

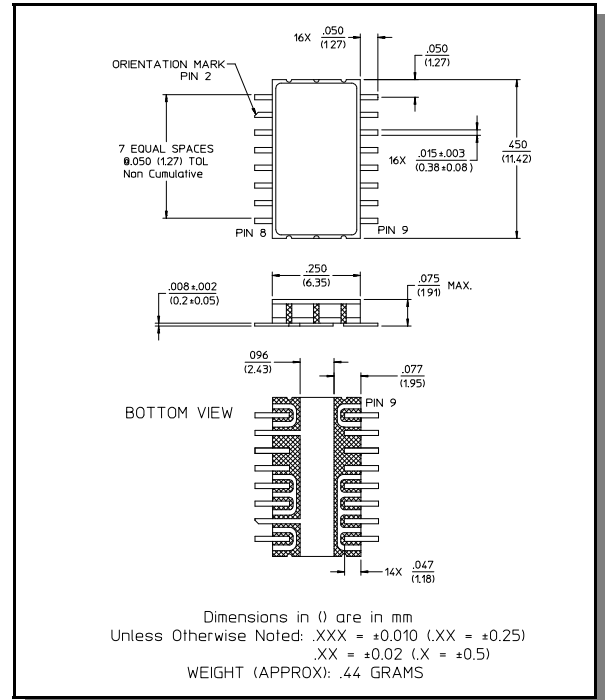
## Features

- Attenuation: 1 dB steps to 15 dB
- Temperature Stability:  $\pm 0.18$  dB from  $-55^{\circ}\text{C}$  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 $+85^{\circ}\text{C}$ <sup>1</sup>

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 <sup>2</sup>	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 $\pm 0.4$ 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 $\pm 0.4$ 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 <sub>cc</sub>	V <sub>cc</sub> = 4.5 to 5.5V V <sub>ctl</sub> = 0 to 0.8V, or V <sub>cc</sub> -2.1V to V <sub>cc</sub>	—	mA	—	—	4.0
I <sub>ee</sub>	V <sub>ee</sub> = -5.0 to -8.0V	—	mA	—	—	1.0
V <sub>ctl</sub>	Logic 0 (TTL)	—	V	0.0	—	0.8
V <sub>ctl</sub>	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 <sup>3</sup>**

Parameter	Absolute Maximum
Max Input Power 0.5 GHz 0.5 - 3.0 GHz	+27 dBm +34 dBm
Supply Voltages V <sub>cc</sub> V <sub>ee</sub>	+5.5V -8.5V
Control Voltage <sup>4</sup>	-0.5V to V <sub>cc</sub> +0.5V
Operating Temperature	-55°C to +125°C
Storage Temperature	-65°C to +150°C

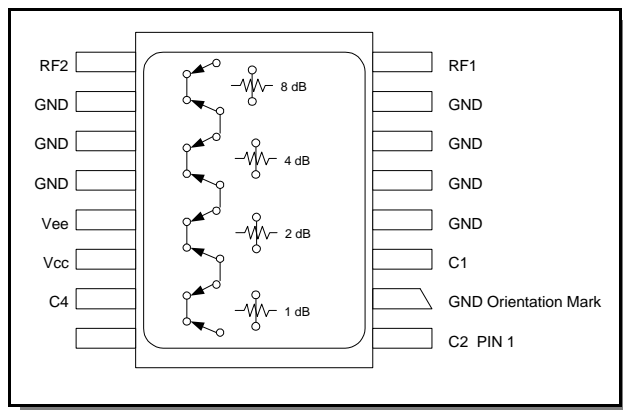
- Operation of this device above any one of these parameters may cause permanent damage.
- Standard CMOS TTL interface, latch-up will occur if logic signal is applied prior to power supply.

**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.

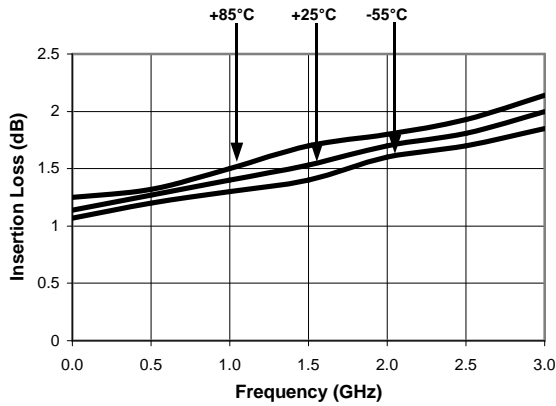
- North America: Tel. (800) 366-2266
- Asia/Pacific: Tel.+81-44-844-8296, Fax +81-44-844-8298
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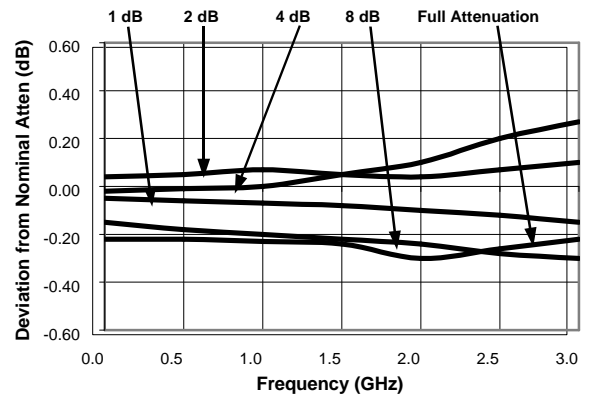


### Typical Performance Curves

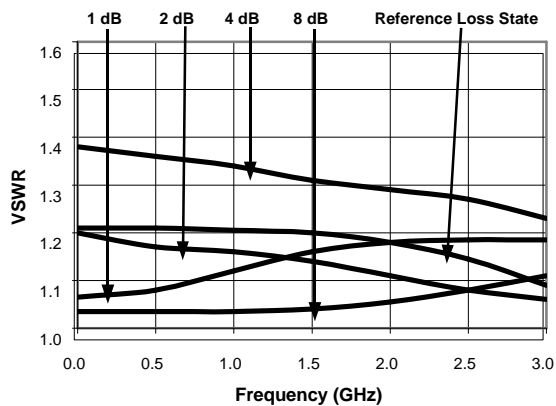
Ref. Insertion Loss vs. Frequency



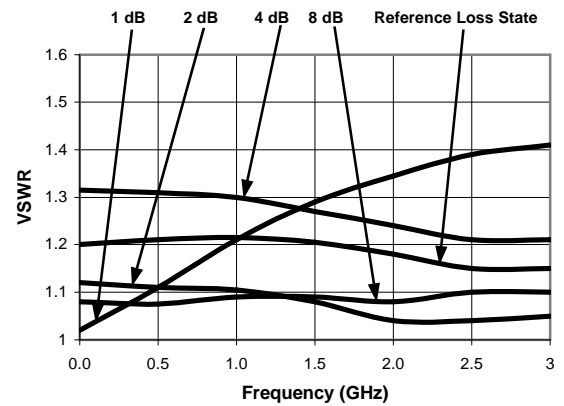
Attenuation Accuracy vs. Frequency



RF1 VSWR vs. Frequency



RF2 VSWR vs. Frequency



### Ordering Information

Part Number	Package
AT-213 PIN	CR-11

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