tyco Electronics

M/A-COM

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

AT90-0106
V7

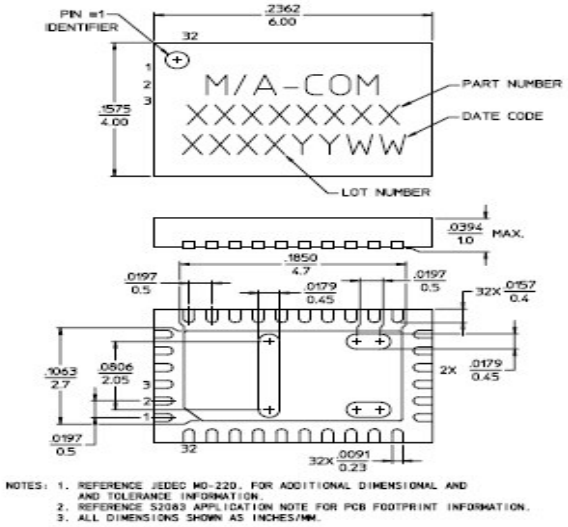
Features

- 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



Pin Configuration

Pin No.	Function	Pin No.	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[1]	26	GND
11	GND	27	RF2
12	RF1	28	GND
13	GND	29	NC[1]
14	NC	30	-Vee
15	NC	31	NC
16	NC	32	+Vcc

1. Pins 10 & 29 must be isolated

Ordering Information

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

Note: Reference Application Note M513 for reel size information.

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	1	1	1	1	50.0 dB

0 = TTL Low; 1 = TTL High

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Electrical Specifications: T_A = +25°C

Parameter	Test Conditions	Frequency	Units	Min.	Typ.	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 DC - 2.4 GHz	dB dB	— —	— —	±(.3 +5% of atten setting) ±(.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 nS	— —	75 20	150 50
1 dB Compression	— —	50 MHz 0.5 - 2.4 GHz	dBm dBm	— —	+21 +24	— —
Input IP3	Two-tone inputs up to +5 dBm	50 MHz 0.5 - 2.4 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 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	—	0.2	6
-Iee	-Vee min to max, Logic “0” or “1”	—	mA		-0.2	-1
Thermal Resistance θ_{JA}	—	—	°C/W	—	15	—

Absolute Maximum Ratings [3]

Parameter	Absolute Maximum
Max. Input Power 0.05 GHz 0.5 - 2.4 GHz	 +27 dBm +34 dBm
Supply Voltages Vcc Vee	 +5.5V -8.5V
Logic Voltage[4]	-0.5V to Vcc +0.5V
Operating Temperature	-40°C to +85°C
Storage Temperature	-65°C to +125°C

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

Handling Procedures

Please observe the following precautions to avoid damage:

Static Sensitivity

GMIC Circuits are sensitive to electrostatic discharge (ESD) and can be damaged by static electricity. Proper ESD control techniques should be used when handling these devices.

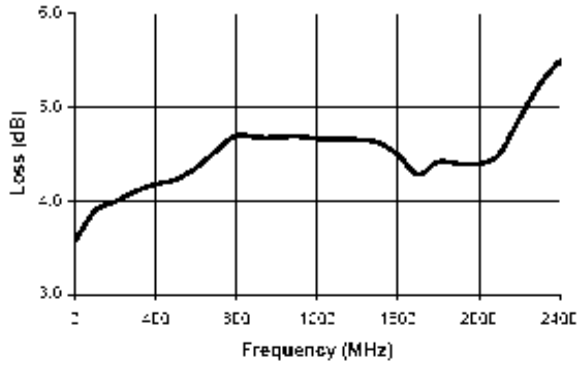
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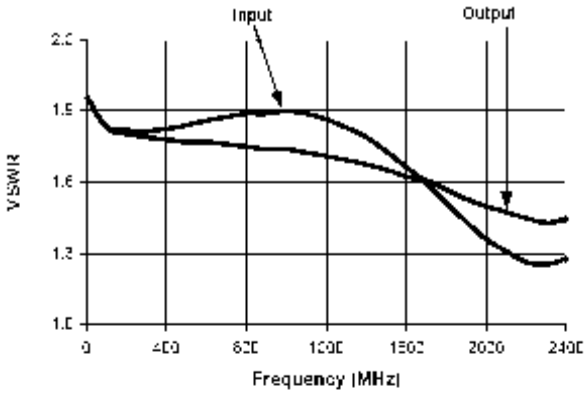
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Typical Performance Curves @ 25ºC

