



Digital Attenuator, 31.5 dB, 6-Bit, TTL Driver DC - 2.0 GHz

Features

- Attenuation: 0.5 dB Steps to 31.5 dB¹
- Temperature Stability: ± 0.18 dB from -40°C to $+85^{\circ}\text{C}$ Typ.
- Low DC Power Consumption
- Surface Mount Package
- Integral TTL Driver
- High Intercept Point
- Low Cost/High Performance

Description

M/A-COM's AT20-0107 is a GaAs FET 6-bit digital attenuator with a 0.5 dB minimum step size and a 31.5 dB total attenuation. This attenuator and integral TTL driver is in a ceramic 24-lead surface mount package. The AT20-0107 is ideally suited for use where accuracy, fast speed, very low power consumption and low inter-modulation products are required. Typical applications include dynamic range setting in precision receiver circuits and other gain/leveling control circuits. Available with enhanced performance as fully hermetic version. Environmentally screenable as P/N AT-107.

Ordering Information

Part Number	Package
AT20-0107	Bulk Packaging
AT20-0107-TR	Tape and Reel ²
AT20-0107-TB	Unit mounted on a test board

2. Check with the factory for available quantities and reel size.

Electrical Specifications³ $T_A = +25^{\circ}\text{C}$

Parameter	Test Conditions	Frequency	Units	Min	Typical	Max
Insertion Loss	—	DC - 0.5 GHz	dB	—	2.5	3.0
		DC - 1.0 GHz	dB	—	2.9	3.4
		DC - 2.0 GHz	dB	—	3.2	3.8
Attenuation Accuracy ^{4,5}	Any Bit or Combination of Bits	DC - 2.0 GHz	dB	—	—	+(.3 +7% of atten.) -(.2 +1% of atten.)
VSWR	Full Range	DC - 2.0 GHz	Ratio	—	—	1.8:1
Trise, Tfall	10% to 90%	50% Control to 90%/10% RF	nS	—	50	—
Ton, Toff	50% Control to 90%/10% RF		nS	—	150	—

1. Above reference insertion loss.

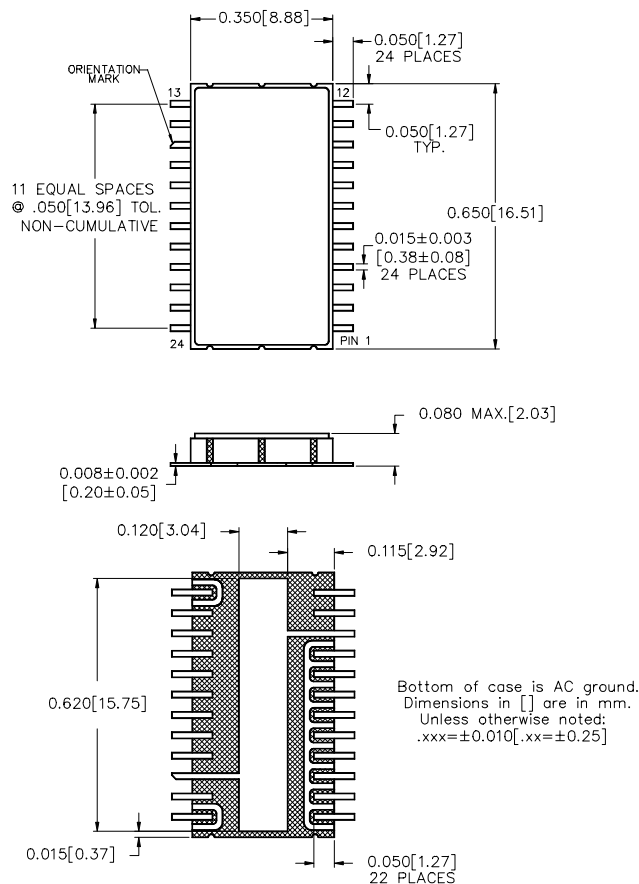
3. All specifications apply when operated with bias voltages of +5V for V_{CC} and -5.0 V to -8.0 V for V_{EE} and 50Ω impedance at all ports unless otherwise stated.

4. This attenuator is guaranteed monotonic.

5. For the attenuator to meet the guaranteed specifications, it is necessary to have a DC return on either RF1 or RF2. The DC return can be either a $10K\Omega$ resistor, or an RF choke.

6. $V_{EE} = -5$ V for the typical numbers given.

CR-13



Specifications subject to change without notice.

V 3.00

■ **North America:** Tel. (800) 366-2266, Fax (800) 618-8883
 ■ **Asia/Pacific:** Tel. +81-44-844-8296, Fax +81-44-844-8298
 ■ **Europe:** Tel. +44 (1344) 869 595, Fax +44 (1344) 300 020

