# AM42-0007

## GaAs MMIC VSAT Power Amplifier, 2.0 W
## 14.0 - 14.5 GHz

Rev. V8

### Features

- High Linear Gain: 22 dB Typical
- High Saturated Output Power: +33 dBm Typical
- High Power Added Efficiency: 22% Typical
- High P1dB: 32 dBm Typ.
- 50 Ω Input/Output Broadband Matched
- Integrated Output Power Detector
- Lead-Free Ceramic Bolt Down Package
- RoHS* Compliant and 260°C Reflow Compatible

### Description

The AM42-0007 is a three-stage MMIC linear power amplifier in a lead-free, ceramic bolt down style hermetic package. The AM42-0007 employs a fully matched chip with internally decoupled gate and drain bias networks and an output power detector. The AM42-0007 is designed to be operated from a constant voltage drain supply.

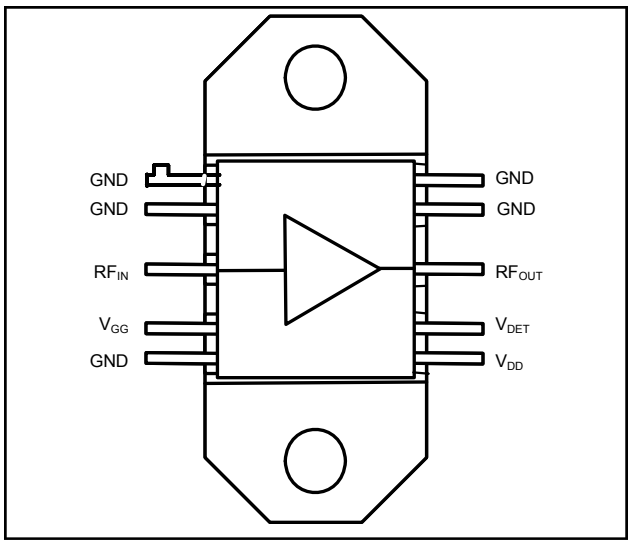
The AM42-0007 is designed for use as an output stage or a driver, in applications for VSAT systems. This design is fully monolithic and requires a minimum of external components.

The AM42-0007 is fabricated using a mature 0.5 micron GaAs MESFET process. The process features full passivation for increased performance and reliability. This product is 100% RF tested to ensure compliance to performance specifications.

### Ordering Information

| Part Number | Package |
|---|---|
| AM42-0007 | Ceramic Bolt Down |

### Functional Schematic




### Pin Configuration

| Pin No. | Pin Name | Description |
|---|---|---|
| 1 | GND | DC and RF Ground |
| 2 | GND | DC and RF Ground |
| 3 | $RF_{IN}$ | RF Input |
| 4 | $V_{GG}$ | Gate Supply |
| 5 | GND | DC and RF Ground |
| 6 | $V_{DD}$ | Voltage Drain Supply |
| 7 | $V_{DET}$ | Output Power Detector |
| 8 | $RF_{OUT}$ | RF Output |
| 9 | GND | DC and RF Ground |
| 10 | GND | DC and RF Ground |

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





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## Electrical Specifications: $T_A$ = +25°C, $V_{DD}$ = +9 V, $V_{GG}$ =- 5.0 V, $Z_0$ = 50 Ω

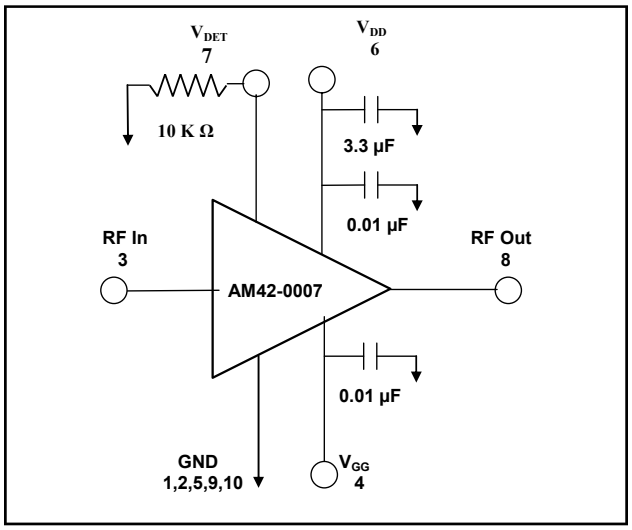
| Parameter | Test Conditions | Units | Min. | Typ. | Max. |
|---|---|---|---|---|---|
| Linear Gain | $P_{IN} \leq 0$ dBm | dB | 19 | 22 | — |
| Input VSWR | $P_{IN} \leq 0$ dBm | Ratio | — | 2.5:1 | 2.7:1 |
| Output VSWR | $P_{IN} \leq 0$ dBm | Ratio | — | 2.7:1 | — |
| Saturated Output Power | $P_{IN}$ = +14 dBm | dBm | — | 33 | — |
| Output Power at P1dB | — | dBm | 31 | 32 | — |
| Output IP3 | Two +24 dB, output tones @ 1 MHz spacing | dBm | — | 41 | — |
| Power Added Efficiency | $P_{IN}$ = +14 dBm | % | — | 22 | — |
| Bias Current | $I_{DD}$ (No RF)<br>$I_{GG}$ (No RF) | mA<br>mA | —<br>— | 850<br>18 | —<br>25 |
| Thermal Resistance | 25°C Heat Sink | °C/W | — | 9.5 | — |
| Detector Output Voltage | $R_L$ = 10 K Ω, $P_{OUT}$ = +31dBm | V | — | +3.5 | — |

