

## GaAs MMIC VSAT Power Amplifier 2.0 W 5.9 - 6.4 GHz

Rev. V5

### Features

- High Linear Gain: 30 dB Typical
- High Saturated Output Power: +33 dBm Typ.
- High Power Added Efficiency: 26% Typ.
- 50  $\Omega$  Input/Output Broadband Matched
- Lead-Free Ceramic Bolt Down Package
- RoHS\* Compliant and 260°C Reflow Compatible

### Description

The AM42-0040 is a three-stage MMIC power amplifier in a lead-free, ceramic bolt down style hermetic package. The AM42-0040 employs an internally matched monolithic chip with internally decoupled Gate and Drain bias networks. The AM42-0040 is designed to be operated from a constant current Drain supply. By varying the Gate bias voltage, the saturated output power performance of this device can be tailored for various applications.

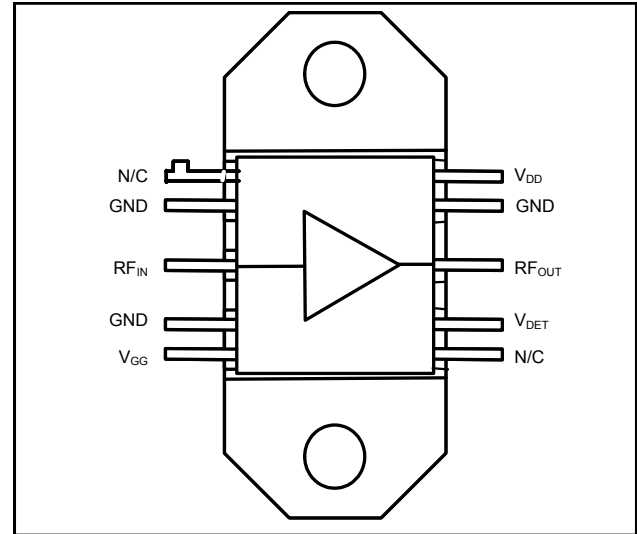
The AM42-0040 is designed for use as an output stage or driver amplifier for C-band VSAT transmitter systems. This amplifier employs a fully monolithic chip and requires a minimum of external components.

The AM42-0040 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
AM42-0040	Ceramic Bolt Down

### Functional Schematic



### Pin Configuration

Pin No.	Pin Name	Description
1	N/C	No Connection
2	GND	DC and RF Ground
3	RF In	RF Input
4	GND	DC and RF Ground
5	V <sub>GG</sub>	Gate Supply
6	N/C	No Connection
7	V <sub>DET</sub>	Detector
8	RF Out	RF Output
9	GND	DC and RF Ground
10	V <sub>DD</sub>	Drain Supply

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

## GaAs MMIC VSAT Power Amplifier 2.0 W 5.9 - 6.4 GHz

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**Electrical Specifications:  $T_A = 25^\circ\text{C}$ ,  $V_{DD} = +9\text{ V}$ ,  $V_{GG}$  adjusted for  $I_{DD} = 1050\text{ mA}$**

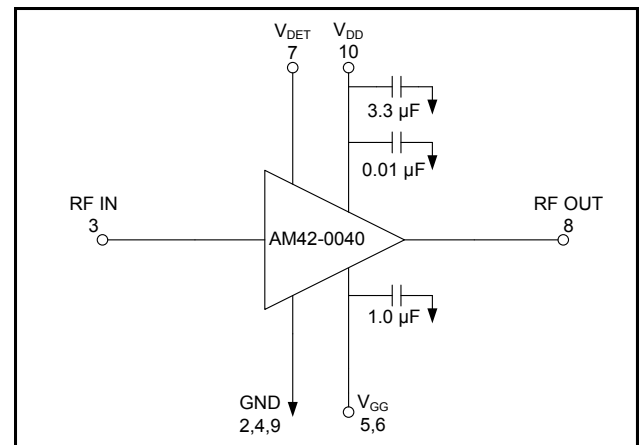
Parameter	Test Conditions	Units	Min.	Typ.	Max.
Linear Gain	$P_{IN} \leq -10\text{ dBm}$	dB	27	30	—
Input VSWR	$P_{IN} \leq -10\text{ dBm}$	Ratio	—	2.3:1	2.7:1
Output VSWR	$P_{IN} \leq -10\text{ dBm}$	Ratio	—	3.0:1	—
Output Power	$P_{IN} = +10\text{ dBm}$ , $I_{DD} = 1050\text{ mA Typ.}$	dBm	31.7	33.0	34.5
Output Power vs. Frequency	$P_{IN} = +10\text{ dBm}$ , $I_{DD} = 1050\text{ mA Typ.}$	dB	—	1.0	1.5
Output Power vs. Temperature (with respect to $T_A = 25^\circ\text{C}$ )	$P_{IN} = +10\text{ dBm}$ , $I_{DD} = 1050\text{ mA Typ.}$ $T_A = -40^\circ\text{C to } +70^\circ\text{C}$	dB	—	$\pm 0.4$	—
Drain Bias Current	$P_{IN} = +10\text{ dBm}$	mA	900	1050	1100
Gate Bias Voltage	$P_{IN} = +10\text{ dBm}$ , $I_{DD} = 1050\text{ mA Typ.}$	V	-2.4	-1.2	-0.4
Gate Bias Current	$P_{IN} = +10\text{ dBm}$ , $I_{DD} = 1050\text{ mA Typ.}$	mA	—	5	20
Thermal Resistance	$25^\circ\text{C Heat Sink}$	$^\circ\text{C/W}$	—	5.6	—
Second Harmonic	$P_{IN} = +10\text{ dBm}$ , $I_{DD} = 1050\text{ mA Typ.}$	dBc	—	-35	—
Third Harmonic	$P_{IN} = +10\text{ dBm}$ , $I_{DD} = 1050\text{ mA Typ.}$	dBc	—	-45	—
$V_{DET}$		V	2	—	—

