

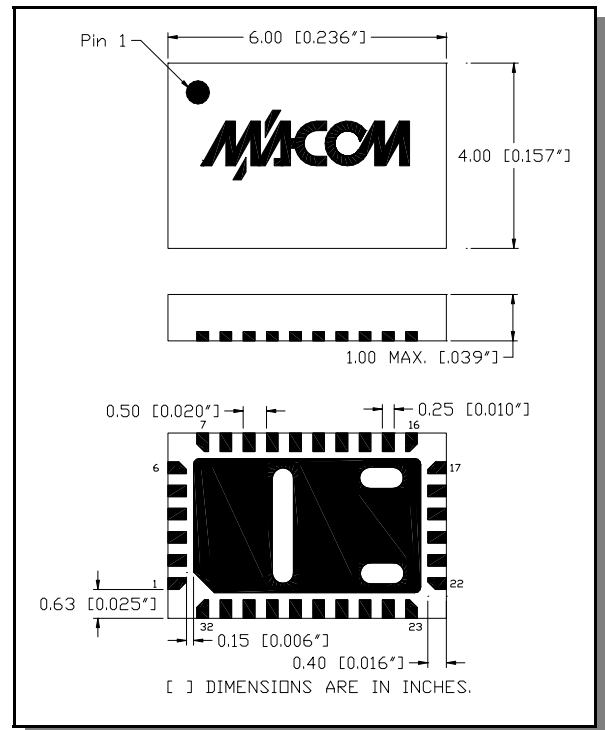
Features

- 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 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 |

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 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 |

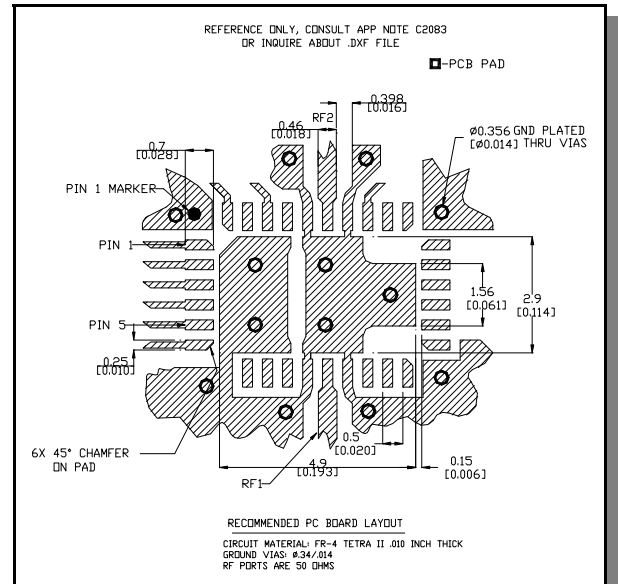
1. Pins 10 & 29 must be isolated

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 ²



2. Application Note C2083 is available on line at www.macom.com

Absolute Maximum Ratings ³

| 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 ⁴ | -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.

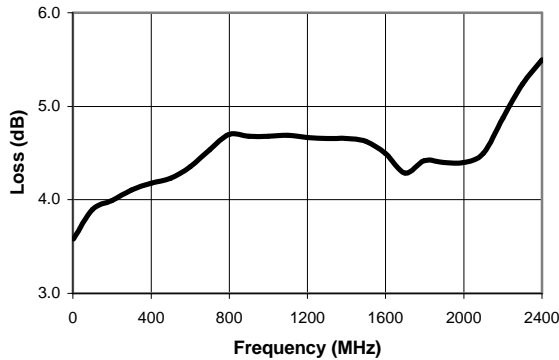
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Visit www.macom.com for additional data sheets and product information.

