THE DATASHEET OF

HMC346LP3ETR

HMC346LP3 / 346LP3E

v05.1008

GaAs MMIC VOLTAGE-VARIABLE ATTENUATOR, DC - 14 GHz

Typical Applications

The HMC346LP3 / HMC346LP3E is ideal for:

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

Features

Wide Bandwidth: DC - 14 GHz

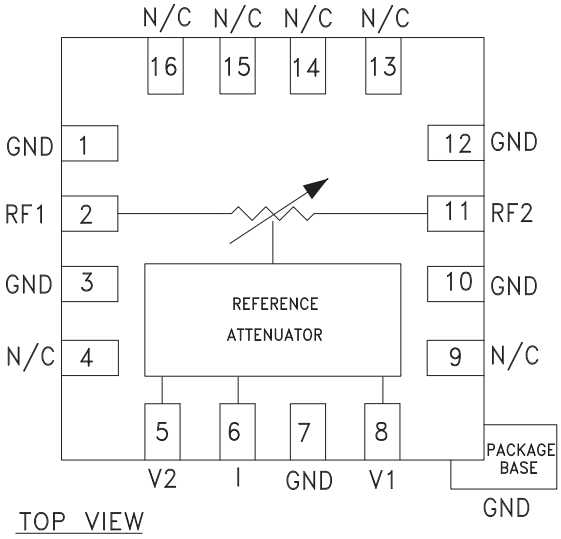
Low Phase Shift vs. Attenuation

30 dB Attenuation Range

Simplified Voltage Control

3 x 3 x 1 mm SMT Package

Functional Diagram



General Description

The HMC346LP3 & HMC346LP3E are pabsorptive Voltage Variable Attenuators (VVA) in low cost leadless surface mount plastic packages operating from DC - 14 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. This VVA is an excellent alternative to the HMC121C8.

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

Parameter		Min	Typical	Max	Units
Insertion Loss	DC - 10 GHz DC - 14 GHz		1.7 2.8	2.2 3.3	dB dB
Attenuation Range	DC - 10 GHz DC - 14 GHz	27 22	30 27		dB dB
Return Loss	DC - 14 GHz	5	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 -4		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

For price, delivery, and to place orders: Analog Devices, Inc., One Technology Way, P.O. Box 9106, Norwood, MA 02062-9106
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Application Support: Phone: 1-800-ANALOG-D

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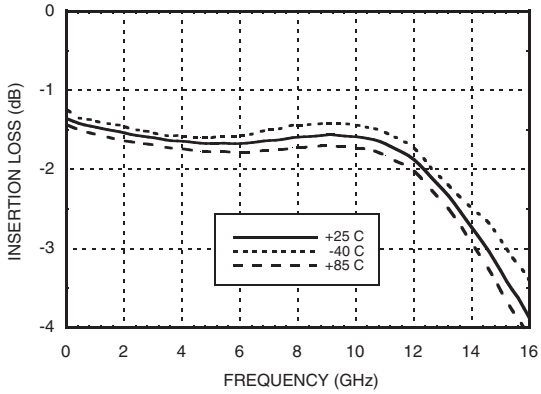
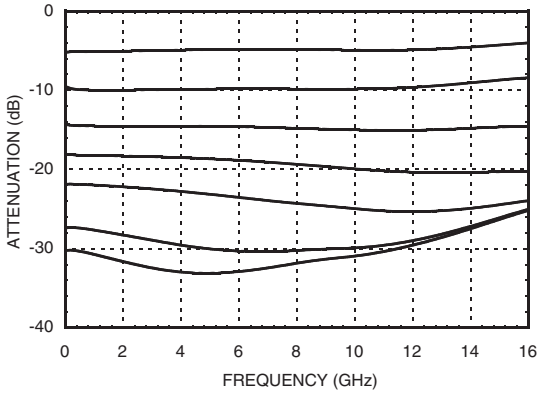
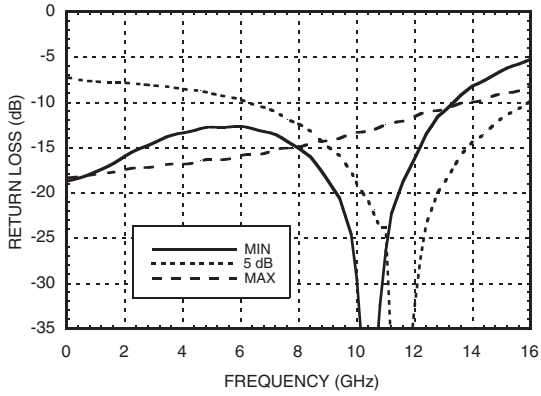
Insertion Loss vs. Temperature



