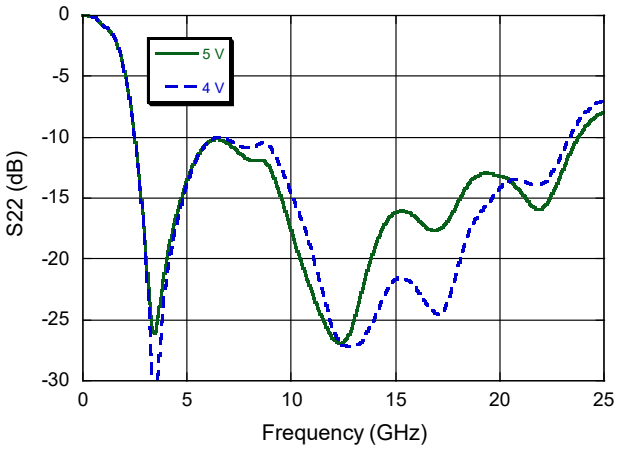
Isolation



Input Return Loss

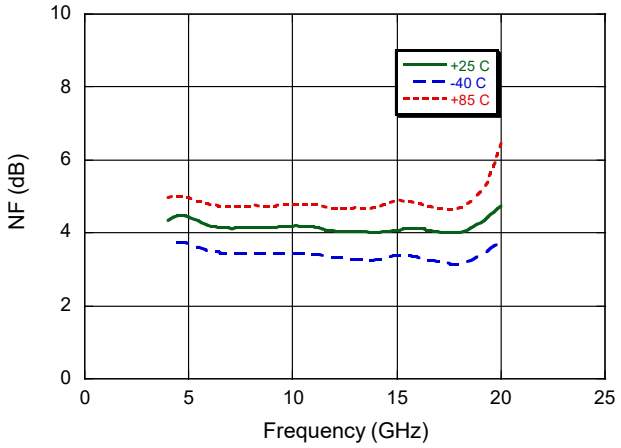


Output Return Loss

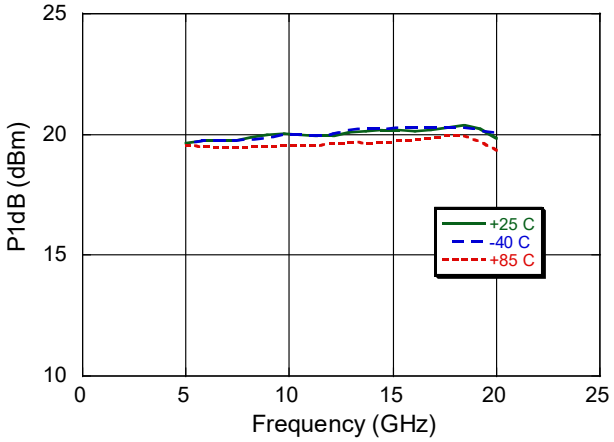


Typical Performance Curves V_D = 5 V

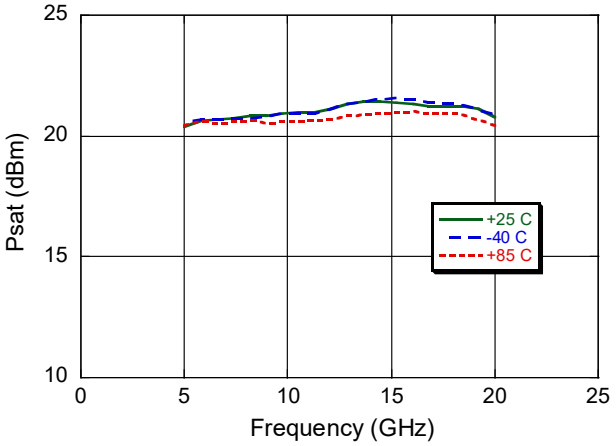
Noise Figure



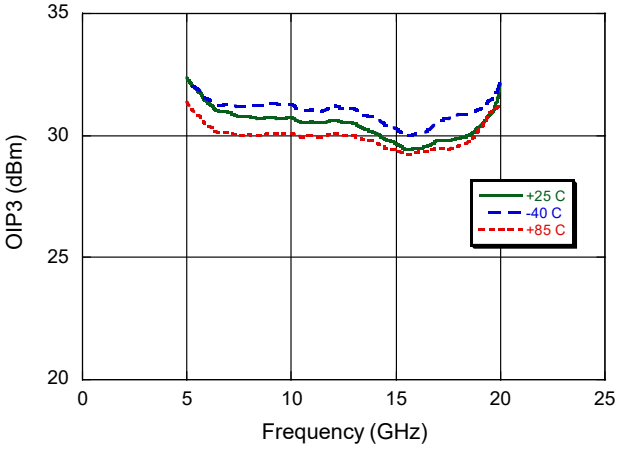
P1dB



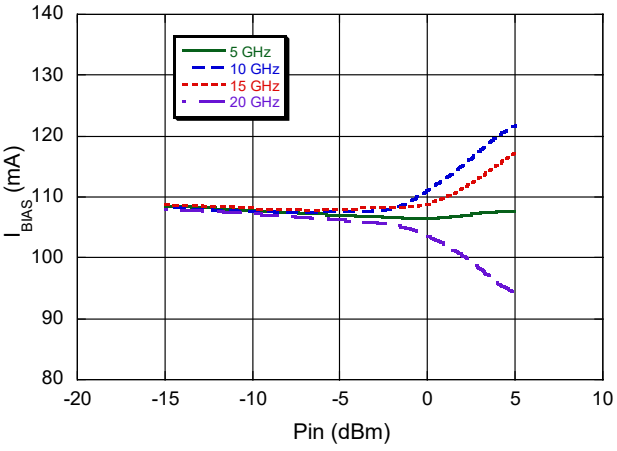
Psat



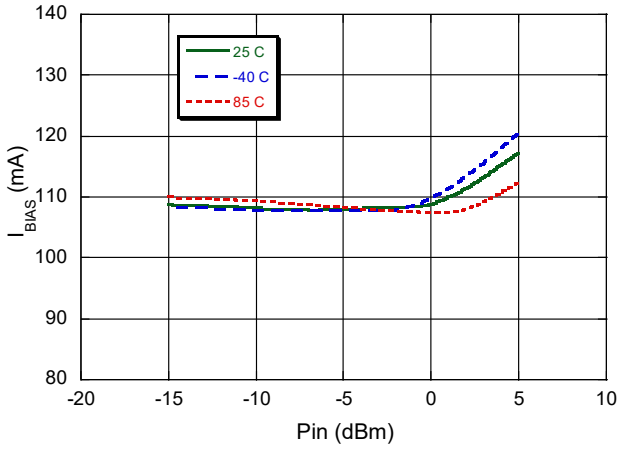
OIP3 @ 10 dBm Pout per Tone



