



Digital Attenuator, 50 dB, 6-Bit, TTL Driver DC - 2.4 GHz

Features

- Attenuation: 1 dB Steps to 50 dB
- Single Positive Supply
- Contains Internal DC to DC Converter
- Low DC Power Consumption
- Plastic MLP SMT Package
- Integral TTL Driver
- 50 ohm Impedance

Description

M/A-COM's AT90-1106 is a GaAs FET 6-bit digital attenuator with integral TTL driver. Step size is 1 dB providing a 50 dB total attenuation range. This device is in a MLP plastic surface mount package. The AT90-1106 is ideally suited for use where accuracy, fast speed, very low power consumption and low costs are required.

Ordering Information

Part Number	Package
AT90-1106	Bulk Packaging
AT90-1106TR	Tape and Reel
AT90-1106-TB	Units Mounted on Test Board

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

Parameter	Test Conditions	Frequency	Units	Min	Typical	Max
Insertion Loss	—	DC - 2.4 GHz	dB	—	5.5	6.0
Attenuation Accuracy	Individual Bits 1-2-4-8-16 dB Any Combination of Bits 1 to 50 dB	DC - 2.4 GHz	dB	—	—	$\pm(.3 + 5\% \text{ of atten setting})$
		DC - 2.4 GHz	dB	—	—	$\pm(.5 + 8\% \text{ of atten setting})$
VSWR	Full Range	DC - 2.4 GHz	Ratio	—	1.8:1	2:1
Switching Speed	50% Cntl to 90%/10% RF 10% to 90% or 90% to 10%	—	nS	—	75	150
		—	nS	—	20	50
1 dB Compression	—	50 MHz	dBm	—	+21	—
		0.5 - 2.40 GHz	dBm	—	+29	—
Input IP_3	Two-tone inputs up to +5 dBm	50 MHz	dB	—	+35	—
		0.5-2.4 GHz	dB	—	+48	—
+Vcc	—	—	V	4.75	5.0	5.25
Logic "0"	Sink Current is 20 μA max.	—	V	0.0	—	0.8
Logic "1"	Source Current is 20 μA max.	—	V	2.0	—	5.0
Icc	Vcc min to max, Logic "0" or "1"	—	mA	—	6	10

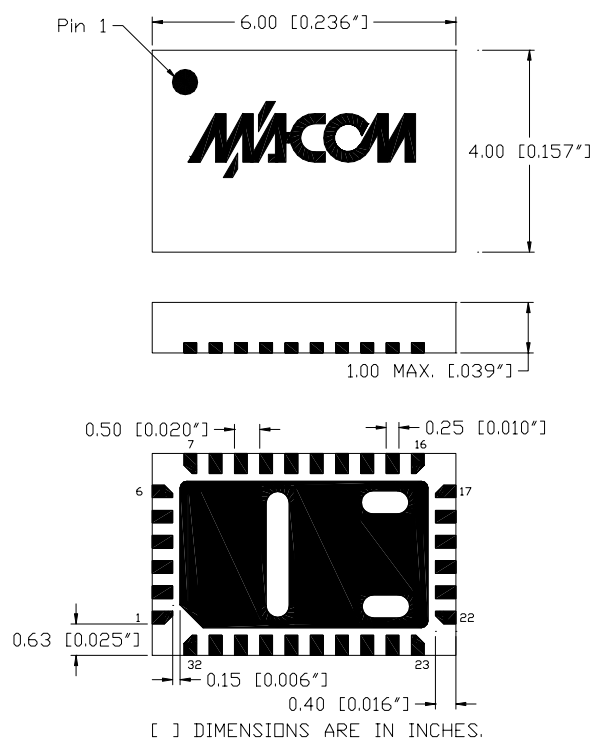
Specifications subject to change without notice.

