# Digital Attenuator, 31.0 dB, 5-Bit, TTL Driver, DC-6.0 GHz

V 5.00

AT90-0001

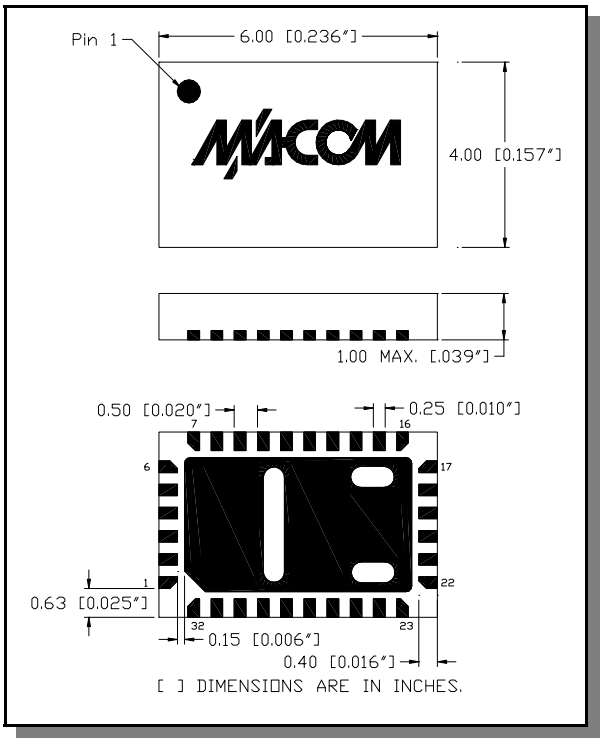
## Features

- Attenuation: 1.0 dB Steps to 31 dB
- High Accuracy to 6 GHz
- Small Footprint, JEDEC Package
- Integral TTL driver
- 50 ohm impedance
- Test boards are available
- Tape and Reel Packaging Available

## Description

M/A-COM's AT90-0001 is a GaAs FET 5-bit digital attenuator with an integral TTL driver. Step size is 1.0 dB providing 31 dB total attenuation range. This device is in a 32 lead FQFP-N surface mount package. Due to superior grounding techniques this digital attenuator offers superior performance to 6 GHz. The AT90-0001 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°C

| Parameter | Test Conditions | Frequency | Units | Min | Typical | Max |
|---|---|---|---|---|---|---|
| Insertion Loss | — | DC - 2.0 GHz<br>DC - 4.0 GHz<br>DC - 6.0 GHz | dB<br>dB<br>dB | —<br>—<br>— | 2.5<br>3.3<br>5.0 | 3.1<br>3.8<br>5.8 |
| Attenuation Accuracy | 1 to 24 dB Bits<br>25 to 31 dB Bits | DC - 6.0 GHz<br>DC - 6.0 GHz | dB<br>dB | —<br>— | —<br>— | ±(0.3 +4% of atten.)<br>±(0.3 +5% of atten.) |
| VSWR | Full Range | DC - 2.0 GHz<br>DC - 6.0 GHz | Ratio<br>Ratio | —<br>— | 1.4:1<br>1.7:1 | 1.7:1<br>2.4:1 |
| 1 dB Compression | —<br>— | 50 MHz<br>0.5 - 6.0 GHz | dBm<br>dBm | —<br>— | +22<br>+28 | —<br>— |
| Input IP2 | Two tone inputs to +5 dBm | 50 MHz<br>0.5 - 6.0 GHz | dBm<br>dBm | —<br>— | +43<br>+60 | —<br>— |
| Input IP3 | Two-tone inputs up to +5 dBm | 50 MHz<br>0.5-6.0 GHz | dB<br>dB | —<br>— | +37<br>+48 | —<br>— |
| Vcc<br>-Vee | —<br>— | —<br>— | V<br>V | 4.75<br>-8.0 | 5.0<br>-5.0 | 5.25<br>-4.75 |
| Switching Speed | 50% Cntl to 90%/10% RF<br>10% to 90% or 90% to 10% | —<br>— | nS<br>nS | —<br>— | 25<br>15 | —<br>— |
| Logic "0"<br>Logic "1" | Sink Current is 20 µA Max.<br>Source Current is 20 µA Max. | —<br>— | V<br>V | 0.0<br>2.0 | -<br>- | 0.8<br>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 |

## Absolute Maximum Ratings [1]

| Parameter | Absolute Maximum |
|---|---|
| Max. Input Power<br>0.05 GHz<br>0.5 - 6.0 GHz | <br>+27 dBm<br>+34 dBm |
| +Vcc | +5.5V |
| -Vee | -8.5V |
| Logic Voltages [2] | -0.5 to Vcc + 0.5V |
| Operating Temperature | -40°C to +85°C |
| Storage Temperature | -65°C to +125°C |

1. Operation of this device above any one of these parameters may cause permanent damange.
2. Standard CMOS TTL interface, latch-up will occur if logic signal is applied prior to power supply.

