



# Digital Attenuator, 31.5 dB, 6-Bit, TTL Driver, DC-4.0 GHz

V 7.00

AT90-0107

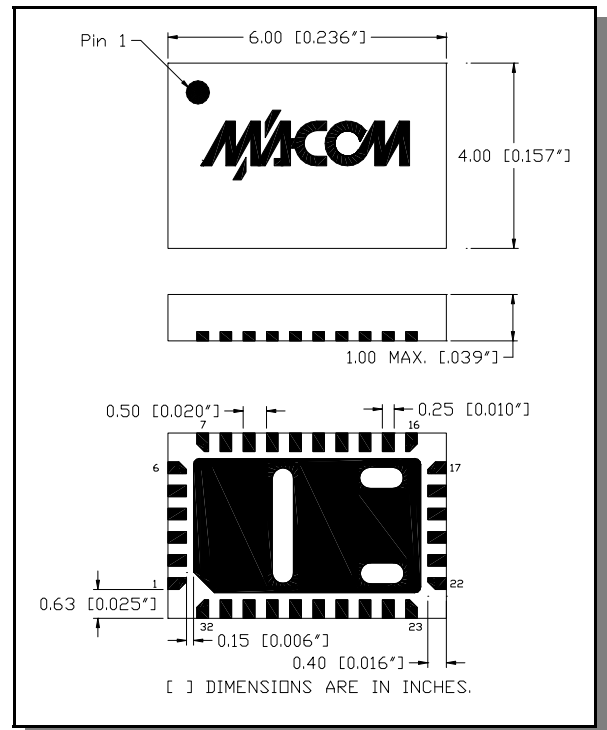
## Features

- Attenuation: 0.5 dB Steps to 31.5 dB
- Low DC Power Consumption
- Small Footprint, JEDEC Package
- Integral TTL Driver
- 50 ohm Impedance
- Test Boards are Available
- Tape and Reel Packaging Available

## Description

M/A-COM's AT90-0107 is a GaAs FET 6-bit digital attenuator with integral TTL driver. Step size is 0.5 dB providing a 31.5 dB total attenuation range. This device is in an FQFP-N plastic surface mount package. The AT90-0107 is ideally suited for use where accuracy, fast speed, very low power consumption and low costs are required.

## CSP-1



## Electrical Specifications $T_A = +25^\circ\text{C}$

Parameter	Test Conditions	Frequency	Units	Min	Typical	Max
Insertion Loss	—	DC - 4.0 GHz	dB	—	4.5	5.1
Attenuation Accuracy	Individual Bits 0.5-1-2-4-8-16 dB Any Combination of Bits 1 to 31.5 dB	DC - 4.0 GHz DC - 4.0 GHz	dB dB	— —	— —	$\pm(0.3 + 7\%$ of atten setting) $\pm(0.5 + 8\%$ of atten setting)
VSWR	Full Range	DC - 4.0 GHz	Ratio	—	2.0:1	2.2:1
Switching Speed	50% Cntl to 90%/10% RF 10% to 90% or 90% to 10%	— —	nS nS	— —	75 20	150 50
1 dB Compression	— —	50 MHz 0.5 - 4.0 GHz	dBm dBm	— —	+21 +29	— —
Input $IP_3$	Two-tone inputs up to +5 dBm	50 MHz 0.5-4.0 GHz	dB dB	— —	+35 +48	— —
+Vcc -Vee	— —	— —	V V	4.75 -8.0	5.0 -5.0	5.25 -4.75
Logic "0"	Sink Current is 20 $\mu\text{A}$ max.	—	V	0.0	—	0.8
Logic "1"	Source Current is 20 $\mu\text{A}$ max.	—	V	2.0	—	5.0
Icc	Vcc min to max, Logic "0" or "1"	—	mA	—	0.2	6
-Iee	-Vee min to max, Logic "0" or "1"	—	mA	—	-0.2	-1

Pin Configuration

Pin #	Function	Pin #	Function
1	C8	17	NC
2	C4	18	NC
3	C2	19	NC
4	C1	20	NC
5	C0.5	21	NC
6	C16	22	NC
7	GND	23	NC
8	NC	24	NC
9	NC	25	NC
10	NC <sup>1</sup>	26	GND
11	GND	27	RF2
12	RF1	28	GND
13	GND	29	NC <sup>1</sup>
14	NC	30	-Vee
15	NC	31	NC
16	NC	32	+Vcc

