

**Digital Attenuator, 31 dB, 5-Bit  
DC - 2.0 GHz**

**AT-260  
V5**

**Features**

- 1-dB Attenuation Steps to 31 dB
- Ultra Low DC Power Consumption
- Low Intermodulation Products: IP3 = 50 dBm
- SSOP-20 Plastic Package
- Tape and Reel Packaging Available
- Temperature Stability:  $\pm 0.15$  dB from  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$

**Description**

M/A-COM's AT-260 is a 5-bit, 1-dB step GaAs MMIC digital attenuator in a low cost SSOP-20 surface mount plastic package. The AT-260 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.

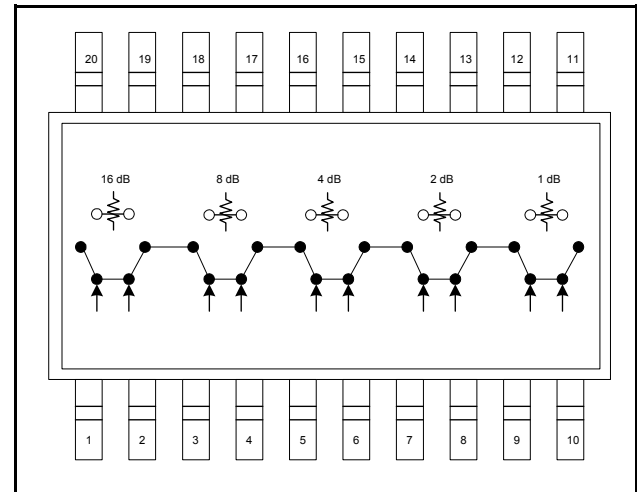
The AT-260 is fabricated with a monolithic GaAs MMIC using a mature 1-micron process. The process features full chip passivation for increased performance and reliability.

**Ordering Information**

Part Number	Package
AT-260	SSOP 20-Lead
AT-260TR	Forward Tape and Reel

Note: Reference Application Note M513 for reel size information.

**Functional Schematic**



**Pin Configuration**

Pin No.	Function	Pin No.	Function
1	VC1	11	RF1
2	$\overline{\text{VC1}}$	12	Ground
3	VC2	13	Ground
4	$\overline{\text{VC2}}$	14	Ground
5	VC3	15	Ground
6	$\overline{\text{VC3}}$	16	Ground
7	VC4	17	Ground
8	$\overline{\text{VC4}}$	18	Ground
9	No Connection	19	Ground
10	$\overline{\text{VC5}}$	20	RF2

**Absolute Maximum Ratings <sup>1,2</sup>**

Parameter	Absolute Maximum
Input Power: 0.05 GHz 0.5 - 2.0 GHz	+27 dBm +34 dBm
Control Voltage	+5V, -8.5V
Operating Temperature	$-40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$
Storage Temperature	$-65^{\circ}\text{C}$ to $+150^{\circ}\text{C}$

1. Exceeding any one or combination of these limits may cause permanent damage to this device.
2. M/A-COM does not recommend sustained operation near these survivability limits.

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**Electrical Specifications:  $T_A = 25^\circ\text{C}$ ,  $Z_0 = 50 \Omega$**

Parameter	Test Conditions	Units	Min.	Typ.	Max.
Reference Insertion Loss	DC - 0.1 GHz	dB	—	1.6	1.8
	DC - 0.5 GHz	dB	—	1.7	1.9
	DC - 1.0 GHz	dB	—	1.9	2.2
	DC - 2.0 GHz	dB	—	2.2	2.5
Attenuation Accuracy <sup>3</sup>	DC - 1.0 GHz DC - 2.0 GHz	± (0.20 dB +3% of Atten Setting in dB) dB ± (0.30 dB +3% of Atten Setting in dB) dB			
VSWR	(Any state)	Ratio	—	1.5:1	—
Trise, Tfall	10% to 90% RF, 90% to 10% RF	nS	—	8	—
Ton, Toff	50% Control to 90% RF, 50% Control to 10% RF	nS	—	15	—
Transients	In Band	mV	—	2	—
1 dB Compression	Input Power 0.05 GHz 0.5 - 2.0 GHz	dBm	—	20	—
		dBm	—	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)	dBm	—	45	—
		dBm	—	60	—
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	—	34	—
		dBm	—	50	—

3. Attenuation accuracy specifications apply with negative bias control and low inductance grounding.

**Truth Table<sup>4</sup>**

Control Inputs									Atten (dB)
$\overline{\text{VC5}}$	$\overline{\text{VC4}}$	VC4	$\overline{\text{VC3}}$	VC3	$\overline{\text{VC2}}$	VC2	$\overline{\text{VC1}}$	VC1	
1	1	0	1	0	1	0	1	0	Reference
0	1	0	1	0	1	0	1	0	1 dB
1	0	1	1	0	1	0	1	0	2 dB
1	1	0	0	1	1	0	1	0	4 dB
1	1	0	1	0	0	1	1	0	8 dB
1	1	0	1	0	1	0	0	1	16 dB
0	0	1	0	1	0	1	0	1	31 dB

4. 0 = Vin Low = 0 V = 0 to -0.2 V @ 20  $\mu\text{A}$  maximum.  
1 = Vin High = -5 V @ 20  $\mu\text{A}$  typical to -8 V @ 200  $\mu\text{A}$  maximum.

