



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

V 5.00

AT90-0106

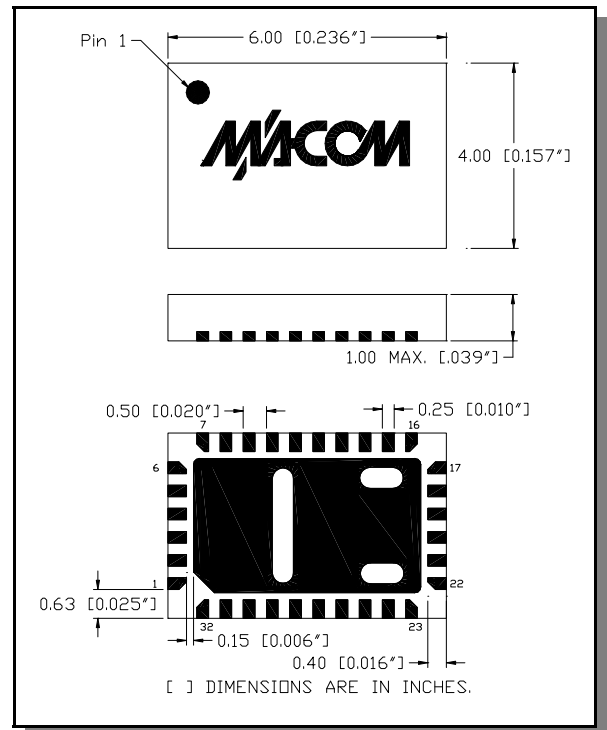
## Features

- Attenuation: 1 dB Steps to 50 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 AT90-0106 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 FQFP-N plastic surface mount package. The AT90-0106 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 - 2.4 GHz	dB	—	5.5	6.0
Attenuation Accuracy	Individual Bits 1-2-4-8-16-32 dB Any Combination of Bits 1 to 50 dB	DC - 2.4 GHz	dB	—	—	$\pm(.3 +5\%$ of atten setting)
		DC - 2.4 GHz	dB	—	—	$\pm(.5 +8\%$ 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
-Vee	—	—	V	-8.0	-5.0	-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	C16	17	NC
2	C8	18	NC
3	C4	19	NC
4	C2	20	NC
5	C1	21	NC
6	C32	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

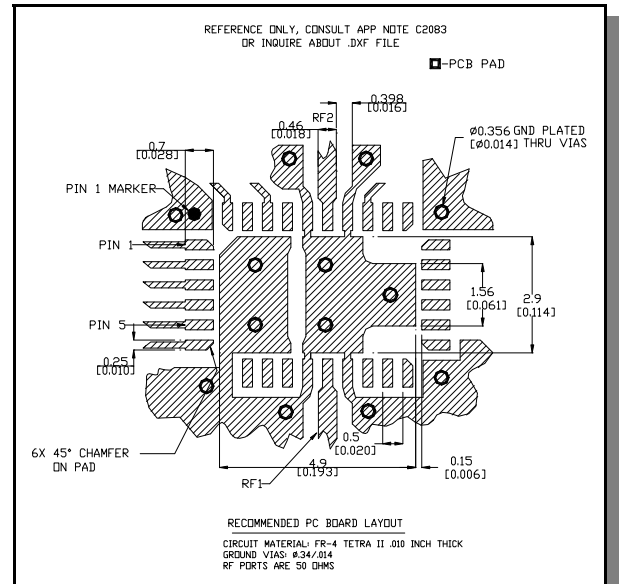
1. Pins 10 & 29 must be isolated

Truth Table

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

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 - 2.4 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.

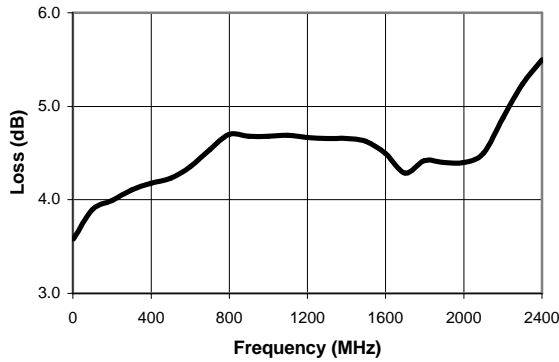
■ North America: Tel. (800) 366-2266  
 ■ Asia/Pacific: Tel.+81-44-844-8296, Fax +81-44-844-8298  
 ■ Europe: Tel. +44 (1344) 869 595, Fax+44 (1344) 300 020

