

## Voltage Variable Absorptive Attenuator 35 dB, 0.5 - 2.0 GHz

Rev. V5

### Features

- Single Positive Voltage Control: 0 to +5 Volts
- 35 dB Attenuation Range at 0.9 GHz
- $\pm 2$  dB Linearity from BSL
- Low DC Power Consumption
- Temperature Range:  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$
- SOIC-8 Plastic Package
- Tape and Reel Packaging Available

### Description

M/A-COM's AT-109 is a GaAs MMIC voltage variable absorptive attenuator in a low-cost SOIC-8 lead surface mount plastic package. The AT-109 is more linear than the higher attenuation range AT-108.

The AT-109 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.

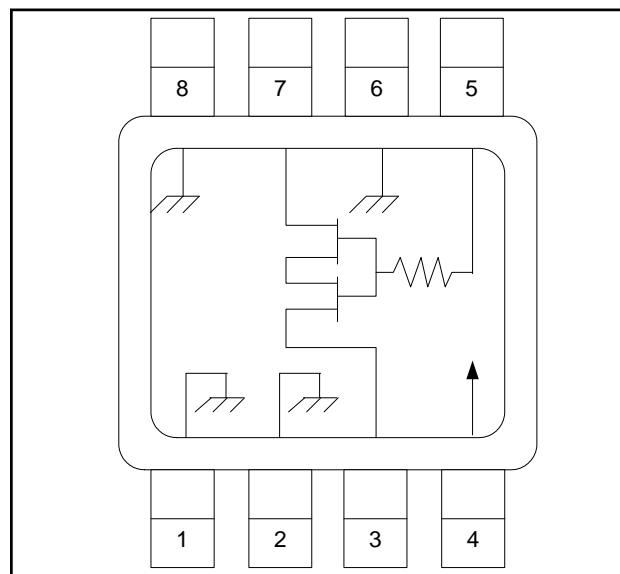
The AT-109 is fabricated with a monolithic GaAs MMIC using a mature 1-micron process. The process features full chip passivation for increased performance and reliability.

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

Part Number	Package
AT-109	SOIC 8-Lead Plastic Package
AT-109TR	Forward Tape and Reel
AT-109SMB	Sample Test Board

1. Reference Application Note M513 for reel size information.

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



2.  $V_{CC} = +5 \text{ VDC} \pm 0.5 \text{ VDC}$  @ 50  $\mu\text{A}$  maximum.
3.  $V_C = 0 \text{ VDC}$  to  $+5 \text{ VDC}$  @ 50  $\mu\text{A}$  maximum.
4. External DC blocking capacitors are required on all RF ports.

### 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>5,6</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 $+150^{\circ}\text{C}$

5. Exceeding any one or combination of these limits may cause permanent damage to this device.
6. M/A-COM does not recommend sustained operation near these survivability limits.

