

## Features

- 1-dB Attenuation Steps to 31 dB
- Ultra Low DC Power Consumption
- Low Intermodulation Products: IP3 = 50 dBm
- SSOP-20 Plastic Package
- Tape and Reel Packaging Available
- Temperature Stability:  $\pm 0.15$  dB from  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$

## Description

M/A-COM's AT-260 is a 5-bit, 1-dB step GaAs MMIC digital attenuator in a low cost SSOP-20 surface mount plastic package. The AT-260 is ideally suited for use where high accuracy, fast switching, very low power consumption and low intermodulation products are required at a low cost.

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

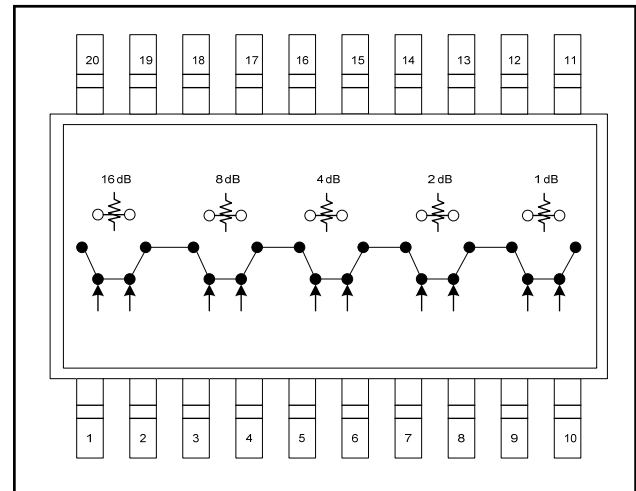
The AT-260 is fabricated with a monolithic GaAs MMIC using a mature 1-micron process. The process features full chip passivation for increased performance and reliability.

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

| Part Number | Package               |
|-------------|-----------------------|
| AT-260      | SSOP 20-Lead          |
| AT-260TR    | Forward Tape and Reel |

1. Reference Application Note M513 for reel size information.

## Functional Schematic



## Pin Configuration

| Pin No. | Function                | Pin No. | Function |
|---------|-------------------------|---------|----------|
| 1       | VC1                     | 11      | RF1      |
| 2       | $\overline{\text{VC1}}$ | 12      | Ground   |
| 3       | VC2                     | 13      | Ground   |
| 4       | $\overline{\text{VC2}}$ | 14      | Ground   |
| 5       | VC3                     | 15      | Ground   |
| 6       | $\overline{\text{VC3}}$ | 16      | Ground   |
| 7       | VC4                     | 17      | Ground   |
| 8       | $\overline{\text{VC4}}$ | 18      | Ground   |
| 9       | No Connection           | 19      | Ground   |
| 10      | $\overline{\text{VC5}}$ | 20      | RF2      |

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

| Parameter                                 | Absolute Maximum                                |
|---|---|
| Input Power:<br>0.05 GHz<br>0.5 - 2.0 GHz | +27 dBm<br>+34 dBm                              |
| Control Voltage                           | +5V, -8.5V                                      |
| Operating Temperature                     | $-40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$  |
| Storage Temperature                       | $-65^{\circ}\text{C}$ to $+150^{\circ}\text{C}$ |

