

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

AM42-0007  
V5

### Features

- High Linear Gain: 22 dB Typical
- High Saturated Output Power: +33 dBm Typical
- High Power Added Efficiency: 22% Typical
- High  $P_{1dB}$ : 32 dBm Typ.
- 50  $\Omega$  Input/Output Broadband Matched
- Integrated Output Power Detector
- Lead-Free Ceramic Bolt Down Package
- RoHS\* Compliant and 260°C Reflow Compatible

### Description

M/A-COM's 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.

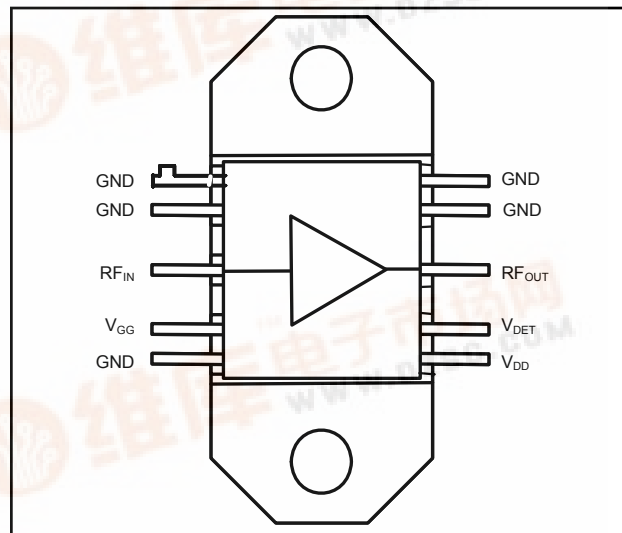
The AM42-0007 is designed for use as an output stage or a driver, in applications for VSAT systems. This design is fully monolithic and requires a minimum of external components.

M/A-COM's 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 Package

### Functional Schematic



### Pin Configuration

Pin No.	Pin Name	Description
1	GND	DC and RF Ground
2	GND	DC and RF Ground
3	IN	RF Input
4	V <sub>GG</sub>	Gate Supply
5	GND	DC and RF Ground
6	V <sub>DD</sub>	Voltage Drain Supply
7	V <sub>DET</sub>	Output Power Detector
8	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:  $T_A = +25^\circ\text{C}$ ,  $V_{DD} = +9\text{ V}$ ,  $V_{GG} = -5.0\text{ V}$ ,  $Z_0 = 50\Omega$ ,  $F = 14.0\text{-}14.5\text{ GHz}$**

Parameter	Test Conditions	Units	Min.	Typ.	Max.
Linear Gain	$P_{IN} \leq 0\text{ dBm}$	dB	19	22	—
Input VSWR	$P_{IN} \leq 0\text{ dBm}$	Ratio	—	2.5:1	2.7:1
Output VSWR	$P_{IN} \leq 0\text{ dBm}$	Ratio	—	2.7:1	—
Saturated Output Power	$P_{IN} = +14\text{ dBm}$	dBm	—	33	—
Output Power at P1dB	—	dBm	31	32	—
Output IP3 <sup>1</sup>	—	dBm	—	41	—
Power Added Efficiency	$P_{IN} = +14\text{ dBm}$	%	—	22	—
Bias Current	$P_{IN} = +14\text{ dBm}$	mA	—	18	25
Thermal Resistance	$25^\circ\text{C}$ Heat Sink	$^\circ\text{C/W}$	—	9.5	—
Detector Output Voltage	$R_L = 10\text{ K}\Omega$ , $P_{OUT} = +31\text{ dBm}$	V	—	+3.5	—

1. IP<sub>3</sub> is measured with two +24 dBm output tones @ 1 MHz spacing

**Absolute Maximum Ratings<sup>2,3,4</sup>**

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

- Exceeding any one or combination of these limits may cause permanent damage to this device.
- M/A-COM does not recommend sustained operation near these survivability limits.
- Case Temperature ( $T_C$ ) =  $+25^\circ\text{C}$ .

