HMC346C8

v02.1008

GaAs MMIC SMT VOLTAGE-VARIABLE ATTENUATOR, DC - 8 GHz

Typical Applications

The HMC346C8 is ideal for:

- Basestation Infrastructure
- Fiber Optics & Broadband Telecom
- Microwave Radio & VSAT
- Military Radios, Radar, & ECM
- Test Instrumentation

Features

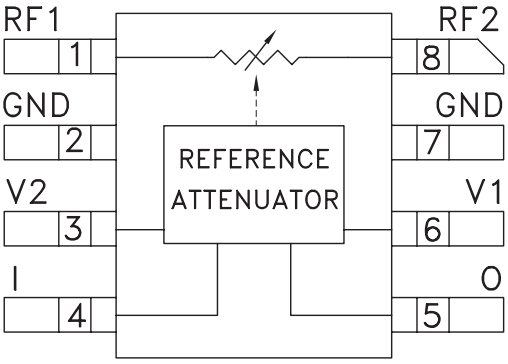
Wide Bandwidth: DC - 8 GHz

Low Phase Shift vs. Attenuation

30 dB Attenuation Range

Surface Mount Ceramic Package

Functional Diagram



General Description

The HMC346C8 is an absorptive Voltage Variable Attenuator (VVA) in a non-hermetic surface-mount ceramic package operating from DC - 8 GHz. It features an on-chip reference attenuator for use with an external op-amp to provide simple single voltage attenuation control, 0 to -3V. The device is ideal in designs where an analog DC control signal must control RF signal levels over a 30 dB amplitude range. Applications include AGC circuits and temperature compensation of multiple gain stages in microwave radios and test instrumentation.

Electrical Specifications, T_A = +25° C, 50 ohm system

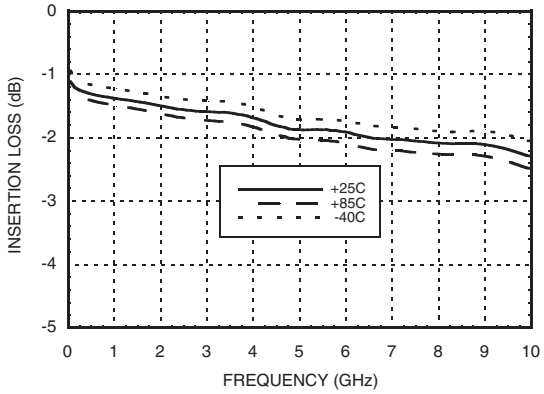
Parameter		Min	Typical	Max	Units
Insertion Loss	DC - 6 GHz DC - 8 GHz		1.9 2.1	2.9 3.1	dB dB
Attenuation Range	DC - 8 GHz		30		dB
Return Loss	DC - 8 GHz		10		dB
Switching Characteristics	tRISE, tFALL (10/90% RF) tON, tOFF (50% CTL to 10/90% RF)		2 8		ns ns
Input Power for 0.25 dB Compression (0.5 - 8 GHz)	Min. Atten. Atten. >2 dB		+8 -2		dBm dBm
Input Third Order Intercept (0.5 - 8 GHz) (Two-tone Input Power = -8 dBm Each Tone)	Min. Atten. Atten. >2 dB		+25 +10		dBm dBm

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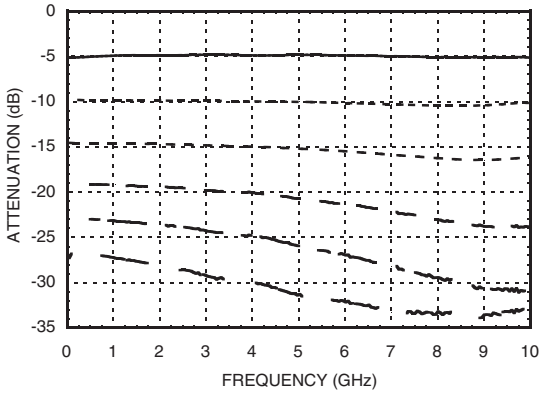
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GaAs MMIC SMT VOLTAGE-VARIABLE ATTENUATOR, DC - 8 GHz