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

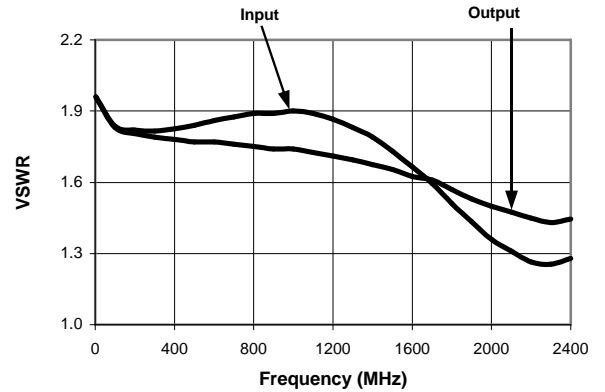


Typical Performance Curves

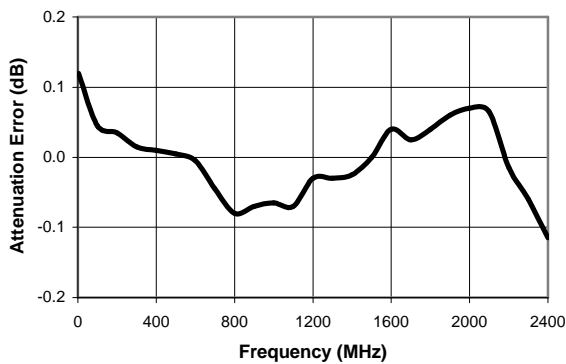
Insertion Loss



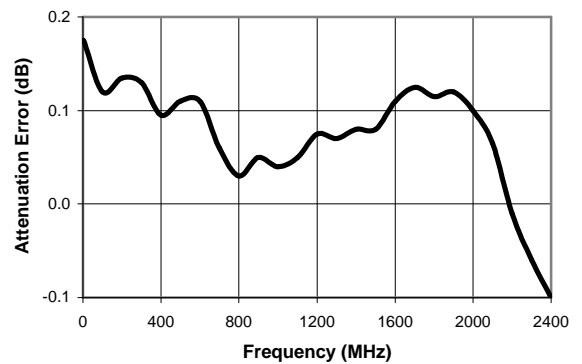
VSWR @ Insertion Loss



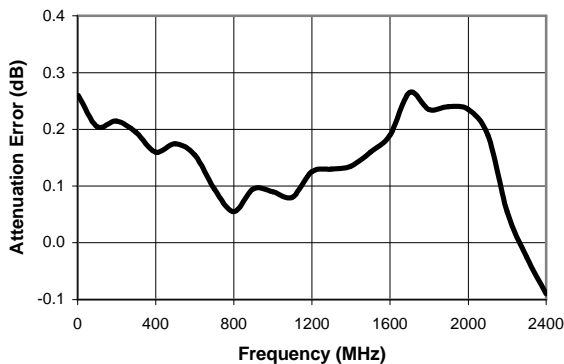
Attenuation Error, 1 dB Bit



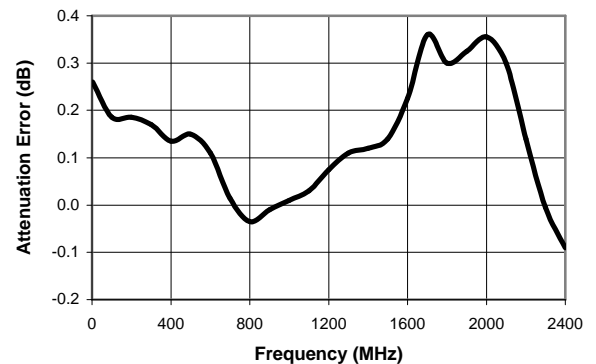
Attenuation Error, 2 dB Bit



Attenuation Error, 4 dB Bit



Attenuation Error, 8 dB Bit



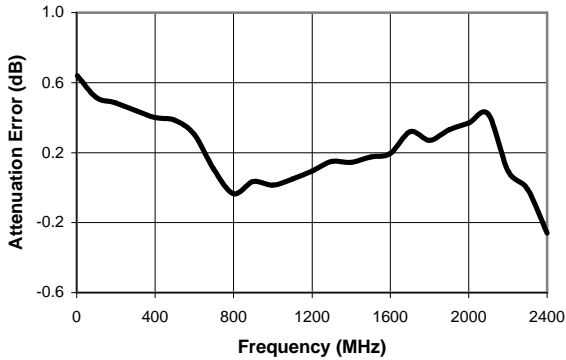
Specifications subject to change without notice.

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

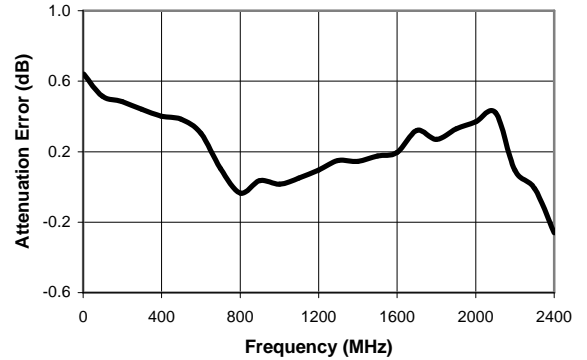
Visit [www.macom.com](http://www.macom.com) for additional data sheets and product information.