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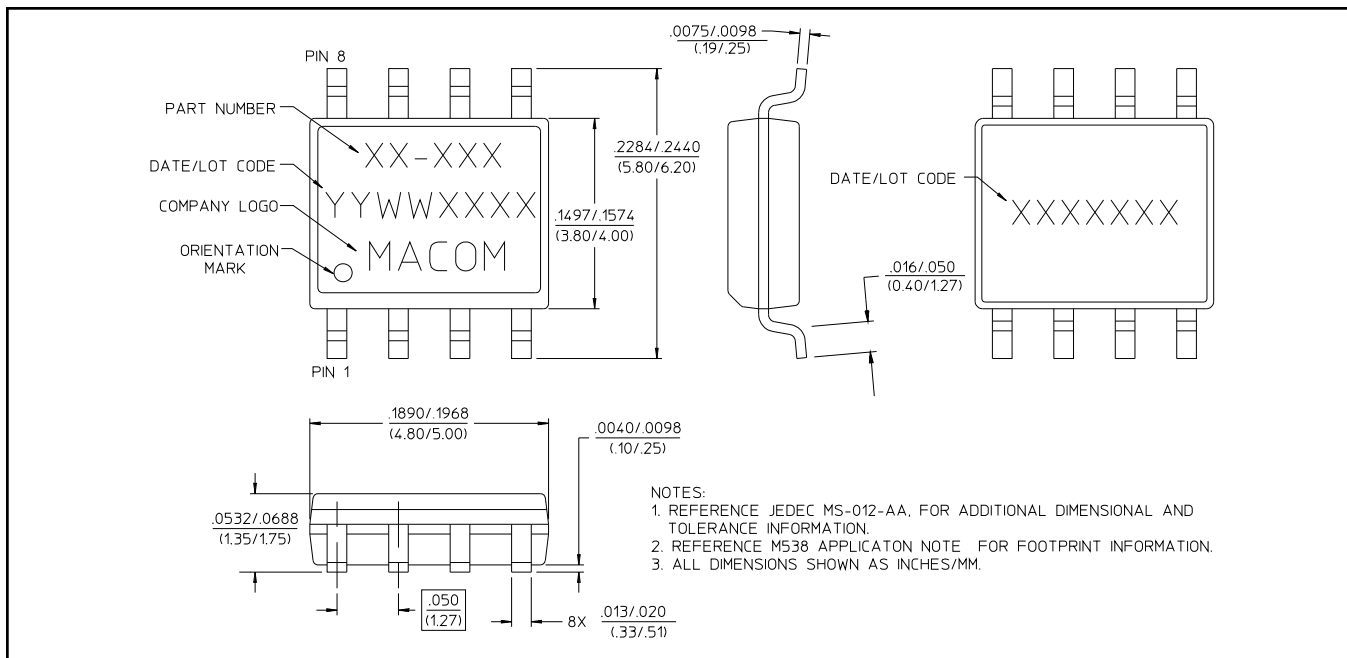
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### Electrical Specifications<sup>7</sup>: $T_A = 25^\circ\text{C}$ , $Z_0 = 50 \Omega$

Parameter	Test Conditions	Units	Min.	Typ.	Max.
Insertion Loss	0.5 - 1.0 GHz	dB	—	2.5	2.7
	1.0 - 2.0 GHz	dB	—	3.2	3.5
Attenuation	0.5 - 1.0 GHz	dB	35	—	—
	1.0 - 2.0 GHz	dB	30	—	—
Flatness (Peak to Peak)	0.5 - 1.0 GHz	dB	—	$\pm 0.5$	$\pm 0.8$
	1.0 - 2.0 GHz	dB	—	$\pm 1.2$	$\pm 1.5$
VSWR	—	Ratio	—	2:1	—
Trise, Tfall	10% to 90% RF, 90% to 10% RF	$\mu\text{S}$	—	25	—
Ton, Toff	50% Control to 90% RF, 50% Control to 10% RF	$\mu\text{S}$	—	35	—
Transients	In-band	mV	—	12	—

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

### SOIC-8

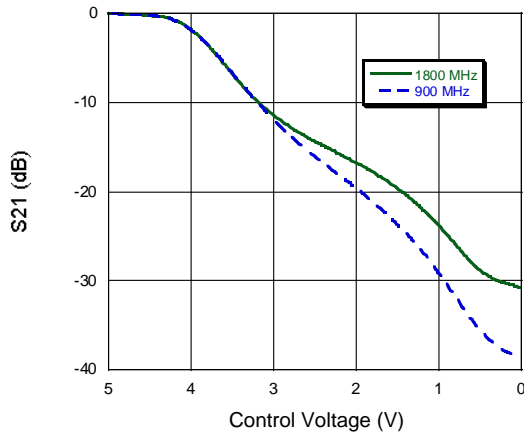


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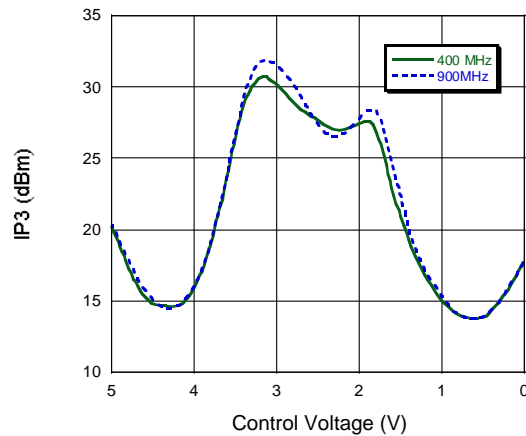
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### Typical Performance Curves @ 25°C

