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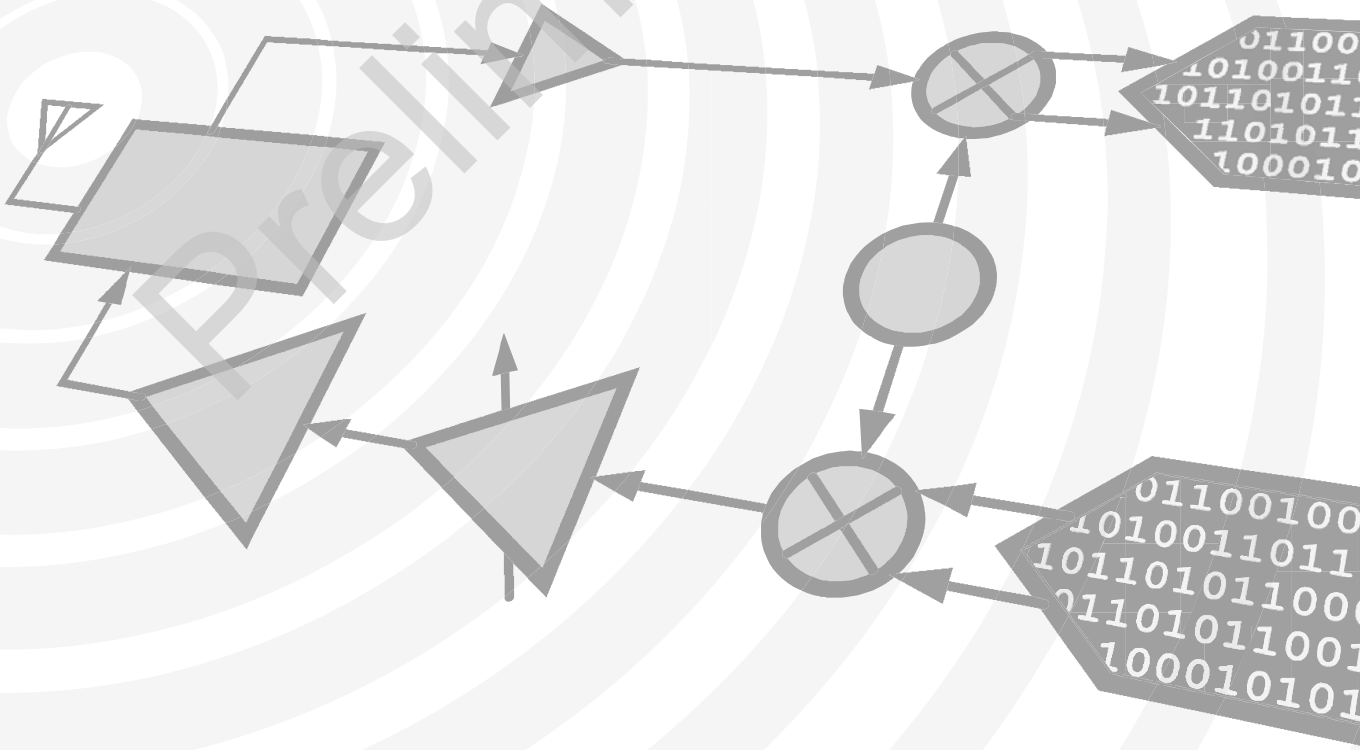

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HMC939A

v00.115

1.0 dB LSB GaAs MMIC 5-BIT DIGITAL ATTENUATOR, 0.1 - 40 GHz

Typical Applications

The HMC939A is ideal for:

- Fiber Optics & Broadband Telecom
- Microwave Radio & VSAT
- Military Radios, Radar & ECM
- Space Applications

