

Digital Attenuator, 28 dB, 3-Bit DC-2.0 GHz

AT-230
V4

Features

- 4-dB Attenuation Steps to 28 dB
- High Accuracy
- Low DC Power Consumption: 50 μ W
- Low Intermodulation Product: +50 dBm IP3
- Temperature Range: -40°C to +85°C
- SOIC-14 Plastic Package
- Tape and Reel Packaging Available

Description

M/A-COM's AT-230 is a 3-bit, 4-dB step GaAs MMIC digital attenuator in a low cost SOIC 14-lead surface mount plastic package. The AT-230 is ideally suited for use where high accuracy, fast switching, very low power consumption and low intermodulation products are required.

Typical applications include radio and cellular equipment, wireless LANs, GPS equipment and other Gain/Level Control circuits.

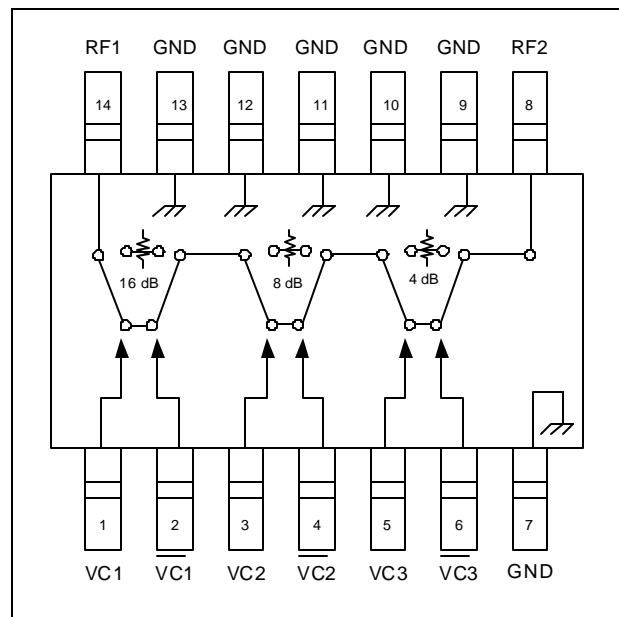
The AT-230 is fabricated with a monolithic GaAs MMIC using a mature 1-micron process. The process features full chip passivation for increased performance and reliability.

Ordering Information

| Part Number | Package |
|-------------|------------------------------|
| AT-230 | SOIC 14-Lead Plastic Package |
| AT-230TR | Forward Tape & Reel |

Note: Reference Application Note M513 for reel size information.

Functional Schematic



Pin Configuration

| Pin No. | Function | Pin No. | Function |
|---------|----------|---------|----------|
| 1 | VC1 | 8 | RF2 |
| 2 | VC1 | 9 | Ground |
| 3 | VC2 | 10 | Ground |
| 4 | VC2 | 11 | Ground |
| 5 | VC3 | 12 | Ground |
| 6 | VC3 | 13 | Ground |
| 7 | Ground | 14 | RF1 |

Absolute Maximum Ratings¹

| Parameter | Absolute Maximum |
|--|--------------------|
| Input Power: 50 MHz 500-2000 MHz | +27 dBm +34 dBm |
| Control Voltage | +5V, -8.5V |
| Operating Temperature | -40°C to +85°C |
| Storing Temperature | -65°C to +150°C |

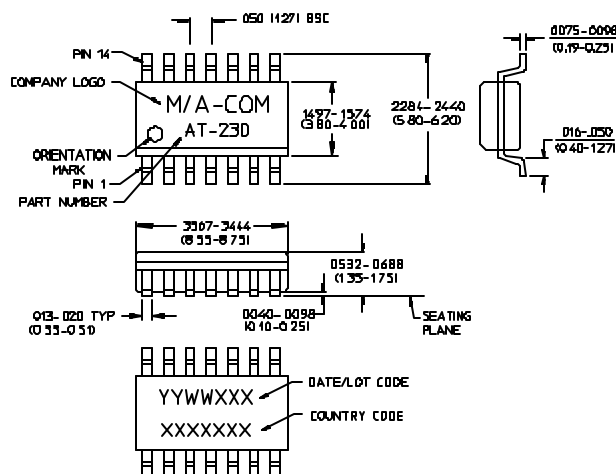
1. Exceeding any one or combination of these limits may cause permanent damage to this device.

