

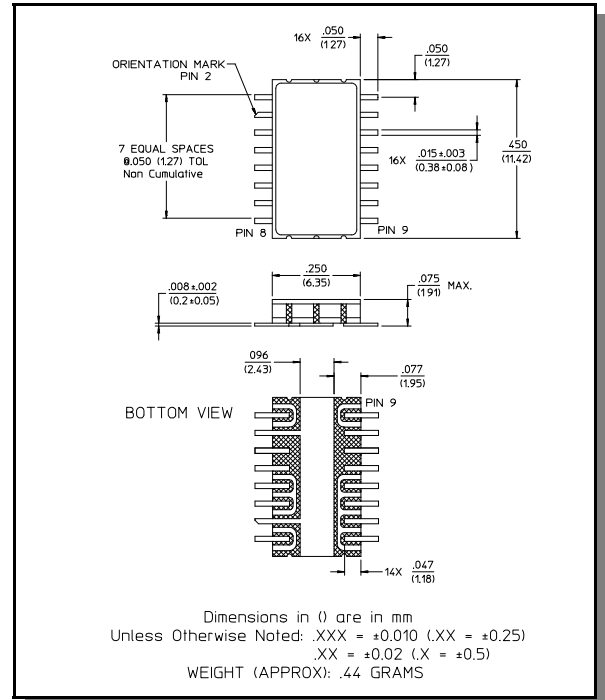
Features

- Attenuation: 1 dB steps to 15 dB
- Temperature Stability: ± 0.18 dB from -55°C to $+85^{\circ}\text{C}$ Typical
- Low DC Power Consumption
- Hermetic Surface Mount Package
- Integral TTL Driver
- 50 Ohms Nominal Impedance

Description

M/A-COM's AT-213 is a 4-bit, 1 dB step digital attenuator in a hermetically sealed ceramic 16-lead surface mount package. The AT-213 is ideally suited for use where high accuracy, fast switching, very low power consumption and low intermodulation products are required. Typical applications include dynamic range setting in a precision receiver circuits and other gain/leveling control circuits. Environmental screening is available. Contact the factory for information.

CR-11



Electrical Specifications: $T_A = -55^{\circ}\text{C}$ to $+85^{\circ}\text{C}$ ¹

| Parameter | Test Conditions | Frequency | Units | Min | Typ | Max |
|-----------------------------------|--|------------------------------|--|------|-----|-------|
| Reference Insertion Loss | — | DC - 0.5 GHz | dB | — | — | 1.7 |
| | | DC - 1.0 GHz | dB | — | — | 1.9 |
| | | DC - 2.0 GHz | dB | — | — | 2.2 |
| | | DC - 3.0 GHz | dB | — | — | 2.5 |
| Attenuation Accuracy ² | Any Single Bit | DC - 2.0 GHz DC - 3.0 GHz | $\pm (0.15 \text{ dB} + 3\% \text{ of atten setting in dB})$ dB $\pm (0.2 \text{ dB} + 3\% \text{ of atten setting in dB})$ dB Or ± 0.4 dB, whichever is greater | | | |
| | Any Combination of Bits | DC - 2.0 GHz DC - 3.0 GHz | $\pm (0.2 \text{ dB} + 3\% \text{ of atten setting in dB})$ dB $\pm (0.2 \text{ dB} + 3\% \text{ of atten setting in dB})$ dB Or ± 0.4 dB, whichever is greater | | | |
| VSWR | — | — | Ratio | — | — | 1.6:1 |
| Trise, Tfall | 10% to 90% | — | ns | — | 9 | — |
| Ton, Toff | 50% Control to 90%/10% RF | — | ns | — | 40 | — |
| Transients | In-Band (peak-peak) | — | mV | — | 30 | — |
| 1 dB Compression | Input Power Input Power | 0.05 GHz | dBm | — | +22 | — |
| | | 0.5 - 3.0 GHz | dBm | — | +28 | — |
| Input IP3 | For two-tone Input Power Up to +5 dBm | 0.05 GHz | dBm | — | +40 | — |
| | | 0.5 - 3.0 GHz | dBm | — | +50 | — |
| Input IP2 | For two-tone Input Power Up to +5 dBm | 0.05 GHz | dBm | — | +45 | — |
| | | 0.5 - 3.0 GHz | dBm | — | +68 | — |
| Vcc | — | — | V | 4.5 | 5.0 | 5.5 |
| Vee | — | — | V | -8.0 | — | -5.0 |

1. All specifications apply when operated with bias voltages of +5V for Vcc and -5.0V for Vee.
 2. This attenuator is guaranteed monotonic.

Electrical Specifications: $T_A = -55^{\circ}\text{C}$ to $+85^{\circ}\text{C}$

| Parameter | Test Conditions | Frequency | Units | Min | Typ | Max |
|------------------------------|--|-----------|-------|-----|-----|-----|
| I _{cc} | V _{cc} = 4.5 to 5.5V V _{ctl} = 0 to 0.8V, or V _{cc} -2.1V to V _{cc} | — | mA | — | — | 4.0 |
| I _{ee} | V _{ee} = -5.0 to -8.0V | — | mA | — | — | 1.0 |
| V _{ctl} | Logic 0 (TTL) | — | V | 0.0 | — | 0.8 |
| V _{ctl} | Logic 1 (TTL) | — | V | 2.0 | — | 5.0 |
| Input Leakage Current (Low) | 0 to 0.8V | — | μA | — | — | 1.0 |
| Input Leakage Current (High) | 2.0 to 5.0V | — | μA | — | — | 1.0 |