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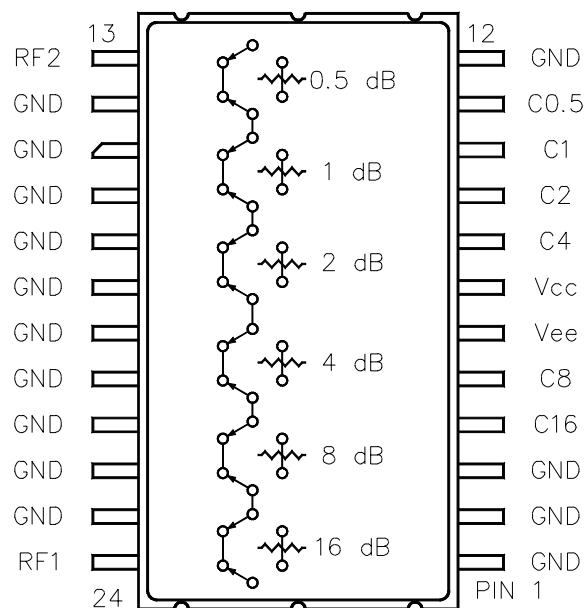
Parameter	Test Conditions	Frequency	Units	Min	Typical	Max
1 dB Compression ⁶	Input Power	0.05 GHz	dBm	—	+75	—
	Input Power	0.5 - 2.0 GHz	dBm	—	+79	—
Input IP_3 ⁶	Two-tone inputs up to +5 dBm	50 MHz	dB	—	+35	—
		0.5-2.0 GHz	dB	—	+48	—
Input IP_2 ⁶	Two-tone inputs up to +5 dBm	50 MHz	dB	—	+75	—
		0.5-2.0 GHz	dB	—	+79	—
Vcc	—	—	V	4.5	5.0	5.5
-Vee	—	—	V	-8.0	—	-5.0
Icc	Vcc = 4.5 to 5.5 V		mA	—	—	6.0
-Iee	-Vee = -5.0 to -8.0 V		mA	—	—	1.0

Absolute Maximum Ratings⁷

Parameter	Absolute Maximum
Max. Input Power	
0.05 GHz	+27 dBm
0.5 - 2.0 GHz	+34 dBm
+Vcc	+5.5V
-Vee	-8.5V
Control Voltage	-0.5V to Vcc +0.5V
Operating Temperature	-40°C to +125°C
Storage Temperature	-65°C to +150°C

7. Operation of this device above any one of these parameters may cause permanent damage.

Functional Schematic (Top View)



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

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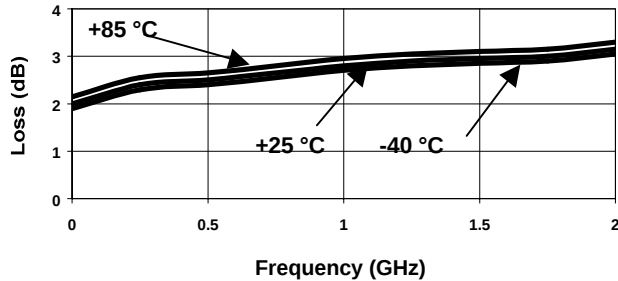
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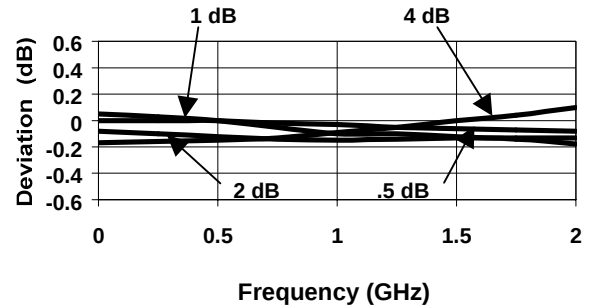
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Typical Performance

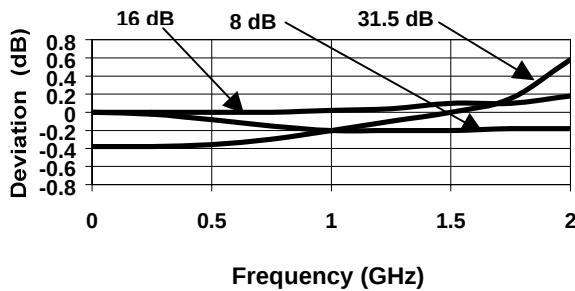
Insertion Loss vs Frequency



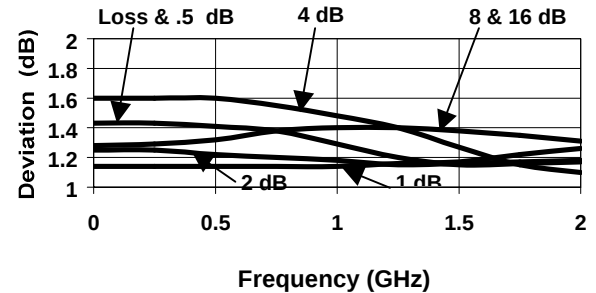
Attenuation Accuracy vs. Frequency



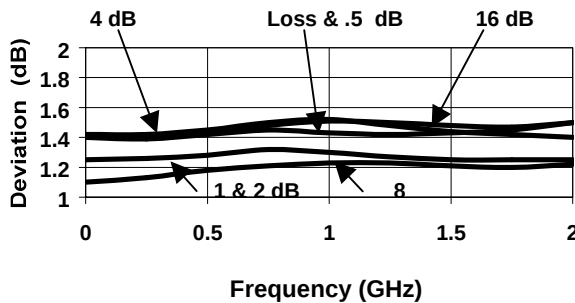
Attenuation Accuracy vs. Frequency



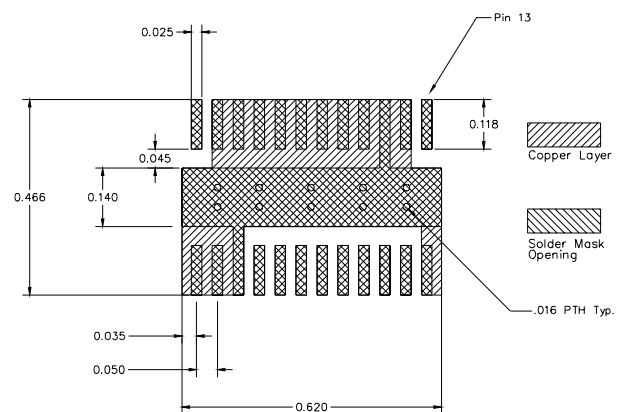
RF1 VSWR vs. Frequency



RF2 VSWR vs. Frequency



PCB Layout



Typical Metal/Solder Mask Layout for CR-13 Package.

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