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Electrical Specifications: $T_A = 25^\circ\text{C}$, $Z_\theta = 50\text{ W}$

| Parameter | Test Conditions | Units | Min | Typ | Max |
|-----------------------------------|--|--|-----|-------|-----|
| Reference Insertion Loss | DC-0.1 GHz | dB | — | 1.2 | 1.4 |
| | DC-0.5 GHz | dB | — | 1.5 | 1.7 |
| | DC-1.0 GHz | dB | — | 1.6 | 1.8 |
| | DC-2.0 GHz | dB | — | 1.8 | 2.1 |
| | | | | | |
| Attenuation Accuracy | DC-1.0 GHz DC-2.0 GHz | ± (0.15 dB +3% of Atten Setting in dB) dB ± (0.30 dB +3% of Atten Setting in dB) dB | | | |
| VSWR | | Ratio | — | 1.2:1 | — |
| Trise, Tfall | 10% to 90% RF, 90% to 10% RF | nS | — | 12 | — |
| Ton, Toff | 50% Control to 90% RF, 50% Control to 10% RF | nS | — | 18 | — |
| Transients | In Band | mV | — | 25 | — |
| 1 dB Compression (Input Power) | 0.05 GHz | dBm | — | 20 | — |
| | 0.5-2.0 GHz | dBm | — | 28 | — |
| IP ₂ | 0.05 GHz | dBm | — | 45 | — |
| | 0.5-2.0 GHz Measured Relative to Input Power (for two-tone input power up to +5 dBm) | dBm | — | 68 | — |
| IP ₃ | 0.05 GHz | dBm | — | 40 | — |
| | 0.5-2.0 GHz Measured Relative to Input Power (for two-tone input power up to +5 dBm) | dBm | — | 50 | — |

SOIC-14

- NOTES
1 REFERENCE JEDEC M9-012-AB, FOR ADDITIONAL DIMENSIONAL AND TOLERANCE INFORMATION.
2 REFERENCE M538 APPLICATION NOTE FOR FOOTPRINT INFORMATION
3 ALL DIMENSIONS SHOWN AS INCHES/MM.

Truth Table

| Control Input | | | | | | |
|------------------|-----|------------------|-----|------------------|-----|------------|
| $\overline{VC3}$ | VC3 | $\overline{VC2}$ | VC2 | $\overline{VC1}$ | VC1 | Atten (dB) |
| 1 | 0 | 1 | 0 | 1 | 0 | Reference |
| 0 | 1 | 1 | 0 | 1 | 0 | 4 dB |
| 1 | 0 | 0 | 1 | 1 | 0 | 8 dB |
| 1 | 0 | 1 | 0 | 0 | 1 | 16 dB |
| 0 | 1 | 0 | 1 | 0 | 1 | 28 dB |

0 = VIN Low = 0 V to -0.2 V @ 20 μ A maximum.

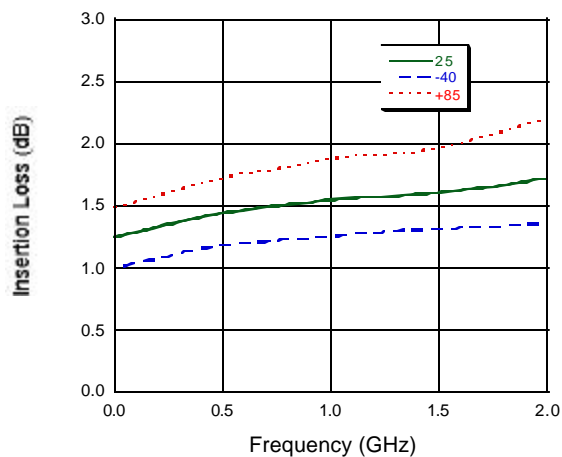
1 = VIN High = -5 V @ 10 μ A typical to -8 V @ 200 μ A maximum.

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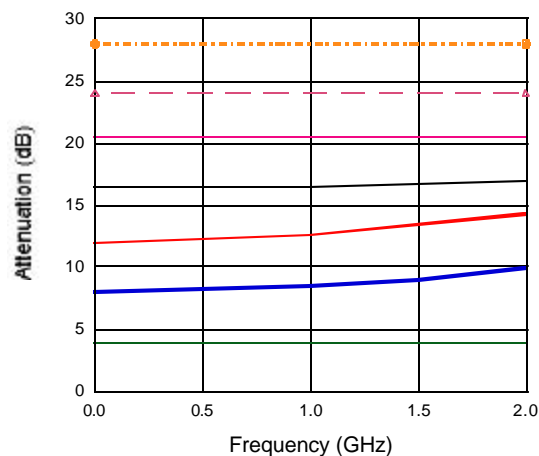
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Typical Performance Curves

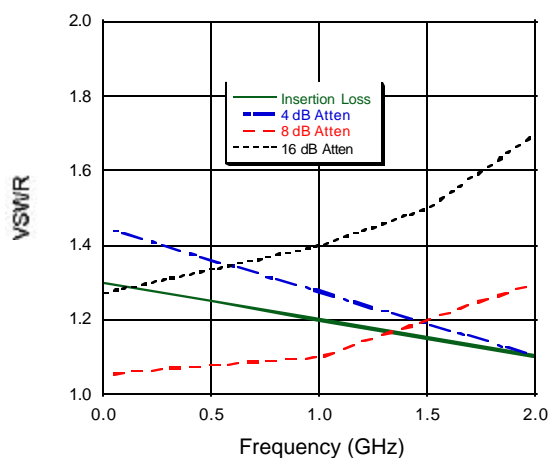
Insertion Loss



Attenuation



VSWR



Attenuation Accuracy