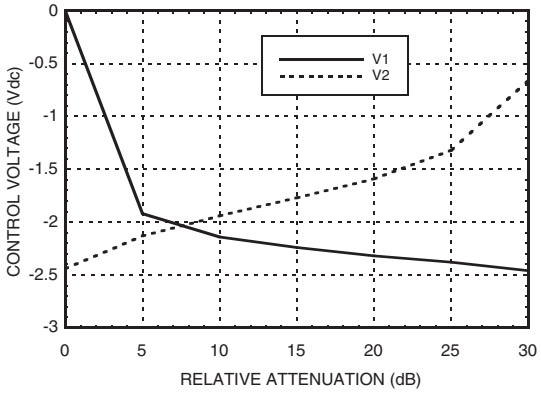
Relative Attenuation



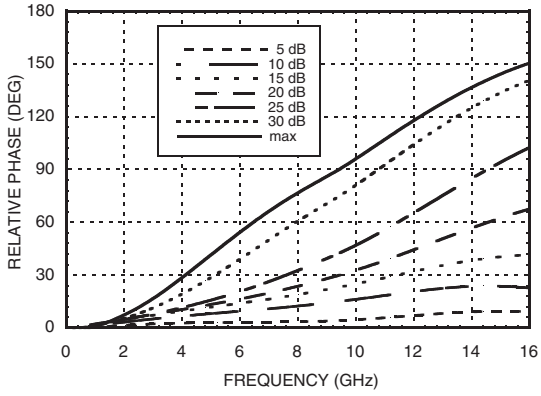
Return Loss vs. Attenuation



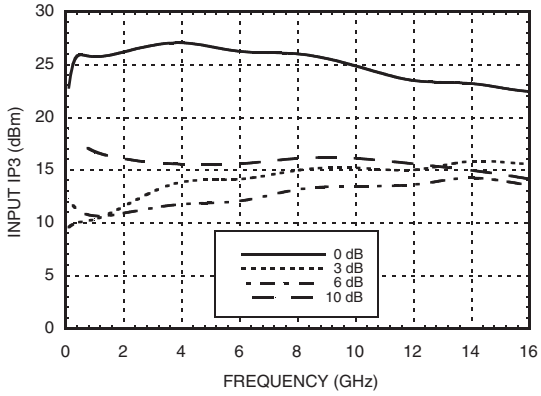
Relative Attenuation vs. Control Voltage @ 10 GHz



Relative Phase



Input IP3 vs. Attenuation*



*Two-tone input power = -8 dBm each tone, 1 MHz spacing.

