Digital Attenuator, 15 dB, 4-Bit
DC-2.0 GHz

AT-210
V4

Features

- Attenuation 1-dB Steps to 15 dB
- High Accuracy
- Low Intermodulation Product: +50 dBm IP3
- Low DC Power Consumption: 50 µW
- SOIC-16 Plastic Package
- Tape and Reel Packaging Available
- Temperature Stability +/-0.15 dB: -40°C to +85°C

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.

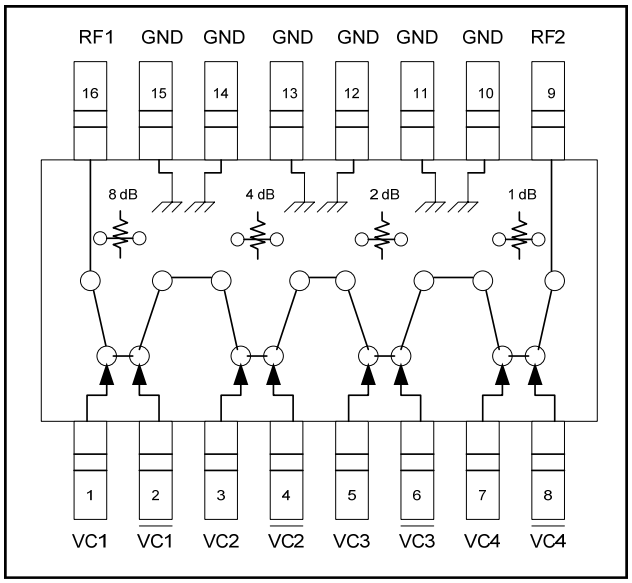
The AT-210 is fabricated with a monolithic GaAs MMIC using a mature 1-micron process. The process features full chip passivation for increased performance and reliability.

Ordering Information[1]

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

1. Reference Application Note M513 for reel size information.

Functional Schematic



Pin Configuration

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

Absolute Maximum Ratings [2,3]

Parameter	Absolute Maximum
Input Power: 50 MHz 500-2000 MHz	 +27 dBm +34 dBm
Control Voltage	-8.5 V ≤ V_C ≤ 5V
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.
3. M/A-COM does not recommend sustained operation near these survivability limits.

M/A-COM Inc. and its affiliates reserve the right to make changes to the product(s) or information contained herein without notice. M/A-COM makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does M/A-COM assume any liability whatsoever arising out of the use or application of any product(s) or information.

- **North America** Tel: 800.366.2266 / Fax: 978.366.2266
- **Europe** Tel: 44.1908.574.200 / Fax: 44.1908.574.300
- **Asia/Pacific** Tel: 81.44.844.8296 / Fax: 81.44.844.8298

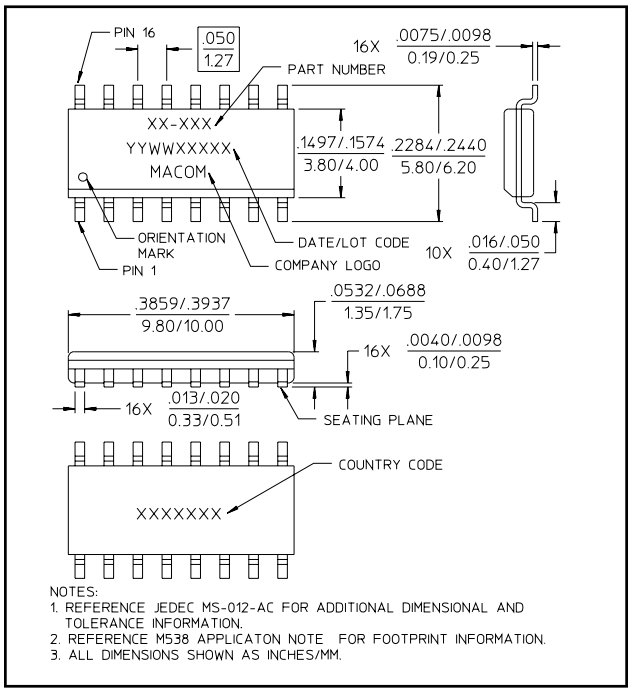
Visit www.macom.com for additional data sheets and product information.

Electrical Specifications: T_A = 25°C, V_C = 0 V / –5 V, Z_0 = 50 Ω

Parameter	Test Conditions	Frequency	Units	Min.	Typ.	Max.
Insertion Loss (Reference state)		DC - 0.1 GHz DC - 0.5 GHz DC - 1.0 GHz DC - 2.0 GHz	dB dB dB dB	— — — —	0.9 1.3 1.5 2.0	— 1.5 1.8 —
Attenuation Accuracy [4]		DC - 1.0 GHz DC - 2.0 GHz	± (0.15 dB + 3% of Atten Setting in dB) dB ± (0.30 dB + 3% of Atten Setting in dB) dB			
VSWR			Ratio	—	1.4	—
Trise, Tfall	10% to 90% RF, 90% to 10% RF	—	nS	—	10	—
Ton, Toff	50% Control to 90% RF, 50% Control to 10% RF	—	nS	—	15	—
Transients	In-Band	—	mV	—	18	—
1 dB Compression	Input Power Input Power	0.05 GHz 0.5 - 2.0 GHz	dBm dBm	— —	22 28	— —
IP_2	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_3	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	— —
Control Current	$\|V_C\|$ = 5 V		µA	—	10	20

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

SOIC-16†



†Meets JEDEC moisture sensitivity level 1 requirements.

