

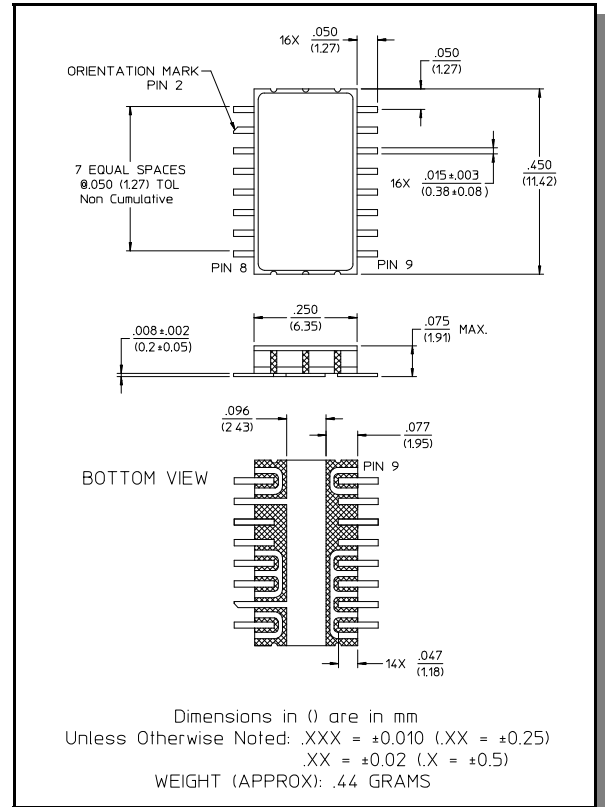
## Features

- Attenuation: 16 dB steps to 32 dB
- Temperature Stability:  $\pm 0.18$  dB from  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$  Typical
- Low DC Power Consumption
- Surface Mount Package
- Integral TTL Driver
- Low Cost/High Performance
- 50 Ohm Nominal Impedance

## Description

M/A-COM's AT20-0273 is a GaAs FET digital attenuator with a 16 dB minimum step size and 32 dB total attenuation. This attenuator and integral TTL driver is in a sealed ceramic 16-lead surface mount package. The AT20-0273 is ideally suited for use where accuracy, fast switching, very low power consumption and low intermodulation products are required. Typical applications include dynamic range setting in precision receiver circuits and other gain/leveling control circuits. Available with enhanced performance as fully hermetic version. Environmentally screenable as P/N AT-273.

## CR-11



## Electrical Specifications: $T_A = 25^{\circ}\text{C}^1$

| Parameter                         | Test Conditions                          | Frequency  | Units          | Min  | Typ               | Max               |
|-----------------------------------|--|--|----------------|--|-------------------|-------------------|
| Reference Insertion Loss          | —  | DC - 0.5 GHz<br>DC - 1.0 GHz<br>DC - 2.0 GHz                 | dB<br>dB<br>dB | —<br>—<br>—  | 1.2<br>1.3<br>1.5 | 1.6<br>1.7<br>1.9 |
| Attenuation Accuracy <sup>2</sup> | C1 Bit<br>Full Attenuation (32 dB)       | DC - 2.0 GHz<br>DC - 0.5 GHz<br>DC - 1.0 GHz<br>DC - 2.0 GHz |                | $\pm 3\%$ of attenuation setting in dB<br>$\pm 3\%$ of attenuation setting in dB<br>$\pm 3\%$ of attenuation setting in dB, -1 dB<br>$\pm 3\%$ of attenuation setting in dB, -3 dB |                   |                   |
| VSWR                              | —  | DC - 2.0 GHz   | Ratio          | —  | —                 | 1.4:1             |
| Trise, Tfall                      | 10% to 90%                               | —  | ns             | —  | 50                | —                 |
| Ton, Toff                         | 50% Control to 90/10% RF                 | —  | ns             | —  | 150               | —                 |
| Transients                        | In-Band (peak-peak)                      | —  | mV             | —  | 50                | —                 |
| 1 dB Compression                  | Input Power<br>Input Power               | 0.05 GHz   | dBm            | —  | +20               | —                 |
|                                   |  | 0.5 - 2.0 GHz  | dBm            | —  | +28               | —                 |
| Input IP3                         | For two-tone Input Power<br>Up to +5 dBm | 0.05 GHz   | dBm            | —  | +38               | —                 |
|                                   |  | 0.5 - 2.0 GHz  | dBm            | —  | +48               | —                 |
| Input IP2                         | For two-tone Input Power<br>Up to +5 dBm | 0.05 GHz   | dBm            | —  | +44               | —                 |
|                                   |  | 0.5 - 2.0 GHz  | dBm            | —  | +68               | —                 |
| Vcc                               | —  | —  | V              | 4.5  | 5.0               | 5.5               |
| Vee                               | —  | —  | V              | -8.0   | —                 | -5.0              |

1. All specifications apply when operated with bias voltages of +5V for Vcc and -5.0V for Vee.
2. This attenuator is guaranteed monotonic.