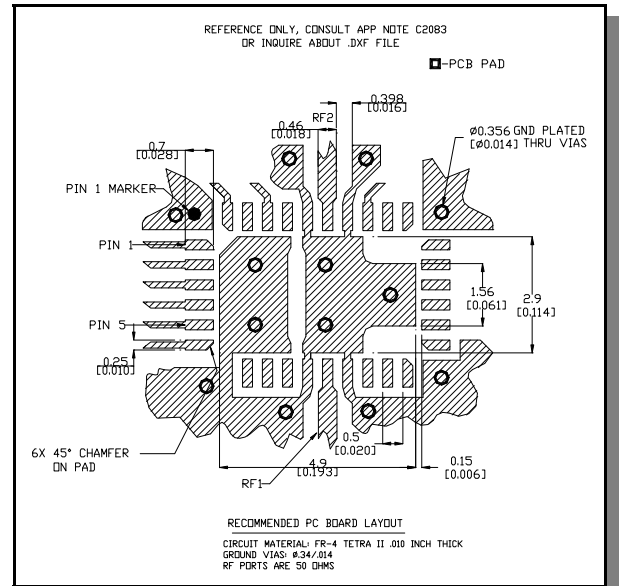
1. Pins 10 & 29 must be isolated

Truth Table

C16	C8	C4	C2	C1	C0.5	Attenuation
0	0	0	0	0	0	Loss, Reference
0	0	0	0	0	1	0.5 dB
0	0	0	0	1	0	1.0 dB
0	0	0	1	0	0	2.0 dB
0	0	1	0	0	0	4.0 dB
0	1	0	0	0	0	8.0 dB
1	0	0	0	0	0	16.0 dB
1	1	1	1	1	1	31.5 dB

0 = TTL Low; 1 = TTL High

Recommended PCB Layout <sup>2</sup>



2. Application Note C2083 is available on line at [www.macom.com](http://www.macom.com)

Absolute Maximum Ratings <sup>3</sup>

Parameter	Absolute Maximum
Max. Input Power 0.05 GHz 0.5 - 4.0 GHz	+27 dBm +34 dBm
+Vcc	+5.5V
-Vee	-8.5V
Logic Voltages <sup>4</sup>	-0.5 to +Vcc + 0.5V
Operating Temperature	-40°C to +85°C
Storage Temperature	-65°C to +125°C

3. Operation of this device above any one of these parameters may cause permanent damage.  
4. Standard CMOS TTL interface, latch-up will occur if logic signal is applied prior to power supply.

Specifications subject to change without notice.

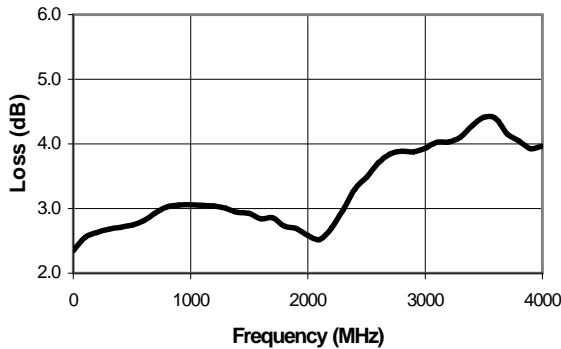
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Visit [www.macom.com](http://www.macom.com) for additional data sheets and product information.

