

## 2 Watt C-Band VSAT Power Amplifier 5.9 - 7.1 GHz

Rev. V5

### Features

- High Linear Gain: 33 dB Typical
- High Saturated Output Power: +33 dBm Typ.
- High Power Added Efficiency: 25% Typ.
- 50  $\Omega$  Input / Output Broadband Matched
- Integrated Output Power Detector
- Lead-Free Bolt Down Ceramic Package
- RoHS\* Compliant and 260°C Reflow Compatible

### Description

The AM42-0039 is a three stage MMIC power amplifier in a lead-free, bolt down ceramic package, allowing easy assembly. This device employs a fully matched chip with internally decoupled gate and drain bias networks. The device is designed to operate from a constant current drain supply or a constant voltage gate supply. By varying the bias conditions, the saturated output power performance of this device may be tailored for various applications.

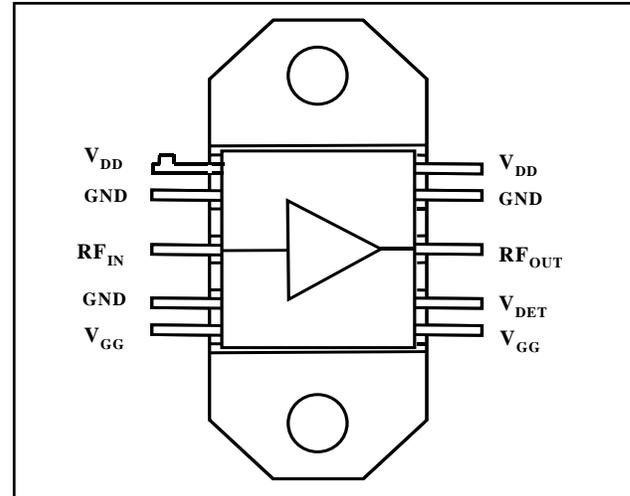
The AM42-0039 is ideally suited for use as an output stage or a driver amplifier in VSAT systems. The AM42-0039 includes internal supply line bypassing in the package, minimizing the number of external components required.

The AM42-0039 is fabricated using a mature 0.5 micron MBE based 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
AM42-0039	CR-15 Ceramic Bolt Down Package

### Functional Schematic



### Pin Configuration

Pin No.	Pin Name	Description
1	V <sub>DD</sub>	Drain Supply
2	GND	DC and RF Ground
3	RF <sub>IN</sub>	RF Input
4	GND	DC and RF Ground
5	V <sub>GG</sub>	Gate Supply
6	V <sub>GG</sub>	Gate Supply
7	V <sub>DET</sub>	Output Power Detector
8	RF <sub>OUT</sub>	RF Output
9	GND	DC and RF Ground
10	V <sub>DD</sub>	Drain Supply
Flange	GND	DC and RF Ground

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

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**Electrical Specifications:  $T_A = +25^\circ\text{C}$ ,  $V_{DD} = +8\text{ V}$ ,  $V_{GG}$  adjusted for  $I_{DD} = 900\text{ mA}$ ,  $F = 5.9 - 7.1$**

Parameter	Test Conditions	Units	Min.	Typ.	Max.
Linear Gain	$P_{IN} = -10\text{ dBm}$	dB	31	33	35
Input VSWR	$P_{IN} = -10\text{ dBm}$	Ratio	—	2.5:1	3.0:1
Output VSWR	$P_{IN} = -10\text{ dBm}$	Ratio	—	2.5:1	—
Output Power	$P_{IN} = +3\text{ dBm}$ , $I_{ds} = 900\text{ mA Typ.}$	dBm	31.7	33.0	—
Output Power vs. Frequency	$P_{IN} = +3\text{ dBm}$ , $I_{ds} = 900\text{ mA Typ.}$ (5.9 to 6.4 GHz)	dB	—	$\pm 0.3$	$\pm 0.75$
	$P_{IN} = +3\text{ dBm}$ , $I_{ds} = 900\text{ mA Typ.}$ (6.4 to 7.1 GHz)	dB	—	$\pm 0.3$	$\pm 0.75$
Output Power vs. Temperature	$T_A = -40^\circ\text{C}$ to $+85^\circ\text{C}$ , $P_{IN} = +7\text{ dBm}$	dB	—	$\pm 0.4$	—
Drain Bias Current	$P_{IN} = +3\text{ dBm}$	mA	800	900	1000
Gate Bias Voltage	$P_{IN} = +3\text{ dBm}$ , $I_{ds} = 900\text{ mA Typ.}$	V	-2.0	-1.2	-0.4
Gate Bias Current	$P_{IN} = +3\text{ dBm}$ , $I_{ds} = 900\text{ mA Typ.}$	mA	—	10	20
Thermal Resistance (qJC)	25°C Heat Sink	$^\circ\text{C/W}$	—	7.0	—
Second Harmonic	$P_{IN} = +3\text{ dBm}$ , $I_{ds} = 900\text{ mA Typ.}$	dBc	—	-35	—
Third Harmonic	$P_{IN} = +3\text{ dBm}$ , $I_{ds} = 900\text{ mA Typ.}$	dBc	—	-45	—
Detector Voltage	$P_{IN} = +3\text{ dBm}$ , $I_{ds} = 900\text{ mA Typ.}$	V	—	4.0	—