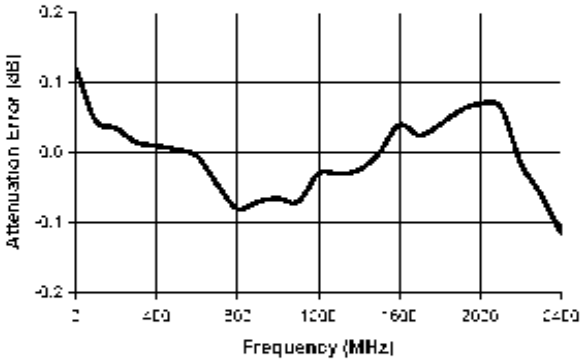
Insertion Loss



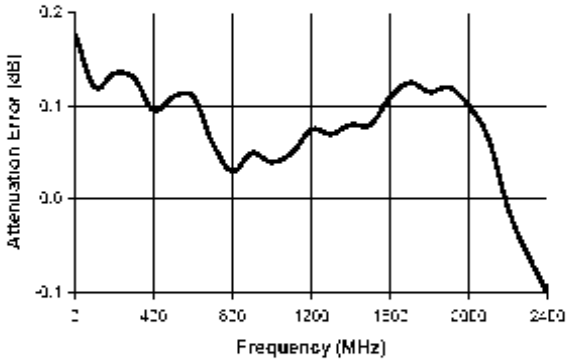
VSWR @ Insertion Loss



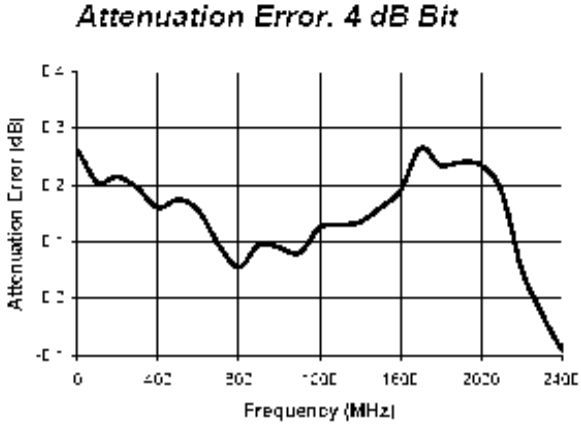
Attenuation Error. 1 dB Bit



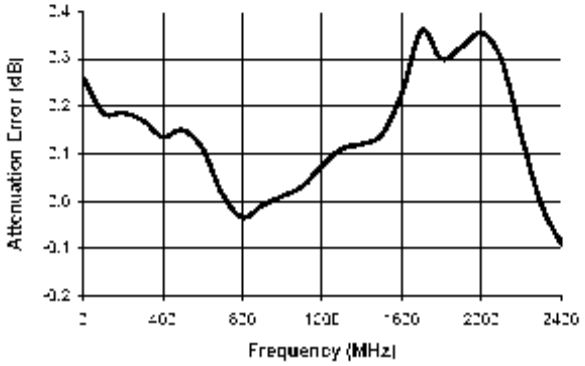
Attenuation Error. 2 dB Bit



Attenuation Error. 4 dB Bit



Attenuation Error, 8 dB Bit

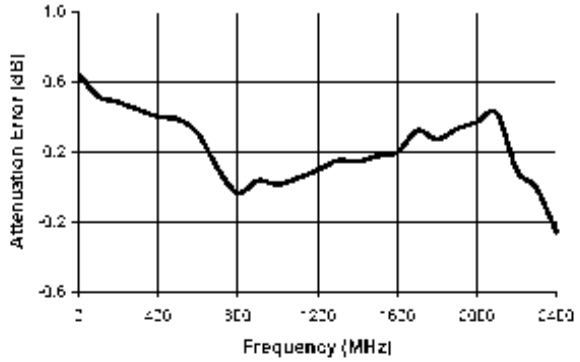


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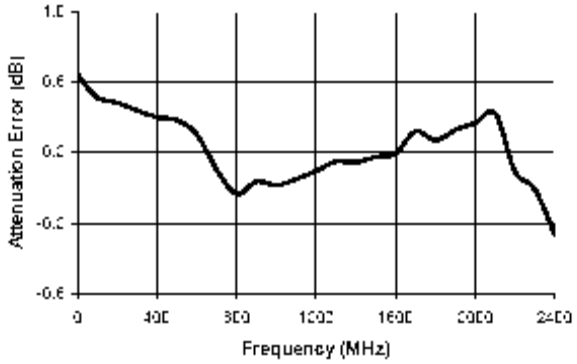
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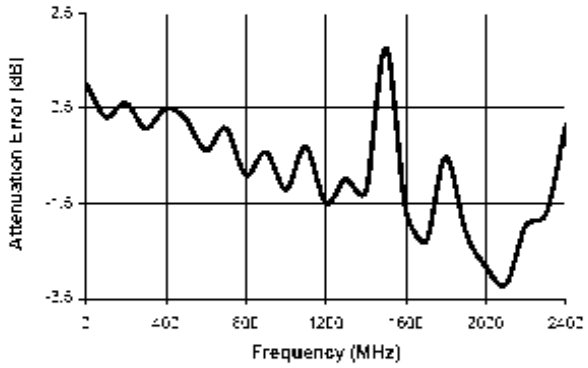
Attenuation Error, 16 dB Bit