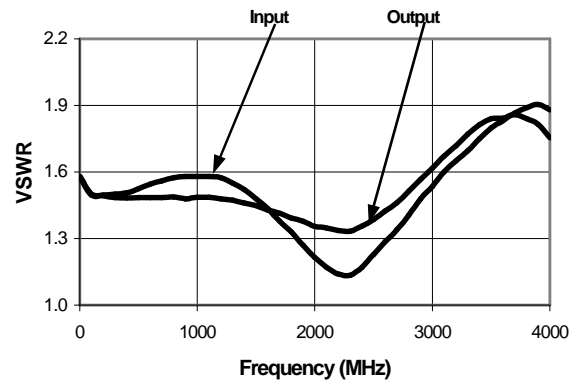


### Typical Performance Curves

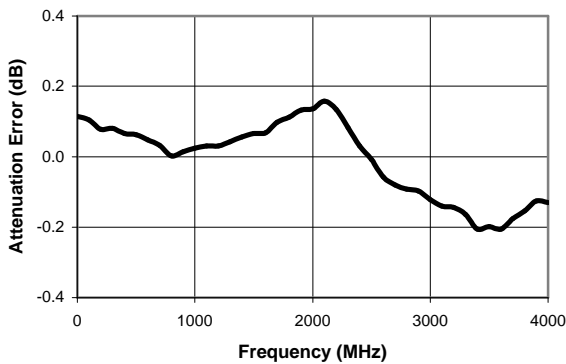
*Insertion Loss*



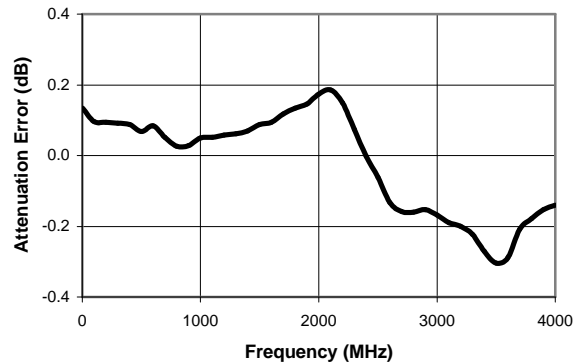
*VSWR @ Insertion Loss*



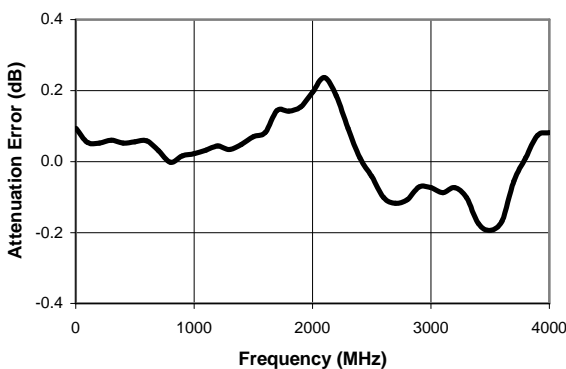
*Attenuation Error, 0.5 dB Bit*



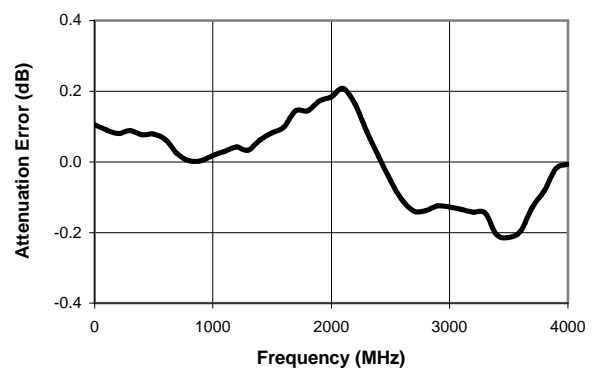
*Attenuation Error, 1 dB Bit*



*Attenuation Error, 2 dB Bit*



*Attenuation Error, 4 dB Bit*



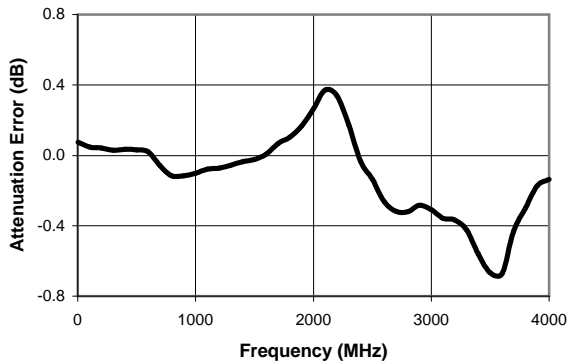
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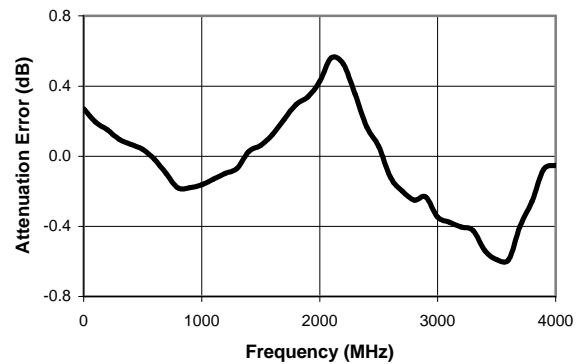
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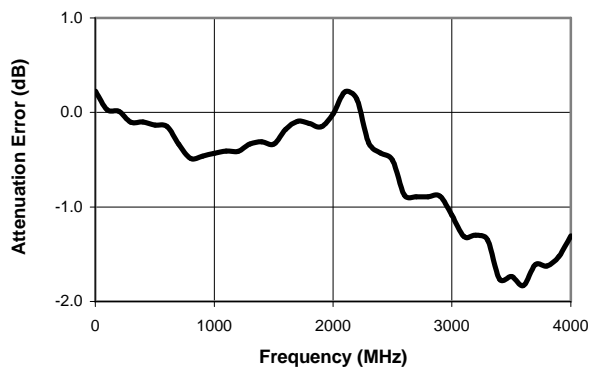
Attenuation Error, 8 dB Bit