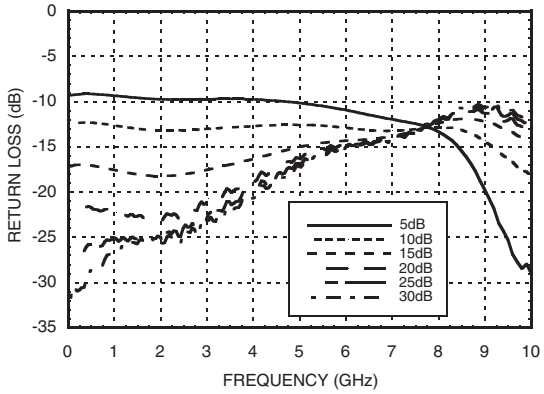
Insertion Loss vs. Temperature



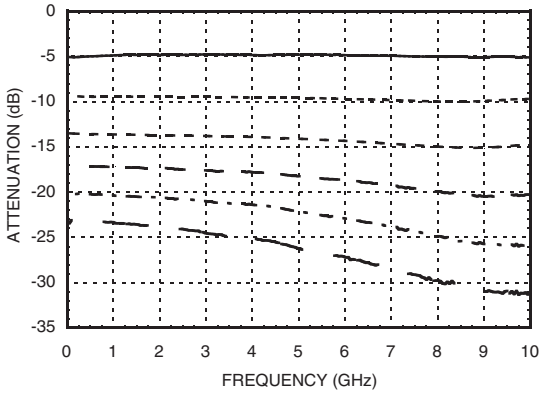
Relative Attenuation, Control Voltage Optimized for 4 GHz Operation



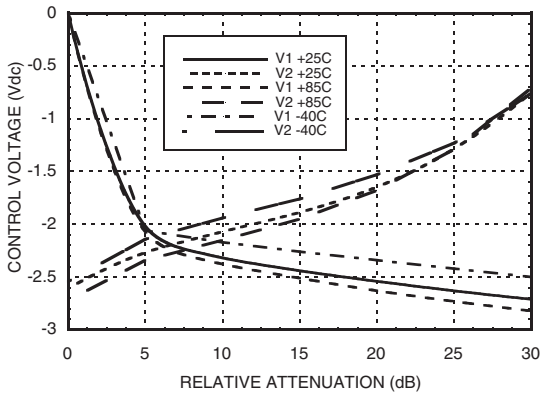
Return Loss vs. Attenuation



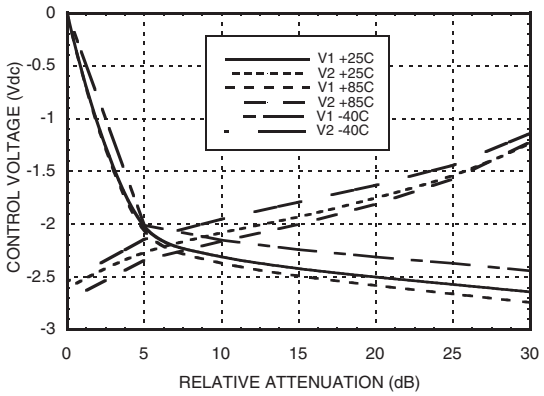
Relative Attenuation, Control Voltage Optimized for 8 GHz Operation



