

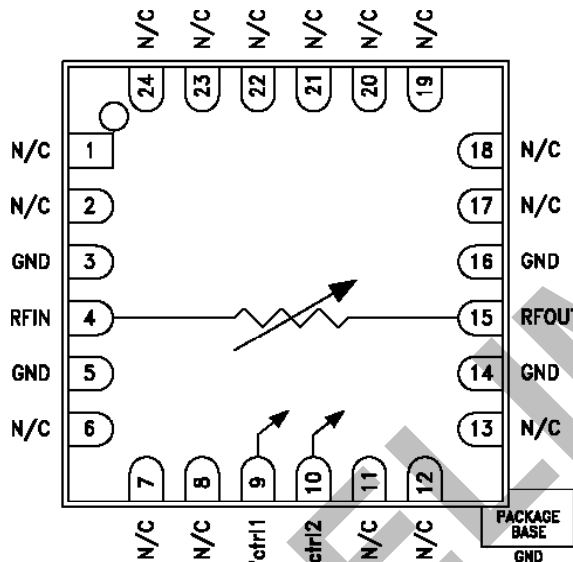
GaAs MMIC VOLTAGE-VARIABLE ATTENUATOR, 5 - 30 GHz

Typical Applications

The HMC812ALC4 is ideal for:

- Point-to-Point Radio
- VSAT Radio
- Test Instrumentation
- Microwave Sensors
- Military, ECM & Radar

Functional Diagram



Features

- Wide Bandwidth: 5 - 30 GHz
- Excellent Linearity: +32 dBm Input IP3
- High Power Handling: +25 dBm Input P1dB
- Wide Attenuation Range: 30 dB
- 24 Lead Ceramic 4x4 mm SMT Package: 16mm²

General Description

The HMC812ALC4 is an absorptive Voltage Variable Attenuator (VVA) which operates from 5 - 30 GHz and is ideal in designs where an analog DC control signal must be used to control RF signal levels over a 30 dB amplitude range. It features two shunt-type attenuators which are controlled by two analog voltages, Vctrl1 and Vctrl2. Optimum linearity performance of the attenuator is achieved by first varying Vctrl1 of the 1st attenuation stage from -5V to 0V with Vctrl2 fixed at -5V. The control voltage of the 2nd attenuation stage, Vctrl2, should then be varied from -5V to 0V, with Vctrl1 fixed at 0V. The HMC812ALC4 is housed in a RoHS compliant 4x4 mm QFN leadless ceramic package

However, if the Vctrl1 and Vctrl2 pins are connected together it is possible to achieve the full analog attenuation range with only a small degradation in input IP3 performance. Applications include AGC circuits and temperature compensation of multiple gain stages in microwave point-to-point and VSAT radios.

Electrical Specifications, $T_A = +25^\circ\text{C}$, 50 Ohm system

Parameter	Min.	Typ.	Max.	Units	
Insertion Loss		5 - 16 GHz	1.5	TBD	dB
		16 - 24 GHz	2	TBD	dB
		24 - 30 GHz	2.5	TBD	dB
Attenuation Range	TBD	30		dB	
Input Return Loss		10		dB	
Output Return Loss		10		dB	
Input Power for 1 dB Compression (any attenuation)		25		dBm	
Input Third Order Intercept (Two-tone Input Power = 10 dBm Each Tone)		32		dBm	

HMC812A* PRODUCT PAGE QUICK LINKS

Last Content Update: 02/23/2017

COMPARABLE PARTS

View a parametric search of comparable parts.

EVALUATION KITS

- Evaluation board for the HMC812A.

DOCUMENTATION

Data Sheet

- HMC812ALC4: GaAs MMIC Voltage-Variable Attenuator, 5 - 30 GHz Preliminary Data Sheet

DESIGN RESOURCES

- hmc812a Material Declaration
- PCN-PDN Information
- Quality And Reliability
- Symbols and Footprints

DISCUSSIONS

View all hmc812a EngineerZone Discussions.

SAMPLE AND BUY

Visit the product page to see pricing options.