V 2.00

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MLP-1

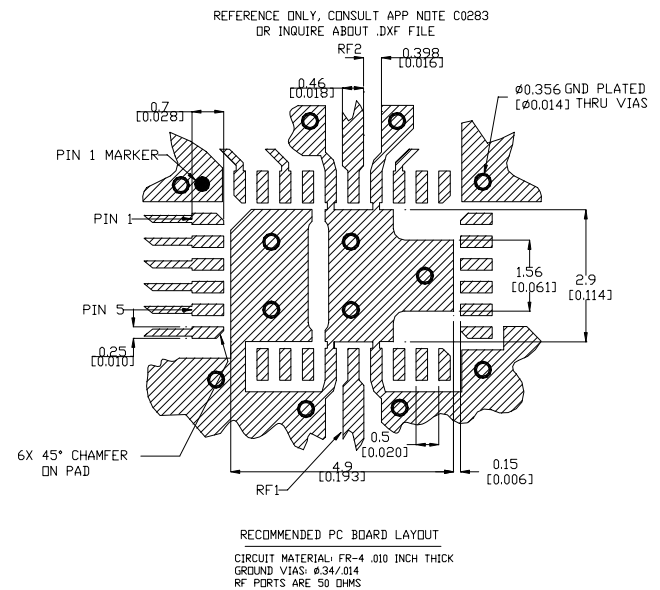


Pin Configuration

Pin #	Function	Pin #	Function
1	C16	17	NC
2	C8	18	NC
3	C4	19	+Vcc ²
4	C2	20	NC
5	C1	21	Cp ⁴
6	C32	22	NC
7	GND	23	Cp ⁴
8	NC	24	NC
9	NC	25	-Vee ³
10	NC ¹	26	GND
11	GND	27	RF2
12	RF1	28	GND
13	GND	29	NC ¹
14	NC	30	-Vee ^{3,5}
15	NC	31	NC
16	NC	32	+Vcc ^{2,6}

1. Pins 10 & 29 Must be isolated
2. Pin 19 must be connected to Pin 32
3. Pin 25 must be connected to Pin 30
4. .01μF cap must be connected between Pins 21 and 23
5. -Vee is produced internally and requires a .1μF cap to GND
6. +Vcc requires a .1μF cap to GND

Recommended PCB Layout



Truth Table

C32	C16	C8	C4	C2	C1	Attenuation
0	0	0	0	0	0	Loss, Reference
0	0	0	0	0	1	1.0 dB
0	0	0	0	1	0	2.0 dB
0	0	0	1	0	0	4.0 dB
0	0	1	0	0	0	8.0 dB
0	1	0	0	0	0	16.0 dB
1	0	0	0	0	0	32.0 dB
1	1	0	0	1	0	50.0 dB

0 = TTL Low; 1 = TTL High

Absolute Maximum Ratings ⁷

Parameter	Absolute Maximum
Max. Input Power	
0.05 GHz	+27 dBm
0.5 - 2.4 GHz	+34 dBm
+Vcc	+5.5V
Logic Voltages	-0.5 to +Vcc + 0.5V
Operating Temperature	-40°C to +85°C
Storage Temperature	-65°C to +125°C

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

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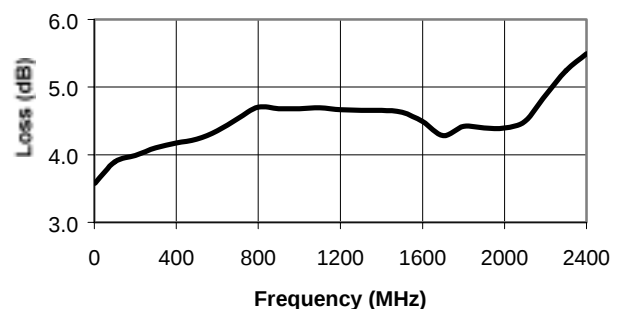
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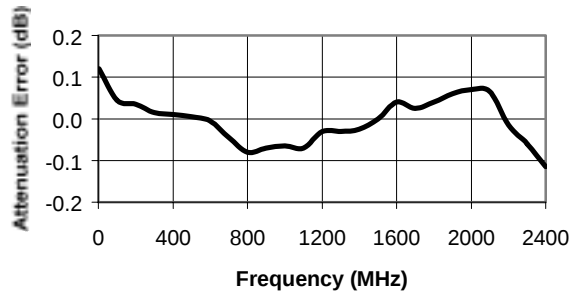
Typical Performance

