

GaAs IC 3 Bit Digital Attenuator 4 dB LSB Positive Control 0.75–2 GHz

Alpha

AD239-12

Features

- Attenuation in 4 dB Steps to 28 dB with High Accuracy
- Single Positive Control Voltage for Each Bit
- +3 V to +5 V Operation
- Small Low Cost SOIC-8 Plastic Package

Description

The AD239-12 is a 3 bit, single positive control, 4 dB step GaAs IC FET digital attenuator in a low cost SOIC-8 plastic package. For positive operation external DC blocking capacitors are required on all RF ports.

The AD239-12 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.

Electrical Specifications at 25°C (0, +3 V)

Parameter ¹	Frequency ²	Min.	Typ.	Max.	Unit
Insertion Loss ²	0.75–2.0 GHz		1.8	2.1	dB
Attenuation Range	0.75–2.0 GHz		28		dB
Attenuation Accuracy ³	0.75–1.0 GHz	± (0.2 + 3% of Attenuation Setting in dB)			dB
	0.75–2.0 GHz	± (0.3 + 3% of Attenuation Setting in dB)			dB
VSWR (I/O)	0.75–2.0 GHz		1.5:1	2.0:1	

Operating Characteristics at 25°C (0, +3 V)

Parameter	Condition	Frequency	Min.	Typ.	Max.	Unit
Switching Characteristics ⁴	Rise, Fall (10/90% or 90/10% RF) On, Off (50% CTL to 90/10% RF) Video Feedthru			0.7 1.0 50		μs μs mV
Input Power for 1 dB Compression	$V_S = +3\text{ V}$ $V_S = +5\text{ V}$	0.75–2.0 GHz 0.75–2.0 GHz		+20 +26		dBm dBm
Intermodulation Intercept Point (IP3)	For Two-tone Input Power +10 dBm $V_S = +3\text{ V}$ $V_S = +5\text{ V}$	0.75–2.0 GHz 0.75–2.0 GHz		+32 +45		dBm dBm
Control Voltages	$V_{Low} = 0$ to 0.2 V @ 20 μA Max. $V_{High} = +3\text{ V}$ @ 100 μA Max. to +5 V @ 200 μA Max. $V_S = V_{High} \pm 0.2\text{ V}$					

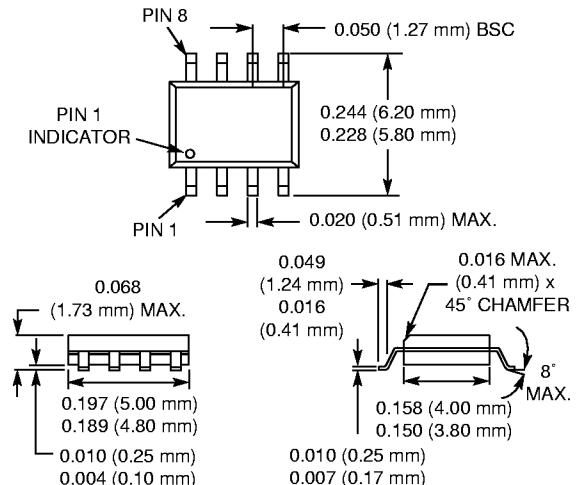
1. All measurements made in a 50 Ω system, unless otherwise specified.

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

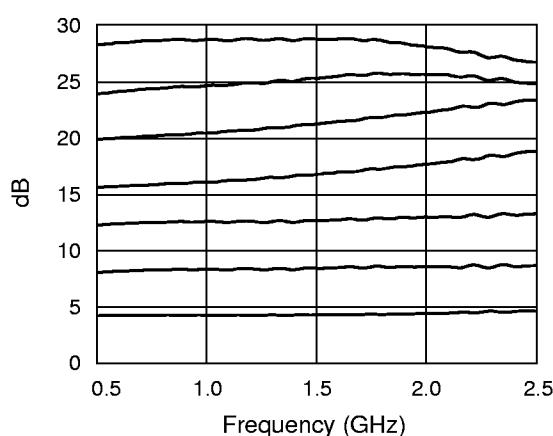
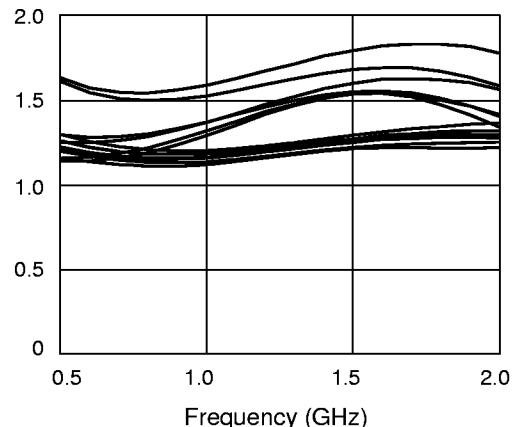
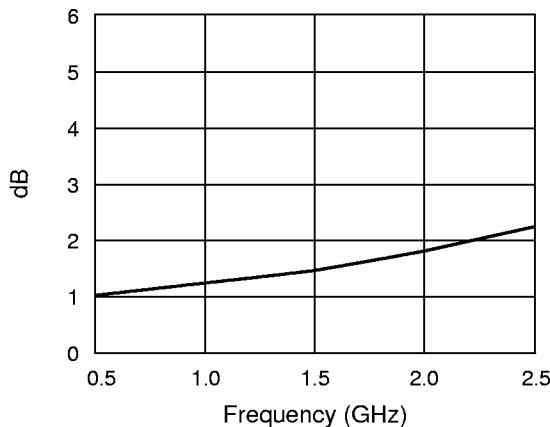
3. Attenuation referenced to insertion loss.

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

SOIC-8



Typical Performance Data (0, +3 V)

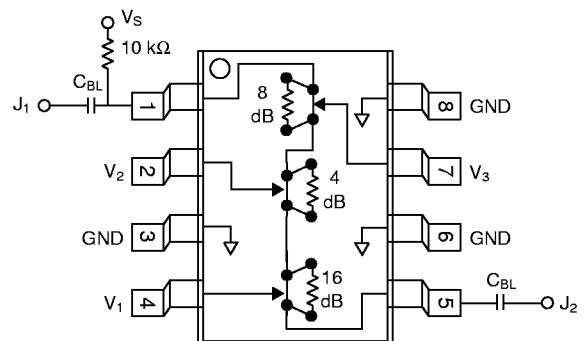


Absolute Maximum Ratings

Characteristic	Value
RF Input Power	1 W > 500 MHz 0/8 V 0.5 W @ 50 MHz 0/8 V
Supply Voltage	+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



DC blocking capacitors (C_{BL}) and biasing resistor must be supplied externally for positive operation.

$C_{BL} = 100 \text{ pF}$ for operation $> .75 \text{ GHz}$.

Truth Table

V_1	V_2	V_3	Attenuation
			J_1-J_2
16 dB	4 dB	8 dB	
V_{High}	V_{High}	V_{High}	Ins. Loss
V_{High}	0	V_{High}	4 dB
V_{High}	V_{High}	0	8 dB
V_{High}	0	0	12 dB
0	V_{High}	V_{High}	16 dB
0	0	V_{High}	20 dB
0	V_{High}	0	24 dB
0	0	0	28 dB

$V_{High} = +3 \text{ to } +5 \text{ V}$ ($V_S = V_{High} \pm 0.2 \text{ V}$).