Features

1.0 dB LSB Steps to 31 dB

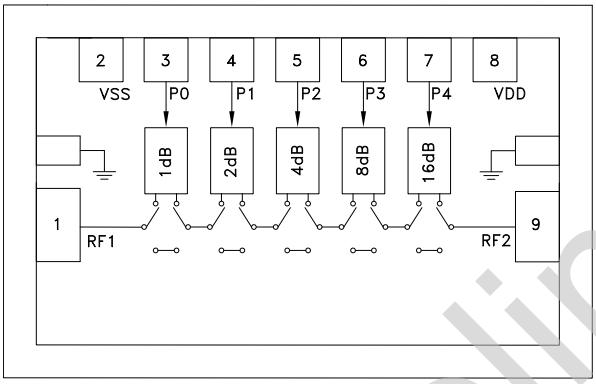
Single Positive Control Line Per Bit

±1.0 dB Typical Bit Error

High Input IP3: +43 dBm

Die Size: 2.29 x 0.95 x 0.1 mm

Functional Diagram



General Description

The HMC939A die is a broadband 5-bit GaAs IC digital attenuator MMIC chip. Covering 0.1 to 40 GHz, the insertion loss is less than 5 dB typical. The attenuator bit values are 1.0 (LSB), 2, 4, 8, 16 for a total attenuation of 31 dB. Attenuation accuracy is excellent at less than ±1.0 dB typical step error with an IIP3 of +43 dBm. Five control voltage inputs, toggled between +5V and 0V, are used to select each attenuation state.

Electrical Specifications, T_A = +25° C, With Vdd = +5V, Vss = -5V & VCTL = 0/ +5V

Parameter	Frequency (GHz)	Min.	Typ.	Max.	Units
Insertion Loss	0.1 - 18 GHz 18 - 40 GHz		3.5 6.0	5.0 7.5	dB dB
Attenuation Range	0.1 - 40 GHz		31		dB
Return Loss (RF1 & RF2, All Atten. States)	0.1 - 40 GHz		12		dB
Attenuation Accuracy: (Referenced to Insertion Loss) 1.0 - 15 dB States 16 - 31 dB States	 0.1 - 40 GHz 0.1 - 40 GHz	 ± 0.5 + 5% of Atten. Setting Max ± 0.6 + 6% of Atten. Setting Max			 dB dB
Input Power for 0.1 dB Compression	0.1 - 0.5 GHz 0.5 - 40.0 GHz		20 25		dBm dBm
Input Third Order Intercept Point (Two-Tone Input Power= 0 dBm Each Tone)	0.1 - 0.5 GHz 0.5 - 40.0 GHz		40 43		dBm dBm
Switching Characteristics tRISE, tFALL (10/90% RF) tON/tOFF (50% CTL to 10/90% RF)	0.1 - 40 GHz		 60 90		 ns ns
Idd	0.1 - 40 GHz	3	5	7	mA
Iss	0.1 - 40 GHz	-4	-6	-8	mA

For price, delivery, and to place orders: Analog Devices, Inc., One Technology Way, P.O. Box 9106, Norwood, MA 02062-9106
Phone: 781-329-4700 • Order online at www.analog.com
Application Support: Phone: 1-800-ANALOG-D

1.0 dB LSB GaAs MMIC 5-BIT DIGITAL ATTENUATOR, 0.1 - 40 GHz

Bias Voltages & Currents

Vdd	+5V @ 5 mA
Vss	-5V @ 6 mA

Control Voltage

State	Bias Condition
Low	0 to 0.8V @ 1 µA
High	2 to 5V @ 1 µA

Absolute Maximum Ratings

RF Input Power (0.5 to 40 GHz)	+25 dBm
Control Voltage (P0 to P4)	Vdd + 0.5V
Vdd	+7 Vdc
Vss	-7 Vdc
Channel Temperature	150 °C
Thermal Resistance (channel to die bottom)	144 °C/W
Storage Temperature	-65 to + 150 °C
Operating Temperature	-55 to +85 °C

Truth Table

Control Voltage Input					Attenuation State RF1 - RF2
P4 16 dB	P3 8 dB	P2 4 dB	P1 2 dB	P0 1 dB	
High	High	High	High	High	Reference I.L.
High	High	High	High	Low	1 dB
High	High	High	Low	High	2 dB
High	High	Low	High	High	4 dB
High	Low	High	High	High	8 dB
Low	High	High	High	High	16 dB
Low	Low	Low	Low	Low	31 dB

Any Combination of the above states will provide an attenuation approximately equal to the sum of the bits selected.

ELECTROSTATIC SENSITIVE DEVICE
OBSERVE HANDLING PRECAUTIONS

Outline Drawing