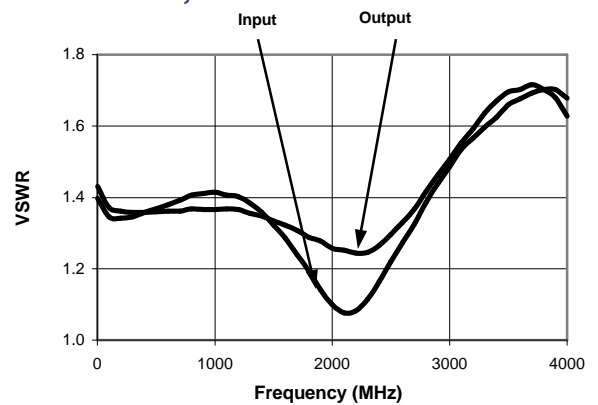
Attenuation Error, 16 dB Bit



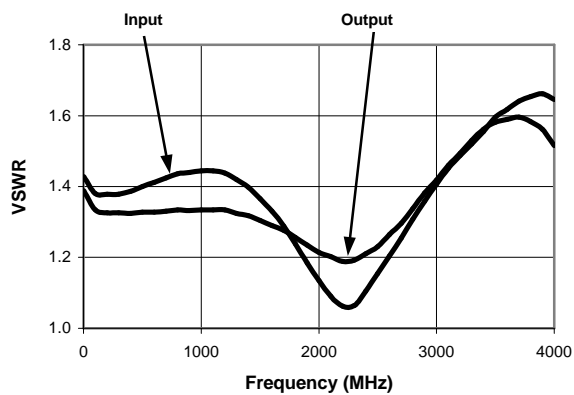
Attenuation Error, Max. Attenuation



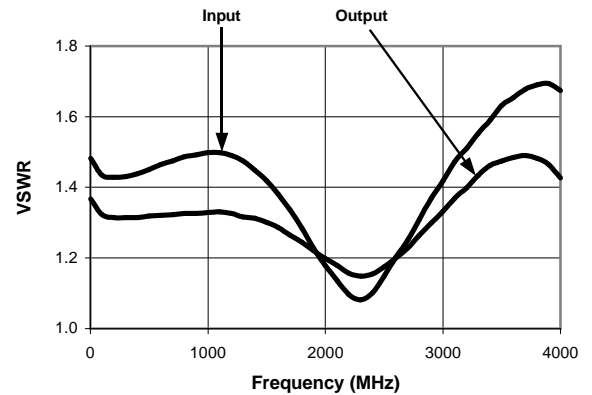
VSWR, 0.5 dB Bit



VSWR, 1 dB Bit



VSWR, 2 dB Bit



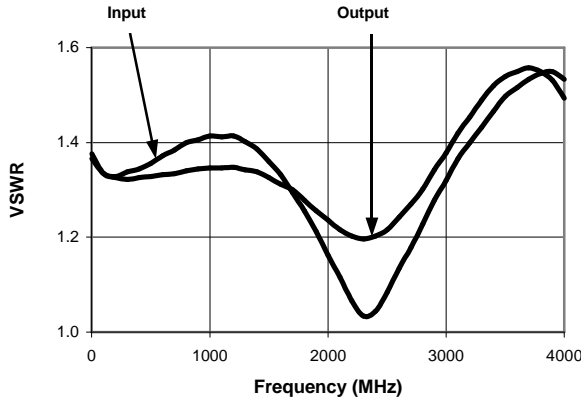
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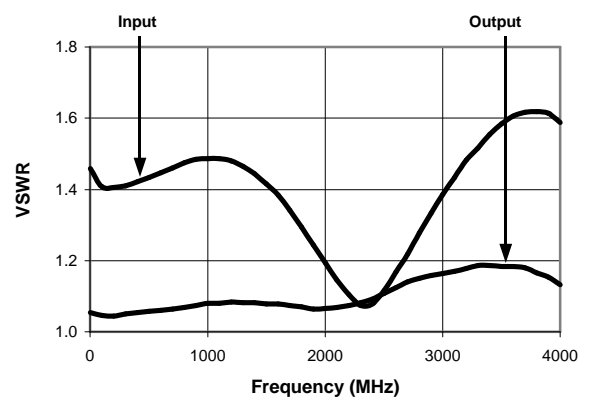
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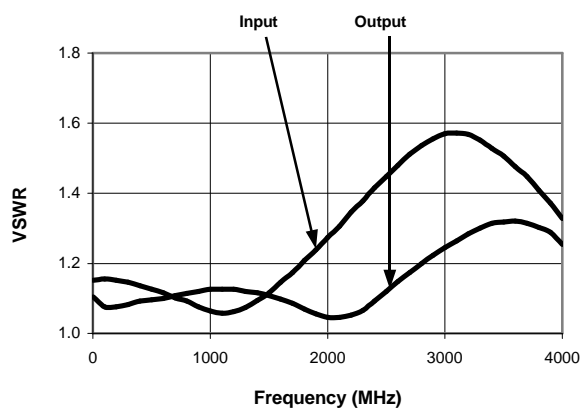
VSWR, 4 dB Bit



