

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

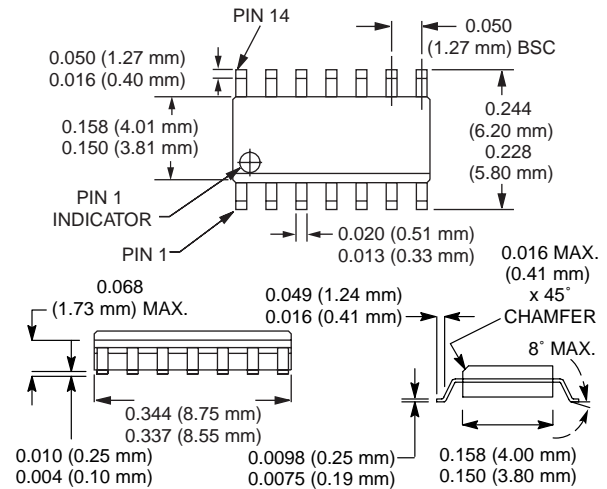


AK802D4-24

Features

- Attenuation in 1 dB Steps to 15 dB
- Low Cost SOIC-14 Plastic Package
- Low DC Current < 16 mA Total
- Integral Driver +5 V, -5.6 V Supply Voltages

SOIC-14



Description

The AK802D4-24 is an IC FET digital attenuator consisting of four monolithic attenuators with an LSB of 1 dB and a total attenuation of 15 dB with all attenuators connected.

The device has integral drivers for each bit requiring less than 4 mA per bit. DC supply voltages of +5 and -5.6 V are required.

The attenuator is packaged in a 14 lead plastic SOIC.

Electrical Specifications at 25°C (+5 V, -5.6 V)

| Parameter ¹ | Frequency ² | Min. | Typ. | Max. | Unit |
|---|------------------------|---|-------|-------|------|
| Insertion Loss ³ | DC–0.5 GHz | | 1.7 | 2.0 | dB |
| | DC–1.0 GHz | | 2.2 | 2.5 | dB |
| | DC–2.0 GHz | | 3.1 | 3.5 | dB |
| Attenuation Accuracy Per Bit ⁴ | DC–1.0 GHz | (7% or 0.25 dB Whichever is Greater) | | | dB |
| | DC–2.0 GHz | (10% or 0.5 dB Whichever is Greater) | | | dB |
| VSWR (I/O) | DC–1.0 GHz | | 1.2:1 | 1.3:1 | |
| | DC–2.0 GHz | | 1.4:1 | 1.5:1 | |

Operating Characteristics at 25°C (+5 V, -5.6 V)

| Parameter | Condition | Frequency | Min. | Typ. | Max. | Unit |
|--|--|-------------|------|------|------|------|
| Switching Characteristics ⁵ | Rise, Fall (10/90% or 90/10% RF) On, Off (50% CTL to 90/10% RF) Video Feedthru | | | 15 | | ns |
| | | | | 30 | | ns |
| | | | | 30 | | mV |
| Input Power for 1 dB Compression | | 0.5–1.0 GHz | | +24 | | dBm |
| | | 0.05 GHz | | +16 | | dBm |
| Control Voltages | V _{Low} | | 0.0 | | 0.2 | V |
| | V _{High} | | 4.5 | | 5.0 | V |
| Supply Voltages ^{6,7} | +5.0 V ± 0.20 V @ 4 mA Typ. -5.6 V ± 0.20 V @ 12 mA Typ. | | 4.8 | | 5.2 | V |
| | | | -5.4 | | -5.8 | V |

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

2. DC = 300 kHz.

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

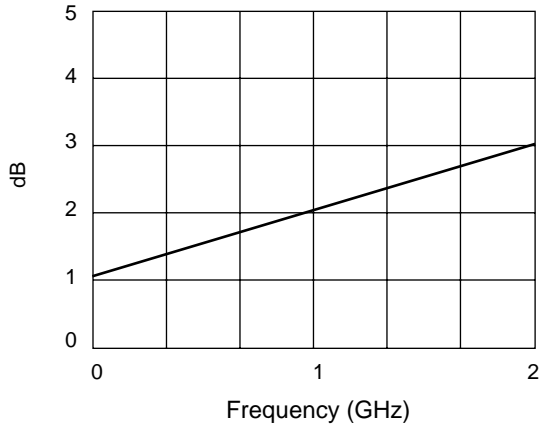
4. Attenuation referenced to insertion loss.

