

# Digital Attenuator, 15.5 dB, 5-Bit DC - 2.0 GHz

Rev. V5

### **Features**

- 0.5 dB Attenuation Steps to 15.5 dB
- Ultra Low DC Power Consumption
- Low Intermodulation Product: +45 dBm IP3
- SOIC-16 Plastic Package
- Tape and Reel Packaging Available
- Temperature Stability: +/-0.15 dB from -40°C to +85°C

### **Description**

M/A-COM's AT-280 is a 5-bit, 0.5-dB step GaAs MMIC digital attenuator in a low cost SOIC 16-lead surface mount plastic package. The AT-280 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.

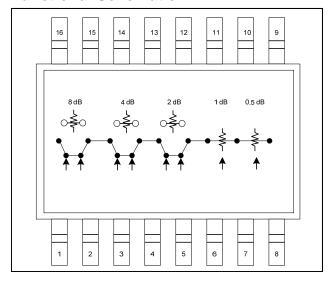
The AT-280 is fabricated with a monolithic GaAs MMIC using a mature 1-micron process. The process features full chip passivation for increased performance and reliability.

# Ordering Information <sup>1</sup>

Part Number	Package
AT-280	SOIC 16-Lead
AT-280TR	Forward Tape and Reel
AT-280SMB	Sample Test Board (Includes 5 Samples)

1. Reference Application Note M513 for reel size information.

### **Functional Schematic**



### **Pin Configuration**

Pin No.	Function	Pin No.	Function
1	VC1	9	RF2
2	VC1	10	Ground
3	VC2	11	Ground
4	VC2	12	Ground
5	VC3	13	Ground
6	VC3	14	Ground
7	VC4	15	Ground
8	VC5	16	RF1

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

Parameter	Absolute Maximum			
Input Power: 0.05 GHz 0.5 - 2.0 GHz	+27 dBm +34 dBm			
Control Voltage	-8.5 V <u>&lt;</u> V <sub>C</sub> <u>&lt;</u> +5 V			
Operating Temperature	-40°C to +85°C			
Storage Temperature	-65°C to +150°C			

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

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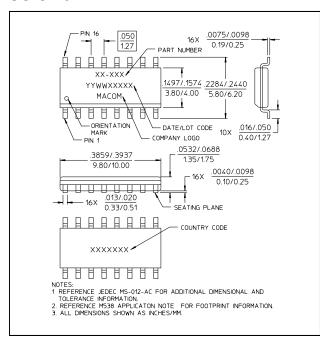
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## Electrical Specifications: $T_A = 25$ °C, $Z_0 = 50 \Omega$

Parameter	Test Conditions	Units	Min	Тур	Max
Reference Insertion Loss	DC—0.1 GHz DC—0.5 GHz DC—1.0 GHz DC—2.0 GHz	DC—0.5 GHz         dB         —         1           DC—1.0 GHz         dB         —         1			
Attenuation Accuracy <sup>3</sup>	DC—1.0 GHz DC—2.0 GHz	± (0.20 dB +3% of Attenuation Setting in dB) of ± (0.30 dB +3% of Attenuation Setting in dB) of			
VSWR	(Any state)	Ratio	1.5:1	1.8:1	_
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	_	30	
1 dB Compression	Input Power, 0.05 GHz Input Power, 0.5 - 2.0 GHz	dBm dBm	_	22 27	
IP <sub>2</sub>	0.05 GHz 0.5 - 2.0 GHz  Measured Relative to Input Power (for two-tone input power up to +5 dBm)		53 68	_	
IP <sub>3</sub>	0.05 GHz 0.5 - 2.0 GHz Measured Relative to Input Power (for two-tone input power up to +5 dBm)	dBm dBm	_	40 45	_

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

### SOIC-16



## Truth Table 4,5

Control Inputs								
VC 5	VC 4	VC 3	VC 3	VC 2	VC 2	VC 1	VC 1	Atten. (dB)
1	1	1	0	1	0	1	0	Refer- ence
0	1	1	0	1	0	1	0	0.5 dB
1	0	1	0	1	0	1	0	1 dB
1	1	0	1	1	0	1	0	2 dB
1	1	1	0	0	1	1	0	4 dB
1	1	1	0	1	0	0	1	8 dB
0	0	0	1	0	1	0	1	15.5 dB

- 4.  $0 = Vin Low = 0 V = 0 to -0.2 V @ 20 \mu A maximum$
- 5. 1 = Vin High = -5 V at 20  $\mu A$  to -8 V at 20  $\mu A$  maximum
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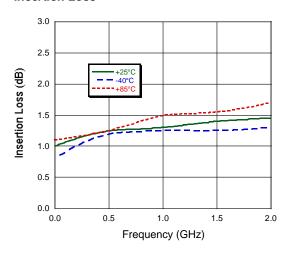


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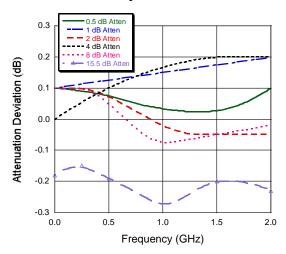
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## **Typical Performance Curves**

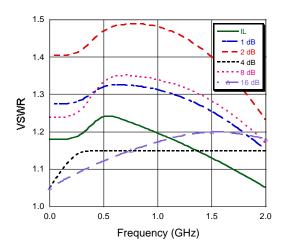
### Insertion Loss



### **Attenuation Accuracy**



### **VSWR**



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