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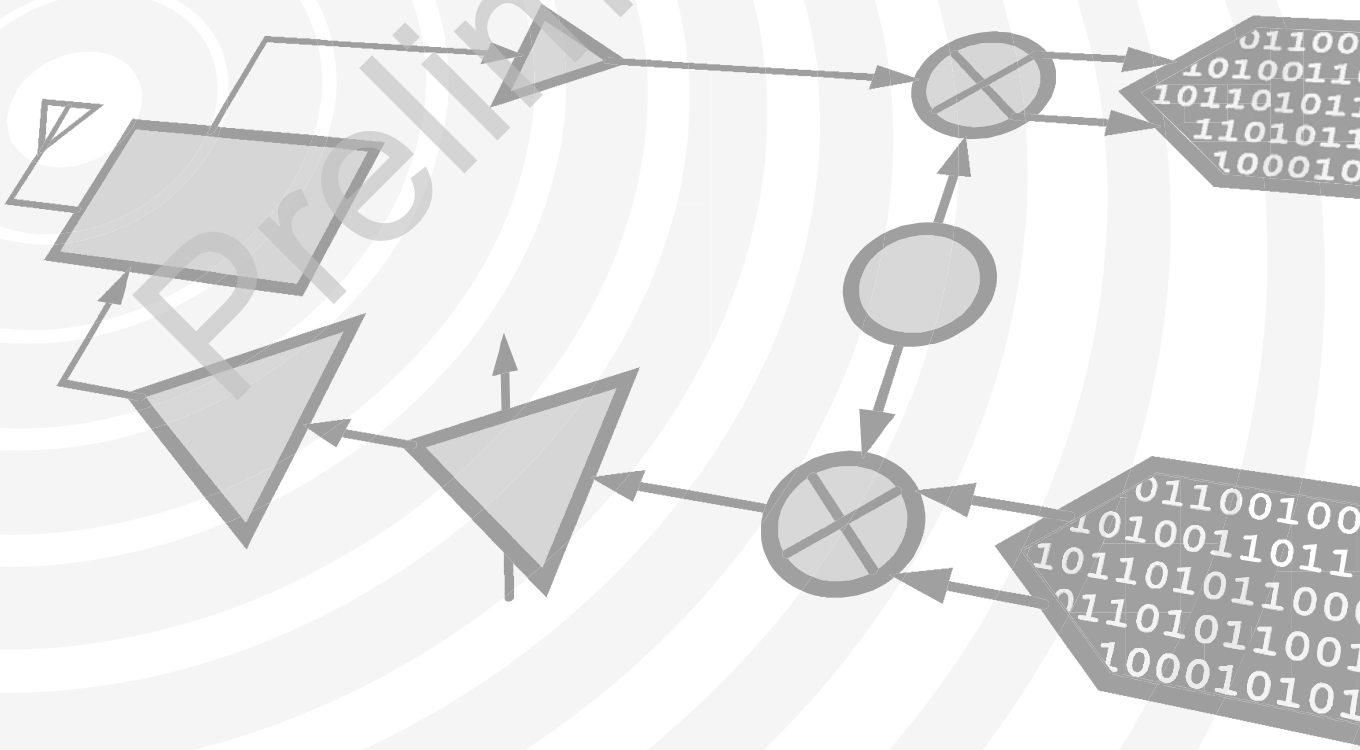

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HMC941A

v00.1115

0.5 dB LSB GaAs MMIC 5-BIT DIGITAL ATTENUATOR, 0.1 - 30 GHz

Typical Applications

The HMC941A is ideal for:

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

Features

0.5 dB LSB Steps to 15.5 dB

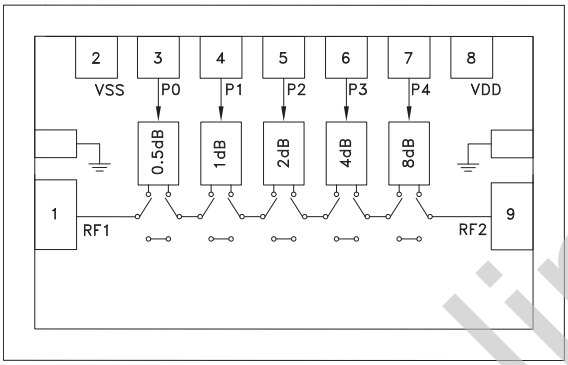
Single Positive Control Line Per Bit

±0.5 dB Typical Bit Error

High Input IP3: +45 dBm

Die Size: 2.29 x 0.95 x 0.1 mm

Functional Diagram



General Description

The HMC941A die is a broadband 5-bit GaAs IC digital attenuator MMIC chip. Covering 0.1 to 30 GHz, the insertion loss is less than 4 dB typical. The attenuator bit values are 0.5 (LSB), 1, 2, 4, 8, for a total attenuation of 15.5 dB. Attenuation accuracy is excellent at less than ± 0.5 dB typical step error with an IIP3 of +45 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 - 18.0 GHz 18.0 - 30.0 GHz		2.5 4.0	3.5 4.8	dB dB
Attenuation Range	0.1 - 30.0 GHz		15.5		dB
Return Loss (RF1 & RF2, All Atten. States)	0.1 - 30.0 GHz		15		dB
Attenuation Accuracy: (Referenced to Insertion Loss) 0.5 - 7.5 dB States 8 - 15.5 dB States	 0.1 - 30.0 GHz 0.1 - 30.0 GHz	 ± 0.3 + 4% of Atten. Setting Max ± 0.3 + 5% of Atten. Setting Max			 dB dB
Input Power for 0.1 dB Compression	0.1 - 0.5 GHz 0.5 - 30.0 GHz		22 27		dBm dBm
Input Third Order Intercept Point (Two-Tone Input Power= 0 dBm Each Tone)	0.1 - 0.5 GHz 0.5 - 30.0 GHz		42 45		dBm dBm
Switching Characteristics tRISE, tFALL (10/90% RF) tON/tOFF (50% CTL to 10/90% RF)	0.1 - 30.0 GHz		 60 90		 ns ns
Idd	0.1 - 30.0 GHz	3	5	7	mA
Iss	0.1 - 30.0 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

Absolute Maximum Ratings

RF Input Power (0.5 to 30 GHz)	+27 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)	146 °C/W
Storage Temperature	-65 to + 150 °C
Operating Temperature	-55 to +85 °C

ELECTROSTATIC SENSITIVE DEVICE
OBSERVE HANDLING PRECAUTIONS

Bias Voltages & Currents

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

Control Voltage

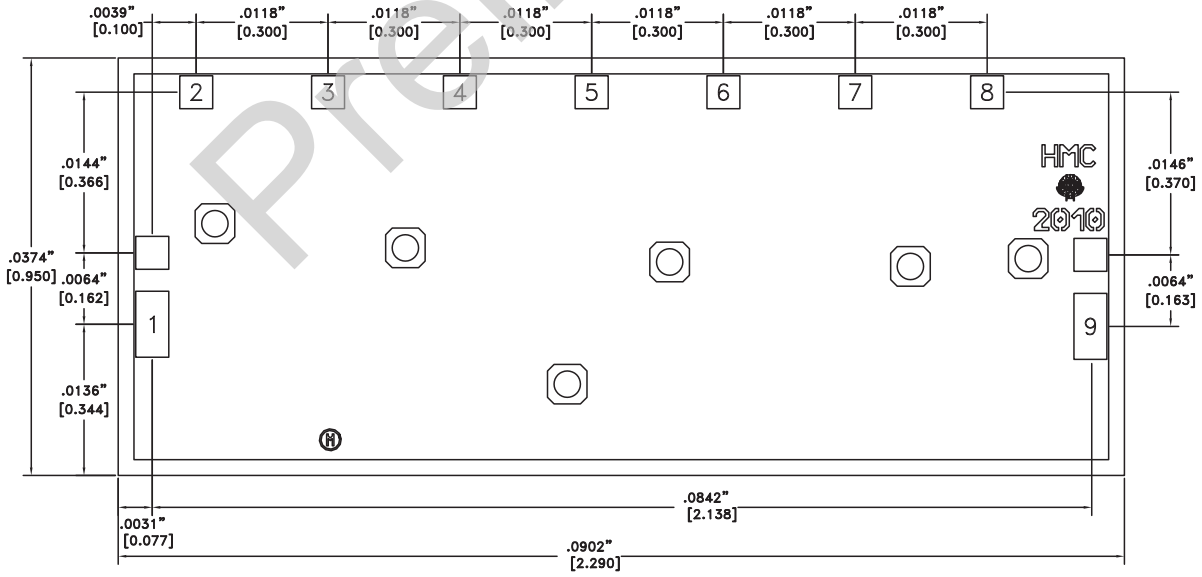
State	Bias Condition
Low	0 to 0.8V @ 1 µA
High	2 to 5V @ 1 µA

Truth Table

Control Voltage Input					Attenuation State RF1 - RF2
P4 8 dB	P3 4 dB	P2 2 dB	P1 1 dB	P0 0.5 dB	
High	High	High	High	High	Reference I.L.
High	High	High	High	Low	0.5 dB
High	High	High	Low	High	1 dB
High	High	Low	High	High	2 dB
High	Low	High	High	High	4 dB
Low	High	High	High	High	8 dB
Low	Low	Low	Low	Low	15.5 dB

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

Outline Drawing



1. ALL DIMENSIONS ARE IN INCHES (MILLIMETERS).
2. TYPICAL BOND PAD IS .004" SQUARE.
3. TYPICAL BOND PAD SPACING IS .006" CENTER TO CENTER EXCEPT AS NOTED.
4. BACKSIDE METALIZATION: GOLD
5. BACKSIDE METAL IS GROUND
6. BOND PAD METALIZATION: GOLD