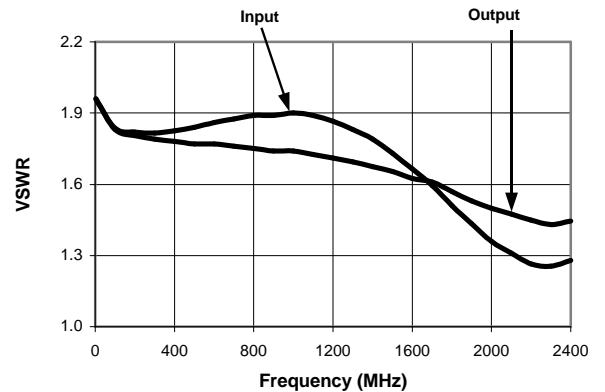


Typical Performance Curves

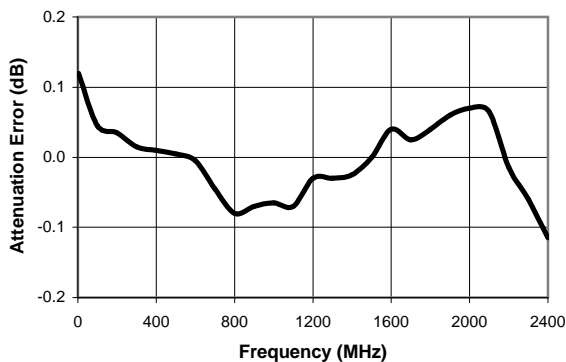
Insertion Loss



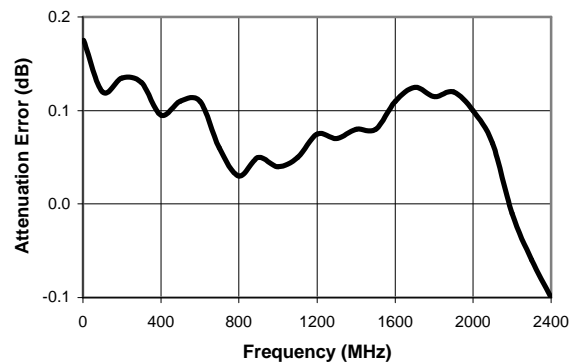
VSWR @ Insertion Loss



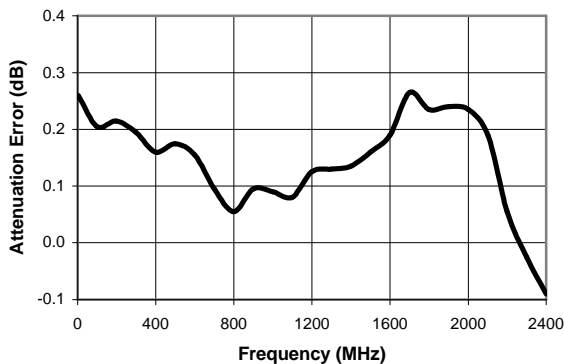
Attenuation Error, 1 dB Bit



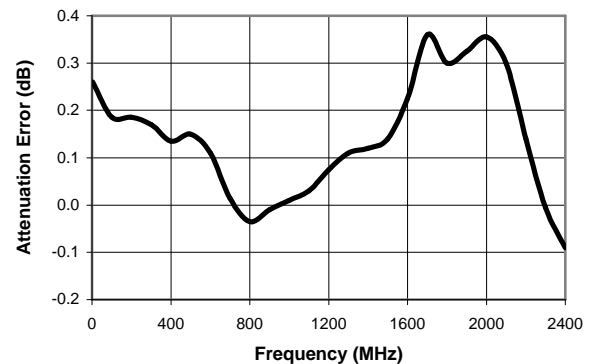
Attenuation Error, 2 dB Bit



Attenuation Error, 4 dB Bit



Attenuation Error, 8 dB Bit



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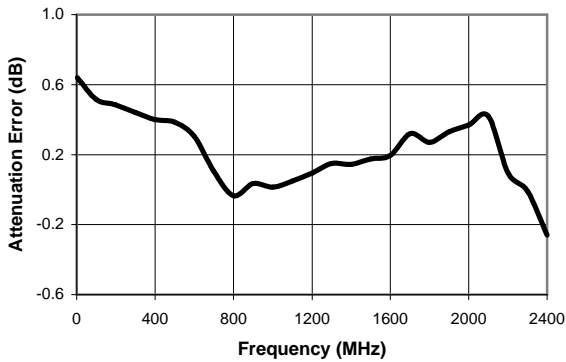
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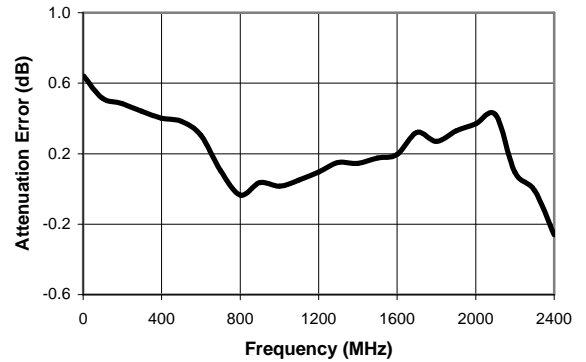


