

## Voltage Variable Absorptive Attenuator 12 dB, DC - 2.0 GHz

Rev. V5

### Features

- Attenuation: 12 dB at 1 GHz
- Low Intermodulation Products
- Low DC Power Consumption: 50  $\mu$ W
- Single Voltage Control: 0 to -4 Volts
- Nanosecond Switching Speed
- Temperature Range: -40°C to +85°C
- SOT-143 Plastic Package
- Tape and Reel Packaging Available

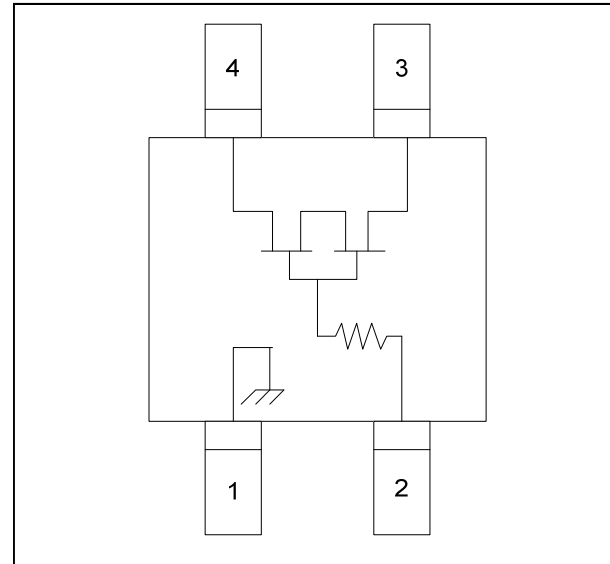
### Description

M/A-COM's AT-259 is a GaAs MMIC voltage variable absorptive attenuator in a low cost SOT-143 4-Lead surface mount plastic package. The AT-259 is ideally suited for use where attenuation fine tuning, fast switching and very low power consumption are required.

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

The AT-259 is fabricated with a monolithic GaAs MMIC using a mature 1 micron process. The process features full chip passivation for increased performance and reliability.

### Functional Schematic



### Pin Configuration

| Pin No. | Function       | Pin No. | Function |
|---------|----------------|---------|----------|
| 1       | Ground         | 3       | RF2      |
| 2       | V <sub>c</sub> | 4       | RF1      |

### Ordering Information <sup>1,2</sup>

| Part Number | Package               |
|-------------|-----------------------|
| AT-259      | Bulk Packaging        |
| AT-259TR    | Forward Tape and Reel |
| AT-259SMB   | Sample Board          |

1. Reference Application Note M513 for reel size information.
2. All sample boards include 5 loose parts.

### Absolute Maximum Ratings <sup>3</sup>

| Parameter             | Absolute Maximum |
|-----------------------|------------------|
| Input Power           | +21 dBm          |
| Control Voltage       | +5V, -8.5V       |
| Operating Temperature | -40°C to +85°C   |
| Storage Temperature   | -65°C to +150°C  |

