

# GaAs MMIC VSAT Power Amplifier 1.4 W 14.0 - 14.5 GHz

Rev. V5

#### **Features**

- High Linear Gain: 22 dB Typical
- High Saturated Output Power: +31.5 dBm Typical
- High Power Added Efficiency: 22% Typical
- 50 Ω 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 AM42-0002 is a three-stage MMIC linear power amplifier in a lead-free, ceramic bolt down style hermetic package. The AM42-0002 employs a fully matched chip with internally decoupled gate and drain bias networks and an output power detector. The AM42-0002 is designed to be operated from a constant voltage drain supply.

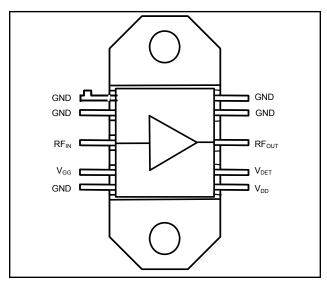
The AM42-0002 is designed for use as an output stage or a driver, in applications for VSAT systems. This design is fully monolithic and requires a minimum of external components.

M/A-COM's AM42-0002 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
AM42-0002	Ceramic Bolt Down Package

#### **Functional Schematic**



### **Pin Configuration**

Pin No.	Pin Name	Description			
1 0	GND	DC and RF Ground			
2/	GND	DC and RF Ground			
3	RF <sub>IN</sub>	RF Input			
4	$V_{GG}$	Gate Supply			
5	GND	DC and RF Ground			
6	$V_{DD}$	Voltage Drain Supply			
0411	V <sub>DÉT</sub>	Output Power Detector			
<b>V</b> 8/V	RF <sub>OUT</sub>	RF Output			
9	GND	DC and RF Ground			
10	GND	DC and RF Ground			

<sup>\*</sup> Restrictions on Hazardous Substances, European Union Directive 2002/95/EC.

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## Electrical Specifications: $T_A = 25^{\circ}C$ , $V_{DD} = +9$ V, $V_{GG} = -5.0$ V, $Z_0 = 50$ $\Omega$

Parameter	Test Conditions	Units	Min.	Тур.	Max.
Linear Gain	P <sub>IN</sub> ≤ 0 dBm	dB	19	22	_
Input VSWR	P <sub>IN</sub> ≤ 0 dBm	Ratio	_	2.5:1	2.7:1
Output VSWR	P <sub>IN</sub> ≤ 0 dBm	Ratio	_	2.7:1	_
Saturated Output Power	P <sub>IN</sub> = +14 dBm	dBm	30.5	31.5	_
Output Power at P1dB	_	dBm	_	29.5	_
Output IP3	Two +24 dBm output tones @ 1 MHz spacing	dBm	_	39	_
Power Added Efficiency	P <sub>IN</sub> = +14 dBm	%	_	22	_
Bias Current	P <sub>IN</sub> = +14 dBm	mA	_	800	1400
Thermal Resistance	25°C Heat Sink	°C/W	_	10	_
Detector Output Voltage	$R_L$ = 10 K $\Omega$ , $P_{OUT}$ = +31 dBm	V	_	+3.5	_

## **Absolute Maximum Ratings** <sup>1,2,3</sup>

Parameter	Absolute Maximum		
V <sub>DD</sub>	12 Volts		
$V_{GG}$	-10 Volts		
RF Input Power	+23 dBm		
Channel Temperature	150°C		
Storage Temperature	-65°C to +150°C		

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

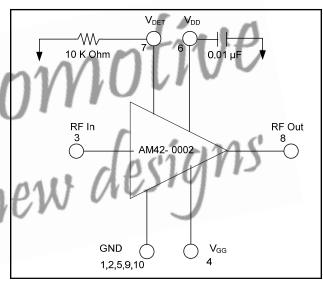
### **Handling Procedures**

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.

# Application Schematic 4,5,8,9



- 4. Nominal bias is obtained by first connecting -5 volts to pin 4 (VGG), followed by connection +9 volts to pin 6 (VDD). 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. The DC resistance at the input port is an open circuit and at the output port is a short circuit.
- 8. For optimum IP3 performance, the VDD bypass capacitors should be placed within 0.5 inches of pin 6.
- 9. Resistor and capacitors surrounding the amplifier are suggestions and not included as part of the AM42-0002.

ADVANCED: Data Sheets contain information regarding a product M/A-COM Technology Solutions is considering for development. Performance is based on target specifications, simulated results

and/or prototype measurements. Commitment to develop is not guaranteed. **PRELIMINARY:** Data Sheets contain information regarding a product M/A-COM Technology Solutions has under development. Performance is based on engineering tests. Specifications are typical. Mechanical outline has been fixed. Engineering samples and/or test data may be available. Commitment to produce in volume is not guaranteed.

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changes to the product(s) or information contained herein without notice.

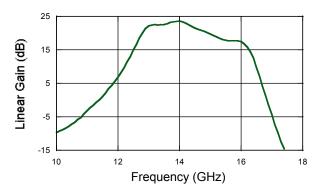


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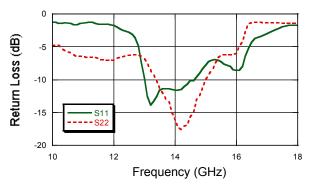
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## Typical Performance Curves @ +25°C

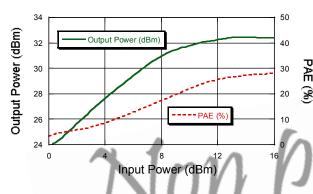
#### Linear Gain vs. Frequency



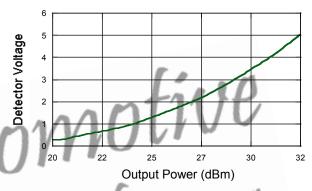
## Input and Output Return Loss vs. Frequency



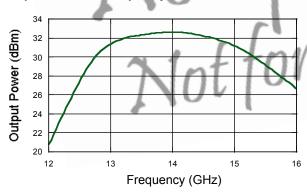
#### Output Power & PAE vs. Input Power @ 14.25 GHz



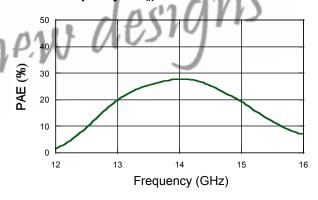
#### Detector Voltage vs. Output Power @ 14.25 GHz



#### Output Power vs. Frequency @ $P_{IN} = +14 \text{ dBm}$



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



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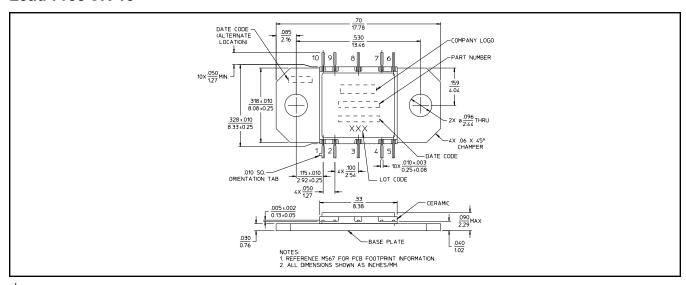
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#### Lead-Free CR-15<sup>†</sup>



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



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