Truth Table [5]

Control Inputs								
$\overline{VC4}$	VC4	$\overline{VC3}$	VC3	$\overline{VC2}$	VC2	$\overline{VC1}$	VC1	Attenuation (dB)
1	0	1	0	1	0	1	0	Reference state
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

5. 0 = -0.2 V to 0 V, 1 = -8 V to -5 V.

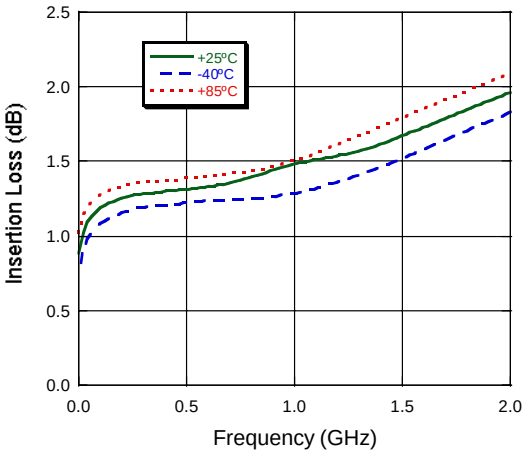
M/A-COM Inc. and its affiliates reserve the right to make changes to the product(s) or information contained herein without notice. M/A-COM makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does M/A-COM assume any liability whatsoever arising out of the use or application of any product(s) or information.

• **North America** Tel: 800.366.2266 / Fax: 978.366.2266
• **Europe** Tel: 44.1908.574.200 / Fax: 44.1908.574.300
• **Asia/Pacific** Tel: 81.44.844.8296 / Fax: 81.44.844.8298

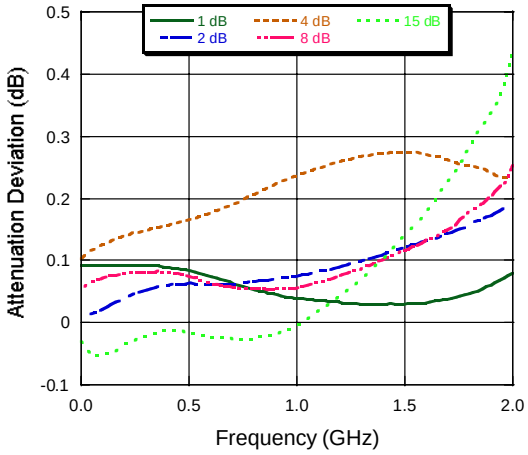
Visit www.macom.com for additional data sheets and product information.

Typical Performance Curves

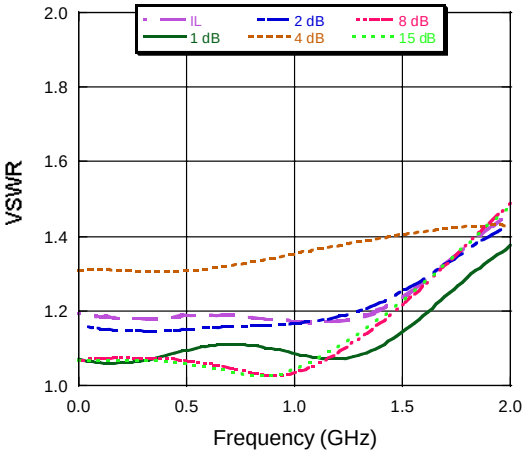
Insertion Loss



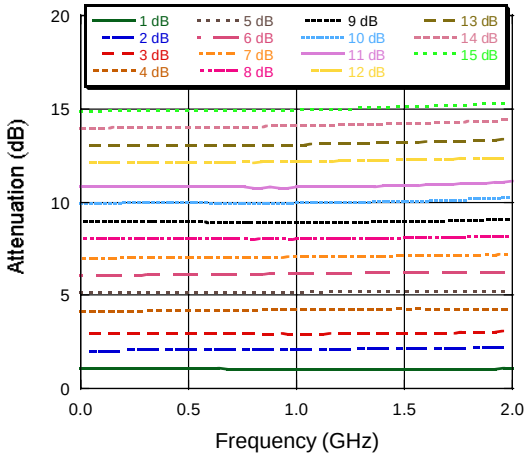
Attenuation Accuracy



VSWR



Attenuation



M/A-COM Inc. and its affiliates reserve the right to make changes to the product(s) or information contained herein without notice. M/A-COM makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does M/A-COM assume any liability whatsoever arising out of the use or application of any product(s) or information.

- **North America** Tel: 800.366.2266 / Fax: 978.366.2266
- **Europe** Tel: 44.1908.574.200 / Fax: 44.1908.574.300
- **Asia/Pacific** Tel: 81.44.844.8296 / Fax: 81.44.844.8298

Visit www.macom.com for additional data sheets and product information.