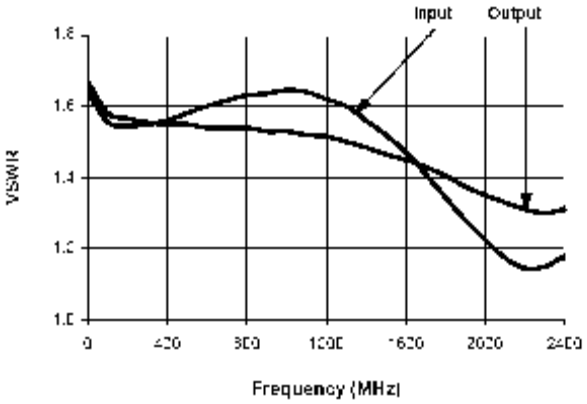
Attenuation Error, 32 dB Bit



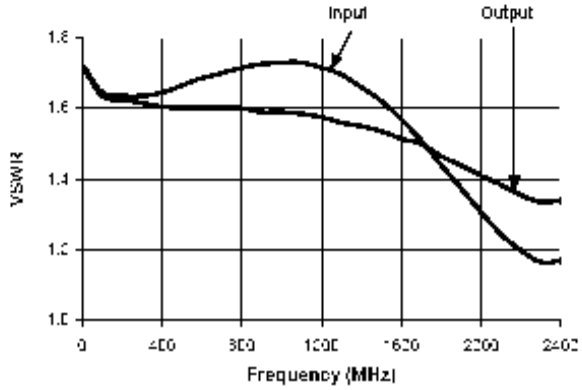
Attenuation Error. Max. Attenuation



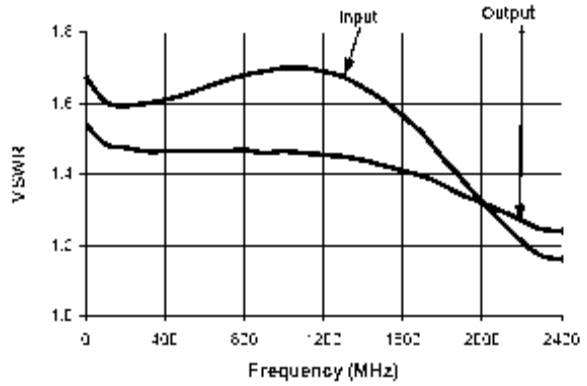
VSWR. 1 dB Bit



VSWR, 2 dB Bit



VSWR, 4 dB Bit

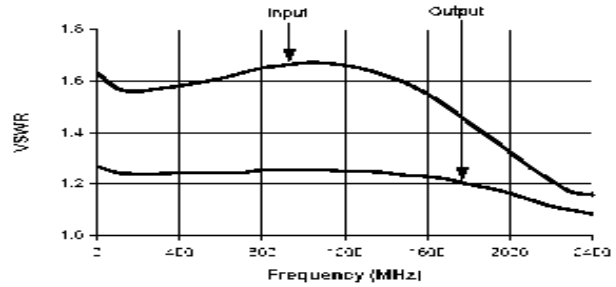


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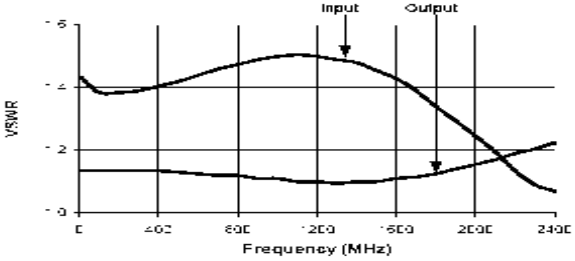
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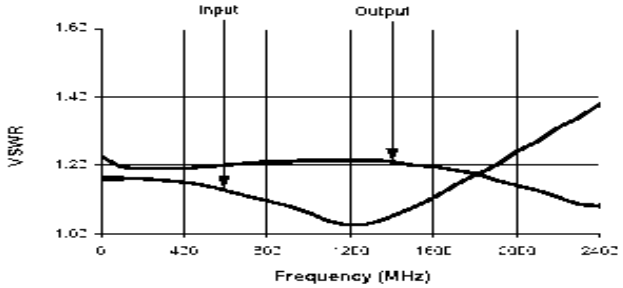
VSWR, 8 dB Bit



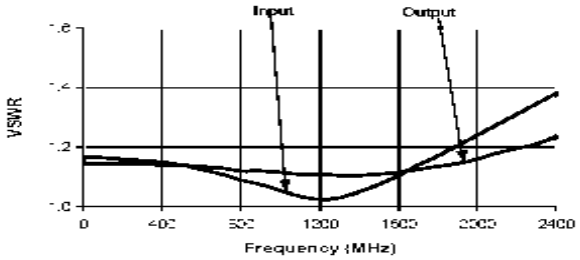
VSWR, 16 dB Bit



