

# GaAs IC 4 Bit Digital Attenuator 1 dB LSB DC–2 GHz



AD310-25

## Features

- Attenuation in 1 dB Steps to 15 dB with High Accuracy
- Designed for Cellular Radio Applications
- Low Cost SOIC-16 Plastic Package
- Low DC Power Consumption

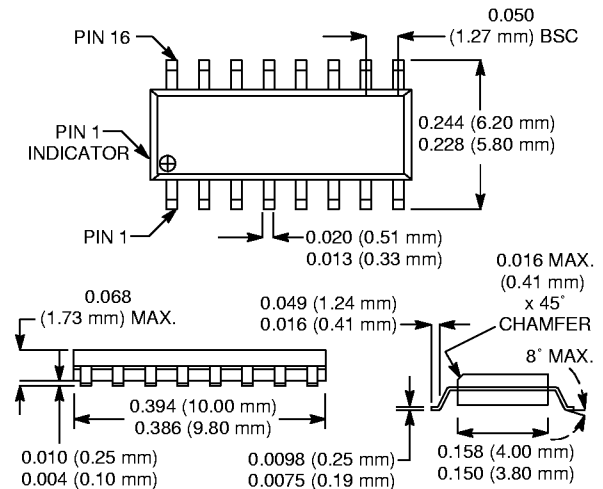
## Description

The AD310-25 is an IC FET digital attenuator consisting of four monolithic attenuators with LSB of 1 dB and a total attenuation of 15 dB with all attenuators connected.

This unit is a pin for pin replacement for the AT002D8-25 with improved RF performance extended to 2 GHz.

The AD310-25 is particularly suited where high attenuation accuracy, low insertion loss and low intermodulation products are required. Typical applications include cellular radio, wireless data, wireless local loop and other gain level control circuits.

## SOIC-16



## Electrical Specifications at 25°C (0, -5 V)

| Parameter <sup>1</sup>            | Frequency <sup>2</sup> | Min.                                       | Typ.  | Max. | Unit |
|-----------------------------------|------------------------|--|-------|------|------|
| Insertion Loss <sup>3</sup>       | DC–0.1 GHz             |  | 0.9   | 1.2  | dB   |
|                                   | DC–0.5 GHz             |  | 1.1   | 1.5  | dB   |
|                                   | DC–1.0 GHz             |  | 1.3   | 1.8  | dB   |
|                                   | DC–2.0 GHz             |  | 2.1   | 2.5  | dB   |
| Attenuation Range                 |                        |  | 15    |      | dB   |
| Attenuation Accuracy <sup>4</sup> | DC–1.0 GHz             | ± (0.25 + 3% of Attenuation Setting in dB) |       |      | dB   |
|                                   | DC–2.0 GHz             | ± (0.4 + 5% of Attenuation Setting in dB)  |       |      | dB   |
| VSWR (I/O)                        | DC–1.0 GHz             |  | 1.3:1 |      |      |
|                                   | DC–2.0 GHz             |  | 1.6:1 |      |      |

## Operating Characteristics at 25°C (0, -5 V)

| Parameter                              | Condition   | Frequency    | Min. | Typ. | Max. | Unit |
|--|---|--------------|------|------|------|------|
| Switching Characteristics <sup>5</sup> | Rise, Fall (10/90% or 90/10% RF)  |              |      | 15   |      | ns   |
|  | On, Off (50% CTL to 90/10% RF)  |              |      | 25   |      | ns   |
|  | Video Feedthru  |              |      | 25   |      | mV   |
| Input Power for 1 dB Compression       |   | 0.50–2.0 GHz |      | +28  |      | dBm  |
|  |   | 0.05 GHz     |      | +22  |      | dBm  |
| Intermodulation Intercept Point (IP3)  | For Two-tone Input Power +5 dBm   | 0.50–2.0 GHz |      | +48  |      | dBm  |
|  |   | 0.05 GHz     |      | +38  |      | dBm  |
| Control Voltages                       | $V_{Low} = 0$ to $-0.2$ V @ 20 $\mu$ A Max.<br>$V_{High} = -5$ V @ 10 $\mu$ A Typ. to $-8$ V @ 200 $\mu$ A Max. |              |      |      |      |      |