Insertion Loss

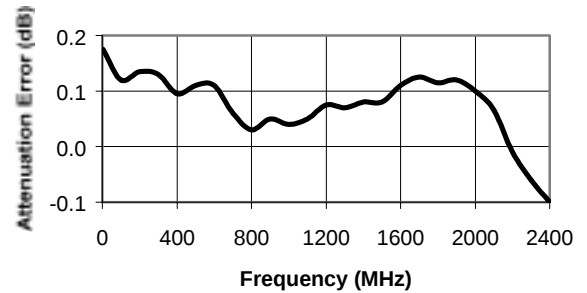


Typical Performance

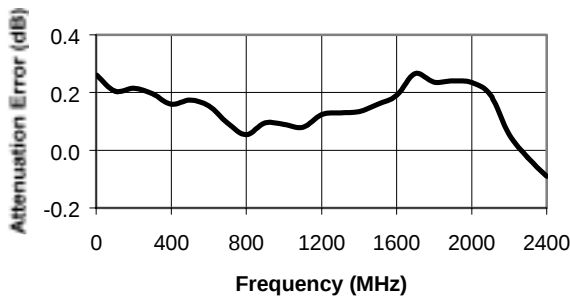
Attenuation Error
1 dB Bit



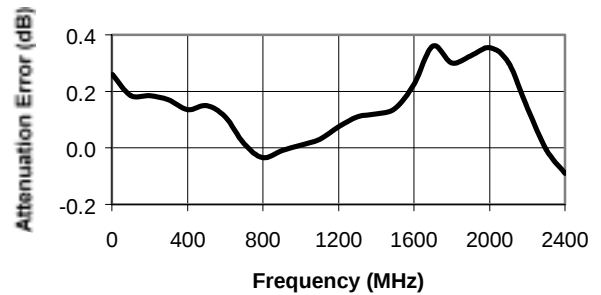
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2 dB Bit



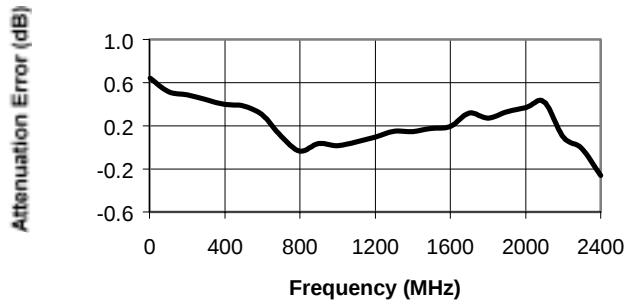
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4 dB Bit