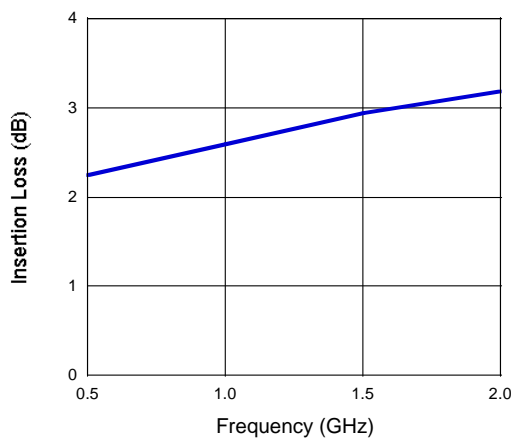
**Attenuation vs. Control Voltage,  $F = 900, 1800$  MHz**



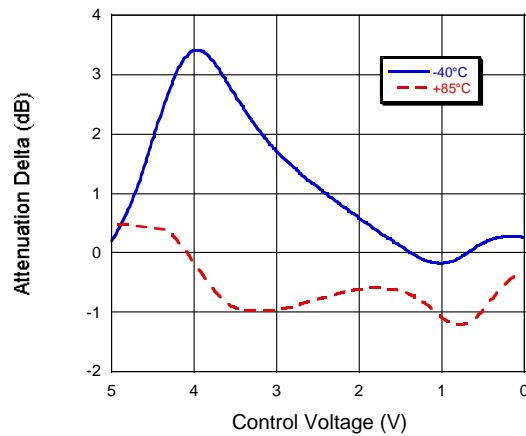
**IP3 vs. Control Voltage**



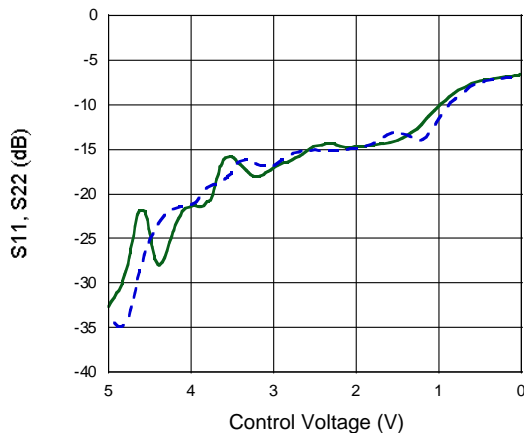
**Insertion Loss vs. Frequency**



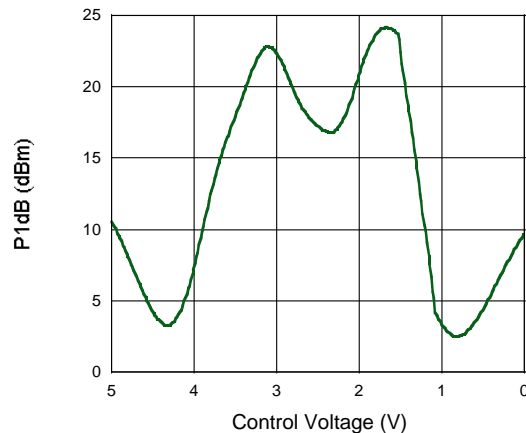
**Attenuation vs. Temperature, Normalized to 25°C,  $F = 900$  MHz**



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



**1 dB Compression vs. Control Voltage,  $F = 900$  MHz**



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