

## Features

- 3 Stage Driver Amplifier for 18/23 GHz Bands
- 23 dB Gain
- 33 dBm Output Third Order Intercept (OIP3)
- 21 dBm Output P1dB
- 2.8 dB Noise Figure
- Variable Gain with Adjustable Bias
- Lead-Free 4 mm 16-Lead PQFN Package
- RoHS\* Compliant

## Description

The MAAM-011132 is a packaged driver amplifier that operates from 17.7 - 23.6 GHz. The amplifier provides 23 dB small signal gain. The input and output are internally matched to 50 ohms with on-chip DC blocking capacitors. The 33 dBm output third order intercept point (OIP3) and 21 dBm output P1dB provide excellent linearity for transmit lineups.

The packaged amplifier comes in an industry standard lead free 4 mm QFN package. The device includes on-chip ESD protection structures and DC by-pass capacitors to ease the implementation and volume assembly of the packaged part.

The device is specifically designed for use in 18 and 23 GHz point-to-point radios for cellular backhaul applications.

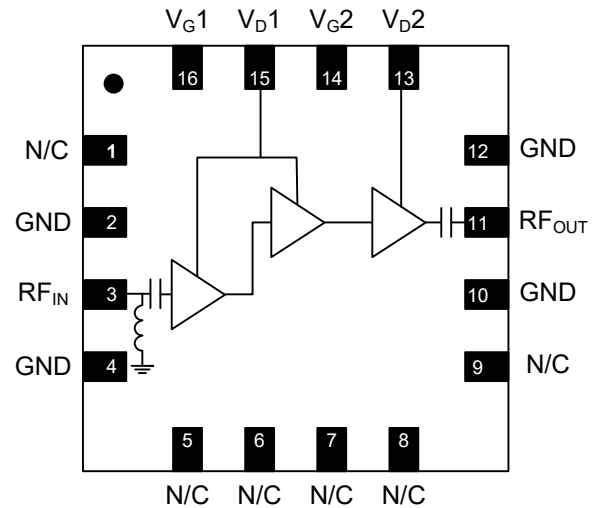
## Ordering Information<sup>1,2</sup>

Part Number	Package
MAAM-011132-TR0500	500 Piece Reel
MAAM-011132-TR1000	1000 Piece Reel
MAAM-011132-000SMB	Sample Board

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

\* Restrictions on Hazardous Substances, European Union Directive 2011/65/EU.

## Functional Schematic



## Pin Configuration<sup>3</sup>

Pin No.	Function	Pin No.	Function
1	No Connection	9	No Connection
2	Ground	10	Ground
3	RF Input	11	RF Output
4	Ground	12	Ground
5	No Connection	13	V <sub>D2</sub>
6	No Connection	14	V <sub>G2</sub>
7	No Connection	15	V <sub>D1</sub>
8	No Connection	16	V <sub>G1</sub>
		17	Paddle <sup>4</sup>

3. For optimum RF performance, all N/Cs should be terminated to ground.
4. The exposed pad centered on the package bottom must be connected to RF and DC ground.

## Electrical Specifications<sup>5</sup>:

RF Freq: 17.7 - 23.6 GHz,  $V_D = 4\text{ V}$ ,  $I_{D1} = 90\text{ mA}$ ,  $I_{D2} = 90\text{ mA}$ ,  $T_A = +25^\circ\text{C}$

Parameter	Units	Min.	Typ.	Max.
Frequency Range (LO)	GHz	17.7	—	23.6
Gain	dB	20	23	—
Input Return Loss	dB	—	12	—
Output Return Loss	dB	—	12	—
Noise Figure	dB	—	2.8	—
Output P1dB	dBm	—	21	—
Output IP3	dBm	—	33	—

5. Apply gate voltages prior to drain voltages. Adjust  $V_{G1}$  and  $V_{G2}$  between -1.0 and -0.1 V to achieve specified drain current. Typical current, 180 mA = 90 ( $I_{D1}$ ) + 90 ( $I_{D2}$ )

## Absolute Maximum Ratings<sup>6,7,8</sup>

Parameter	Absolute Maximum
Drain Voltage	+4.3 V
Drain Current per Stage	133 mA
Gate Bias Voltage ( $V_{G1,2}$ )	-1.5 V < $V_G$ < 0 V
Input Power	+3 dBm
Storage Temperature	-55°C to +150°C
Operating Temperature	-40°C to +85°C
Junction Temperature	+150°C

- Exceeding any one or combination of these limits may cause permanent damage to this device.
- MACOM does not recommend sustained operation near these survivability limits.
- Operating at nominal conditions with  $T_J \leq +150^\circ\text{C}$  will ensure  $\text{MTTF} > 1 \times 10^6$  hours. Channel temperature directly affects device MTTF. Channel temperature should be kept as low as possible to maximize lifetime. Thermal resistance,  $\Theta_{jc}$ , is 62.5 °C/W.