Absolute Maximum Ratings ³

| Parameter | Absolute Maximum |
|---|--------------------------------|
| Max Input Power 0.5 GHz 0.5 - 3.0 GHz | +27 dBm +34 dBm |
| Supply Voltages V _{cc} V _{ee} | +5.5V -8.5V |
| Control Voltage ⁴ | -0.5V to V _{cc} +0.5V |
| Operating Temperature | -55°C to +125°C |
| Storage Temperature | -65°C to +150°C |

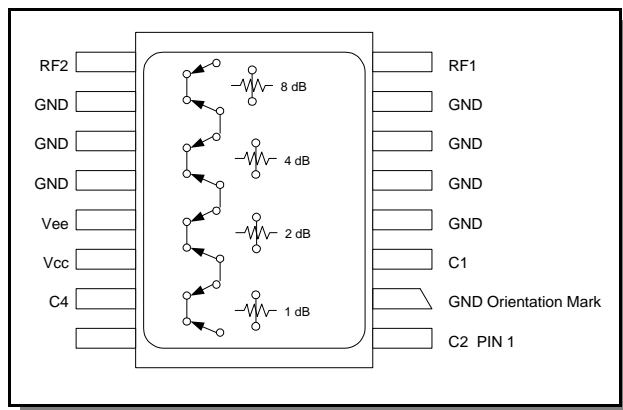
3. Operation of this device above any one of these parameters may cause permanent damage.
4. Standard CMOS TTL interface, latch-up will occur if logic signal is applied prior to power supply.

Truth Table

| Control Inputs | | | | |
|----------------|----|----|----|-------------|
| C4 | C3 | C2 | C1 | Attenuation |
| 0 | 0 | 0 | 0 | Reference |
| 0 | 0 | 0 | 1 | 1 dB |
| 0 | 0 | 1 | 0 | 2 dB |
| 0 | 1 | 0 | 0 | 4 dB |
| 1 | 0 | 0 | 0 | 8 dB |
| 1 | 1 | 1 | 1 | 15 dB |

0 = TTL Low 1 = TTL High

Functional Schematic (Top View)



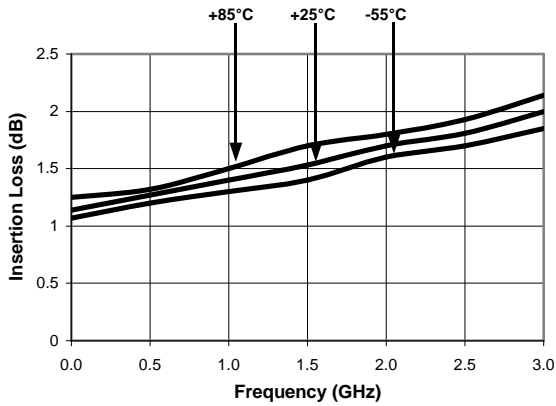
Specifications subject to change without notice.

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- Asia/Pacific: Tel.+81-44-844-8296, Fax +81-44-844-8298
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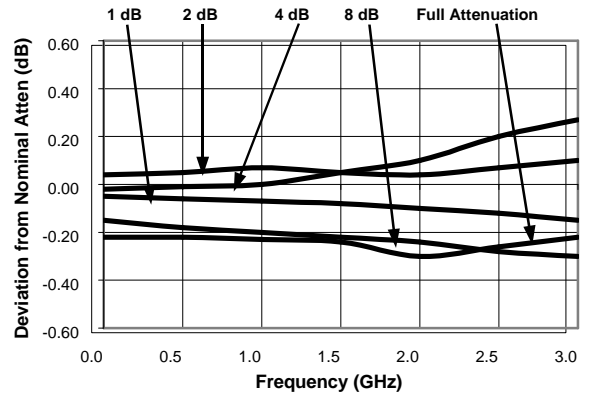
Visit www.macom.com for additional data sheets and product information.

Typical Performance Curves

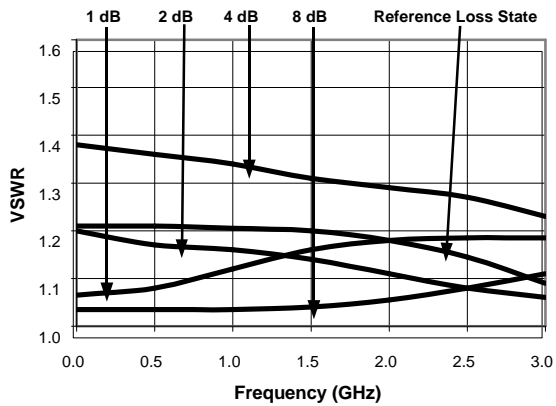
Ref. Insertion Loss vs. Frequency



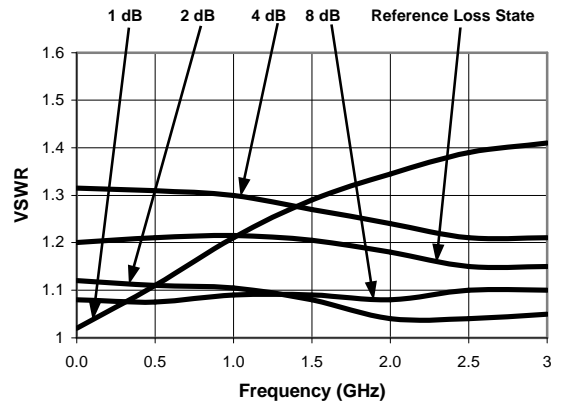
Attenuation Accuracy vs. Frequency



RF1 VSWR vs. Frequency



RF2 VSWR vs. Frequency



Ordering Information

| Part Number | Package |
|-------------|---------|
| AT-213 PIN | CR-11 |

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