## Absolute Maximum Ratings [1,2,3]

| Parameter | Absolute Maximum |
|---|---|
| $V_{DD}$ | 12 Volts |
| $V_{GG}$ | -10 Volts |
| Power Dissipation | 13.2 W |
| RF Input Power | +23 dBm |
| Channel Temperature | 150°C |
| Storage Temperature | -65°C to +150°C |
| $I_{DS}$ | 2100 mA |

1. Exceeding any one or combination of these limits may cause permanent damage to this device.
2. M/A-COM Technology does not recommend sustained operation near these survivability limits.
3. Case Temperature ($T_C$) = +25°C.

## Typical Bias Configuration [4,5,6,7,8]




4. Nominal bias is obtained by first connecting –5 volts to pin 4 ($V_{GG}$), followed by connection +9 volts to pin 6 ($V_{DD}$). Note sequence.
5. RF ground and thermal interface is the flange (case bottom). Adequate heat sinking is required.
6. No DC bias voltage appears at the RF ports.
7. For optimum IP3 performance, the $V_{DD}$ bypass capacitors should be placed within 0.5 inches of pin 6.
8. Resistor and capacitors surrounding the amplifier are suggestions and not included as part of the AM42-0007.





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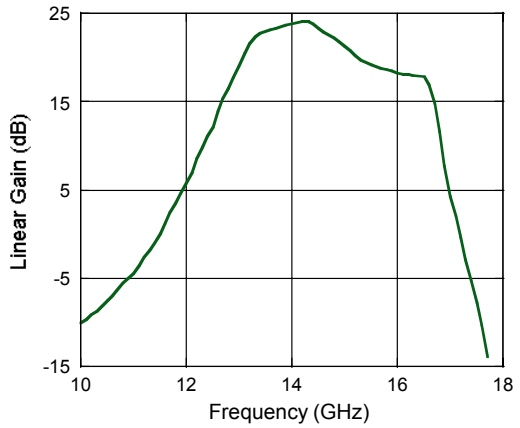
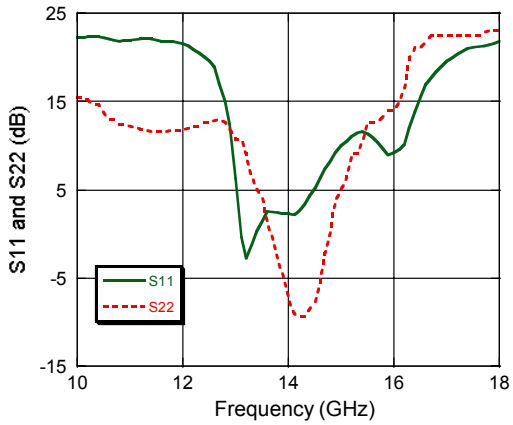
## Typical Performance Curves @ +25°C