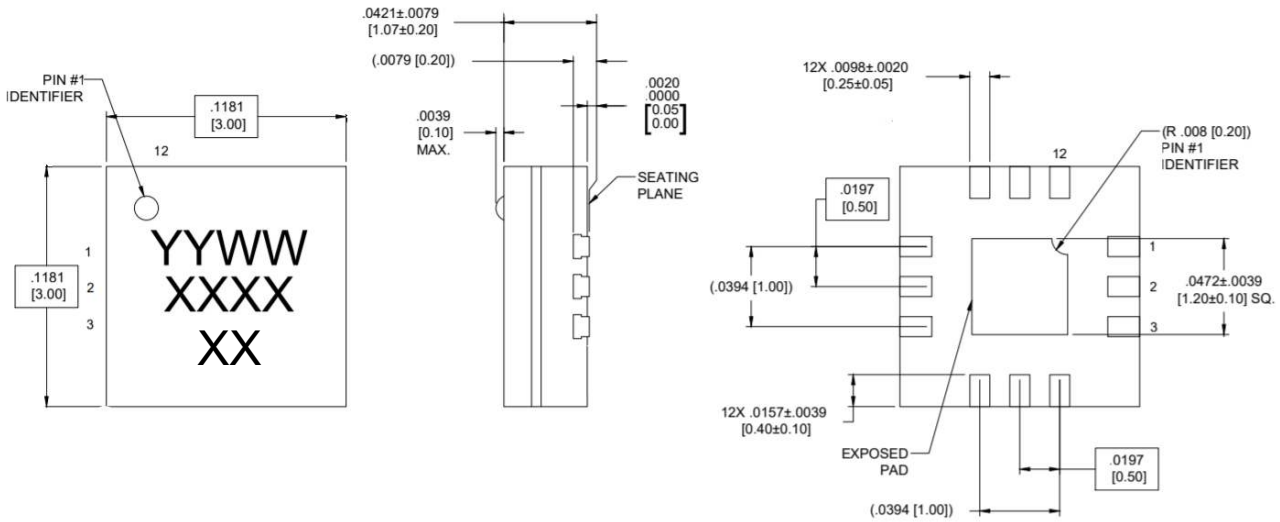
I_{BIAS}



I_{BIAS} @ 15 GHz



3 mm 12-Lead AQFN Package



All dimensions shown as in [mm]
Marking: line one "YY" is a 2 digit year code, followed by "WW" a 2-digit week code,
line two is for lot number,
line three is for 2-digit marking code.

† Reference Application Note S2083 for lead-free solder reflow recommendations.
Meets JEDEC moisture sensitivity level 3 requirements.
Plating is NiPdAu