Typical Performance Curves

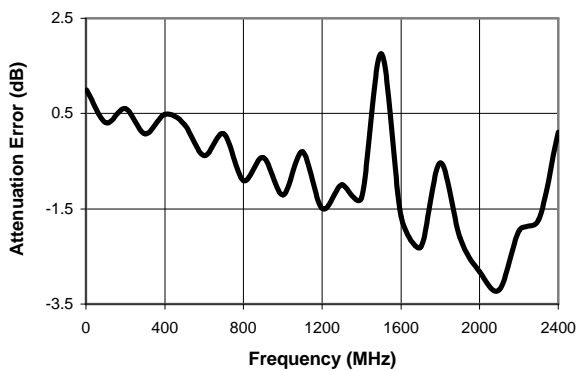
Attenuation Error, 16 dB Bit



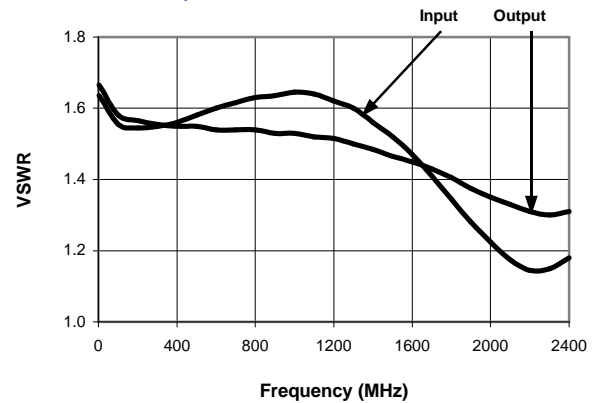
Attenuation Error, 32 dB Bit



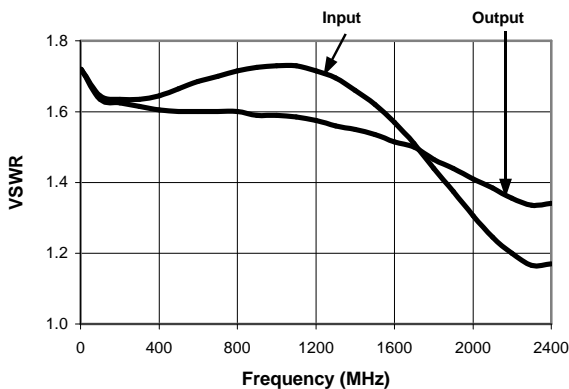
Attenuation Error, Max. Attenuation



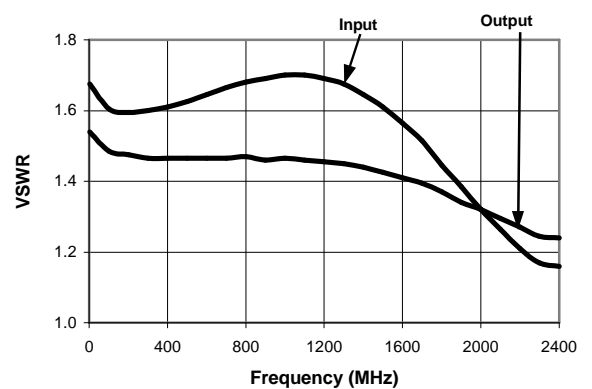
VSWR, 1 dB Bit



VSWR, 2 dB Bit



VSWR, 4 dB Bit



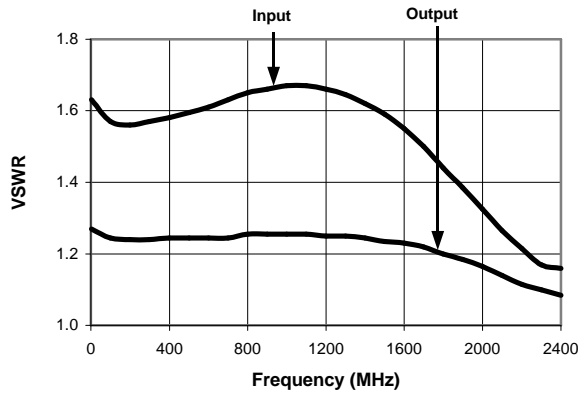
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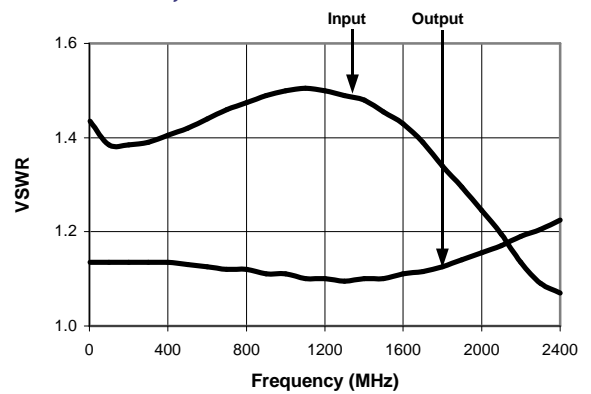
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Typical Performance Curves