TECHNICAL SUPPORT

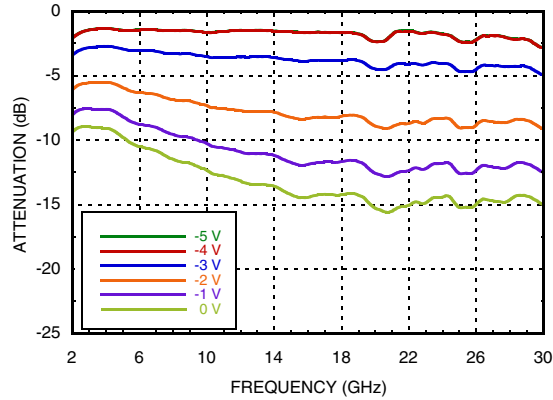
Submit a technical question or find your regional support number.

DOCUMENT FEEDBACK

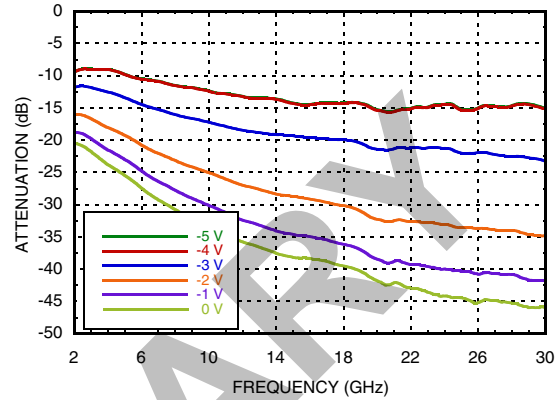
Submit feedback for this data sheet.

GaAs MMIC VOLTAGE-VARIABLE ATTENUATOR, 5 - 30 GHz

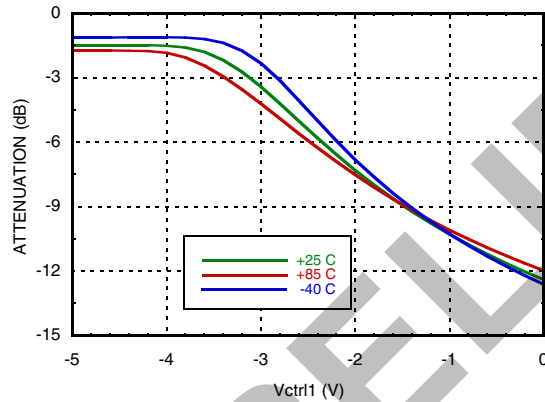
Attenuation vs. Frequency over Vctrl
Vctrl1 = Variable, Vctrl2 = -5V



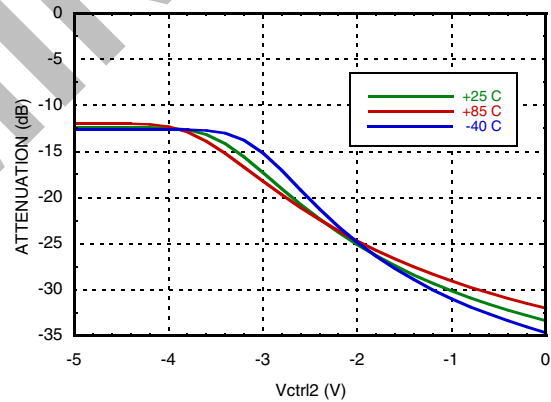
Attenuation vs. Frequency over Vctrl
Vctrl1 = 0V, Vctrl2 = Variable



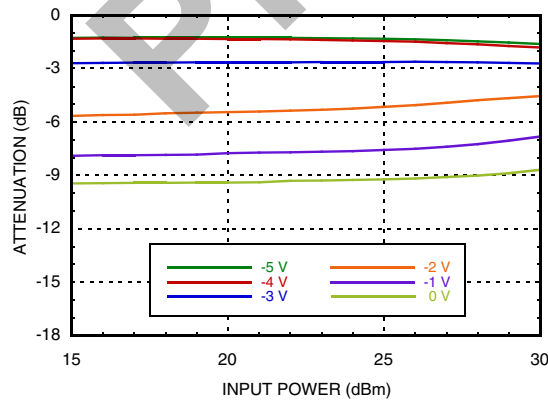
Attenuation vs. Vctrl1
Over Temperature @ 10 GHz, Vctrl2 = -5V