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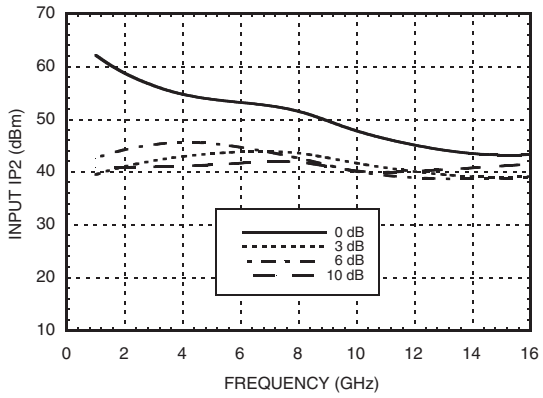
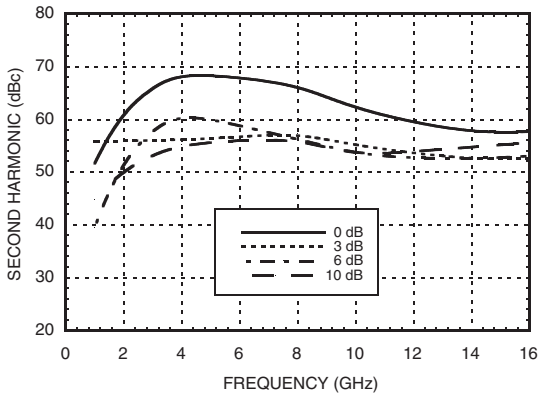
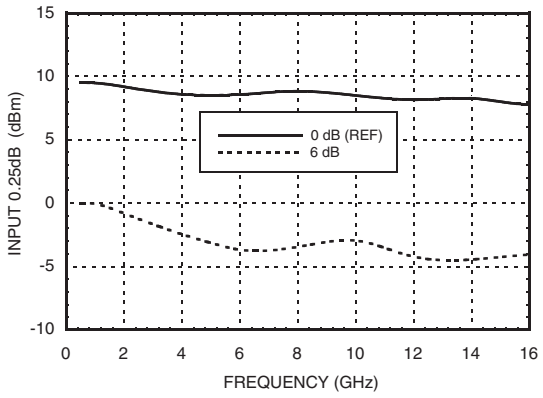
Input IP2 vs. Attenuation*



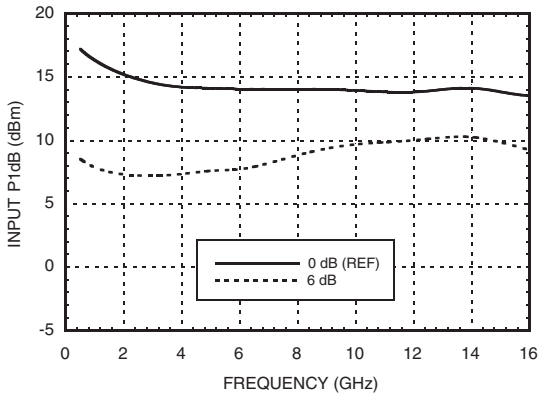
Second Harmonic vs. Attenuation, Pin = -8 dBm



0.25 dB Compression vs. Attenuation



1 dB Compression vs. Attenuation



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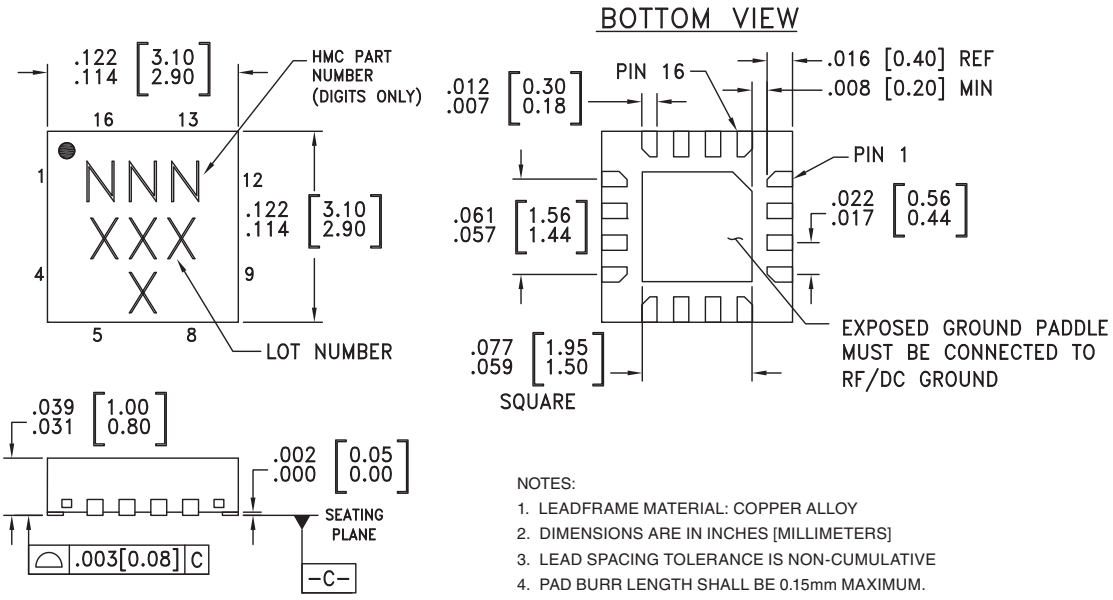
Absolute Maximum Ratings