## Truth Table

| C16 | C8 | C4 | C2 | C1 | Attenuation |
|---|---|---|---|---|---|
| 0 | 0 | 0 | 0 | 0 | Loss, Reference |
| 0 | 0 | 0 | 0 | 1 | 1 dB |
| 0 | 0 | 0 | 1 | 0 | 2 dB |
| 0 | 0 | 1 | 0 | 0 | 4 dB |
| 0 | 1 | 0 | 0 | 0 | 8 dB |
| 1 | 0 | 0 | 0 | 0 | 16 dB |
| 1 | 1 | 1 | 1 | 1 | 31 dB |

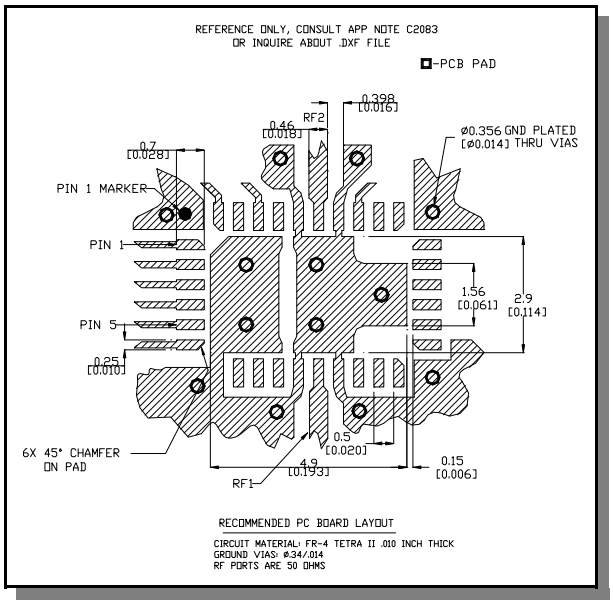
0 = TTL Low; 1 = TTL High

## Pin Configuration

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

NC = No Connection

## Recommended PCB Layout [3]




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



*Specifications subject to change without notice.*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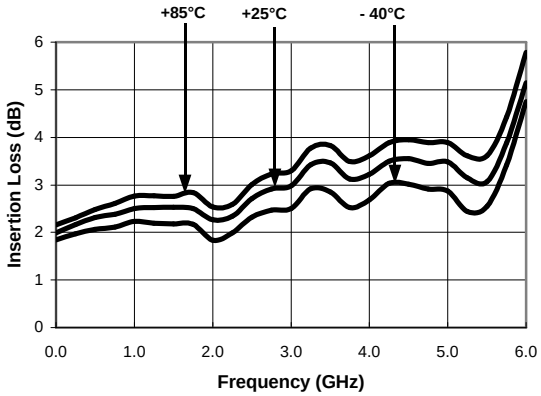
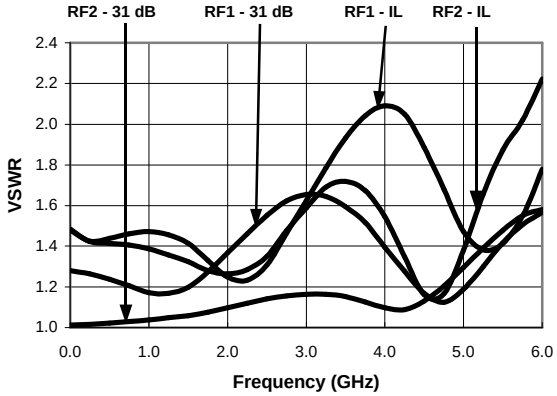
**Visit www.macom.com for additional data sheets and product information.**

## Typical Performance Curves

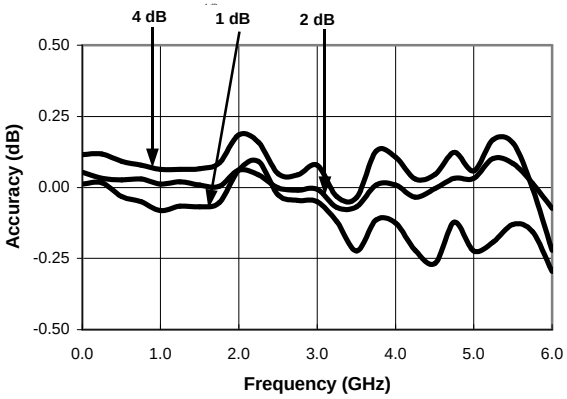
### Insertion Loss vs. Frequency



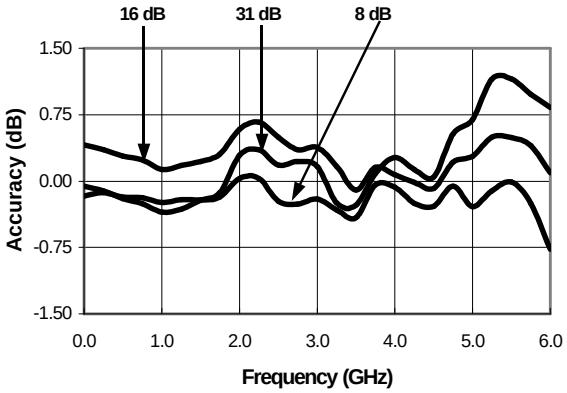

### VSWR vs. Frequency




### Accuracy (dB) vs. Frequency




### Accuracy (dB) vs. Frequency




## Ordering Information

| Part Number | Package |
|---|---|
| AT90-0001 | Bulk Packaging |
| AT90-0001TR | Tape and Reel (1K Reel) |
| AT90-0001-TB | Units Mounted on Test Board |




- **North America:** Tel. (800) 366-2266
- **Asia/Pacific:** Tel.+81-44-844-8296, Fax +81-44-844-8298
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