

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



AD210-25

Features

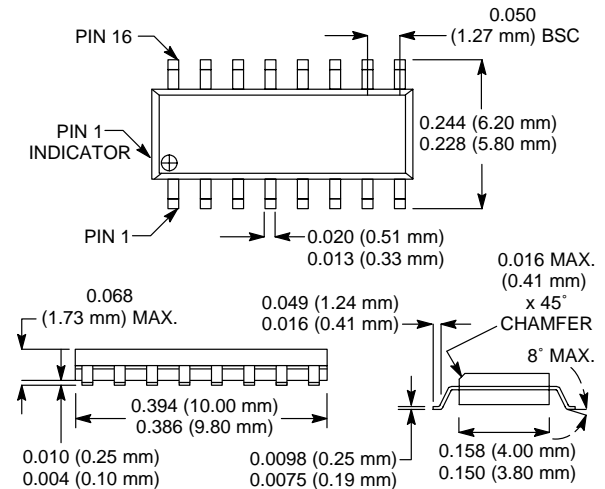
- Attenuation in 1 dB Steps to 15 dB with High Accuracy
- Low Intermodulation Products
- Low Cost SOIC-16 Plastic Package
- Low DC Power Consumption

Description

The AD210-25 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. Attenuator bits are switched with -5 and 0 V.

The AD210-25 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 ¹ | Frequency ² | Min. | Typ. | Max. | Unit |
|-----------------------------------|------------------------|--|-------|-------|------|
| Insertion Loss ³ | 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 ⁴ | 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 | 1.4:1 | |
| | DC–2.0 GHz | | 1.6:1 | 1.8:1 | |

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

| Parameter ¹ | Condition | Frequency | Min. | Typ. | Max. | Unit |
|--|--|--------------|------|------|------|------|
| Switching Characteristics ⁵ | 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 | $V_{Low} = 0 \text{ to } -0.2 \text{ V @ } 10 \mu\text{A Typ.}$ $V_{High} = -5 \text{ @ } 10 \mu\text{A Typ. to } -8 \text{ V @ } 200 \mu\text{A Typ.}$ | | | | | |

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

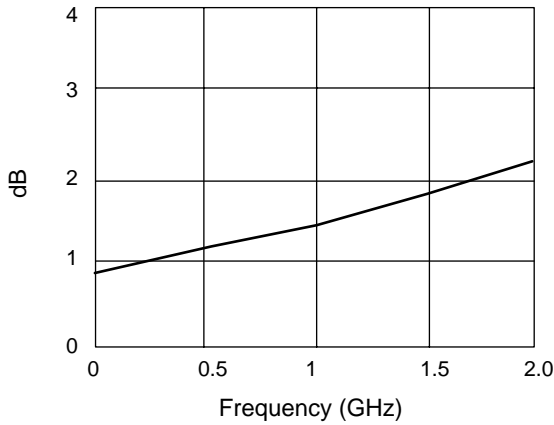
2. DC = 300 kHz.

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

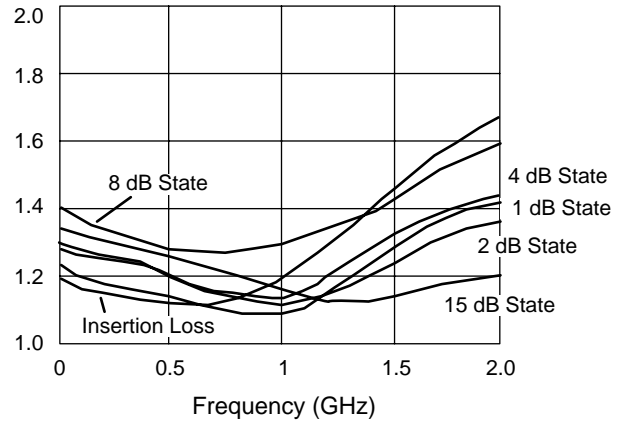
4. Attenuation referenced to insertion loss.

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

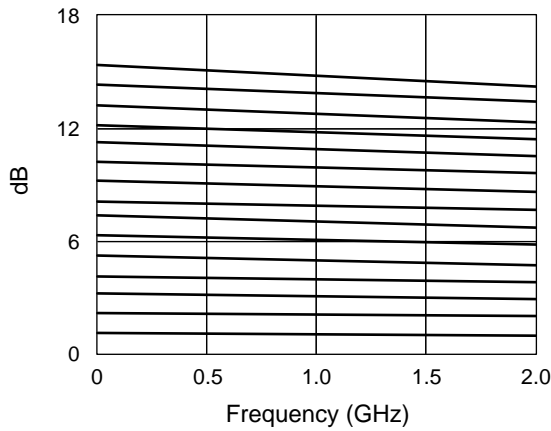
Typical Performance Data (0, -5 V)



Insertion Loss vs. Frequency



VSWR vs. Frequency



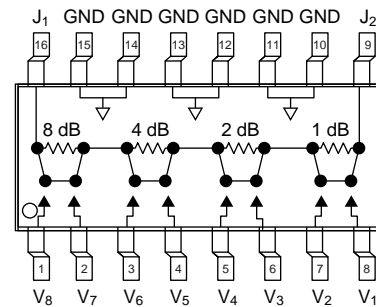
Attenuation vs. Frequency (All States)

Absolute Maximum Ratings

| Characteristic | Value |
|-----------------------|---|
| RF Input Power | 1.5 W > 500 MHz 0/-8 V 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.

Pin Out



Truth Table

| 1 dB | | 2 dB | | 4 dB | | 8 dB | | Attenuation J ₁ -J ₂ |
|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|---|
| V ₁ | V ₂ | V ₃ | V ₄ | V ₅ | V ₆ | V ₇ | V ₈ | |
| -5 | 0 | -5 | 0 | -5 | 0 | -5 | 0 | Reference I. L. |
| 0 | -5 | -5 | 0 | -5 | 0 | -5 | 0 | 1 dB |
| -5 | 0 | 0 | -5 | -5 | 0 | -5 | 0 | 2 dB |
| -5 | 0 | -5 | 0 | 0 | -5 | -5 | 0 | 4 dB |
| -5 | 0 | -5 | 0 | -5 | 0 | 0 | -5 | 8 dB |
| 0 | -5 | 0 | -5 | 0 | -5 | 0 | -5 | 15 dB |