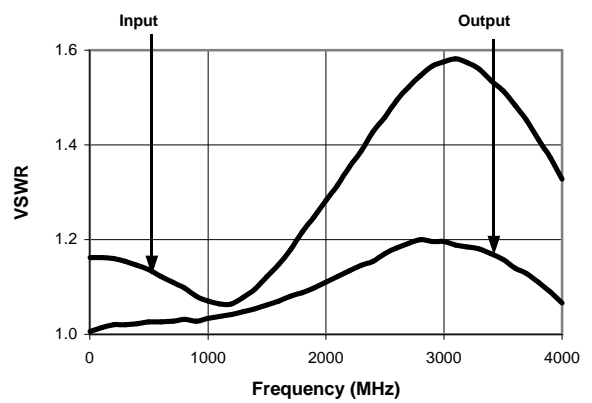
VSWR, 8 dB Bit



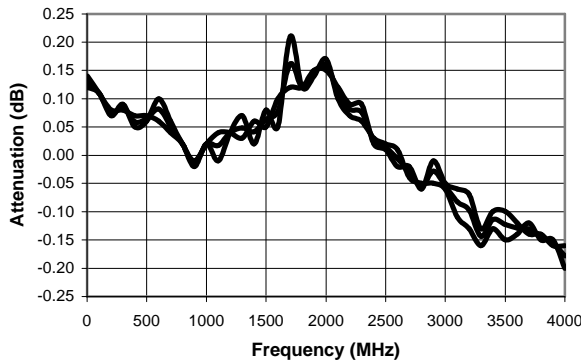
VSWR, 16 dB Bit



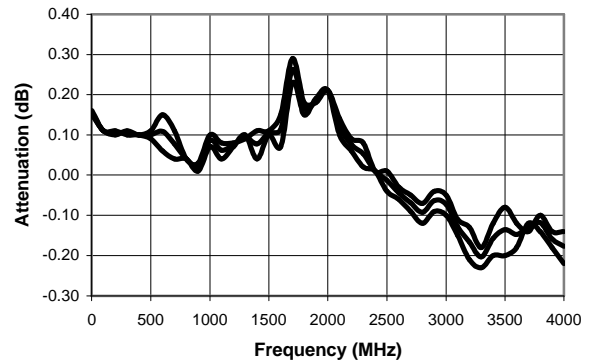
VSWR, Max. Attenuation



Typical Attenuation Deviation vs. Temperature for 0.5 dB Bit



Typical Attenuation Deviation vs. Temperature for 1 dB Bit



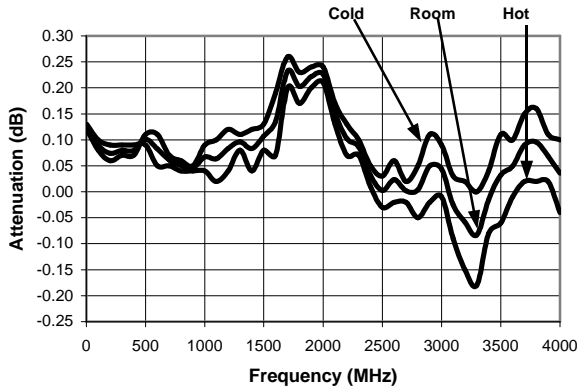
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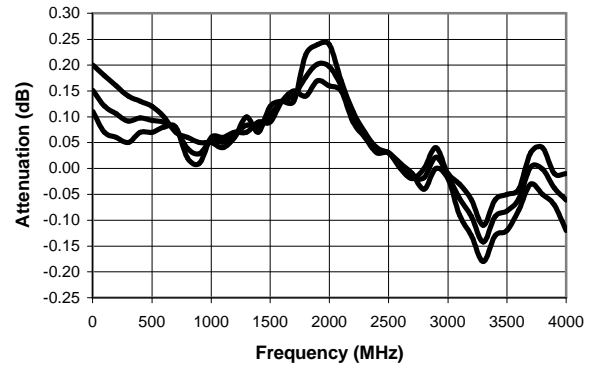
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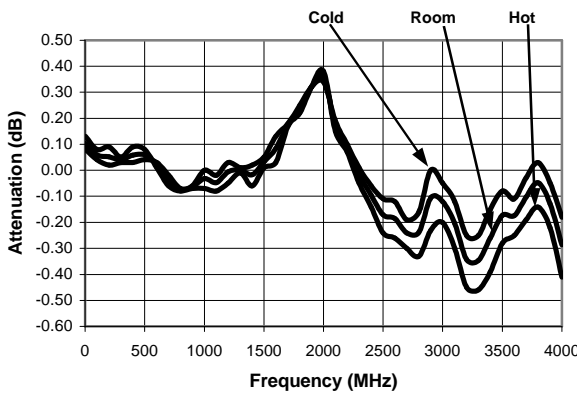
Typical Attenuation Deviation vs. Temperature for 2 dB Bit



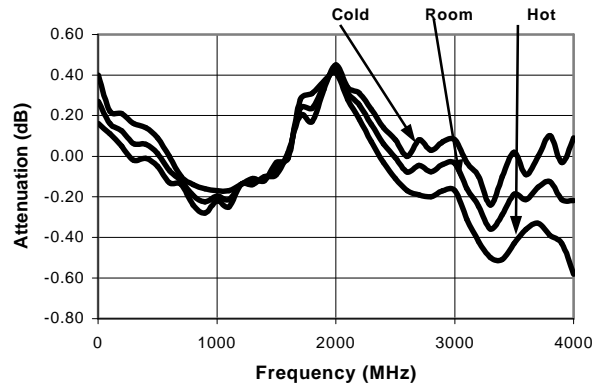