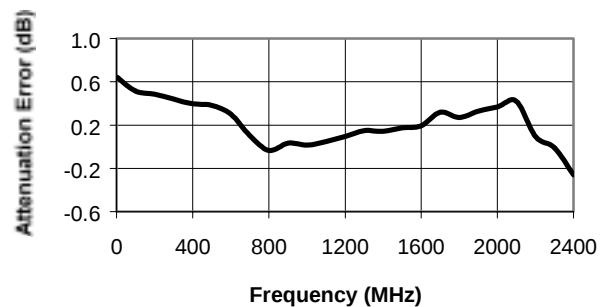
Attenuation Error
8 dB Bit



Attenuation Error
16 dB Bit



Attenuation Error
32 dB Bit



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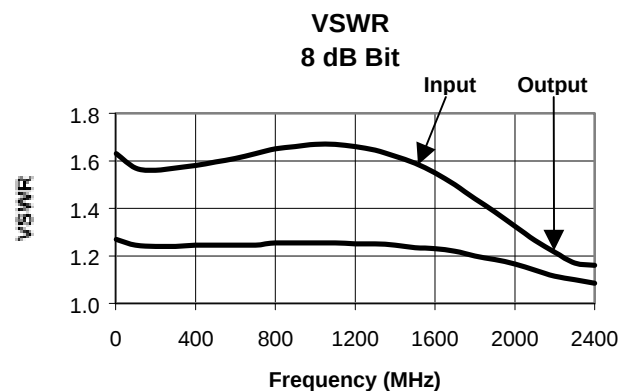
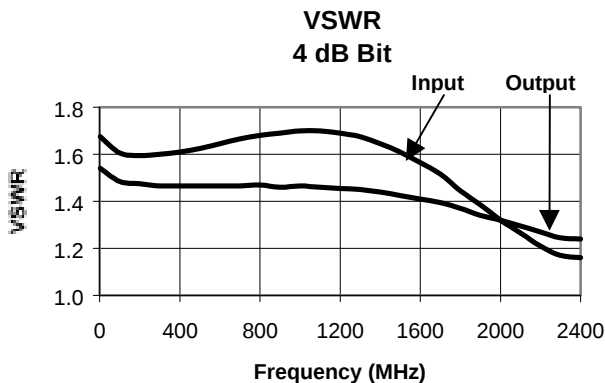
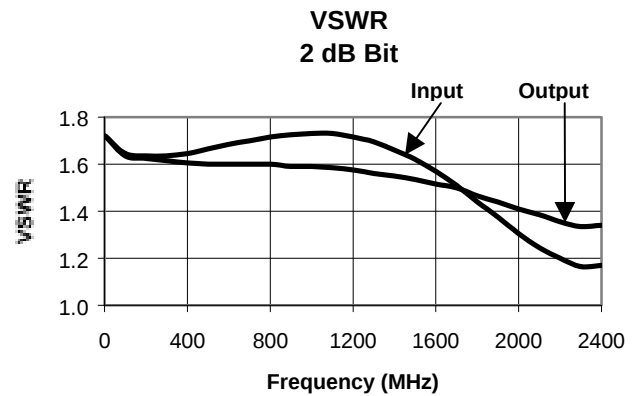
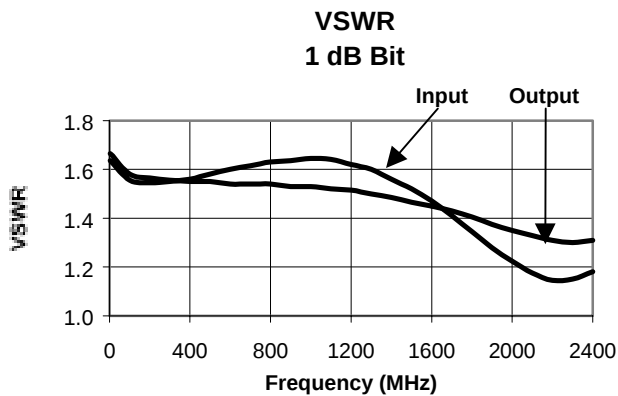
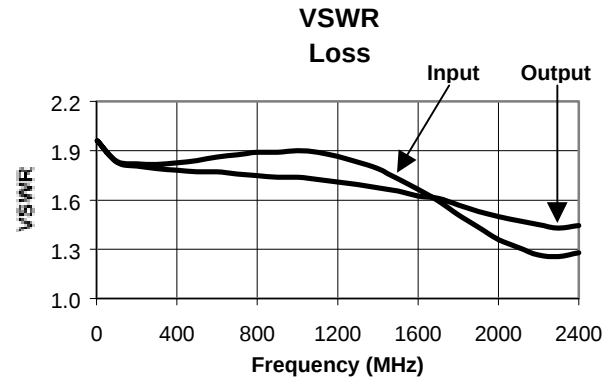
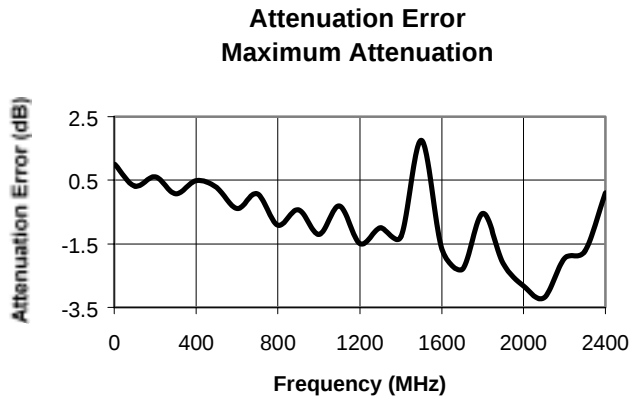
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Typical Performance