**Handling Procedures**

Please observe the following precautions to avoid damage:

**Static Sensitivity**

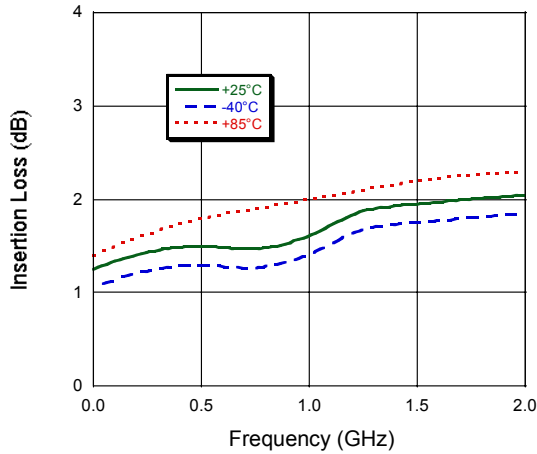
Gallium Arsenide Integrated Circuits are sensitive to electrostatic discharge (ESD) and can be damaged by static electricity. Proper ESD control techniques should be used when handling these devices.

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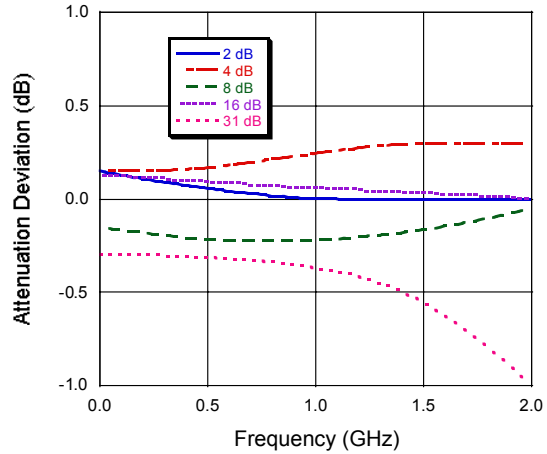
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**Typical Performance Curves**

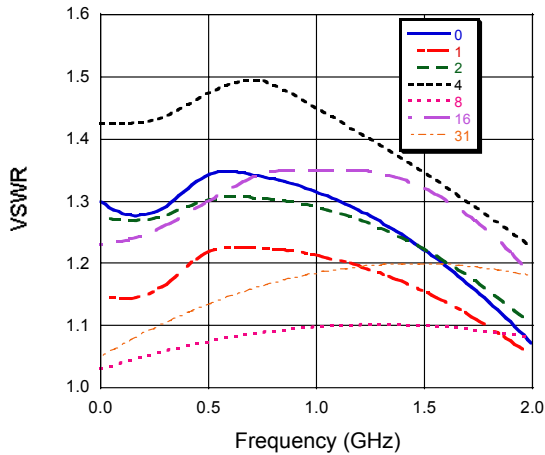
**Insertion Loss**



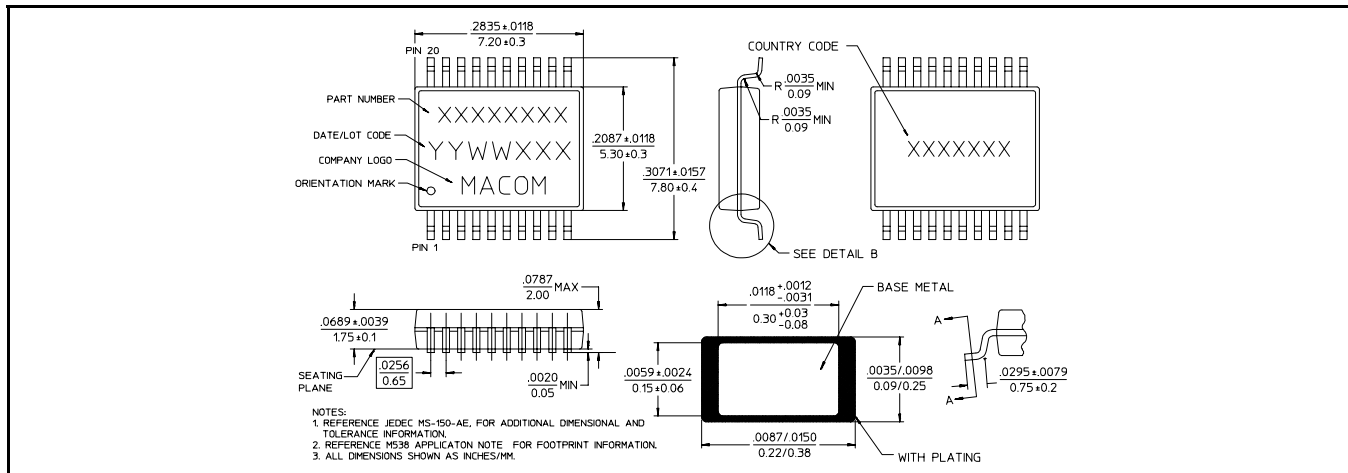
**Attenuation Accuracy**



**VSWR**



**SSOP-20**



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