

Digital Attenuator, 4 Bit, Single Control, 30 dB, 0.5 - 2.0 GHz

V 4.00

AT-264

Features

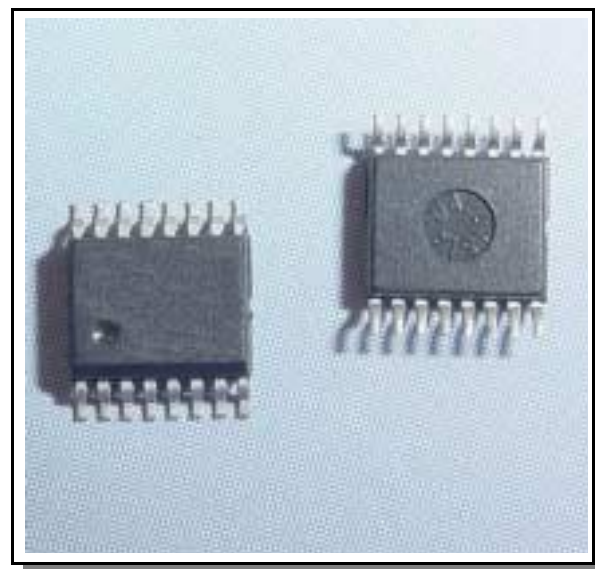
- Single Control CMOS logic for each bit
- 2 dB Attenuation steps to 30 dB
- Low DC Power Consumption: 50 μ W
- Low Cost Plastic TSSOP-16 Package

Description

The M/A-COM AT-264 is a 4 bit, 2 dB step GaAs MMIC digital attenuator in a low cost TSSOP-16 surface mount plastic package. The AT-264 is ideally suited for use where high accuracy, very low power consumption and low intermodulation products are required. Typical applications include radio, cellular, wireless LANs, GPS equipment and other gain/level control circuits.

The AT-264 is fabricated using a mature 1 micron GaAs MESFET process. The process features full chip passivation for increased performance and reliability.

TSSOP-16



Electrical Specifications¹: $T_A = 25^\circ\text{C}$, $Z_0 = 50\ \Omega$, $V_S = 5\ \text{V}$

Parameter	Test Conditions	Frequency	Units	Min	Typ	Max
Reference Insertion Loss		0.5 - 1.0 GHz	dB	—	2.0	2.4
		0.5 - 2.0 GHz	dB	—	2.2	2.6
Attenuation Accuracy		0.5 - 1.0 GHz	$\pm (0.15\ \text{dB} + 5\% \text{ of attenuation setting in dB})\ \text{dB}$			
		0.5 - 2.0 GHz	$\pm (0.3\ \text{dB} + 5\% \text{ of attenuation setting in dB})\ \text{dB}$			
VSWR		1.0 - 1.5 GHz	Ratio	—	1.5:1	—
		0.5 - 2.0 GHz	Ratio	—	1.9:1	—
Trise, Tfall	10% to 90% RF, 90% to 10% RF	—	nS	—	500	—
Ton, Toff	50% Control to 90% RF, 50% Control to 10% RF	—	nS	—	500	—
Transients	In Band	—	mV	—	75	—
1 dB Compression	Input Power Input Power	0.5 GHz	dBm	—	25	—
		0.9 GHz	dBm	—	25	—
IP ₂	Measured Relative to two-tone Input Power up to +5 dBm	0.5 GHz	dBm	—	65	—
		0.5 - 2.0 GHz	dBm	—	71	—
IP ₃	Measured Relative to two-tone Input Power up to +5 dBm	0.5 GHz	dBm	—	43	—
		0.5 - 2.0 GHz	dBm	—	47	—

1. External DC blocking capacitors are required on all RF ports. Loss varies at 0.003 dB/°C.

Absolute Maximum Ratings ²

Parameter	Absolute Maximum
Input Power 50 MHz 500 - 2000 MHz	+27 dBm +34 dBm
Control Voltage	$-0.5\text{ V} \leq V_C \leq 8.5\text{ V}$
Operating Temperature	-40°C to +85°C
Storage Temperature	-65°C to +150°C

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

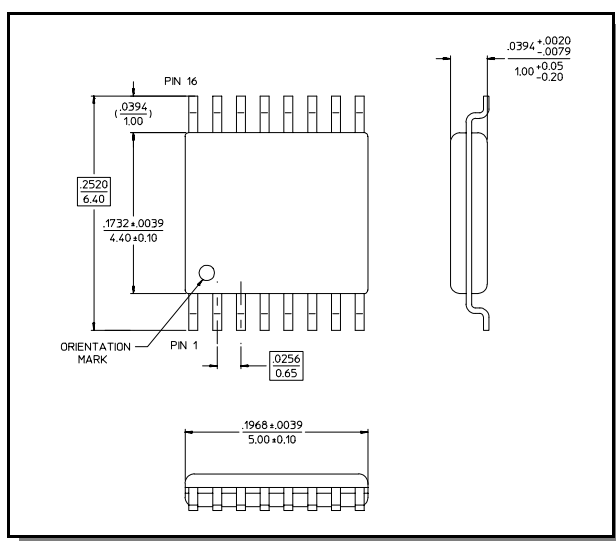
Truth Table

VC1	VC2	VC3	VC4	Attenuation (dB)
1	1	1	1	Reference Insertion Loss
1	1	1	0	2
1	1	0	1	4
1	0	1	1	8
0	1	1	1	16
0	0	0	0	30