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

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

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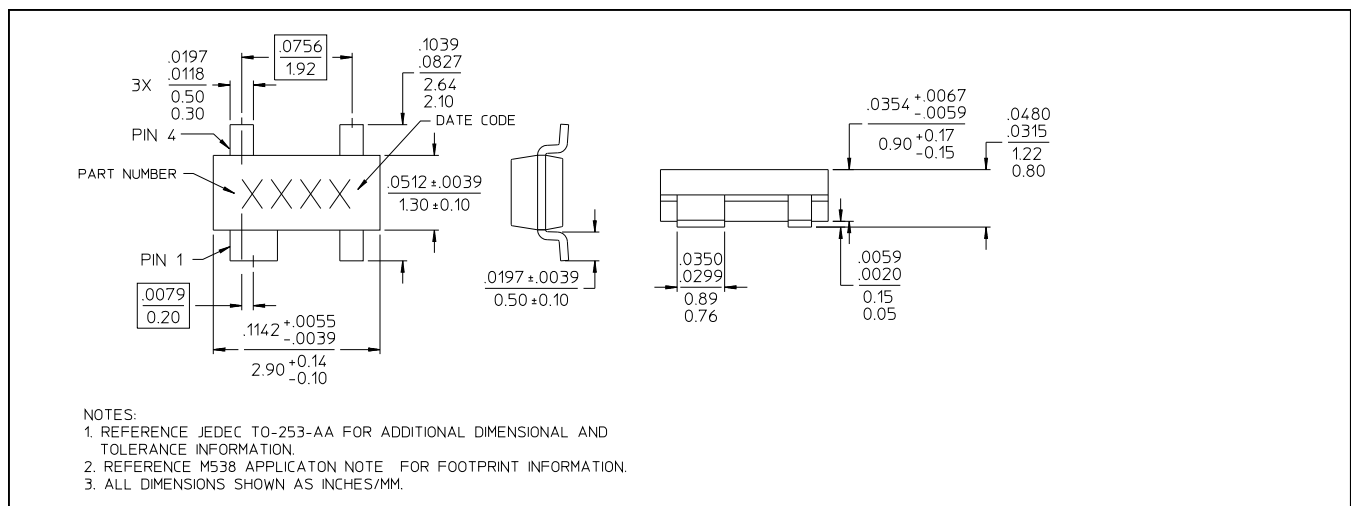
### Electrical Specifications: $T_A = 25^\circ\text{C}$ , $Z_0 = 50 \Omega$

| Parameter                  | Test Conditions <sup>4</sup>  | Frequency     | Units | Min. | Typ.            | Max.      |
|----------------------------|---|---------------|-------|------|-----------------|-----------|
| Insertion Loss             | —   | DC - 0.1 GHz  | dB    | —    | 2.9             | 3.1       |
|                            |   | DC - 0.5 GHz  | dB    | —    | 3.0             | 3.2       |
|                            |   | DC - 1.0 GHz  | dB    | —    | 3.2             | 3.5       |
|                            |   | DC - 2.0 GHz  | dB    | —    | 3.4             | 3.8       |
| Flatness<br>(Peak to Peak) | 5 dB Attenuation  | DC - 2.0 GHz  | dB    | —    | $\pm 0.2$       | $\pm 0.4$ |
|                            | 10 dB Attenuation   | DC - 2.0 GHz  | dB    | —    | $\pm 2.3$       | $\pm 2.5$ |
|                            | 15 dB Attenuation   | DC - 2.0 GHz  | dB    | —    | $\pm 7.0$       | $\pm 7.5$ |
| Output Impedance           | —   | —             | Ohms  | —    | 50              | —         |
| VSWR                       | —   | —             | Ratio | —    | 2.1:1           | —         |
| Trise, Tfall               | 10% to 90% RF, 90% to 10% RF  | —             | nS    | —    | 3               | —         |
| Ton, Toff                  | 50% Control to 90% RF, 50% Control to 10% RF                                | —             | nS    | —    | 5               | —         |
| Transients                 | In Band   | —             | mV    | —    | 10              | —         |
| Power Handling             | Linear Operation<br>Absolute maximum Input Power                            | —             | dBm   | —    | —               | 13        |
|                            |   | —             | dBm   | —    | —               | 21        |
| IP <sub>2</sub>            | Measured Relative to Input Power<br>(For two-tone Input Power Up to +5 dBm) | 0.05 GHz      | dBm   | —    | 34              | —         |
|                            |   | 0.5 - 2.0 GHz | dBm   | —    | 47              | —         |
| IP <sub>3</sub>            | Measured Relative to Input Power<br>(For two-tone Input Power Up to +5 dBm) | 0.05 GHz      | dBm   | 18   | 31 <sup>5</sup> | —         |
|                            |   | 0.5 - 2.0 GHz | dBm   | 18.5 | 36 <sup>5</sup> | —         |

4. Control voltage: 0 to -4 volts @ 20  $\mu\text{A}$  typical.

5. For levels above 6 dB attenuation. For levels below 6 dB, the minimum specification numbers apply.

### SOT-143<sup>†</sup>



<sup>†</sup> Meets JEDEC moisture sensitivity level 1 requirements.