## Handling Procedures

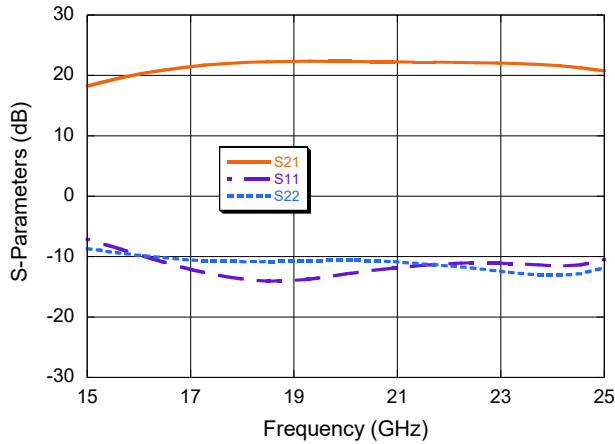
Please observe the following precautions to avoid damage:

## Static Sensitivity

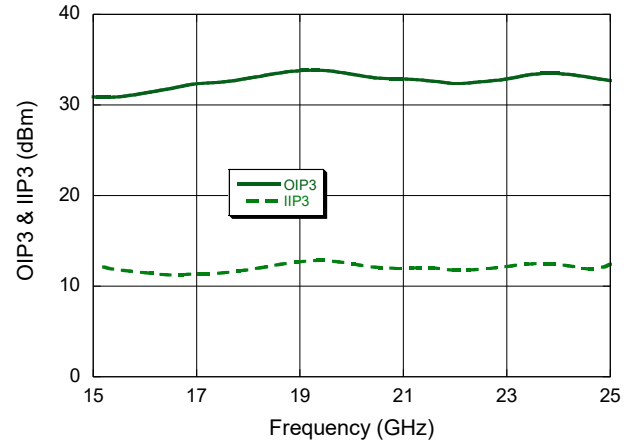
Gallium Arsenide Integrated Circuits are sensitive to electrostatic discharge (ESD) and can be damaged by static electricity. Proper ESD control techniques should be used when handling these HBM Class 1B devices.