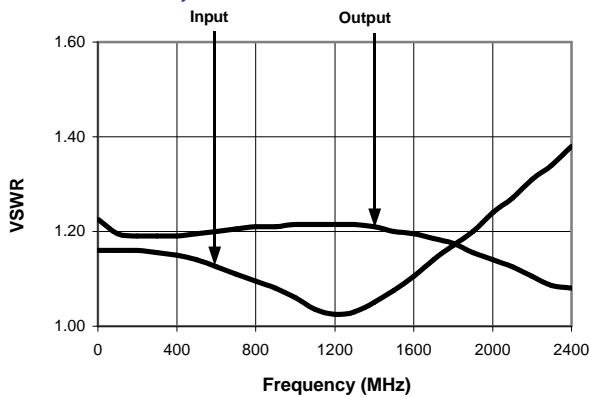
VSWR, 8 dB Bit



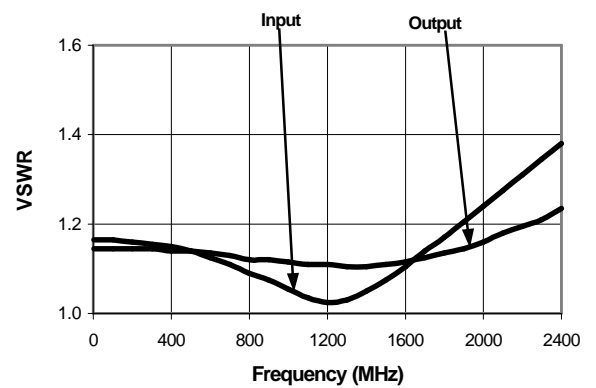
VSWR, 16 dB Bit



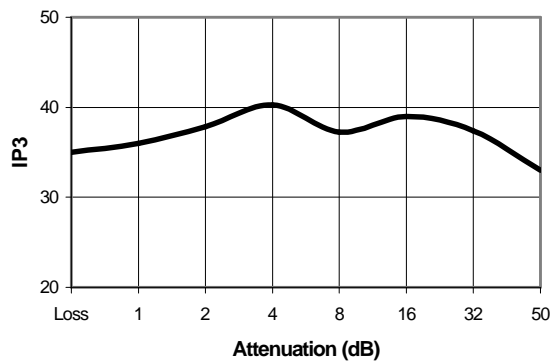
VSWR, 32 dB Bit



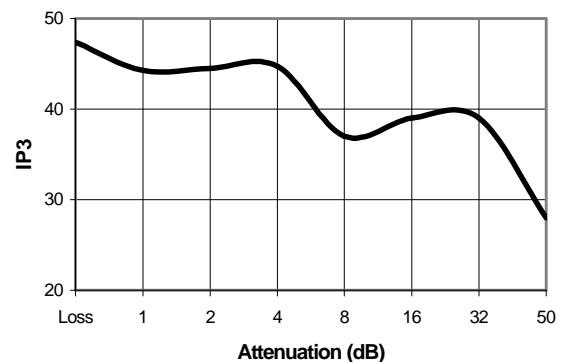
VSWR, Maximum Attenuation



Maximum IP3 over Temperature Range and Attenuation @ 50 MHz



Maximum IP3 over Temperature Range and Attenuation @ 950 MHz



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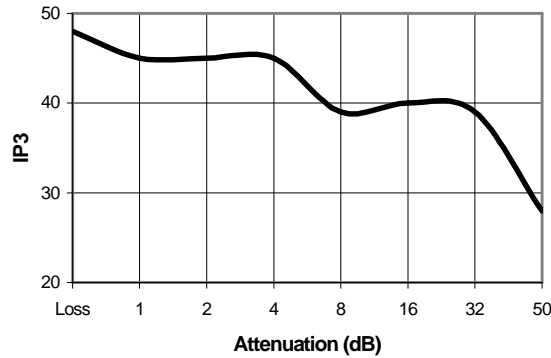
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Typical Performance Curves

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 |

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