Logic 0 = $0 \pm 0.2\text{ V}$

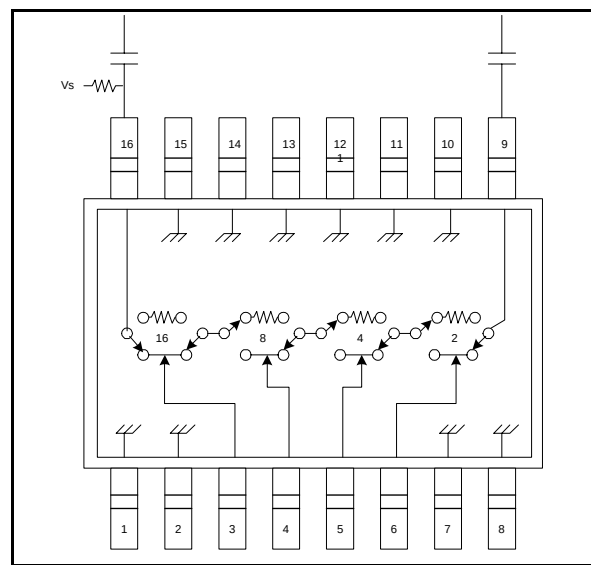
Logic 1 = +5V @ 30 μA max. current total.

TSSOP-16



Pin Configuration

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

Functional Schematic ^{3,4}

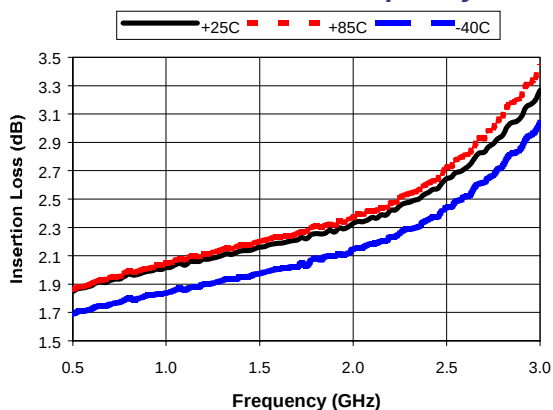
3. Blocking caps are required on all RF ports (39 pF used for data measurements).
4. $V_S = +5 \pm 0.2\text{ VDC}$ must be applied at RF1 or RF2 using a 10 K ohm or greater pull-up resistor.

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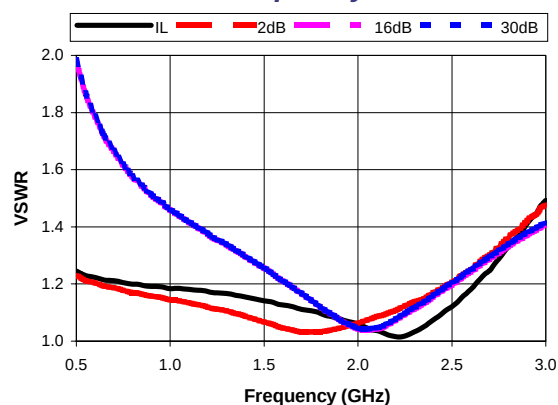
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Typical Performance Curves

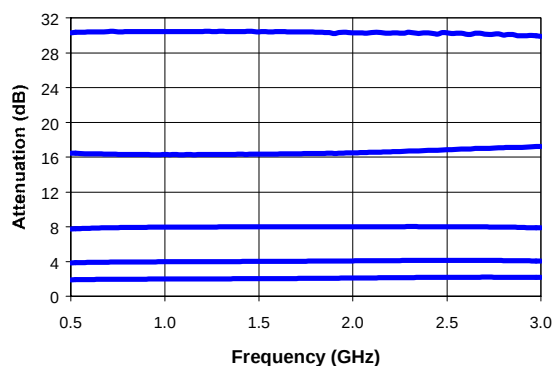
Insertion Loss vs. Frequency



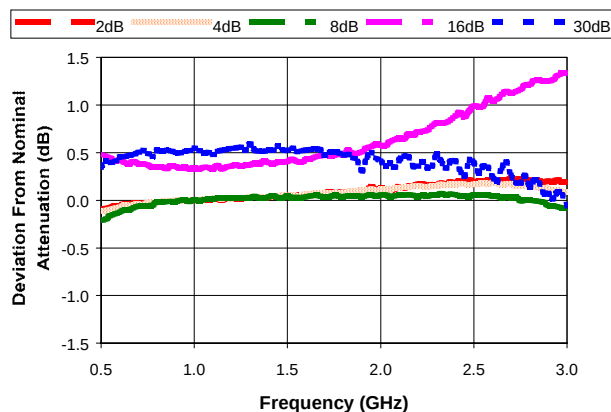
VSWR vs. Frequency



Attenuation vs. Frequency



Attenuation Accuracy vs. Frequency



Ordering Information

Part Number	Package
AT-264	TSSOP 16-Lead Plastic Package
AT-264TR*	Tape and Reel

* Reference Application Note M513 for reel size information.

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