

# GaAs 4 Bit Digital Attenuator

## 1, 2, 4, 8 dB Bits DC–2 GHz



AT002D8-31

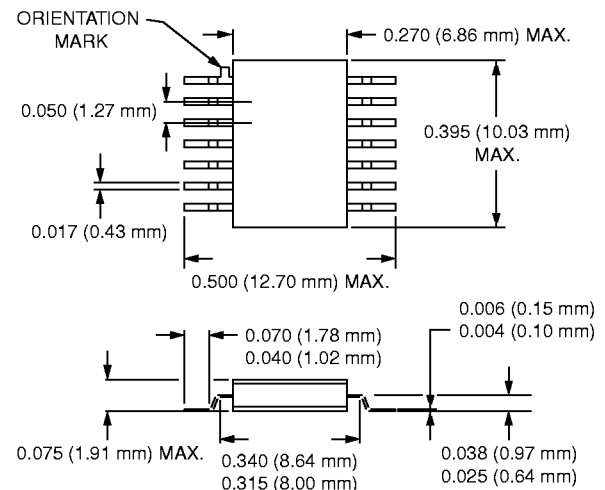
### Features

- Low DC Power Consumption
- Attenuation in 1 dB Steps to 15 dB with High Accuracy
- 14 Lead Hermetic Surface Mount Package
- Capable of Meeting MIL-STD Requirements<sup>6</sup>

### Description

The AT002D8-31 is an MMIC 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. This attenuator is recommended for fast response, low power consumption AGC circuits. Typical applications include AGC circuits for radar processing, instrumentation and levelers in RF equipment.

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### Electrical Specifications at 25°C

Parameter <sup>1</sup>	Frequency <sup>5</sup>	Min.	Typ.	Max.	Unit
Insertion Loss <sup>2</sup>	DC–0.5 GHz		2.0	2.5	dB
	DC–1.0 GHz		2.7	3.0	dB
	DC–2.0 GHz		3.5	4.0	dB
Attenuation Range <sup>3</sup>	DC–2.0 GHz		15		dB
Attenuation Accuracy Per Bit	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	DC–0.5 GHz		1.2:1	1.5:1	
	DC–2.0 GHz		1.4:1	1.8:1	

### Operating Characteristics at 25°C

Parameter	Condition	Frequency	Min.	Typ.	Max.	Unit
Switching Characteristics	Rise, Fall (10/90% or 90/10% RF)			10		ns
	On, Off (50% CTL to 90/10% RF)			20		ns
	Video Feedthru <sup>4</sup>			20		mV
Input Power for 1 dB Compression		0.5–2 GHz		27		dBm
		0.001 GHz		17		dBm
Intermodulation Intercept Point (IP3)	For Two-tone Input Power 13 dBm	0.5–2 GHz		43		dBm
		0.001–0.5 GHz		32		dBm
Control Voltages	$V_{Low} = 0 \text{ to } -0.2 \text{ V @ } 20 \mu\text{A Max.}$ $V_{High} = -5 \text{ V @ } 50 \mu\text{A to } -9 \text{ V @ } 200 \mu\text{A Max.}$					

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

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

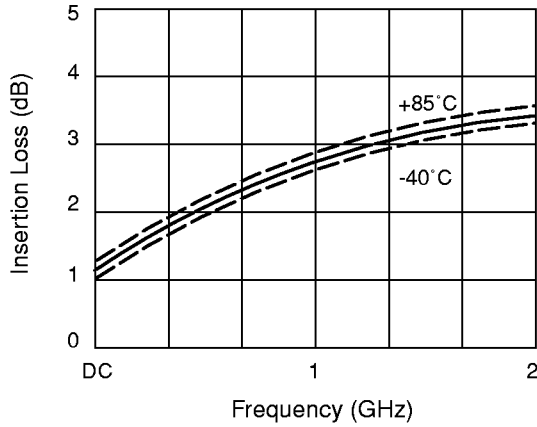
3. Attenuation referenced to insertion loss.

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

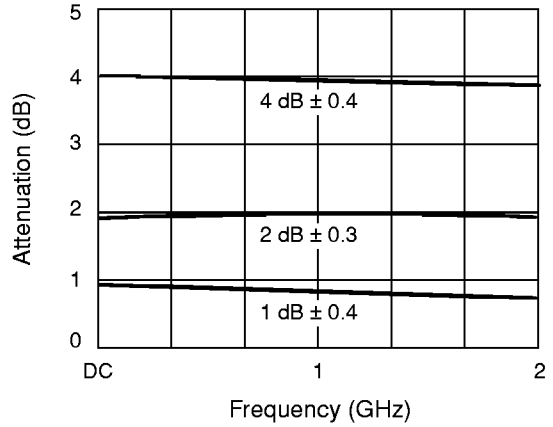
5. DC = 300 kHz.

6. See Quality/Reliability section.

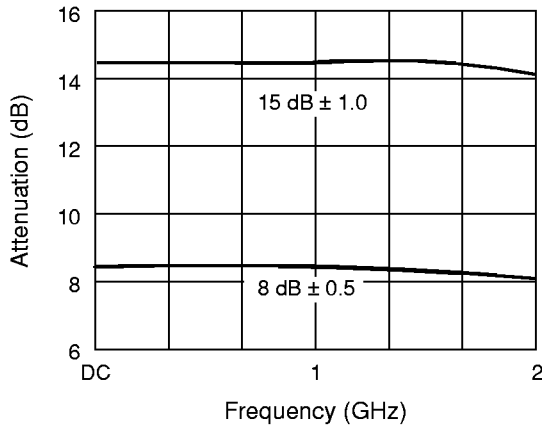
Typical Performance Data



Insertion Loss vs. Frequency



Attenuation 1, 2, 4 dB Bits

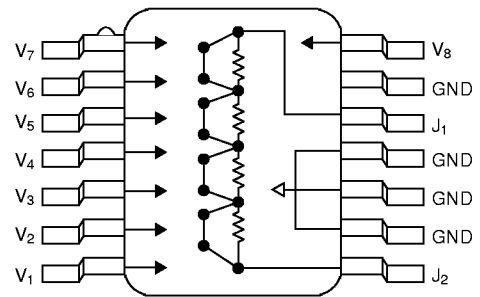


Attenuation 8, 15 dB Bits

Absolute Maximum Ratings

Characteristic	Value
RF Input Power (RF In)	2 W > 500 MHz 0/-8 V 0.5 W @ 50 MHz 0/-8 V
Control Voltage (V <sub>C</sub> )	+0.2 V, -10 V
Operating Temperature (T <sub>OP</sub> )	-40°C to +85°C
Storage Temperature (T <sub>ST</sub> )	-65°C to +150°C
Thermal Resistance (Θ <sub>JC</sub> )	25°C/W

Pin Out



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>	Condition
8 dB	1 dB	2 dB	4 dB					
0	-5	0	-5	0	-5	0	-5	Insertion Loss
0	-5	-5	0	0	-5	0	-5	1 dB State
0	-5	0	-5	-5	0	0	-5	2 dB State
0	-5	0	-5	0	-5	-5	0	4 dB State
-5	0	0	-5	0	-5	0	-5	8 dB State
-5	0	-5	0	-5	0	-5	0	15 dB Max. Atten.