**Typical Performance Curves:  $V_{D1,2} = 4\text{ V}$ ,  $I_{D1} = I_{D2} = 90\text{ mA}$**

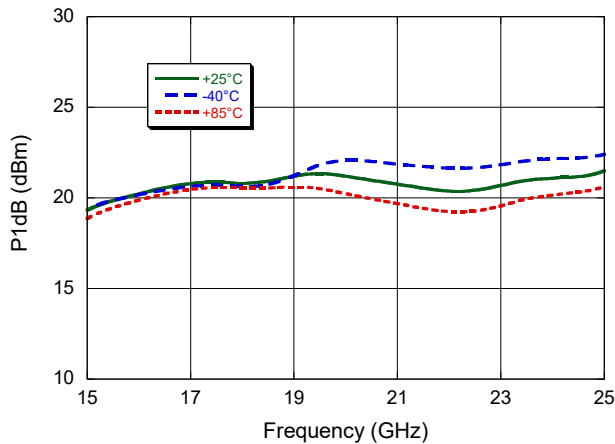
**S-Parameters vs. Frequency**



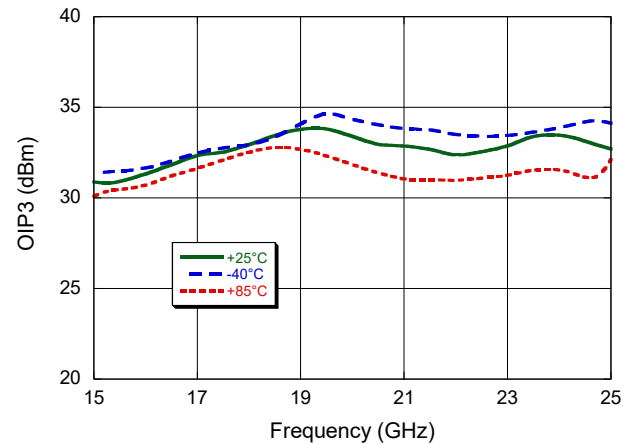
**Output / Input IP3 vs. Frequency**



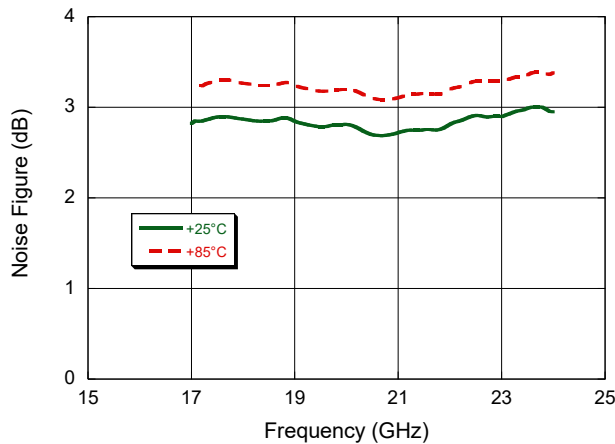
**Output P1dB vs. Frequency**



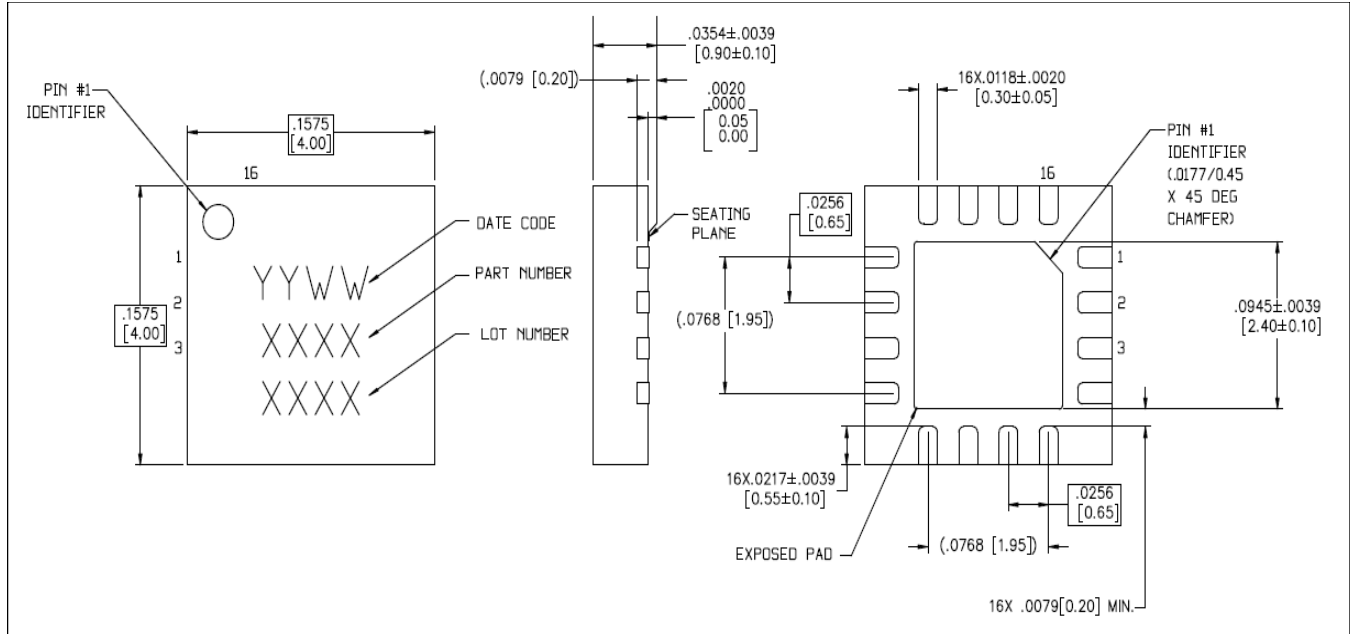
**Output IP3 vs. Frequency**



**Noise Figure vs. Frequency**



## Lead-Free 4 mm 16-Lead PQFN<sup>†</sup>



<sup>†</sup> Reference Application Note S2083 for lead-free solder reflow recommendations and PCB footprint information.  
Reference JEDEC MO-220,VAR,VGGC for additional dimensional and tolerance information.  
Meets JEDEC moisture sensitivity level 1 requirements  
All dimensions shown as in/mm

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