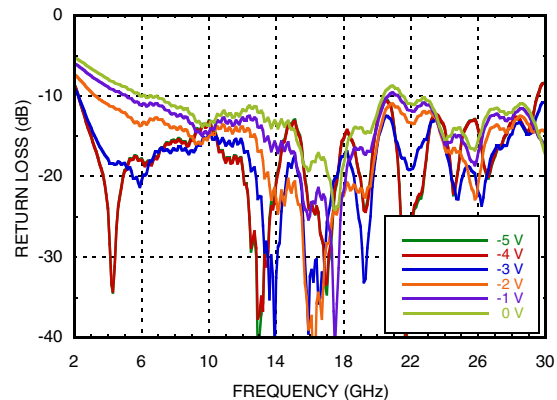
Attenuation vs. Vctrl2
Over Temperature @ 10 GHz, Vctrl1 = 0V



Attenuation vs. Pin @ 5 GHz
Vctrl1 = Variable, Vctrl2 = -5V



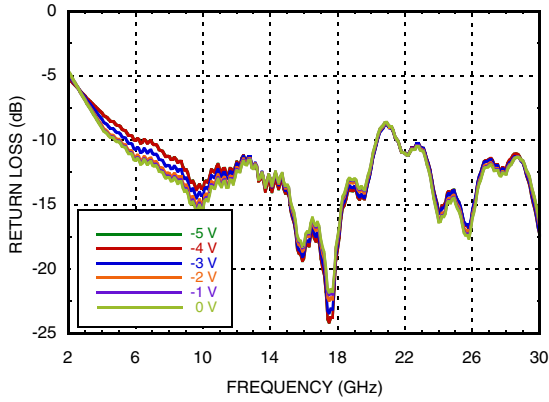
Input Return Loss
Vctrl1 = Variable, Vctrl2 = -5V



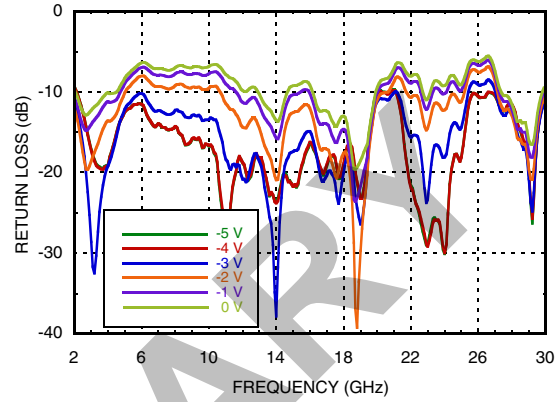
**GaAs MMIC VOLTAGE-VARIABLE
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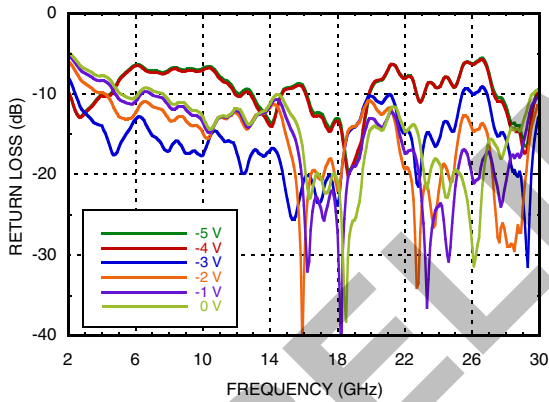
Input Return Loss
Vctrl1 = 0V, Vctrl2 = Variable



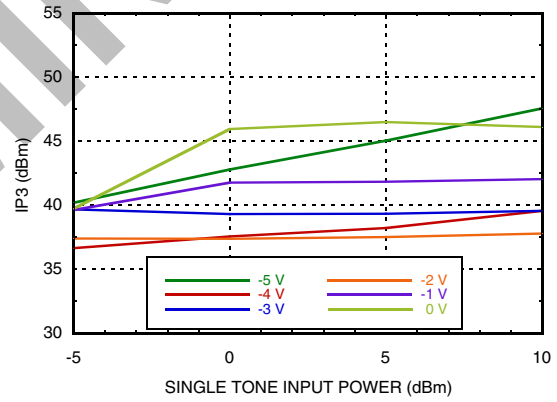
Output Return Loss
Vctrl1 = Variable, Vctrl2 = -5V



