

## 3 Volt Voltage Variable Absorptive Attenuator 40 dB, 0.5 - 2.0 GHz

Rev. V1

### Features

- Single Positive Voltage Control: 0 to +3 Volts
- 40 dB Attenuation Range at 0.9 GHz
- $\pm 2$  dB Linearity from BSL
- Low DC Power Consumption
- Lead-Free SOIC-8 Plastic Package
- 100% Matte Tin Plating over Copper
- Halogen-Free "Green" Mold Compound
- 260°C Reflow Compatible
- RoHS\* Compliant Version of AT-113

### Description

M/A-COM's MAAV-008022 is a GaAs MMIC voltage variable absorptive attenuator in a lead-free low-cost SOIC 8-lead surface mount plastic package. The MAAV-008022 is ideally suited for use where linear attenuation fine tuning and very low power consumption are required.

Typical applications include radio, cellular, GPS equipment and automatic gain/level control circuits.

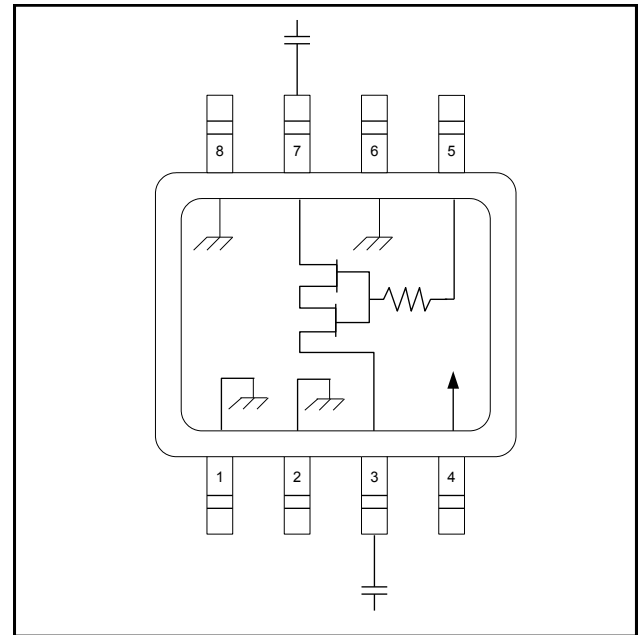
The MAAV-008022 is fabricated with a monolithic GaAs MMIC using a mature 1-micron process. The process features full chip passivation for increased performance and reliability.

### Ordering Information <sup>1</sup>

Part Number	Package
MAAV-008022-000000	Bulk Packaging
MAAV-008022-TR3000	3000 piece reel

1. Reference Application Note M513 for reel size information.

### Functional Schematic <sup>2,3,4,5</sup>



2.  $V_{CC} = +3$  VDC @ 50  $\mu$ A maximum.
3.  $V_C = 0$  VDC to +3 VDC @ 50  $\mu$ A maximum.
4. External DC blocking capacitors are required on all RF ports.
5. 39 pF used for data measurements.

### Pin Configuration

Pin No.	Function	Pin No.	Function
1	Ground	5	$V_C$
2	Ground	6	Ground
3	RF Port	7	RF Port
4	$V_{CC}$	8	Ground

### Absolute Maximum Ratings <sup>6</sup>

Parameter	Absolute Maximum
Input Power	+21 dBm
Supply Voltage $V_{CC}$	$-1 \text{ V} \leq V_{CC} \leq +8 \text{ V}$
Control Voltage $V_C$	$-1 \text{ V} \leq V_C \leq V_{CC} + 0.5 \text{ V}$
Operating Temperature	$-40^\circ\text{C}$ to $+85^\circ\text{C}$
Storage Temperature	$-65^\circ\text{C}$ to $+150^\circ\text{C}$

