

Driver Amplifier 27.5 - 33.4 GHz

Rev. V2

Features

- 3 Stage Driver Amplifier for 28/32 GHz Bands
- 21 dB Gain
- 32 dBm Output Third Order Intercept (OIP3)
- 20 dBm Output P1dB
- Variable Gain with Adjustable Bias
- Lead-Free 4 mm 24 Lead PQFN Package
- RoHS* Compliant and 260°C Reflow Compatible

Description

The MAAM-011139 is a driver amplifier assembled in a lead-free 4 mm 24-lead PQFN plastic package that operates from 27.5 - 33.4 GHz.

The amplifier provides 21 dB small signal gain. The input and output are internally matched to 50 ohms with on-chip DC blocking capacitors. The 32 dBm Output Third Order Intercept Point (OIP3) and 20 dBm output P1dB provide excellent linearity for transmit lineups.

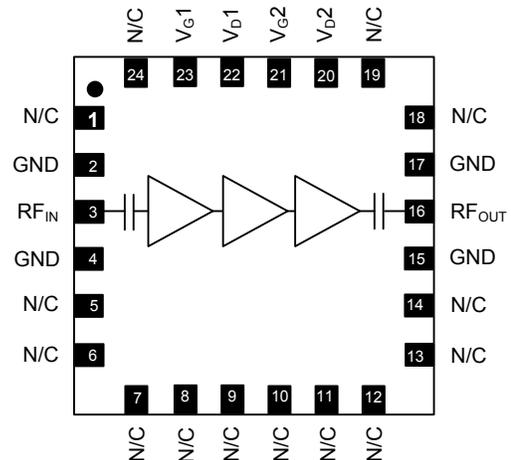
Each device is 100% RF tested to ensure performance compliance.

Ordering Information^{1,2}

| Part Number | Package |
|--------------------|-----------------|
| MAAM-011139-TR0500 | 500 piece reel |
| MAAM-011139-TR1000 | 1000 piece reel |
| MAAM-011139-000SMB | Sample Board |

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

Functional Schematic



Pin Configuration^{3,4}

| Pin No. | Function | Pin No. | Function |
|---------|------------------|---------|-------------------|
| 1 | N/C | 13 | N/C |
| 2 | GND | 14 | N/C |
| 3 | RF _{IN} | 15 | GND |
| 4 | GND | 16 | RF _{OUT} |
| 5 | N/C | 17 | GND |
| 6 | N/C | 18 | N/C |
| 7 | N/C | 19 | N/C |
| 8 | N/C | 20 | V _{D2} |
| 9 | N/C | 21 | V _{G2} |
| 10 | N/C | 22 | V _{D1} |
| 11 | N/C | 23 | V _{G1} |
| 12 | N/C | 24 | N/C |

3. MACOM recommends connecting unused package pins to ground.
4. The exposed pad centered on the package bottom must be connected to RF, DC and thermal ground.

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

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Electrical Specifications⁵:

Freq = 27.5 - 33.4 GHz, $T_A = 25^\circ\text{C}$, $V_{D1,2} = 4.0\text{ V}$, $I_{D1} = 100\text{ mA}$, $I_{D2} = 100\text{ mA}$

| Parameter | Test Conditions | Units | Min. | Typ. | Max. |
|--------------------|-----------------|-------|------|------|------|
| Gain | 27.5 - 29.5 GHz | dB | 19.0 | 21.0 | — |
| | 29.5 - 33.4 GHz | | 15.5 | 17.5 | |
| Input Return Loss | — | dB | — | -10 | — |
| Output Return Loss | — | dB | — | -8 | — |
| Output P1dB | — | dBm | — | 20 | — |
| Output IP3 | 27.5 - 29.5 GHz | dBm | 28 | 32 | — |
| | 29.5 - 33.4 GHz | | 30 | 32 | |

5. Apply gate voltages prior to drain voltages. Adjust VG1 and VG2 between -1.0 and -0.1 V to achieve specified current.
Typical current, 200 mA = 100 (I_{D1}) + 100 (I_{D2})

Absolute Maximum Ratings^{6,7}

| Parameter | Absolute Maximum |
|-----------------------|------------------|
| Input Power | +20 dBm |
| Drain Supply Voltage | +4.3 Volts |
| Operating Temperature | -40°C to +85°C |
| Junction Temperature | +150°C |
| Storage Temperature | -55°C to +150°C |

6. Exceeding any one or combination of these limits may cause permanent damage to this device.
7. MACOM does not recommend sustained operation near these survivability limits.

