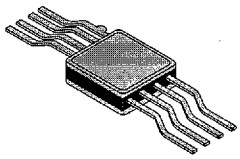
GaAs MMIC FET 4 Bit Digital Attenuator With Driver 1, 2, 4, 8 dB Bits DC–2 GHz

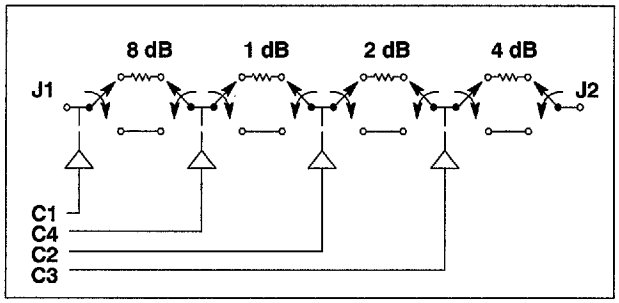
Alpha

AK002D4–11

Features



- Designed for Military and Commercial Applications
- 8 Lead Metal Surface Mount Package
- Low DC Current < 16 mA Total
- Integral Driver +5V, –5V; CMOS & TTL* Compatible
- Meets MIL–STD–883 Screening Requirements



Description

The AK002D4–11 is a MMIC FET digital attenuator consisting of four monolithic attenuators with 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. A dc bias of +5 and –5 volts is required.The attenuator is packaged in the 8 lead metal–surface mount package.

Electrical Specifications at 25°C[7]

Insertion Loss[1]	DC–0.5 GHz	2.3	dB Max
	DC–1 GHz	3.3	dB Max
	DC–2 GHz	4.0	dB Max
Attenuation Range[2]	DC–2 GHz	16	dB Max
		13.5	dB Min
Attenuation Accuracy Per Bit	DC–2 GHz	±10%, 1, 2, 4, 8 dB Bits Max or ±0.5 dB whichever is greater	
VSWR	DC–0.5 GHz	1.4:1	Max
	DC–2 GHz	1.6:1	Max

1. Insertion Loss changes by 0.003 dB/°C.
2. Attenuation value referenced above insertion loss.
3. Measured in 500 MHz bandwidth with 1 ns risetime pulse.
4. To avoid voltage sequencing refer to the Application Note section, "Driver Protection Circuit: AK/AN Series."

Operating Characteristics at 25°C

Impedance		50Ω Nominal	
Switching Characteristics			
RISE, FALL (10/90% or 90/10% RF)	10	ns	Typ
ON, OFF (50% CTL to 90/10% RF)	20	ns	Typ
Video Feedthru[3]	30	mV	Typ
Input Power for 1 dB Compression			
0.5–2 GHz	+24	dBm	Typ
0.001 GHz	+16	dBm	Typ
Intermodulation Intercept Point for Two–tone Input Power up to +13 dBm			
Intercept Points	**IP2**	**IP3**	
0.5–2 GHz	+59	+37	dBm Typ
0.001 GHz	+48	+26	dBm Typ
Logic Drives (Volts)	**Min**	**Max**	
Low (0)	0	0.5	Volts
High (1)	3.5	5	Volts
Bias Voltages[4]	+5V ± 0.5V @ 3 mA Typ –5V ± 0.25V @ 16 mA Typ[5,6]		

5. Bias voltage and ground must be connected before TTL voltage is applied.
6. Current increases from 16 mA to 20 mA @ +85°C.
7. DC = 300 KHz.

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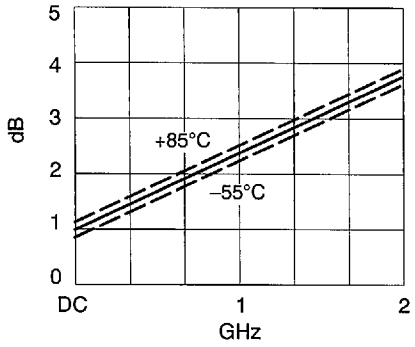
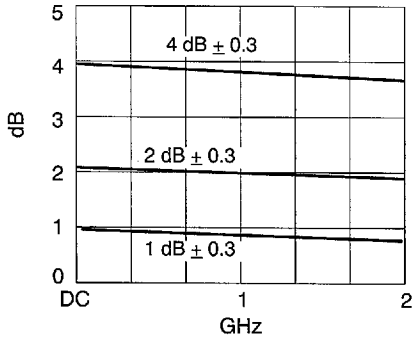
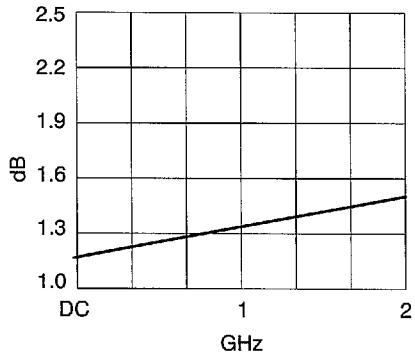
Typical Performance Data



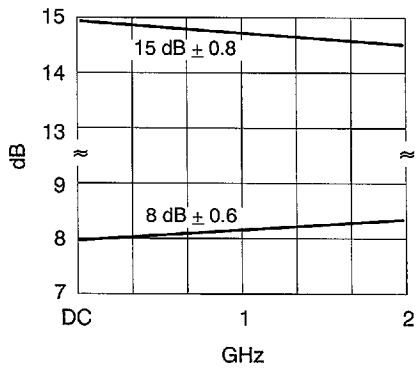
Insertion Loss vs. Frequency



1,2,4 dB Bits



VSWR vs. Frequency (All States)



8, 15 dB Bits

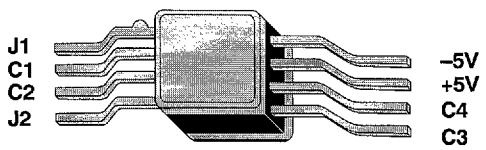
Truth Table[1]

C1 (8 dB Bit)	C2 (2 dB Bit)	C3[2] (4 dB Bit)	C4 (1 dB Bit)	J1–J2 State
0	0	1	0	IL
0	0	1	1	1 dB
0	1	1	0	2 dB
0	0	0	0	4 dB
1	0	1	0	8 dB
1	1	0	1	15 dB

Absolute Maximum Ratings

RF Input Power:	0.8W > 500 MHz 0.2W @ 50 MHz
Bias Voltages:	+7.0V, –7.0V
Control Voltage:	+7.0V
Operating Temperature:	–55°C to 125°C
Storage Temperature:	–65 to 150°C
Thermal Resistance:	30°C/W

Pin Out[2,3]



1. Bias voltage and ground must be connected before TTL voltage is applied. Use of toggle switches or other similar components may produce voltage spikes which can cause irreversible damage to the device.
2. Reverse logic chip available. Consult factory. (Refer to AK402D4–11)
3. Package base is RF ground.

RF GaAs MMIC Products in Metal Packages

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