Relative Attenuation vs. Control Voltage @ 4 GHz



Relative Attenuation vs. Control Voltage @ 8 GHz

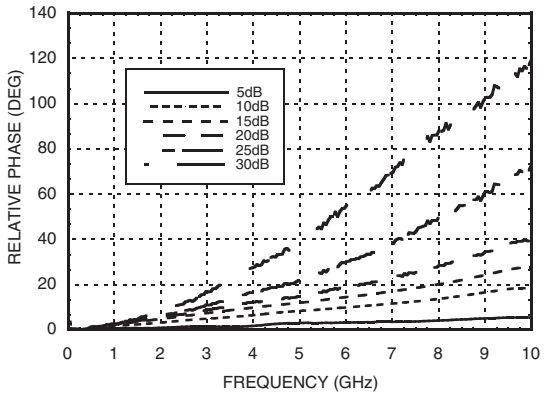


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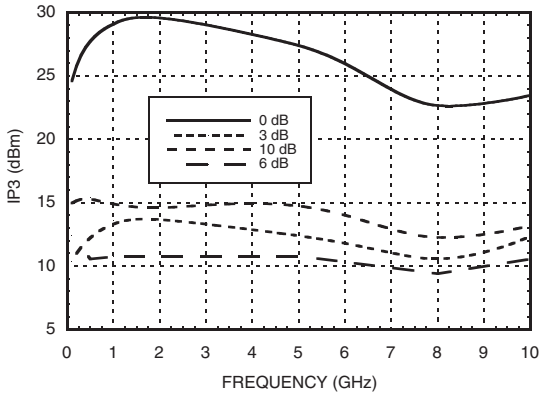
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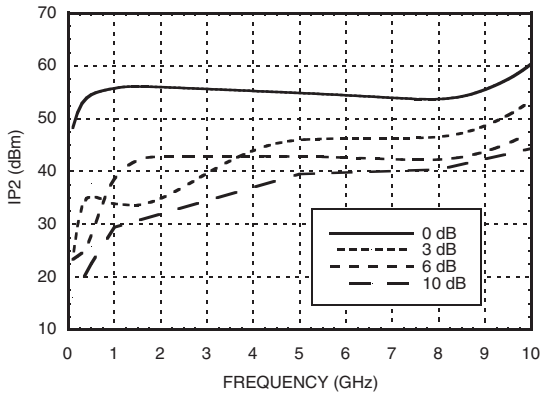
Relative Phase



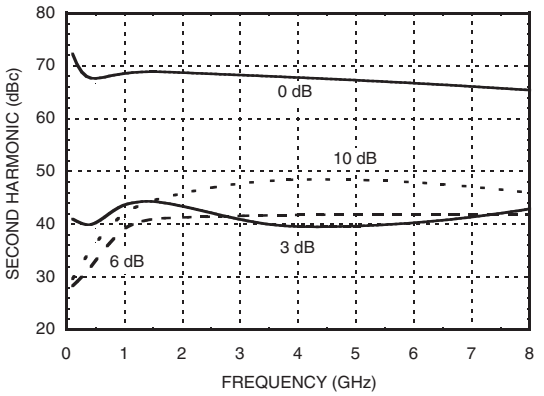
Input Third Order Intercept vs. Attenuation*



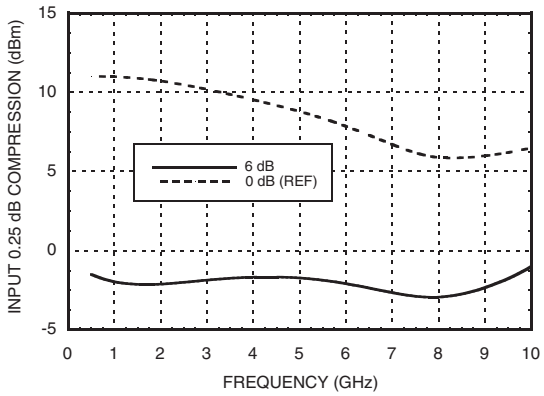
Input Second Order Intercept vs. Attenuation*



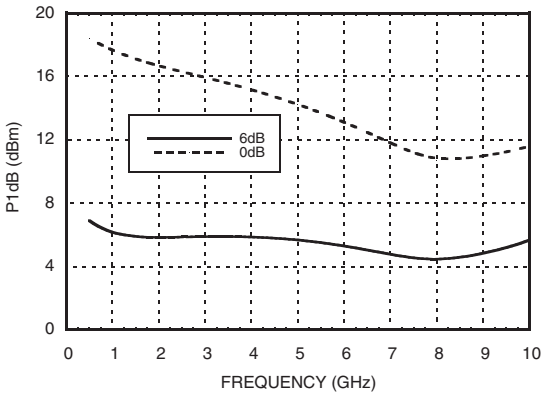
Second Harmonic vs. Attenuation



0.25 dB Compression vs. Attenuation



1 dB Compression vs. Attenuation



*Two-tone input power = -8 dBm each tone.