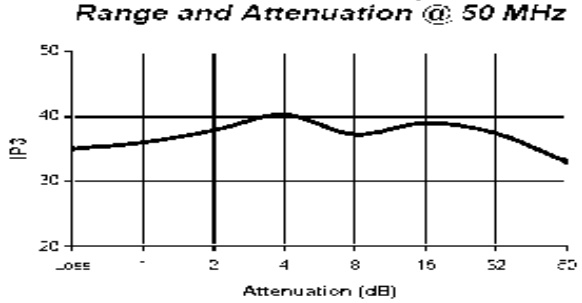
VSWR, 32 dB Bit



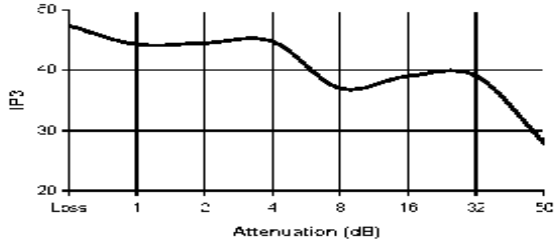
VSWR. Maximum Attenuation



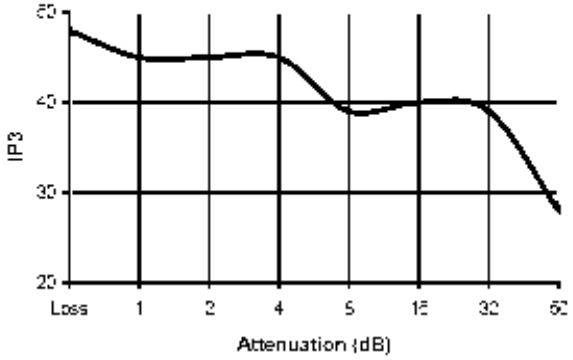
Maximum IP3 over Temperature Range and Attenuation @ 50 MHz



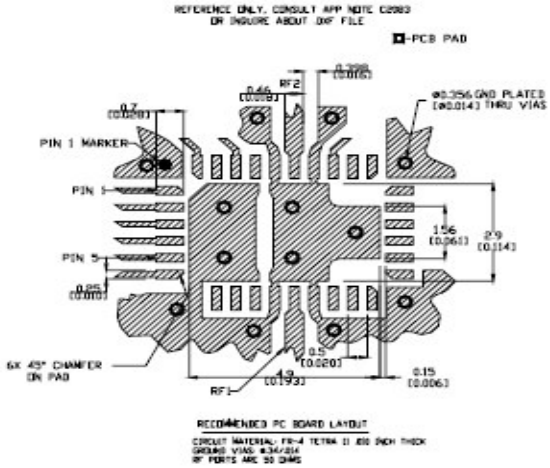
Maximum IP3 over Temperature Range and Attenuation @ 950 MHz



Maximum IP3 over Temperature Range and Attenuation @ 1900 MHz



Recommended PCB Configuration[5]



5. Application Note S2083 is available on line at www.macom.com

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