Handling Procedures

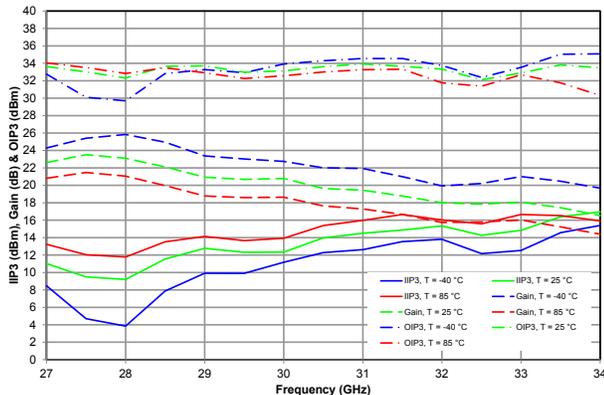
Please observe the following precautions to avoid damage:

Static Sensitivity

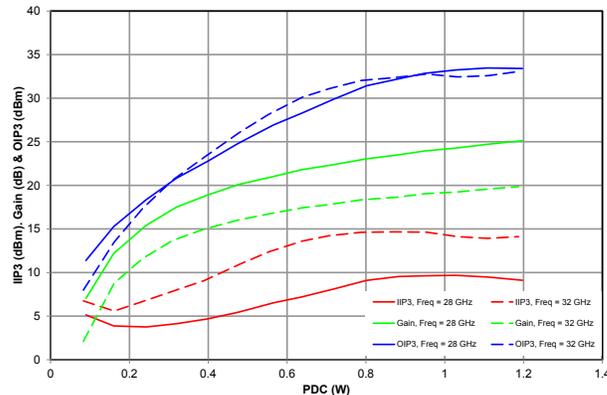
Gallium Arsenide Integrated Circuits are sensitive to electrostatic discharge (ESD) and can be damaged by static electricity. Proper ESD control techniques should be used when handling these Class 1C devices.

Typical Performance Curves

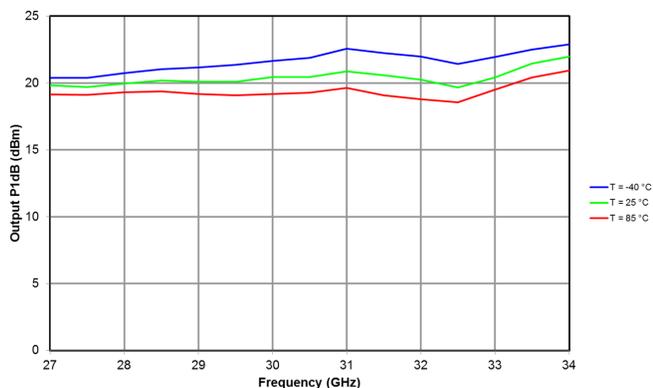
AvgIIP3, Gain, OIP3 vs Freq. Pin=-12 dBm, Id1,2=100mA



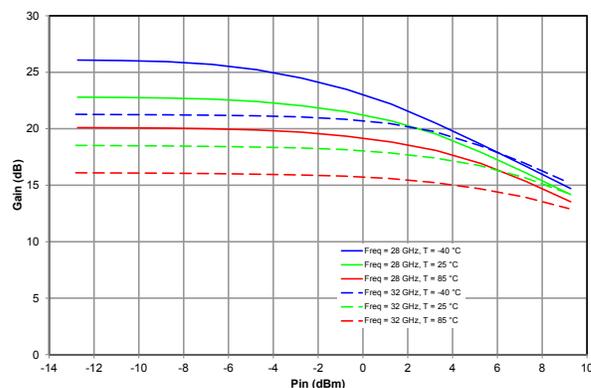
Gain & Linearity vs DC Power at 28 and 32 GHz



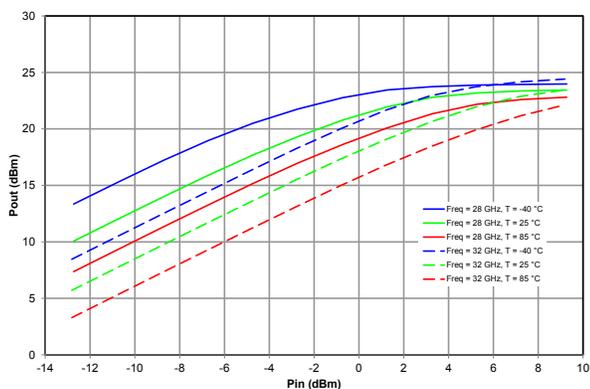
P1dB vs. Frequency VD1,2=4V, Id1,2=100 mA