1. All measurements made in a 50 ohm system, unless otherwise specified.

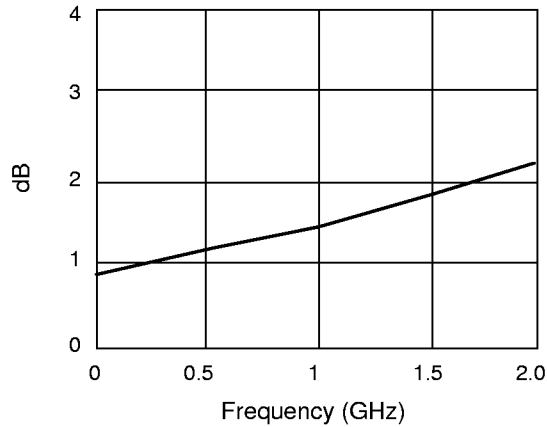
2. DC = 300 kHz.

3. Insertion loss changes by 0.003 dB/°C.

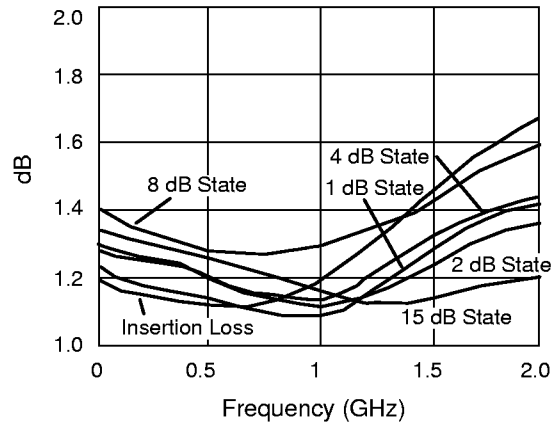
4. Attenuation referenced to insertion loss.

5. Video feedthru measured with 1 ns risetime pulse and 500 MHz bandwidth.

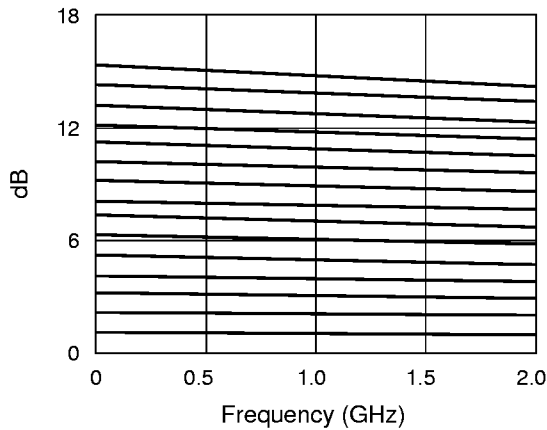
Typical Performance Data (0, -5 V)



Insertion Loss vs. Frequency



VSWR vs. Frequency



Attenuation vs. Frequency (All States)

Absolute Maximum Ratings

| Characteristic        | Value   |
|-----------------------|---|
| RF Input Power        | 2 W > 0.5 GHz 0/-8 V<br>0.5 W @ 50 MHz 0/-8 V |
| Control Voltage       | +0.2 V, -8 V                                  |
| Operating Temperature | -40°C to 85°C                                 |
| Storage Temperature   | -65°C to 150°C                                |

Note: Exceeding these parameters may cause irreversible damage.

Truth Table

| V <sub>1</sub> | V <sub>2</sub> | V <sub>3</sub> | V <sub>4</sub> | V <sub>5</sub> | V <sub>6</sub> | V <sub>7</sub> | V <sub>8</sub> | Attenuation<br>J <sub>1</sub> -J <sub>2</sub> |
|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|---|
| 8 dB Bit       | 1 dB Bit       | 2 dB Bit       | 4 dB Bit       |                |                |                |                |   |
| 0              | -5             | 0              | -5             | 0              | -5             | 0              | -5             | Reference I.L.                                |
| 0              | -5             | -5             | 0              | 0              | -5             | 0              | -5             | 1 dB  |
| 0              | -5             | 0              | -5             | -5             | 0              | 0              | -5             | 2 dB  |
| 0              | -5             | 0              | -5             | 0              | -5             | -5             | 0              | 4 dB  |
| -5             | 0              | 0              | -5             | 0              | -5             | 0              | -5             | 8 dB  |
| -5             | 0              | -5             | 0              | -5             | 0              | -5             | 0              | 15 dB Max. Atten.                             |

Pin Out