Typical Performance Curves

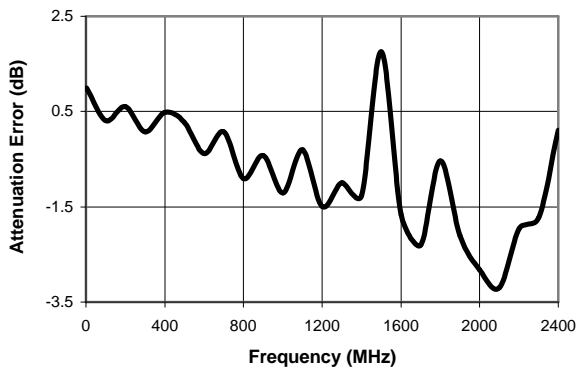
Attenuation Error, 16 dB Bit



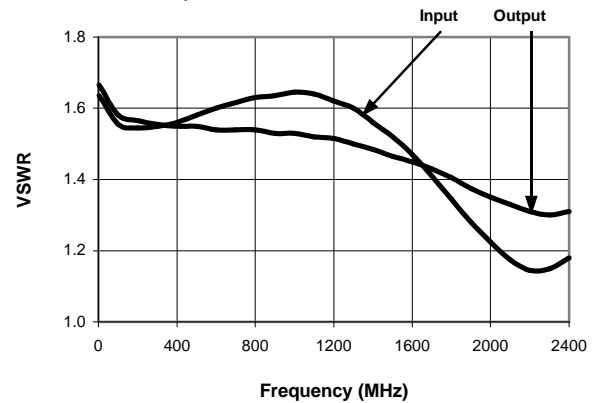
Attenuation Error, 32 dB Bit



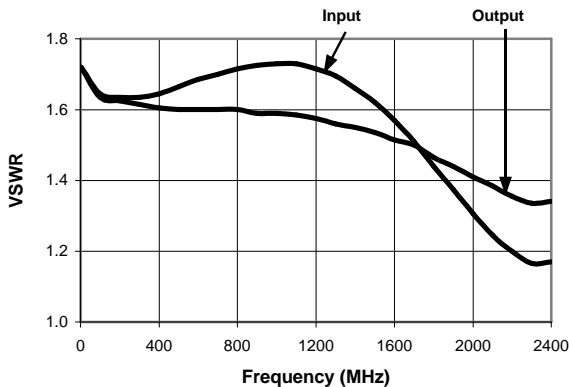
Attenuation Error, Max. Attenuation



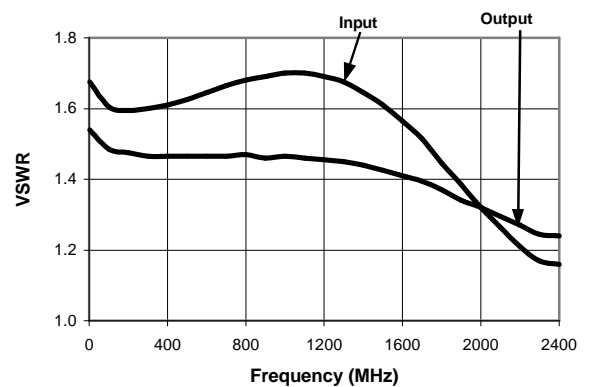
VSWR, 1 dB Bit



VSWR, 2 dB Bit



VSWR, 4 dB Bit



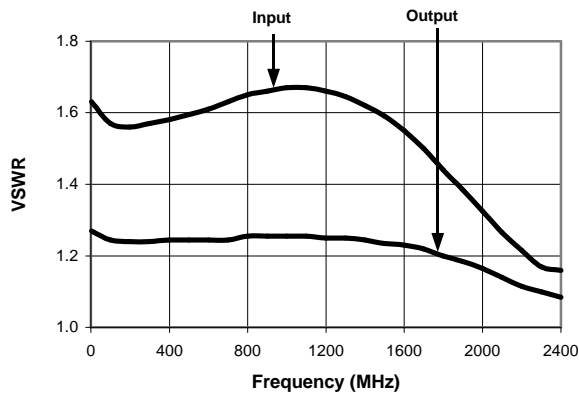
Specifications subject to change without notice.