6. Exceeding any one or combination of these limits may cause permanent damage to this device.

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

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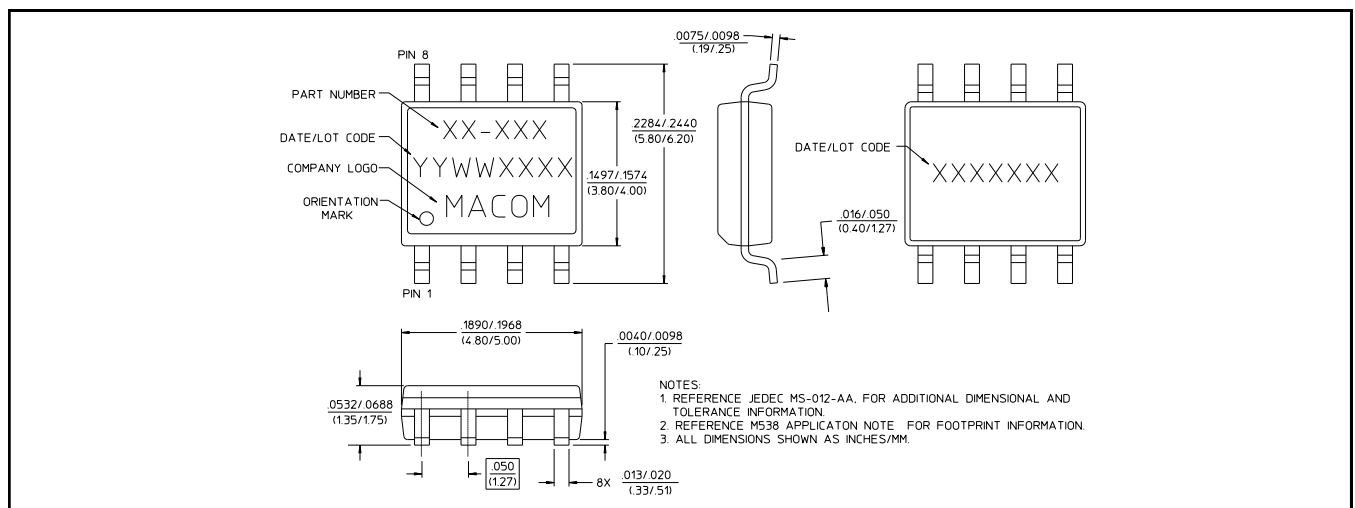
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### Electrical Specifications <sup>7</sup>: T<sub>A</sub> = 25°C, Z<sub>0</sub> = 50 Ω

Parameter	Test Conditions	Units	Min	Typ	Max
Insertion Loss	0.5 - 1.0 GHz	dB	—	2.7	3.0
	1.0 - 2.0 GHz	dB	—	3.0	3.5
Attenuation (Relative to Insertion Loss)	Frequency = 0.5 - 2.0 GHz	dB	34	35	—
	V <sub>c</sub> = 0.0 V (max. atten.)	dB	26	30	—
	V <sub>c</sub> = 1.5 V	dB	12.5	15	17.5
	V <sub>c</sub> = 2.7 V	dB	—	.5	0.7
Slope (at any point on the curve)	V <sub>c</sub> delta 0.5 V - 1.5 V	dB/V	10	15	23
	V <sub>c</sub> delta 1.5 V - 2.7 V	dB/V	0	14	17
VSWR	—	Ratio	—	2:1	—
Trise, Tfall	10% to 90% RF, 90% to 10% RF	μS	—	10	—
Ton, Toff	50% Control to 90% RF, 50% Control to 10% RF	μS	—	12	—
Transients	In-band	mV	—	10	—

7. The RF ports must be blocked outside of the package from ground or any other voltage.

### Lead-Free SOIC-8<sup>†</sup>



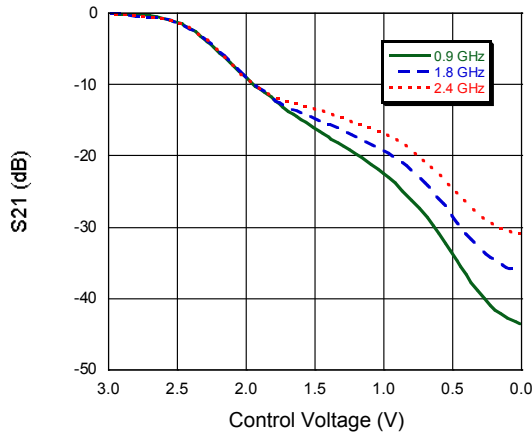
<sup>†</sup> Reference Application Note M538 for lead-free solder reflow recommendations.  
Meets JEDEC moisture sensitivity level 1 requirements.

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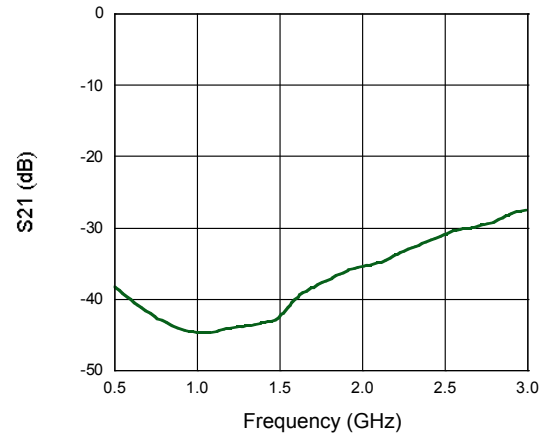
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### Typical Performance Curves @ 25°C