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

Parameter	Absolute Maximum
Input Power	+23 dBm
$V_{DD}$	+12 Volts
$V_{GG}$	-3 Volts
$V_{DD} - V_{GG}$	+12 Volts
$I_{DD}$	1700 mA
Channel Temperature	$-40^\circ\text{C to } +85^\circ\text{C}$
Storage Temperature	$-65^\circ\text{C to } +150^\circ\text{C}$

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

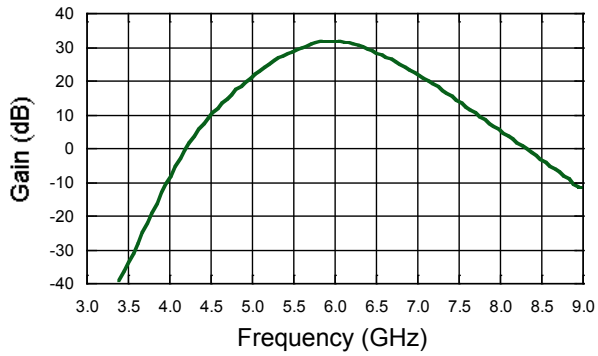
### Typical Bias Configuration <sup>4,5,6,7,8</sup>



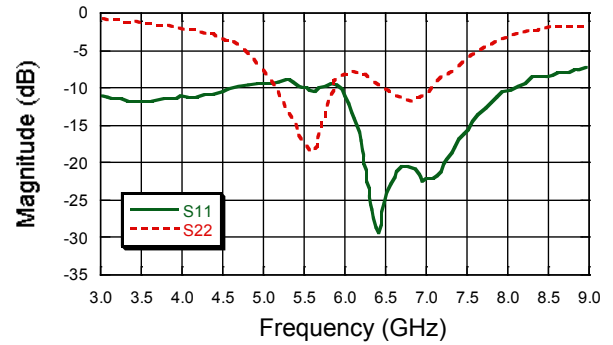
- Nominal bias is obtained by first connecting -2.4 volts to pin 5 ( $V_{GG}$ ), followed by connection +9 volts to pin 10 ( $V_{DD}$ ). Note sequence. Adjust  $V_{GG}$  for a drain current of 1050 mA typical.
- RF ground and thermal interface is the flange (case bottom). Adequate heat sinking is required.
- No DC bias voltage appears at the RF ports.
- For optimum IP3 performance, the  $V_{DD}$  bypass capacitors should be placed within 0.5 inches of the  $V_{DD}$  leads.
- Resistor and capacitors surrounding the amplifier are suggestions and not included as part of the AM42-0040.

**Typical Performance Curves @ +25°C**

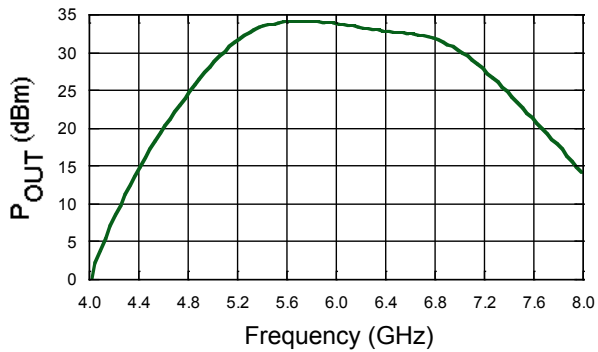
*Linear Gain vs. Frequency*



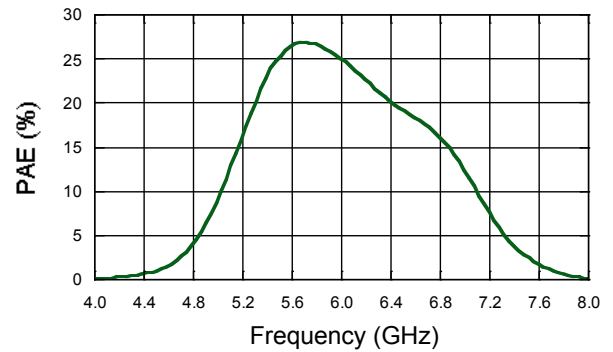
*Input and Output Return Loss vs. Frequency*