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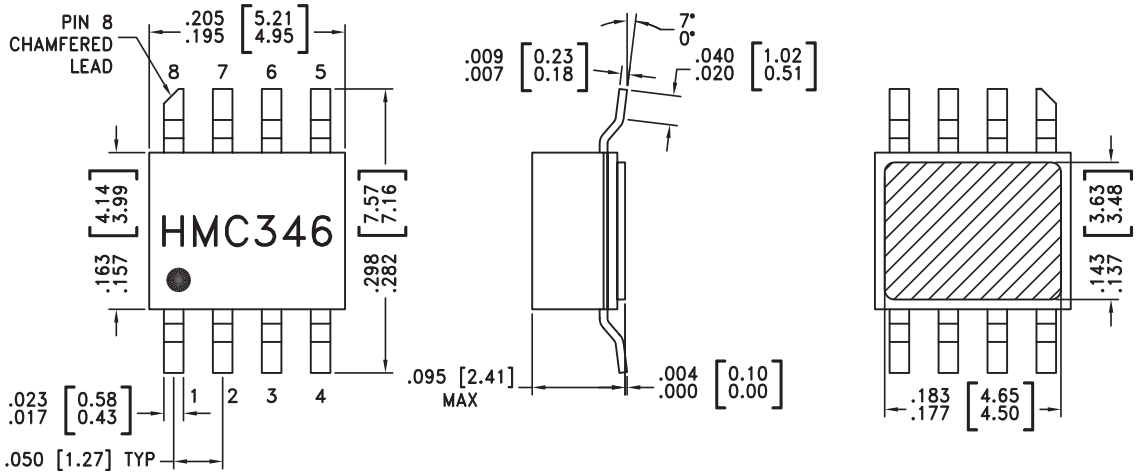
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Absolute Maximum Ratings

RF Input Power	+18 dBm
Control Voltage Range	+1.0 to -5V
Channel Temperature	150 °C
Thermal Resistance	190 °C/W
Storage Temperature	-65 to +150 °C
Operating Temperature	-40 to +85 °C
ESD Sensitivity (HBM)	Class 1A

ELECTROSTATIC SENSITIVE DEVICE
OBSERVE HANDLING PRECAUTIONS

Outline Drawing



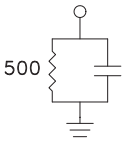
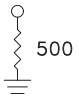
NOTES:

1. PACKAGE MATERIAL: ALUMINA LOADED BOROSILICATE GLASS.
2. LEAD, BASE, COVER MATERIAL: KOVAR™ (#7052 CORNING).
3. PLATING: ELECTROLYTIC GOLD 50 MICROINCHES MIN., OVER ELECTROLYTIC NICKEL 50 MICROINCHES MIN.
4. DIMENSIONS ARE IN INCHES [MILLIMETERS].
5. TOLERANCES: ±.005 [0.13] UNLESS OTHERWISE SPECIFIED.
6. ALL GROUND LEADS AND GROUND PADDLE MUST BE SOLDERED TO PCB RF GROUND.

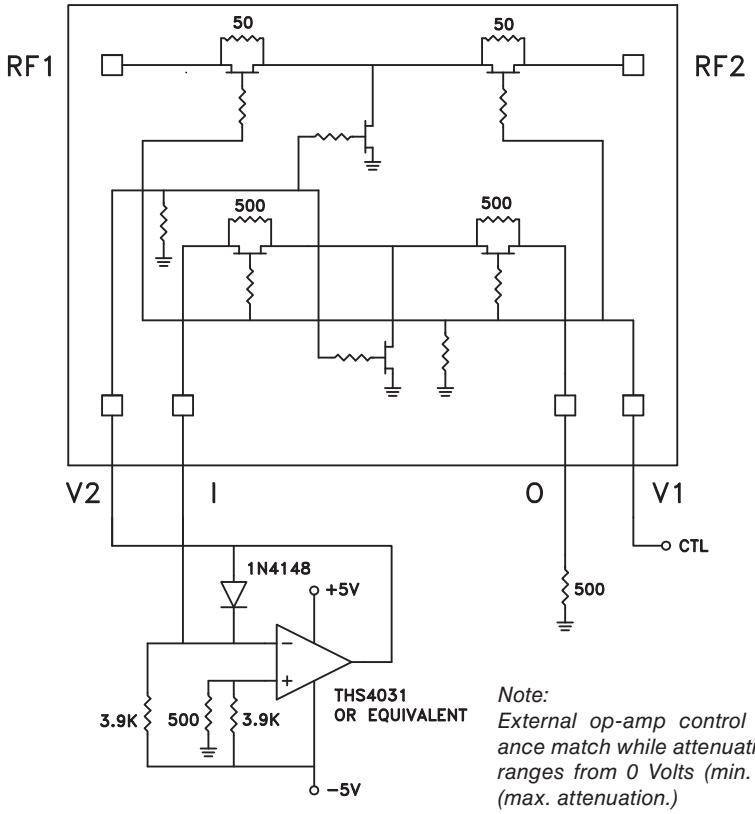
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Pin Descriptions