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

3. M/A-COM does not recommend sustained operation near these survivability limits.

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

| Parameter                         | Test Conditions  | Units  | Min. | Typ.  | Max. |
|-----------------------------------|--|--|------|-------|------|
| Reference Insertion Loss          | DC - 0.1 GHz   | dB   | —    | 1.6   | 1.8  |
|                                   | DC - 0.5 GHz   | dB   | —    | 1.7   | 1.9  |
|                                   | DC - 1.0 GHz   | dB   | —    | 1.9   | 2.2  |
|                                   | DC - 2.0 GHz   | dB   | —    | 2.2   | 2.5  |
| Attenuation Accuracy <sup>4</sup> | DC - 1.0 GHz<br>DC - 2.0 GHz   | $\pm (0.20 \text{ dB} + 3\% \text{ of Atten Setting in dB}) \text{ dB}$<br>$\pm (0.30 \text{ dB} + 3\% \text{ of Atten Setting in dB}) \text{ dB}$ |      |       |      |
| VSWR                              | (Any state)  | Ratio  | —    | 1.5:1 | —    |
| Trise, Tfall                      | 10% to 90% RF, 90% to 10% RF   | nS   | —    | 8     | —    |
| Ton, Toff                         | 50% Control to 90% RF,<br>50% Control to 10% RF  | nS   | —    | 15    | —    |
| Transients                        | In Band  | mV   | —    | 2     | —    |
| 1 dB Compression                  | Input Power<br>0.05 GHz  | dBm  | —    | 20    | —    |
|                                   | 0.5 - 2.0 GHz  | dBm  | —    | 27    | —    |
| IP <sub>2</sub>                   | 0.05 GHz   | dBm  | —    | 45    | —    |
|                                   | 0.5 - 2.0 GHz<br>Measured Relative to Input Power<br>(for two-tone input power up to +5 dBm) | dBm  | —    | 60    | —    |
| IP <sub>3</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  | —    | 50    | —    |

4. Attenuation accuracy specifications apply with negative bias control and low inductance grounding.

## Truth Table <sup>5</sup>

| Control Inputs           |                          |                 |                          |                 |                          |                 |                          |                 | Atten (dB) |
|--------------------------|--------------------------|-----------------|--------------------------|-----------------|--------------------------|-----------------|--------------------------|-----------------|------------|
| $\overline{\text{VC}}_5$ | $\overline{\text{VC}}_4$ | VC <sub>4</sub> | $\overline{\text{VC}}_3$ | VC <sub>3</sub> | $\overline{\text{VC}}_2$ | VC <sub>2</sub> | $\overline{\text{VC}}_1$ | VC <sub>1</sub> |            |
| 1                        | 1                        | 0               | 1                        | 0               | 1                        | 0               | 1                        | 0               | Reference  |
| 0                        | 1                        | 0               | 1                        | 0               | 1                        | 0               | 1                        | 0               | 1 dB       |
| 1                        | 0                        | 1               | 1                        | 0               | 1                        | 0               | 1                        | 0               | 2 dB       |
| 1                        | 1                        | 0               | 0                        | 1               | 1                        | 0               | 1                        | 0               | 4 dB       |
| 1                        | 1                        | 0               | 1                        | 0               | 0                        | 1               | 1                        | 0               | 8 dB       |
| 1                        | 1                        | 0               | 1                        | 0               | 1                        | 0               | 0                        | 1               | 16 dB      |
| 0                        | 0                        | 1               | 0                        | 1               | 0                        | 1               | 0                        | 1               | 31 dB      |

5. 0 = Vin Low = 0 V = 0 to -0.2 V @ 20  $\mu\text{A}$  maximum.  
1 = Vin High = -5 V @ 20  $\mu\text{A}$  typical to -8 V @ 200  $\mu\text{A}$  maximum.

## Handling Procedures

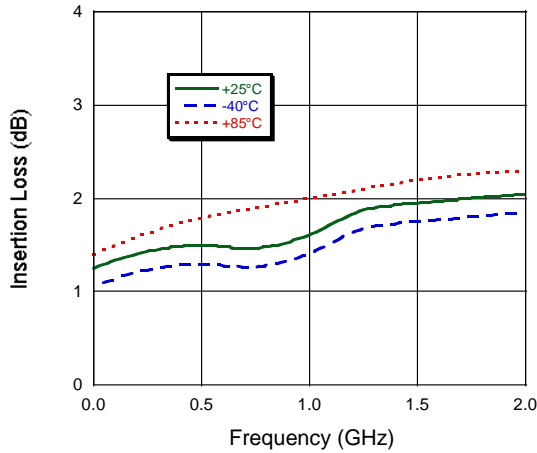
Please observe the following precautions to avoid damage:

## Static Sensitivity

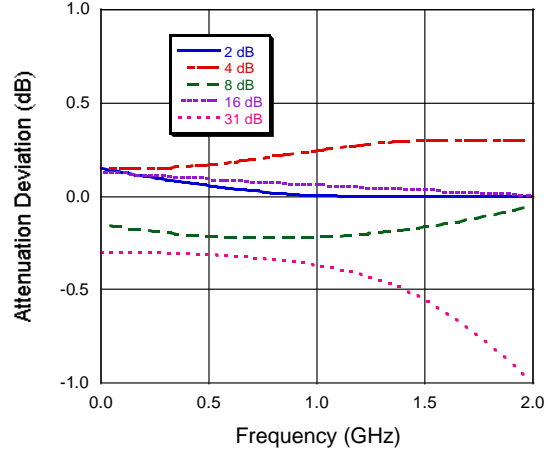
Gallium Arsenide Integrated Circuits are sensitive to electrostatic discharge (ESD) and can be damaged by static electricity. Proper ESD control techniques should be used when handling these devices.

## Typical Performance Curves

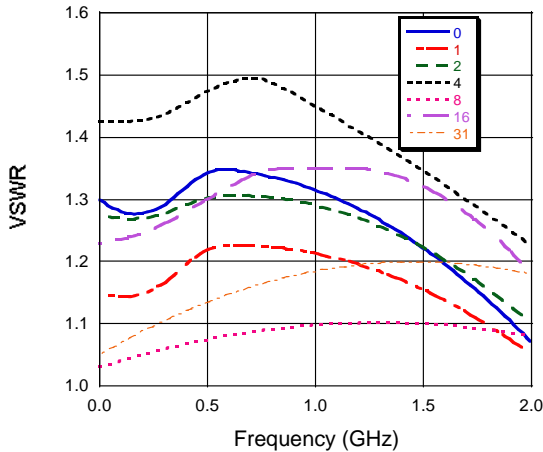
**Insertion Loss**



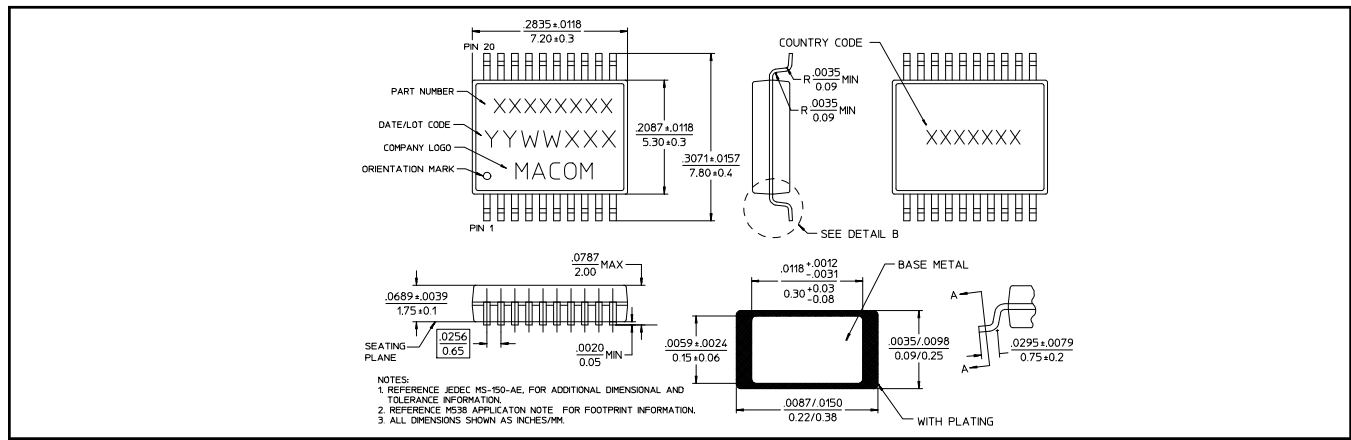
**Attenuation Accuracy**



**VSWR**



## SSOP-20



3

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