RF Input Power	+18 dBm
Control Voltage Range	+1 to -5V
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. LEADFRAME MATERIAL: COPPER ALLOY
2. DIMENSIONS ARE IN INCHES [MILLIMETERS]
3. LEAD SPACING TOLERANCE IS NON-CUMULATIVE
4. PAD BURR LENGTH SHALL BE 0.15mm MAXIMUM. PAD BURR HEIGHT SHALL BE 0.05mm MAXIMUM.
5. PACKAGE WARP SHALL NOT EXCEED 0.05mm.
6. ALL GROUND LEADS AND GROUND PADDLE MUST BE SOLDERED TO PCB RF GROUND.
7. REFER TO HITTITE APPLICATION NOTE FOR SUGGESTED LAND PATTERN.

Package Information

Part Number	Package Body Material	Lead Finish	MSL Rating	Package Marking [3]
HMC346LP3	Low Stress Injection Molded Plastic	Sn/Pb Solder	MSL1 [1]	346 XXXX
HMC346LP3E	RoHS-compliant Low Stress Injection Molded Plastic	100% matte Sn	MSL1 [2]	346 XXXX

[1] Max peak reflow temperature of 235 °C
[2] Max peak reflow temperature of 260 °C
[3] 4-Digit lot number XXXX

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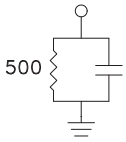
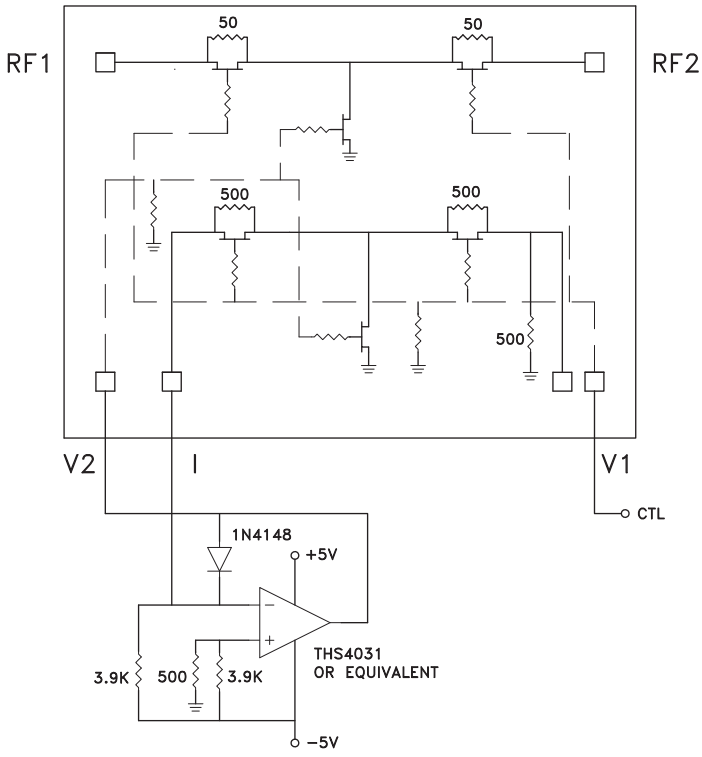
Pin Descriptions