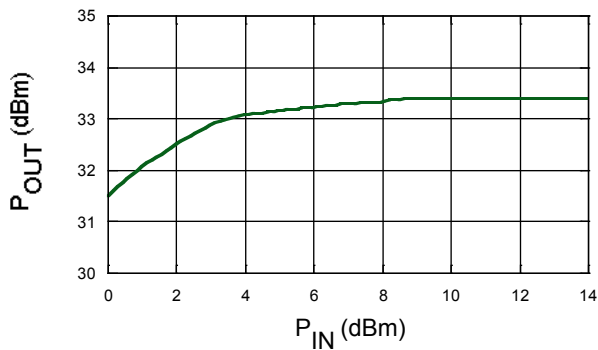
*Output Power vs. Frequency @  $P_{IN} = +10$  dBm*



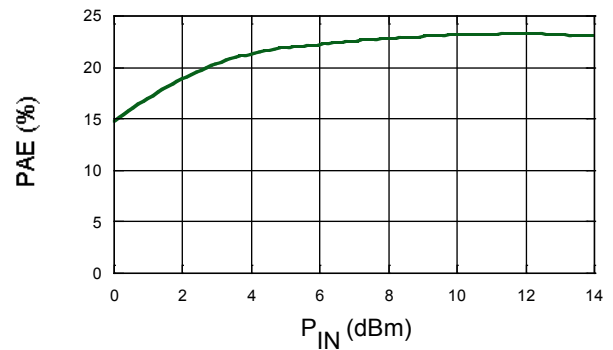
*PAE vs. Frequency @  $P_{IN} = +10$  dBm*



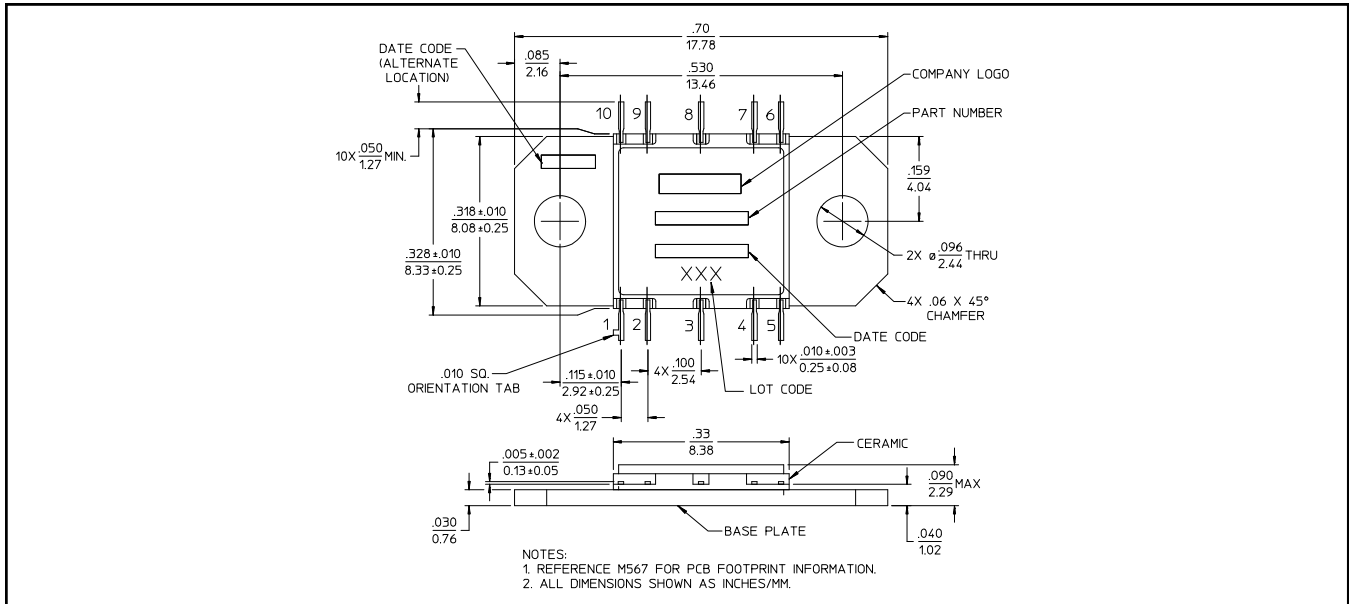
*Output Power vs. Input Power @ 6.15 GHz*



*PAE vs. Input Power @ 6.15 GHz*



## 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.

## 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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5

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