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

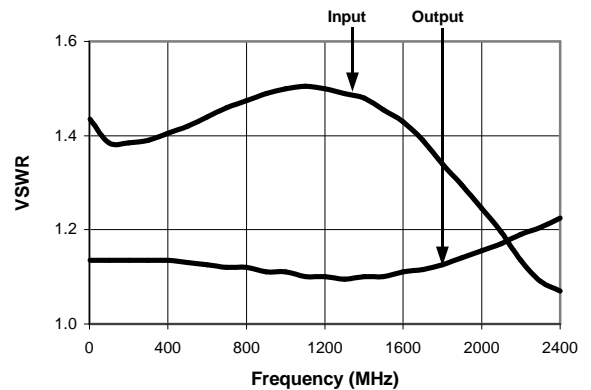
Visit [www.macom.com](http://www.macom.com) for additional data sheets and product information.

Typical Performance Curves

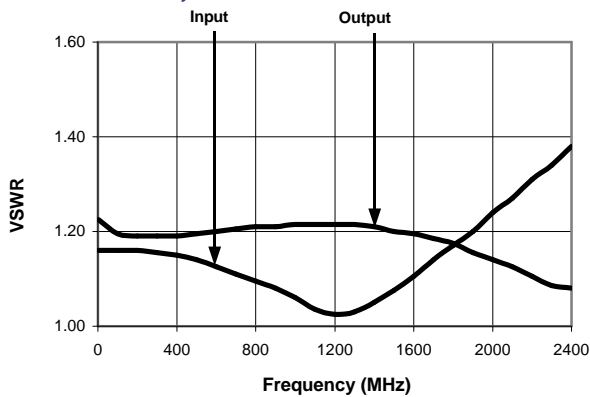
VSWR, 8 dB Bit



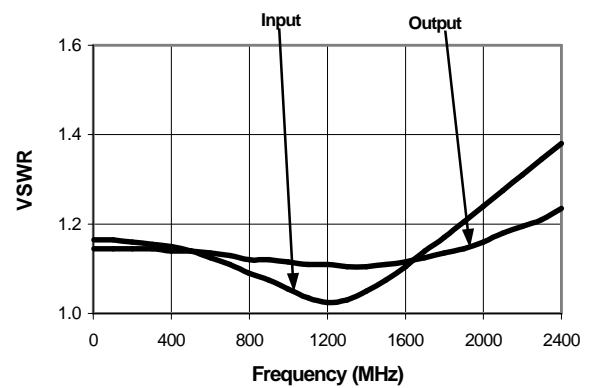
VSWR, 16 dB Bit



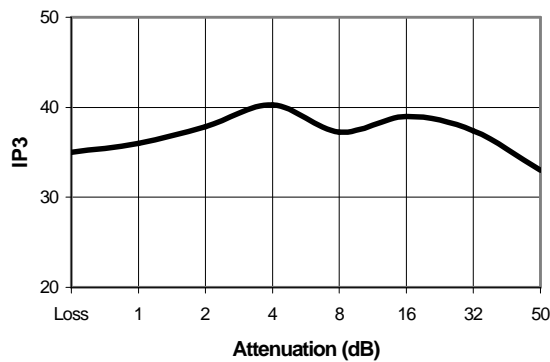
VSWR, 32 dB Bit



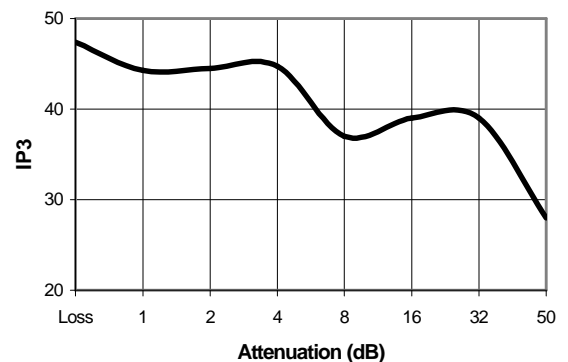
VSWR, Maximum Attenuation



Maximum IP3 over Temperature Range and Attenuation @ 50 MHz



Maximum IP3 over Temperature Range and Attenuation @ 950 MHz



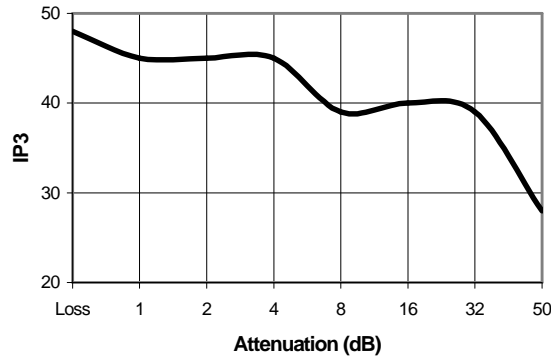
Specifications subject to change without notice.

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

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

Typical Performance Curves

Maximum IP3 over Temperature Range and Attenuation @ 1900 MHz



Ordering Information

Part Number	Package
AT90-0106	Bulk Packaging
AT90-0106TR	Tape and Reel (1K Reel)
AT90-0106-TB	Units Mounted on Test Board

Specifications subject to change without notice.

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

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