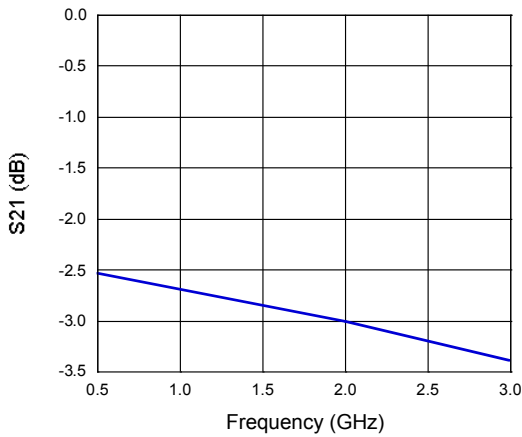
**Attenuation vs. Control Voltage**



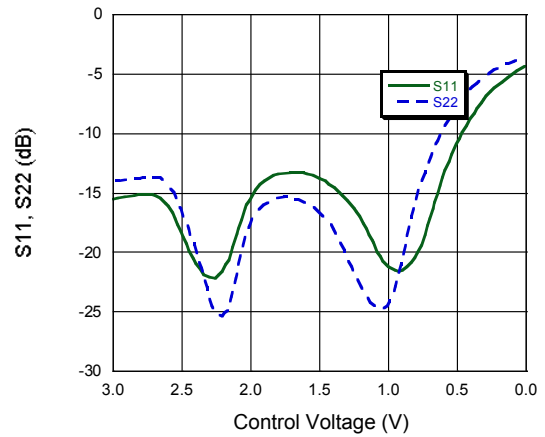
**Attenuation vs. Frequency @ 0V**



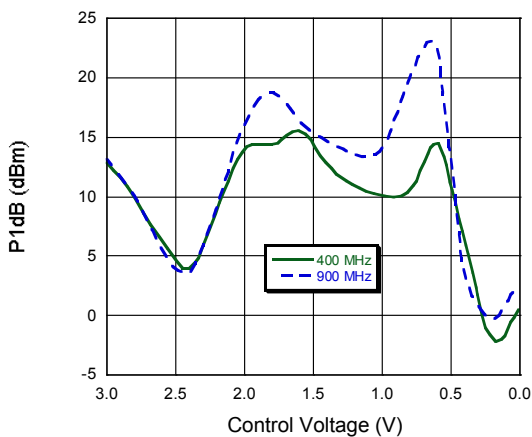
**Insertion Loss vs. Frequency**



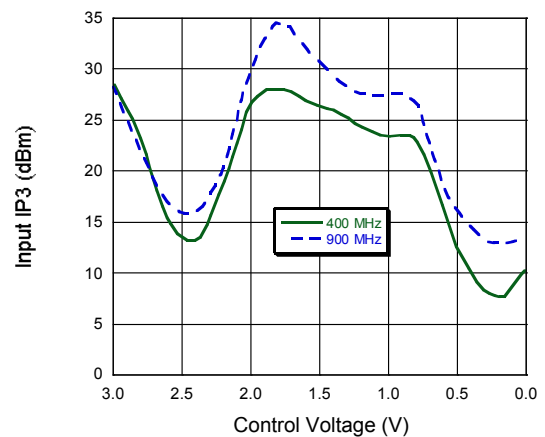
**Return Loss vs. Control Voltage, F = 900 MHz**



**1 dB Compression vs. Control Voltage**



**IP3 vs. Control Voltage**

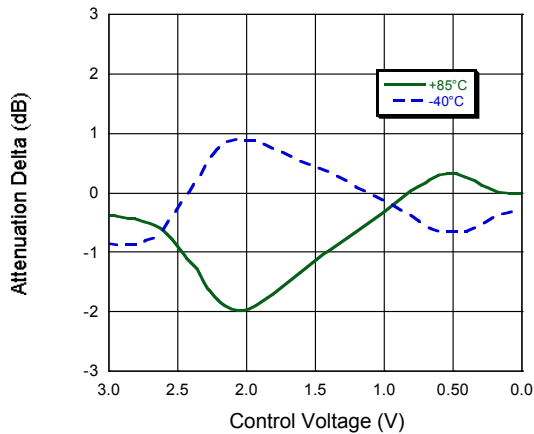


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### Typical Performance Curves @ 25°C

*Attenuation vs. Temperature*  
*Normalized @ 25°C, F = 900 MHz*



### 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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