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

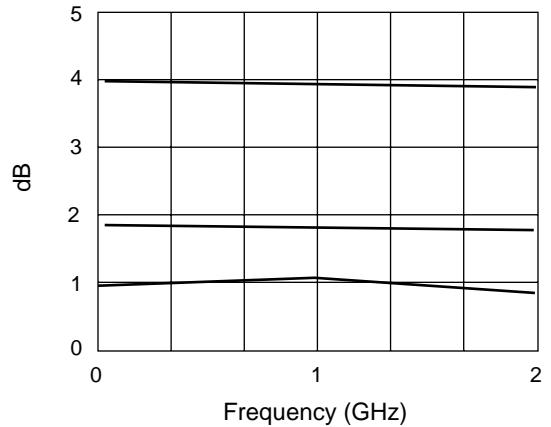
6. Protection circuit for driver included in package.

7. Current drain @ 85°C = 6 mA Typ. @ +5 V, 16 mA Typ. @ -5 V.

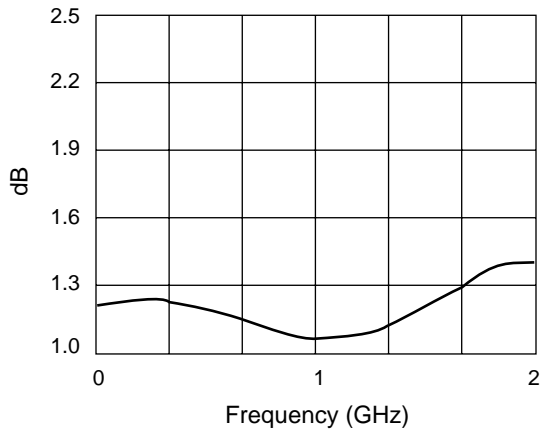
Typical Performance Data (+5 V, -5.6 V)



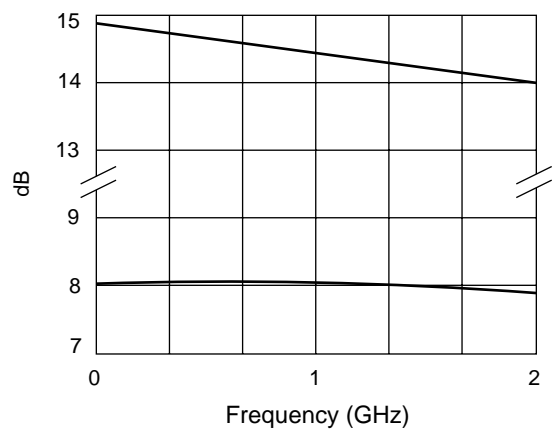
Insertion Loss vs. Frequency



1, 2, 4 dB Bits vs. Frequency



VSWR vs. Frequency (All States)

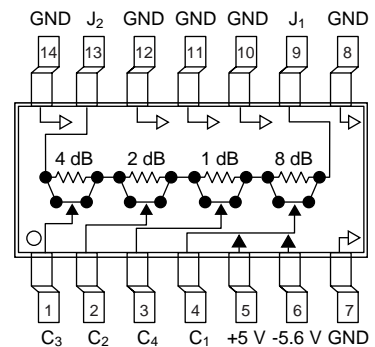


8, 15 dB Bits vs. Frequency

Absolute Maximum Ratings

| Characteristic | Value |
|-----------------------|-----------------------------------|
| RF Input Power | 0.5 W > 500 MHz 0.1 W @ 50 MHz |
| Supply Voltage | +6 V, -6 V |
| Control Voltage | -0.2 V, +6 V |
| Operating Temperature | 0°C to +70°C |
| Storage Temperature | -65°C to +150°C |
| θ_{JC} | 30°C/W |

Pin Out



Truth Table

| C ₁ | C ₂ | C ₃ | C ₄ | Attenuation J ₁ -J ₂ |
|----------------|----------------|----------------|----------------|---|
| 8 dB | 2 dB | 4 dB | 1 dB | Reference I.L. |
| 0 | 0 | 0 | 0 | Reference I.L. |
| 0 | 0 | 0 | 1 | 1 dB |
| 0 | 1 | 0 | 0 | 2 dB |
| 0 | 0 | 1 | 0 | 4 dB |
| 1 | 0 | 0 | 0 | 8 dB |
| 1 | 1 | 1 | 1 | 15 dB |

"0" = 0.0 to 0.2 V, "1" = 4.5 to 5.0 V.