Pin Number	Function	Description	Interface Schematic
1, 3, 7, 10, 12	GND	Package bottom has exposed metal paddle that must also be connected to PCB RF ground.	
2, 11	RF1 RF2	This pin is DC coupled and matched to 50 Ohm. Blocking capacitors are required if the RF line potential is not equal to 0V.	
4, 9, 13, 14, 15, 16	N/C	This pin should be connected to PCB RF ground.	
5, 8	V2, V1	Control input (master).	
6	I	Control input (slave).	

Single-Line Control Driver



External op-amp control circuit maintains impedance match while attenuation is varied. Input control ranges from 0 Volts (min. attenuation) to -3.0 Volts (max. attenuation.)

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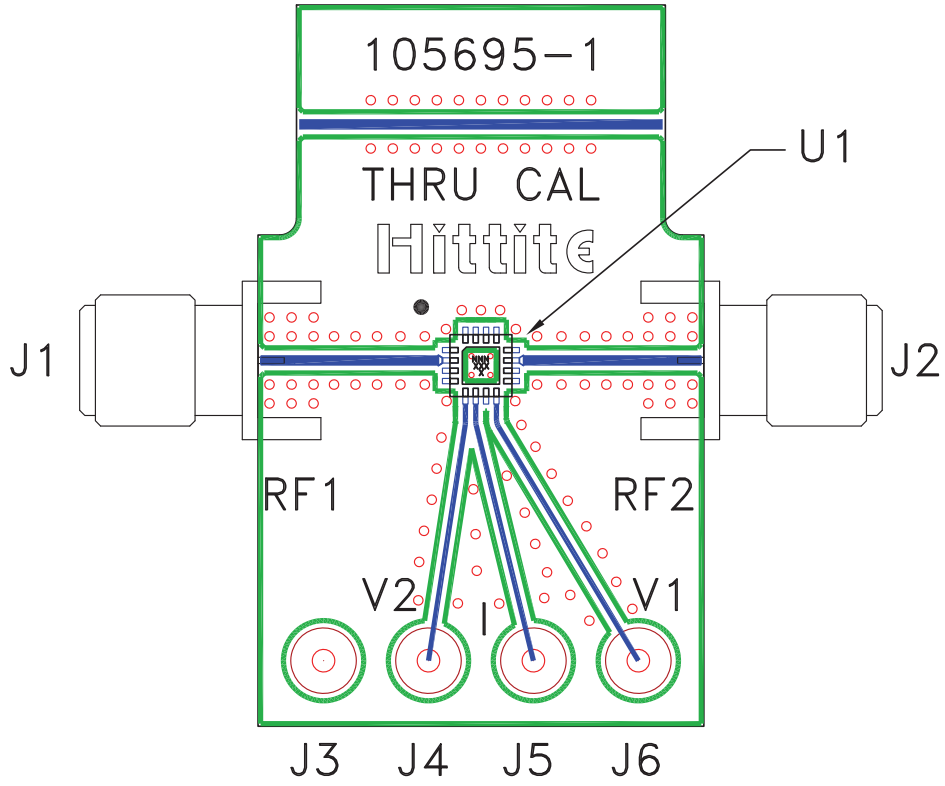
Evaluation PCB



List of Materials for Evaluation PCB 105709 [1]

Item	Description
J1 - J2	PCB Mount SMA RF Connector
J3 - J6	DC Pin
U1	HMC346LP3 / HMC346LP3E VVA
PCB [2]	105695 Evaluation PCB

[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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