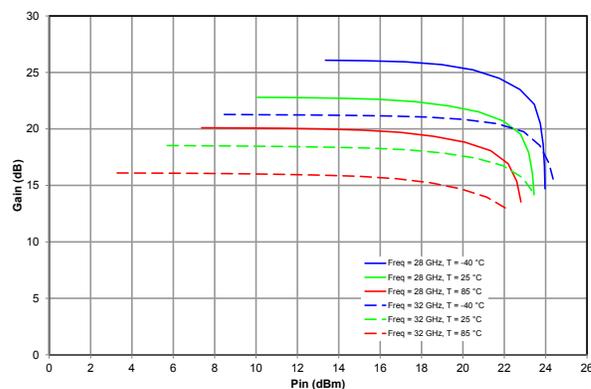
Gain vs. Pin VD1,2=4V, Id1,2=100 mA



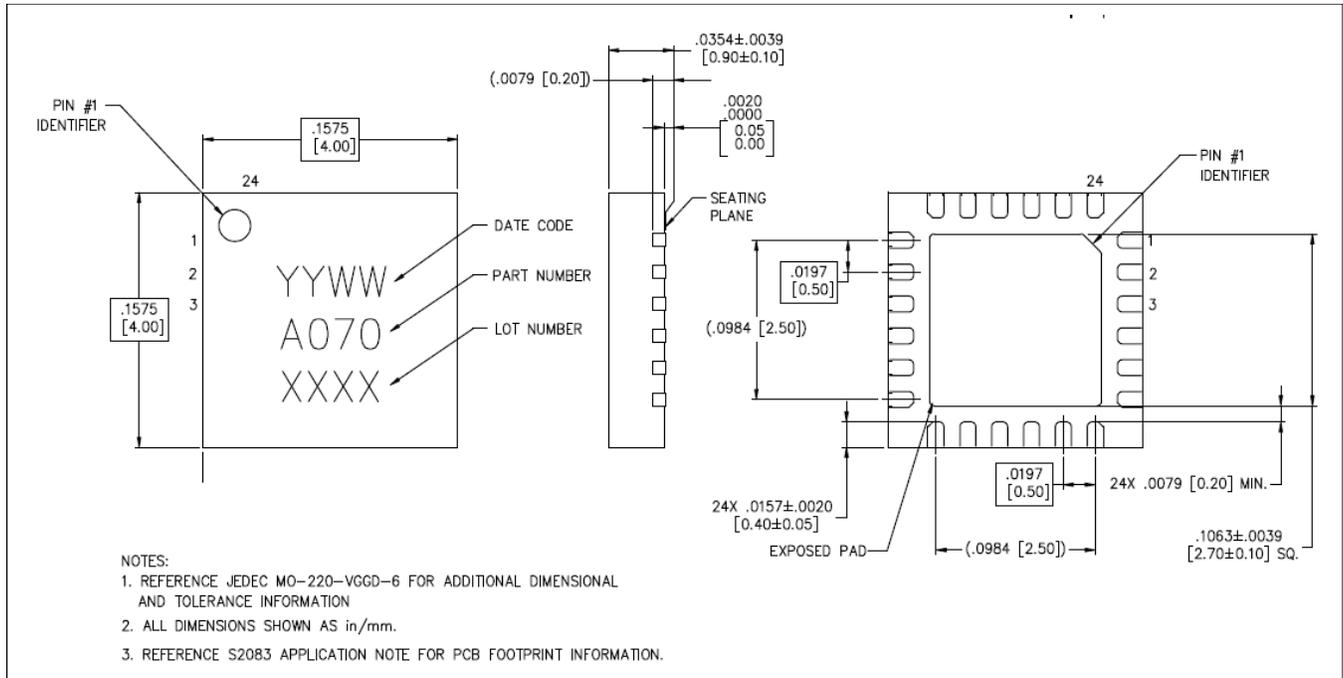
Pout vs. Pin VD1,2=4V, Id1,2=100 mA



Gain vs. Pout VD1,2=4V, Id1,2=100 mA



Lead-Free 4 mm 24-Lead PQFN†



† Reference Application Note S2083 for lead-free solder reflow recommendations.
 Meets JEDEC moisture sensitivity level 1 requirements.
 Plating is 100% matte tin over copper.