Typical Attenuation Deviation vs. Temperature for 4 dB Bit



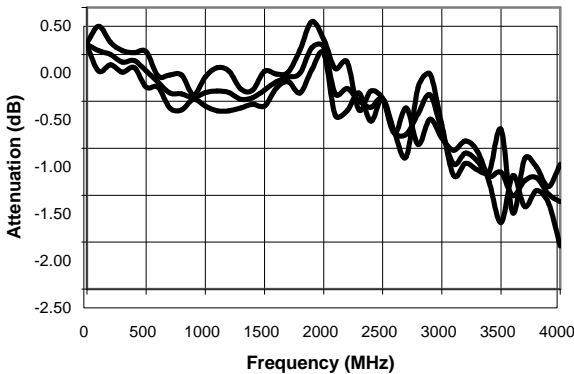
Typical Attenuation Deviation vs. Temperature for 8 dB Bit



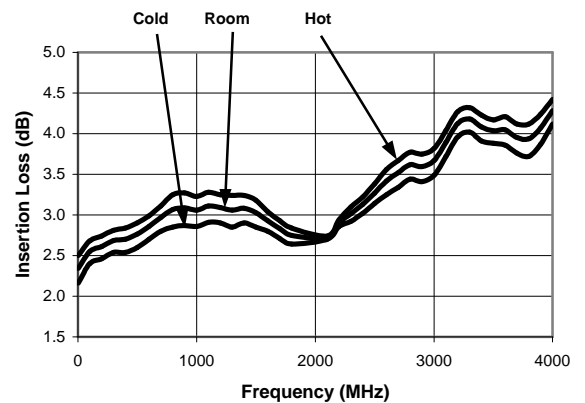
Typical Attenuation Deviation vs. Temperature for 16 dB Bit



Typical Attenuation Deviation vs. Temperature at Maximum Atten.



Insertion Loss vs. Temperature



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## Ordering Information

Part Number	Package
AT90-0107	Bulk Packaging
AT90-0107TR	Tape and Reel (1K Reel)
AT90-0107-TB	Units Mounted on Test Board

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