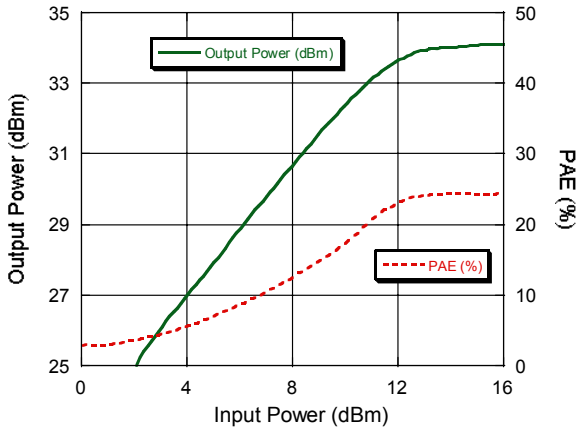
***Linear Gain vs. Frequency***



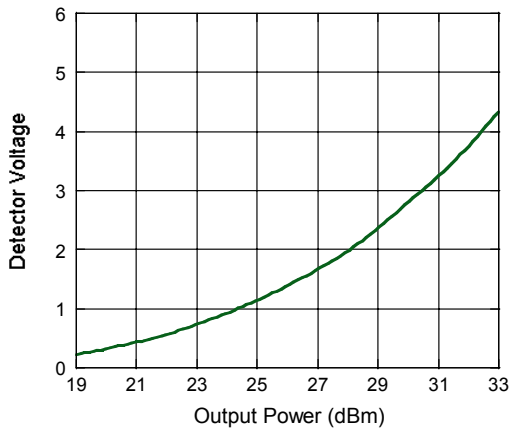

***Input and Output Return Loss vs. Frequency***



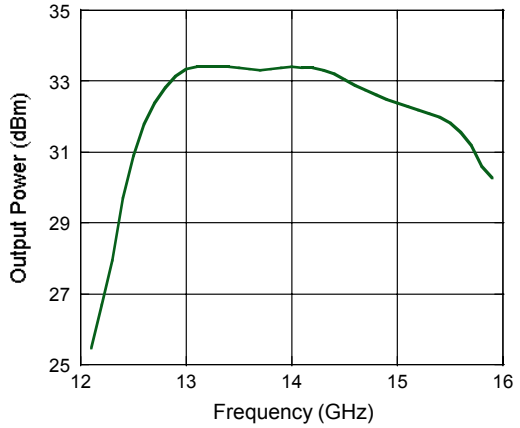

***Output Power vs. Input Power @ 14.25 GHz***



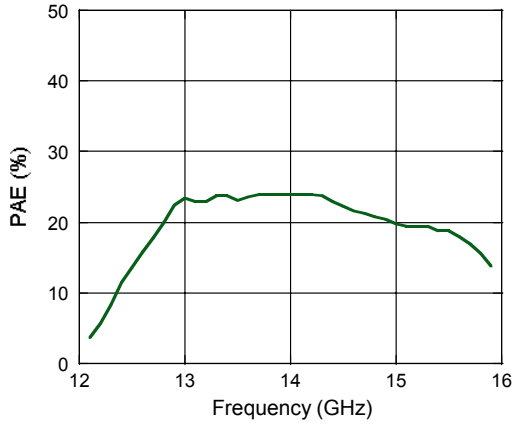

***Detector Voltage vs. Output Power @ 14.25 GHz***




***Output Power vs. Frequency @ $P_{IN}$ = +14 dBm***




***PAE vs. Frequency @ $P_{IN}$ = +14 dBm***





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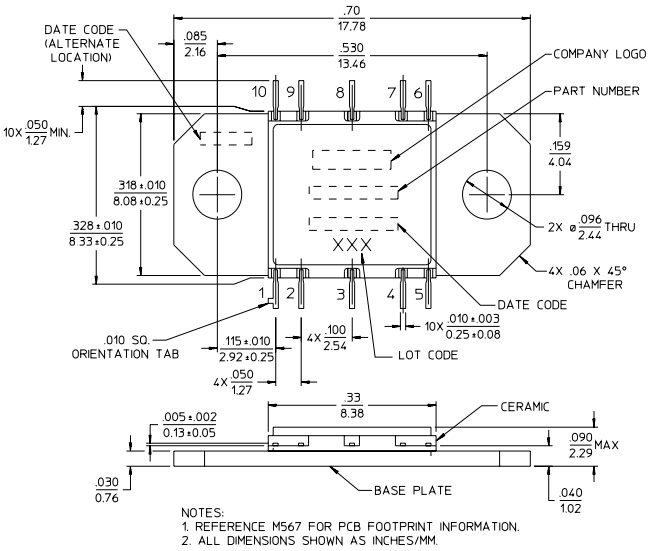
## Lead-Free CR-15†




† Reference Application Note M538 for lead-free solder reflow recommendations.
Meets JEDEC moisture sensitivity level 1 requirements.

## 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 devices.





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