

**Voltage Variable Absorptive Attenuator**  
**35 dB, DC - 2.0 GHz**

**AT-635**  
**V6**

**Features**

- 35 dB Voltage Variable Attenuation at 1 GHz
- Single Voltage Control: 0 to -4 Volts
- Low DC Power Consumption
- Nanosecond Switching Speed
- Temperature Range: -40°C to +85°C
- SOIC-14 Plastic Package
- Tape and Reel Packaging Available

**Description**

M/A-COM's AT-635 is a GaAs MMIC voltage variable absorptive attenuator in a low cost SOIC 14-lead surface mount plastic package. The AT-635 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.

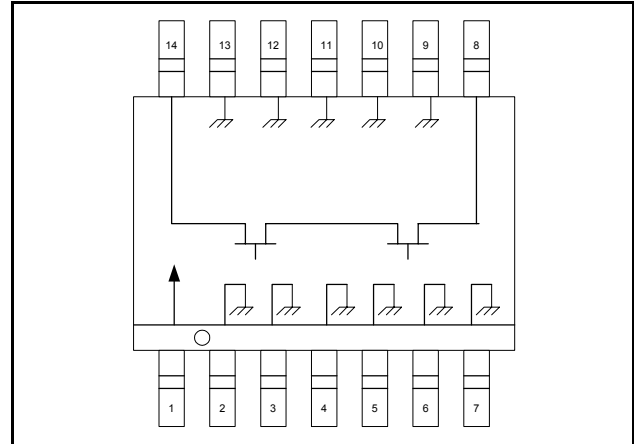
The AT-635 is fabricated with a monolithic GaAs MMIC using a mature 1-micron process. The process features full chip passivation for increased performance and reliability.

**Ordering Information**

| Part Number | Package                      |
|-------------|------------------------------|
| AT-635      | SOIC 14-Lead Plastic Package |
| AT-635TR    | Tape and Reel                |

Note: Reference Application Note M513 for reel size information.

**Functional Schematic**



**Pin Configuration**

| Pin No. | Function       | Pin No. | Function |
|---------|----------------|---------|----------|
| 1       | V <sub>C</sub> | 8       | RF2      |
| 2       | Ground         | 9       | Ground   |
| 3       | Ground         | 10      | Ground   |
| 4       | Ground         | 11      | Ground   |
| 5       | Ground         | 12      | Ground   |
| 6       | Ground         | 13      | Ground   |
| 7       | Ground         | 14      | RF1      |

**Absolute Maximum Ratings**<sup>1,2</sup>

| Parameter             | Absolute Maximum               |
|-----------------------|--------------------------------|
| Input Power           | +21 dBm                        |
| Control Voltage       | -8.5 V ≤ V <sub>C</sub> ≤ +5 V |
| Operating Temperature | -40°C to +85°C                 |
| Storing Temperature   | -65°C to +150°C                |

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

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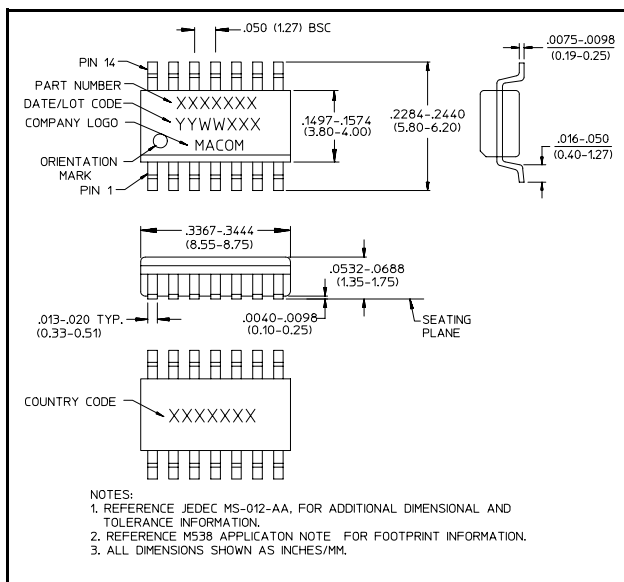
**Electrical Specifications:  $T_A = 25^\circ\text{C}$ ,  $Z_0 = 50 \Omega$**