Output Return Loss
Vctrl1 = 0V, Vctrl2 = Variable



Input IP3 vs Input Power @ 5 GHz
Vctrl1 = Variable, Vctrl2 = -5V



Worst Case Input IP3 vs. Input Power Over Frequency
Vctrl1 = -2V, Vctrl2 = -5V

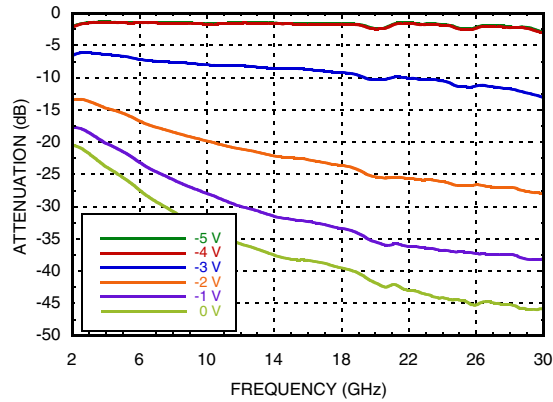
TBD

Worst Case Input IP3 vs. Input Power Over Temperature
Vctrl1 = -2V, Vctrl2 = -5V

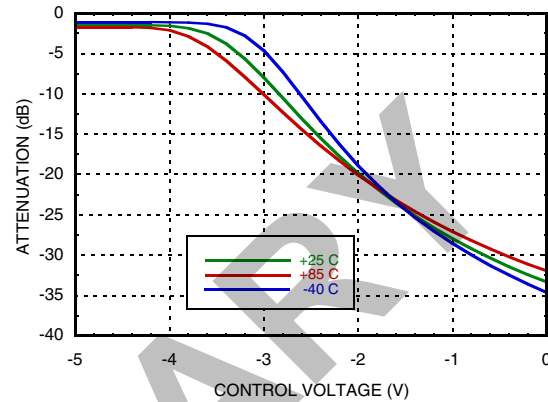
TBD

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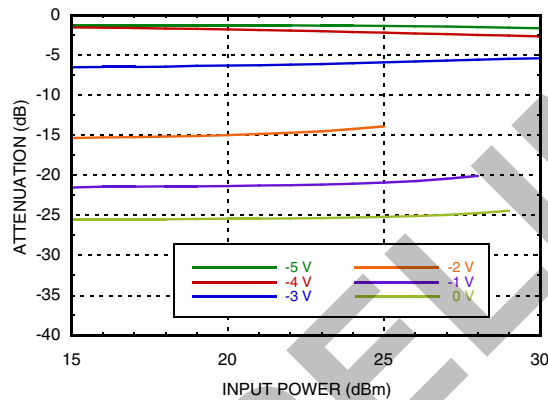
Attenuation vs. Frequency over Vctrl
Vctrl1 = Vctrl2



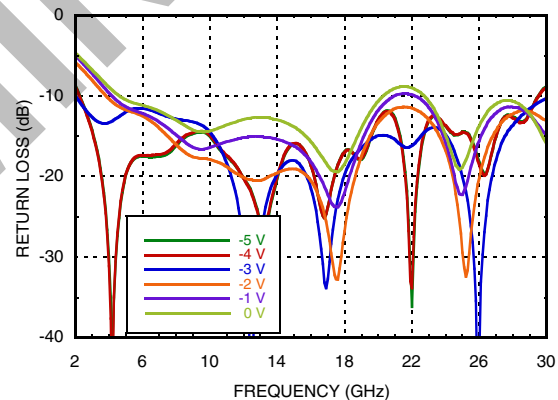
Attenuation vs. Vctrl over Temperature
@ 10 GHz, Vctrl1 = Vctrl2



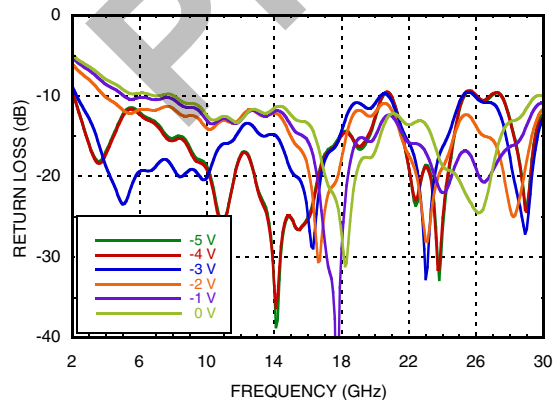
Attenuation vs. Input Power over Vctrl
Vctrl1 = Vctrl2