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

Parameter	Absolute Maximum
Input Power	+15 dBm
Operating Voltages	$V_{DD} = +10\text{ volts}$ ; $V_{GG} = -3\text{ volts}$ ; $V_{DD} - V_{GG} = 12\text{ volts}$
$I_{ds}$	1200 mA
Channel Temperature	+150 $^\circ\text{C}$
Operating Temperature	-40 $^\circ\text{C}$ to +80 $^\circ\text{C}$
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 does not recommend sustained operation near these survivability limits.
- Adequate heat sinking and grounding required on flange base.

### Operating the AM42-0039

The AM42-0039 is static sensitive. Please handle with care. To operate the device, follow these steps.

- Apply -2.0 Volts to  $V_{GG}$ .
- Ramp  $V_{DD}$  to +8V.
- Adjust  $V_{GG}$  to set quiescent drain current.
- Apply RF.
- Power down in reverse sequence. Turn gate voltage off last.

### Handling Procedures

Please observe the following precautions to avoid damage:

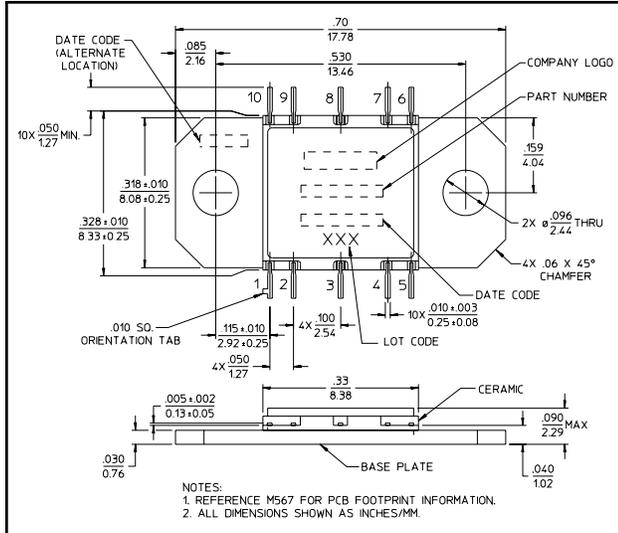
### Static Sensitivity

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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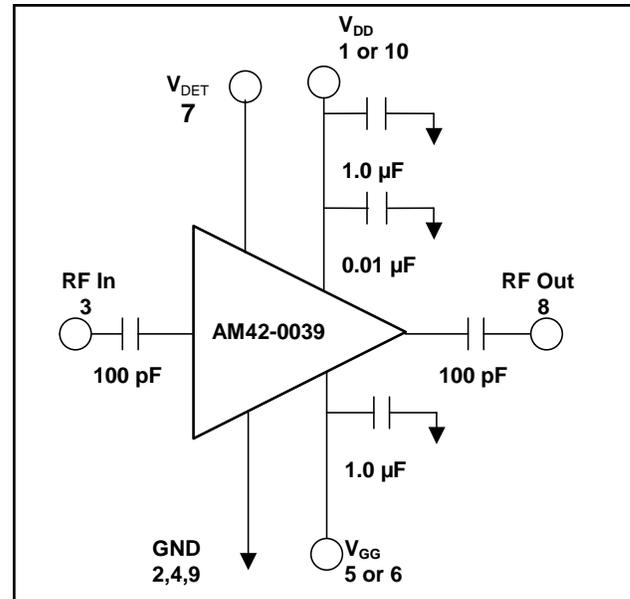
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### Lead-Free CR-15<sup>†</sup>



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

### Application Schematic <sup>4,5,6</sup>



4. Apply -2 volts to pin 5 or 6 ( $V_{GG}$ ), prior to applying +8 volts to pins 1 or 10 ( $V_{DD}$ ). Adjust  $V_{GG}$  for typical drain current.
5. External DC blocking capacitors required on the RF ports.
6. For optimum IP3 performance,  $V_{DD}$  bypass capacitors should be placed within 0.5 inches of the  $V_{DD}$  leads.