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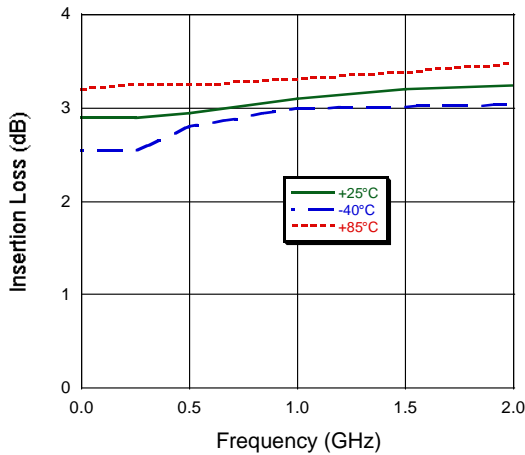
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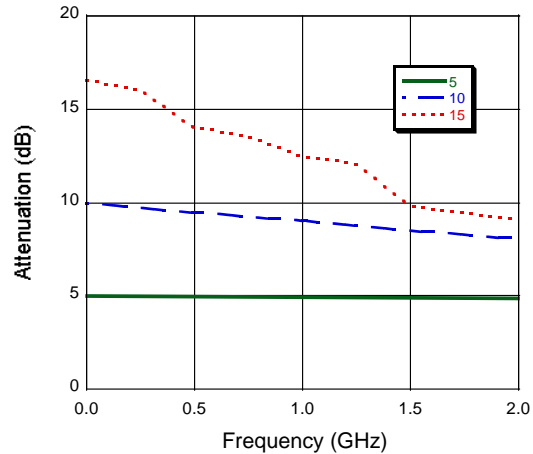
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## Typical Performance Curves

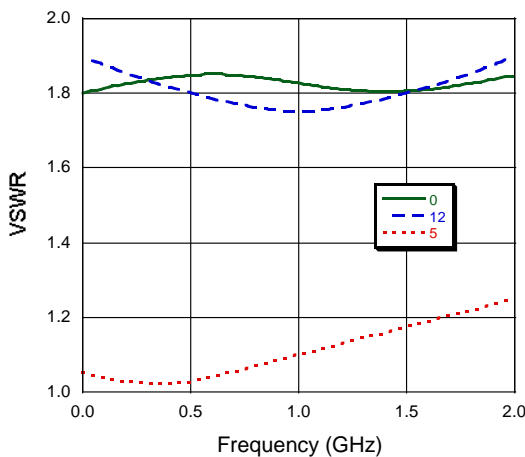
Insertion Loss vs. Frequency



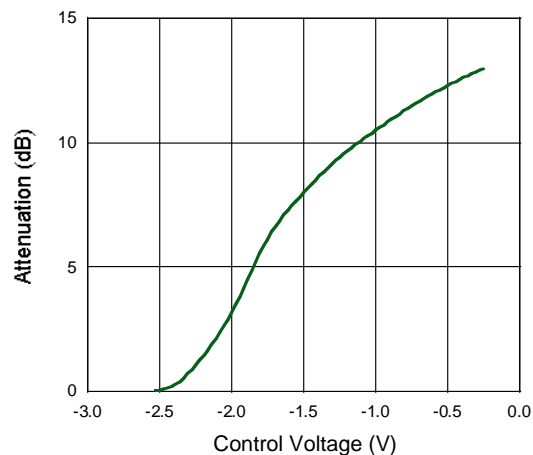
Attenuation vs. Frequency



VSWR vs. Frequency



Attenuation vs. Control Voltage, F = 950 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.