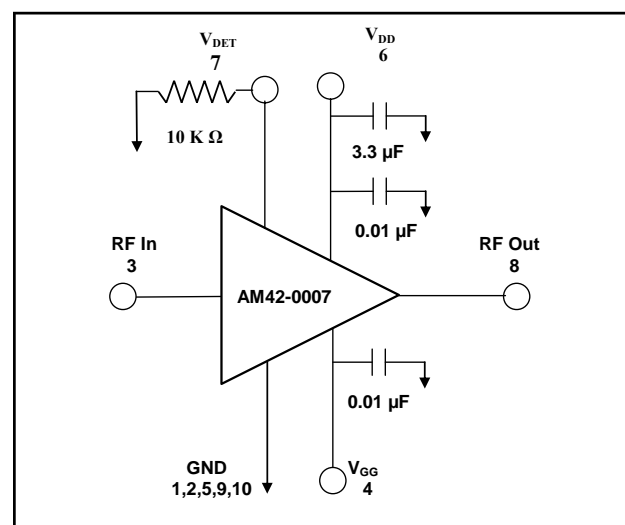
**Handling Procedures**

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.

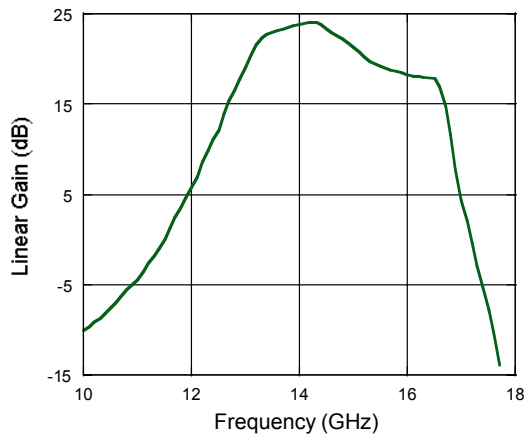
**Typical Bias Configuration<sup>5,6,7,8,9</sup>**



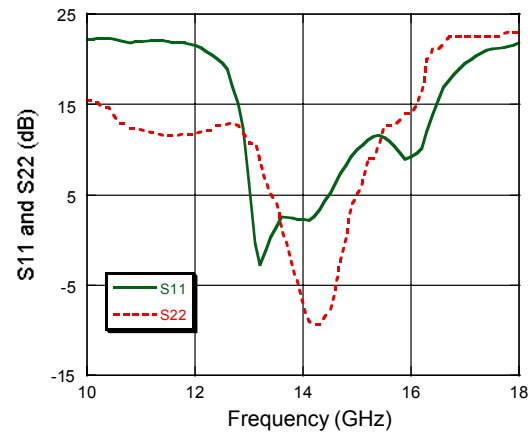
- Nominal bias is obtained by first connecting -5 volts to pin 4 ( $V_{GG}$ ), followed by connection +9 volts to pin 6 ( $V_{DD}$ ). Note sequence.
- RF ground and thermal interface is the flange (case bottom). Adequate heat sinking is required.
- No DC bias voltage appears at the RF ports.
- For optimum IP<sub>3</sub> performance, the  $V_{DD}$  bypass capacitors should be placed within 0.5 inches of pin 6.
- Resistor and capacitors surrounding the amplifier are suggestions and not included as part of the AM42-0007.

