

# Digital Attenuator, 15 dB, 4-Bit DC - 2 GHz

**AT-210** 

### **Features**

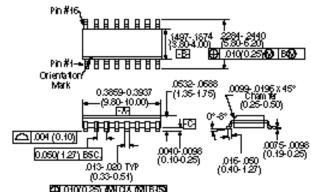
- Attenuation 1-dB Steps to 15 dB
- High Accuracy +/-3%
- Temperature Stability +/-0.15 dB from -40°C to +85°C
- Low Intermodulation Product: +50 dBm IP<sub>3</sub>
- Low DC Power Consumption: 50 μW
- Low Cost SOIC16 Plastic Package
- Tape and Reel Packaging Available<sup>1</sup>

# **Description**

M/A-COM's AT-210 is a 4-bit, 1-dB step GaAs MMIC digital attenuator in a low cost SOIC 16-lead surface mount plastic package. The AT-210 is ideally suited for use where high accuracy, fast switching, very low power consumption and low intermodulation products are required. Typical applications include radio, cellular, and wireless LANs, GPS equipment and other Gain/Level Control circuits.

The AT-210 is fabricated with a monolithic GaAs MMIC using a mature 1-micron process. The process features full chip passivation for increased performance and reliability.

### **SO-16**



#### ## 04070251 ## QA ## B #\$

16-Lead SOP outline dimensions Narrow body .450 (All dimensions per JEEEC No. MS-012-AC, Issue C) Omensions in ( ) are in m m. Unless Other wise Noted: .xxx =  $\pm$  0.010 (.xx =  $\pm$  0.25) .xx =  $\pm$  0.02 (.x =  $\pm$ 0.5)

# **Ordering Information**

Part Number	Package				
AT-210 PIN	SOIC 16-Lead Plastic Package				
AT-210TR	Forward Tape & Reel				
AT-210RTR	Reverse Tape & Reel				

# Electrical Specifications, $T_A = +25$ °C

Parameter	Test Conditions <sup>2</sup>		Unit	Min.	Тур.	Max
Reference Insertion Loss		dB		0.9	1.2	
	DC – 0.5 GHz				1.3	1.5
		DC – 1.0 GHz	dB		1.5	1.8
		DC – 2.0 GHz	dB		1.8	2.0
Attenuation Accuracy <sup>3</sup>		DC – 1.0 GHz DC – 2.0 GHz	$\pm$ (0.15 dB + 3% of Attenuation Setting in dB) dB $\pm$ (0.30 dB + 3% of Attenuation Setting in dB) dB			
VSWR					1.8:1	
Trise, Tfall Ton, Toff Transients	10% to 90% RF, 90% to 10% RF 50% Control to 90% RF, 50% Control to 10% RF In Band				10 15 18	
1 dB Compression	Input Power Input Power	0.05 GHz 0.5 – 2.0 GHz	dBm dBm		22 28	
IP <sub>2</sub>	Measured Relative to Input Power (For two-tone Input Power Up to +5 dBm)	0.05 GHz 0.5 – 2.0 GHz	dBm dBm		49 72	
IP <sub>3</sub>	Measured Relative to Input Power (For two-tone Input Power Up to +5 dBm)	0.05 GHz 0.5 – 2.0 GHz	dBm dBm		45 50	

<sup>1.</sup> Refer to "Tape and Reel Packaging" Section, or contact factory.

<sup>2.</sup> All measurements at 1 GHz in a 50 system, unless otherwise specified.

<sup>3.</sup>Attenuation accuracy specifications apply with negative bias control and low inductance grounding.

# **Absolute Maximum Ratings**

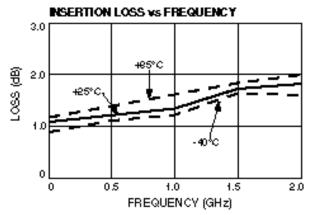
Parameter	Absolute Maximum <sup>1</sup>			
Max. Input Power 50 MHz 500-2000 MHz Control Voltage Operating Temperature Storage Temperature	+27 dBm +34 dBm +5 V, -8.5 V -40°C to +85°C -65°C to +150°C			

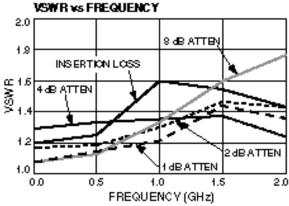
<sup>1.</sup> Operation of this device above any one of these parameters may cause permanent damage.

# **Pin Configuration**

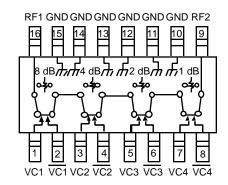
Pin	Description	Pin No.	Description	
1	VC1	9	RF2	
2	VC1	10	GND	
3	VC2	11	GND	
4	VC2	12	GND	
5	VC3	13	GND	
6	VC3	14	GND	
7	VC4	15	GND	
8	VC4	16	RF1	

# **Typical Performance**





### **Functional Schematic**



### **Truth Table**

0.0

Control Inputs								
VC4	VC4	VC3	VC3	VC2	VC2	VC1	VC1	Attenuation (dB)
1	0	1	0	1	0	1	0	Reference
0	1	1	0	1	0	1	0	1 dB
1	0	0	1	1	0	1	0	2 dB
1	0	1	0	0	1	1	0	4 dB
1	0	1	0	1	0	0	1	8 dB
0	1	0	1	0	1	0	1	15 dB

"0" = Vin Low, Vin Low = 0V, "1" = Vin High, Vin High = -5V "0" = 0 to -0.2V @ 20μΑ Max "1" = -5V @ 10 μΑ typ to -8V @ 200 μΑ Max

2.0

ATTENUATION ACCURACY VS FREQUENCY