Pin Number	Function	Description	Interface Schematic
1, 8	RF1, RF2	This pin is DC coupled and matched to 50 Ohms. Blocking capacitors are required if RF line potential is not equal to 0V.	
2, 7	GND	This pin must be DC grounded.	
3, 6	V2, V1	Control Input (Master).	
4	I	Control Input (Slave).	
5	O	This pin must have an external 500 Ohm resistor to ground.	

Single-Line Control Driver

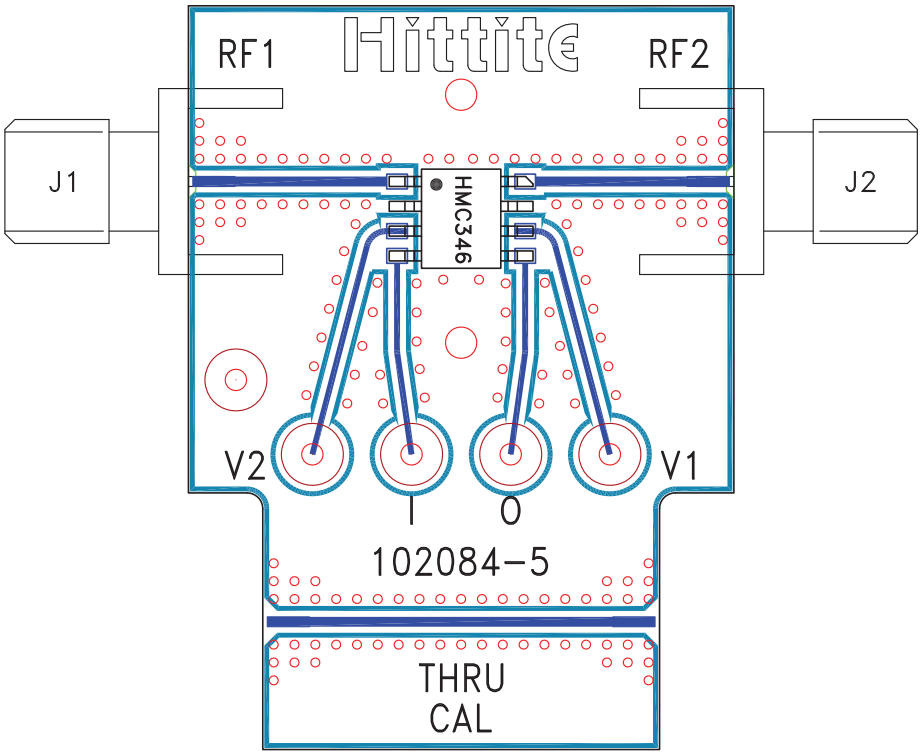


Note:
External op-amp control circuit maintains impedance match while attenuation is varied. Input control ranges from 0 Volts (min. attenuation) to -2.5 Volts (max. attenuation.)

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Evaluation PCB



List of Materials for Evaluation PCB 109023 [1]

Item	Description
J1 - J2	PCB Mount SMA RF Connector
J3 - J7	DC PIN
U1	HMC346C8
PCB [2]	Eval Board 102084-5

[1] Reference this number when ordering complete evaluation PCB

[2]Circuit Board Material: Rogers 4350

The circuit board used in the final application should be generated with proper RF circuit design techniques. Signal lines at the RF ports should be 50 ohm impedance and the package ground leads and package bottom should be connected directly to the PCB RF ground plane, similar to that shown above. The evaluation circuit board shown above is available from Hittite Microwave Corporation upon request.

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