## Typical Performance Curves @ +25°C

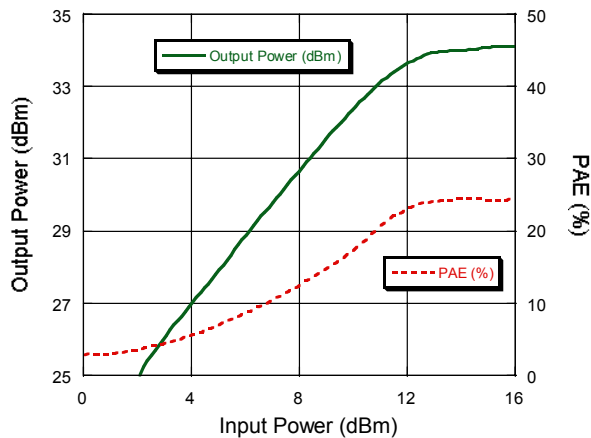
**Linear Gain vs. Frequency**



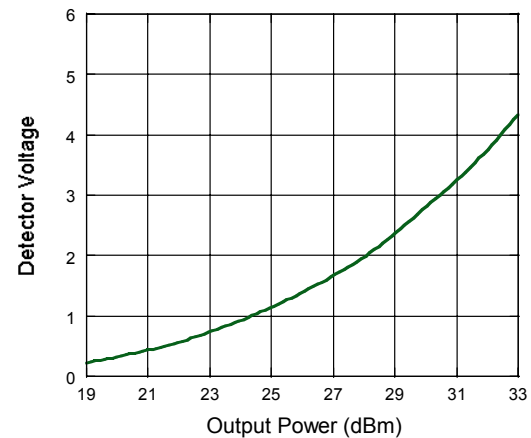
**Input and Output Return Loss vs. Frequency**



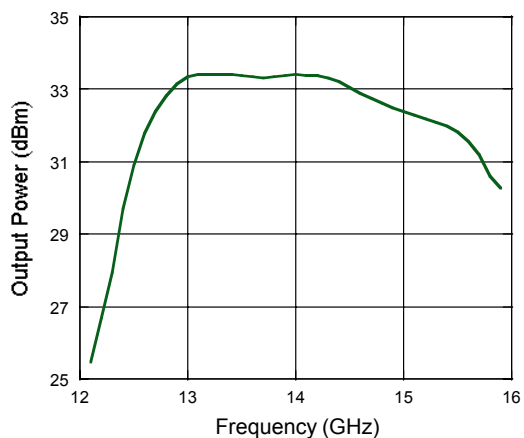
**Output Power vs. Input Power @ 14.25 GHz**



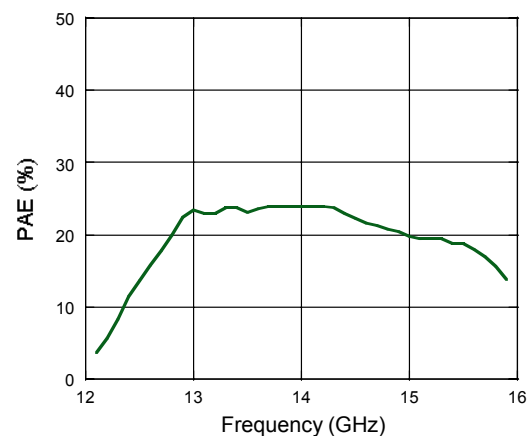
**Detector Voltage vs. Output Power @ 14.25 GHz**



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

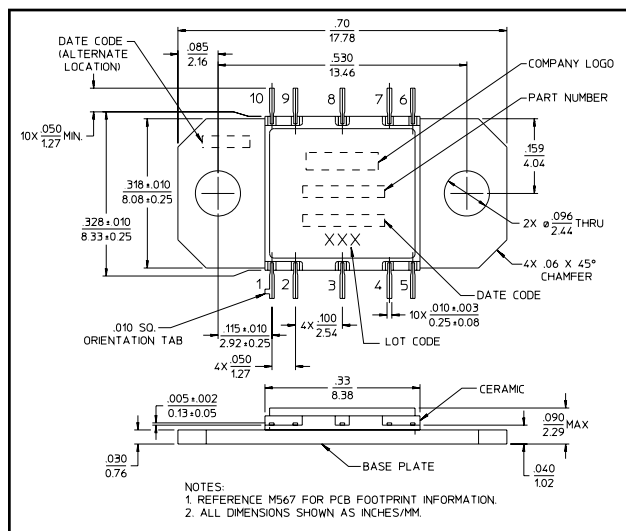


**PAE vs. Frequency @  $P_{IN} = +14$  dBm**



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## Lead-Free CR-15<sup>†</sup>



<sup>†</sup> Reference Application Note M538 for lead-free solder reflow recommendations.

Meets JEDEC moisture sensitivity level 1 requirements.