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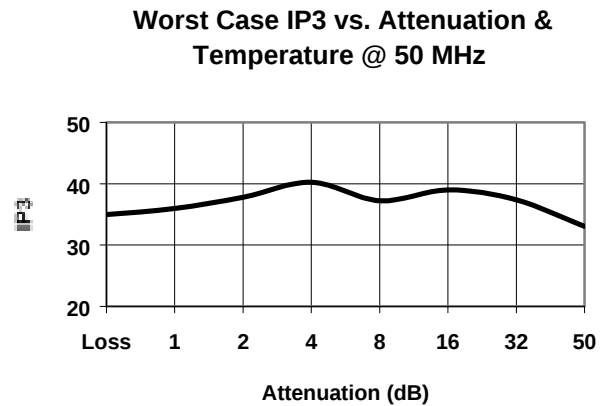
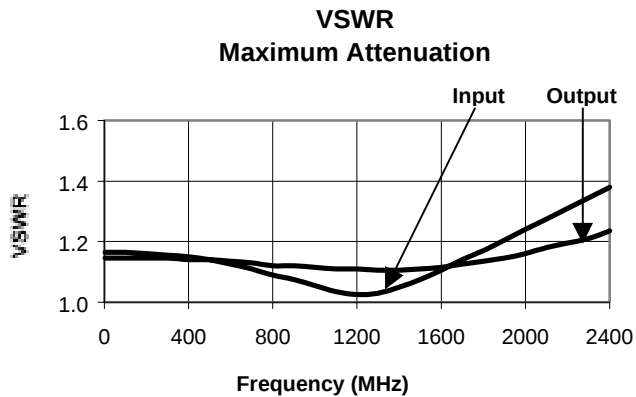
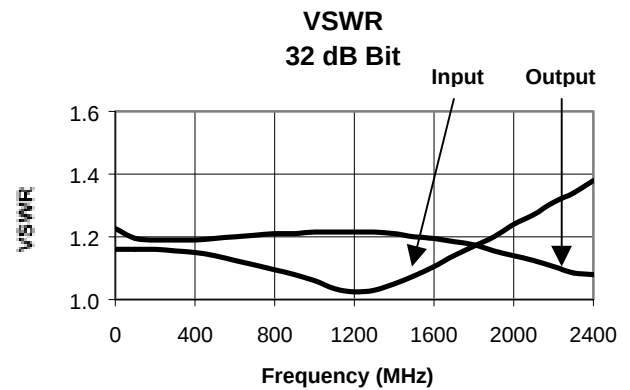
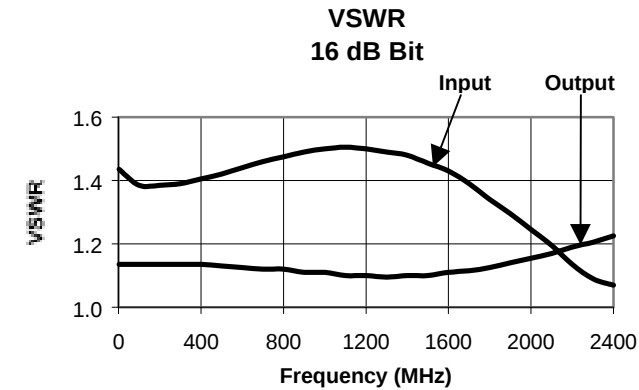
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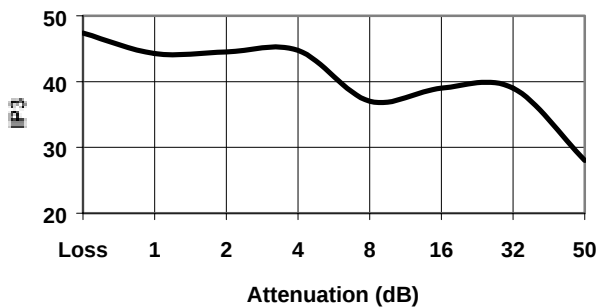
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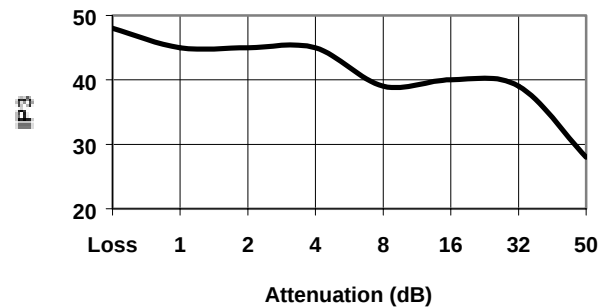
Typical Performance



Maximum IP3 over Temperature Range and Attenuation @ 950 MHz



Maximum IP3 over Temperature Range and Attenuation @ 1900 MHz



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