| Parameter                  | Test Conditions <sup>3</sup>   | Units | Min. | Typ.            | Max.      |
|----------------------------|--|-------|------|-----------------|-----------|
| Insertion Loss             | DC - 0.5 GHz   | dB    | —    | 6.7             | 7.0       |
|                            | 0.5 - 1.0 GHz  | dB    | —    | 7.2             | 7.4       |
|                            | 1.0 - 2.0 GHz  | dB    | —    | 7.5             | 7.8       |
| Flatness<br>(Peak to Peak) | 10 dB Attenuation – DC - 2.0 GHz   | dB    | —    | $\pm 1.0$       | $\pm 1.3$ |
|                            | 20 dB Attenuation – DC - 2.0 GHz   | dB    | —    | $\pm 1.2$       | $\pm 1.5$ |
|                            | 30 dB Attenuation – DC - 2.0 GHz   | dB    | —    | $\pm 1.2$       | $\pm 1.5$ |
| VSWR                       |  | Ratio | —    | 2.0:1           | —         |
| Trise, Tfall               | 10% to 90% RF, 90% to 10% RF   | nS    | —    | 2               | —         |
| Ton, Toff                  | 50% Control to 90% RF,<br>50% Control to 10% RF  | nS    | —    | 4               | —         |
| Transients                 | In Band  | mV    | —    | 30              | —         |
| Power Handling             | Linear Operation   | dBm   | —    | —               | 13        |
|                            | Absolute maximum Input Power   | dBm   | —    | —               | 21        |
| IP <sub>2</sub>            | 0.05 GHz   | dBm   | —    | 34              | —         |
|                            | 0.5 - 2.0 GHz<br>Measured Relative to Input Power<br>(For two-tone Input Power Up to +5 dBm) | dBm   | —    | 47              | —         |
| IP <sub>3</sub>            | 0.05 GHz   | dBm   | 18   | 31 <sup>4</sup> | —         |
|                            | 0.5 - 2.0 GHz<br>Measured Relative to Input Power<br>(For two-tone Input Power Up to +5 dBm) | dBm   | 18.5 | 36 <sup>4</sup> | —         |

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

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

**SOIC-14**



**Handling Procedures**

Please observe the following precautions to avoid damage:

**Static Sensitivity**

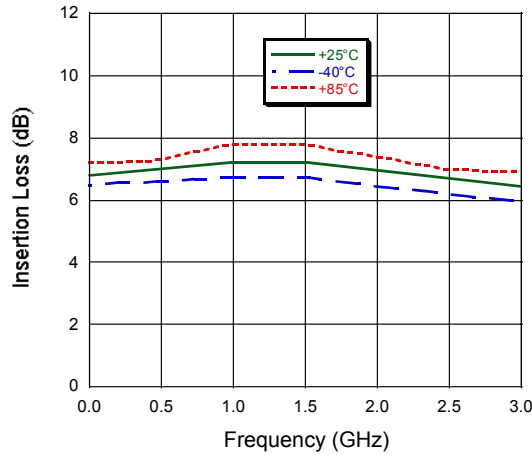
Gallium Arsenide Integrated Circuits are sensitive to electrostatic discharge (ESD) and can be damaged by static electricity. Proper ESD control techniques should be used when handling these devices.

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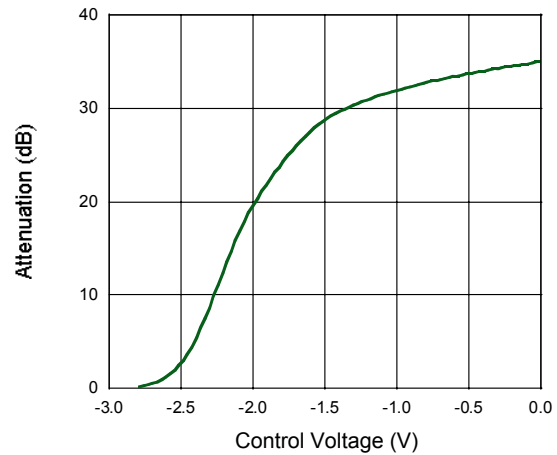
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**Typical Performance Curves**

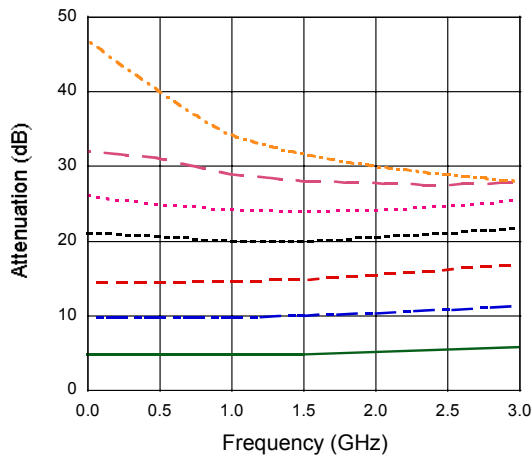
*Insertion Loss vs. Frequency*



*Attenuation vs. Control Voltage, F = 1 GHz*



*Attenuation vs. Frequency*



*VSWR vs. Frequency*

