GaAs IC 2 Bit Digital Attenuator With Driver 16 dB LSB DC–2 GHz

Alpha

AK002D2-00

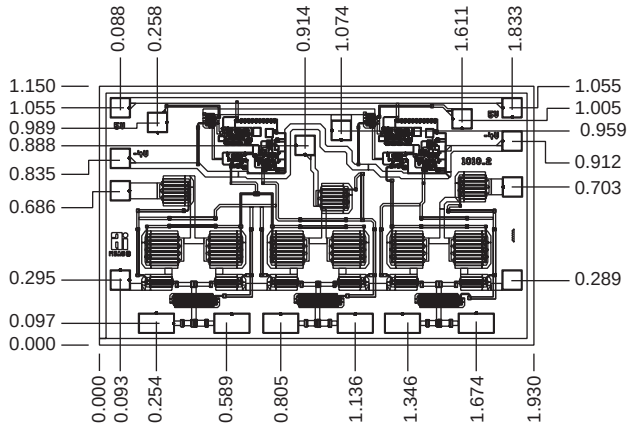
Features

- Integral Driver ±5 V Supply Voltages
- Attenuation in 16 dB Steps to 48 dB
- 100% On-Wafer DC Testing
- Capable of Meeting MIL-STD-883 Requirements[8]

Description

The AK002D2-00 is an IC FET digital attenuator consisting of two monolithic attenuators with an LSB of 16 dB and a total attenuation of 48 dB with all attenuators connected. This chip has integral drivers for each bit requiring less than 3 mA per bit. DC supply voltages of ±5 V are required. The attenuator is designed for both commercial and high reliability applications. These chips are visually inspected per MIL-STD-883 MT 2010.

Chip Outline



Electrical Specifications at 25°C

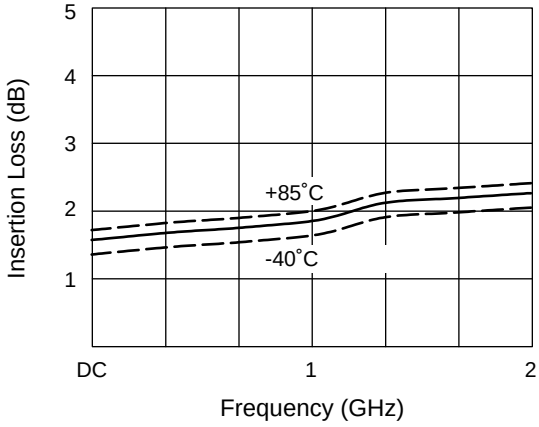
Parameter[1]	Frequency[7]	Min.	Typ.	Max.	Unit
Insertion Loss[2]	DC–0.5 GHz		1.7	1.8	dB
	DC–1.0 GHz		1.9	2.1	dB
	DC–2.0 GHz		2.2	2.5	dB
Attenuation Accuracy[3]		**16 32 48**			**Bits**
	DC–1.0 GHz	±6% ±6% ±8%		Max.	dB
	DC–2.0 GHz	±6% ±8% ±10%		Max.	dB
VSWR (I/O)	DC–1.0 GHz		1.4:1	1.5:1	
	DC–2.0 GHz		1.6:1	1.7:1	

Operating Characteristics at 25°C

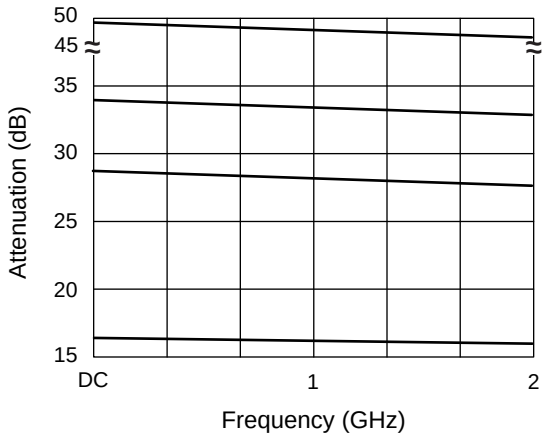
Parameter	Condition	Frequency	Min.	Typ.	Max.	Unit
Switching Characteristics	Rise, Fall (10/90% or 90/10% RF)			10		ns
	On, Off (50% CTL to 90/10% RF)			20		ns
	Video Feedthru[4]			30		mV
Input Power for 1 dB Compression		0.50–2 GHz		20		dBm
		0.05 GHz		12		dBm
Intermodulation Intercept Point (IP3)	For Two-tone Input Power 13 dBm	0.50–2 GHz		37		dBm
		0.05 GHz		26		dBm
Control Voltages	V_{Low}		0.0		0.5	V
	V_{High}		4.0		5.5	V
Supply Voltages[5,6]	+5 V @ 3 mA Typ.		+4.75	+5.0	+5.25	V
	-5 V @ 8 mA Typ.		-4.75	-5.0	-5.25	V

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. Supply voltages and ground must be connected before control voltage is applied. Use of toggle switches or other similar components may produce voltage spikes which can cause irreversible damage to the device.
6. Current drain @ 85°C = 5 mA Typ. @ +5 V, 11 mA Typ. @ -5 V.
7. DC = 300 kHz.
8. See Quality/Reliability section.

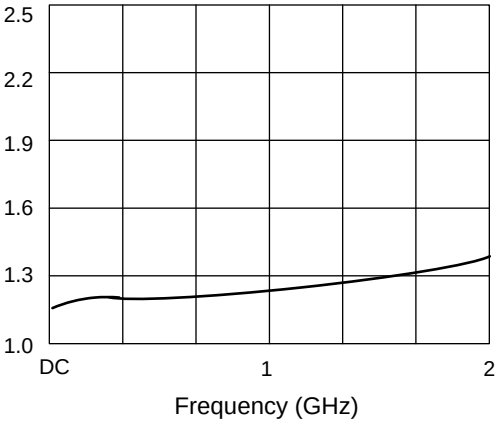
Typical Performance Data



Insertion Loss vs. Frequency



Attenuation 16, 32 and 48 dB States vs. Frequency



VSWR vs. Frequency (All States)

Absolute Maximum Ratings

Characteristic	Value
RF Input Power (RF In)	0.8 W > 500 MHz 0.2 W @ 50 MHz
Supply Voltage (V_S)	+6 V, -6 V
Control Voltage (V_C)	-0.2 V, +6 V
Operating Temperature (T_{OP})	-40°C to +90°C
Storage Temperature (T_{ST})	-65°C to +150°C
Thermal Resistance (Θ_{JC})	30°C/W

Truth Table

C_1	C_2	Attenuation
16 dB	**32 dB**	**J_1–J_2**
0	0	Reference I.L.
1	0	16 dB
0	1	32 dB
1	1	48 dB

Chip Layout