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

| Parameter       | Test Conditions  | Frequency | Units | Min | Typ | Max |
|-----------------|--|-----------|-------|-----|-----|-----|
| I <sub>cc</sub> | V <sub>cc</sub> = 4.5 to 5.5V<br>V <sub>ctl</sub> = 0 to 0.8V, or V <sub>cc</sub> -2.1V to V <sub>cc</sub> | —         | mA    | —   | —   | 2.0 |
| I <sub>ee</sub> | V <sub>ee</sub> = -5.0 to -8.0V  | —         | mA    | —   | —   | 1.0 |

**Absolute Maximum Ratings <sup>3</sup>**

| Parameter   | Absolute Maximum               |
|---|--------------------------------|
| Max Input Power<br>0.5 GHz<br>0.5 - 2.0 GHz           | +27 dBm<br>+34 dBm             |
| Supply Voltages<br>V <sub>cc</sub><br>V <sub>ee</sub> | +5.5V<br>-8.5V                 |
| Control Voltage <sup>4</sup>                          | -0.5V to V <sub>cc</sub> +0.5V |
| Operating Temperature                                 | -40°C to +125°C                |
| Storage Temperature                                   | -65°C to +150°C                |

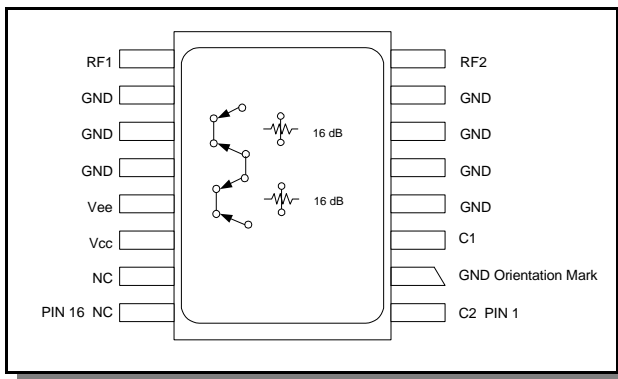
**Truth Table**

| Control Input |    |             |
|---------------|----|-------------|
| C2            | C1 | Attenuation |
| 0             | 0  | Reference   |
| 0             | 1  | 16 dB       |
| 1             | 0  | 32 dB       |

0 = TTL Low      1 = TTL High

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

**Functional Schematic (Top View) <sup>5</sup>**



- Use the C1 control for a single 16-dB bit.

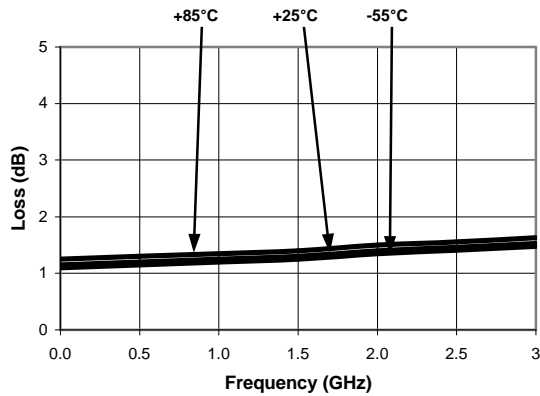
Specifications subject to change without notice.

- 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

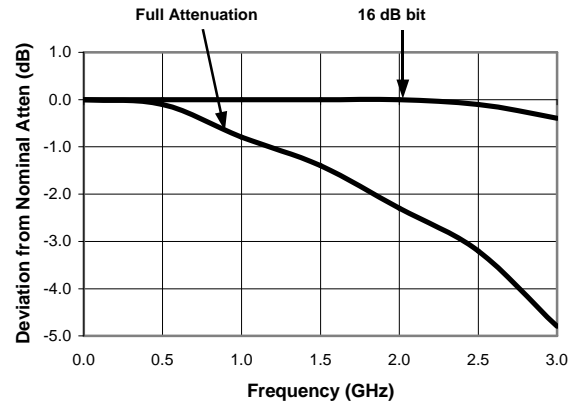
Visit [www.macom.com](http://www.macom.com) for additional data sheets and product information.

### Typical Performance Curves

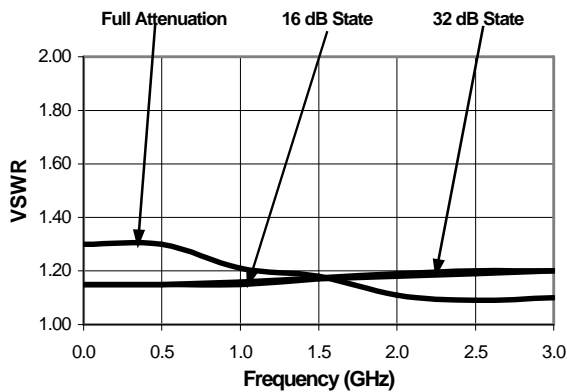
*Ref. Insertion Loss vs. Frequency*



*Attenuation Accuracy vs. Frequency*



*VSWR vs. Frequency*



### Ordering Information

| Part Number | Package |
|-------------|---------|
| AT20-0273   | CR-11   |

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