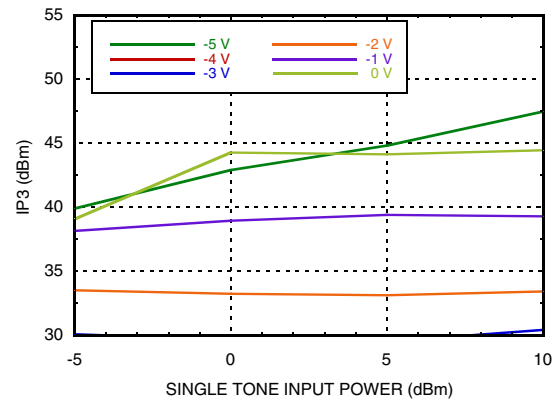
Input Return Loss, Vctrl1 = Vctrl2



Output Return Loss, Vctrl1 = Vctrl2



Input IP3 vs Input Power Over Vctrl
@ 5 GHz, Vctrl1 = Vctrl2



GaAs MMIC VOLTAGE-VARIABLE ATTENUATOR, 5 - 30 GHz

Absolute Maximum Ratings

RF Input Power	+30 dBm
Control Voltage Range	+0.3 to -6V
Channel Temperature	175 °C
Continuous P _{diss} (T = 85 °C) (derate 16.4 mW/ °C above 85 °C)	1.07 W
Thermal Resistance (Channel to ground paddle)	61 °C/W
Storage Temperature	-65 to +150 °C
Operating Temperature	-40 to +85 °C

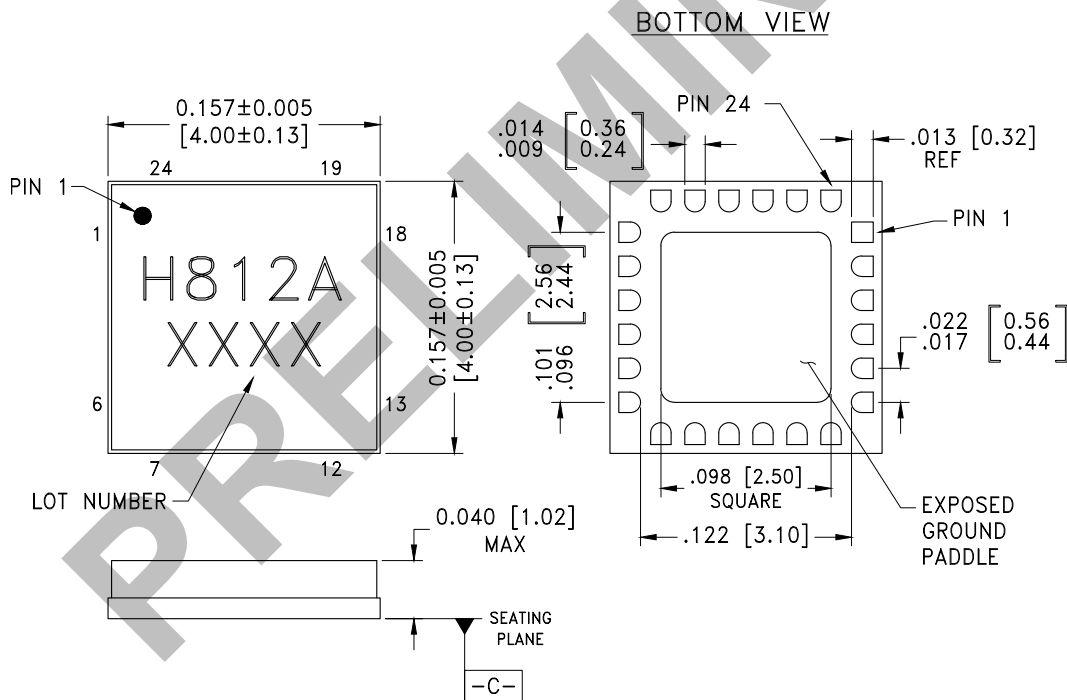
Control Voltages

Vctrl1	-5 to 0V @ 10 μA
Vctrl2	-5 to 0V @ 10 μA




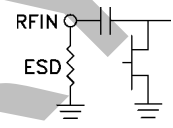
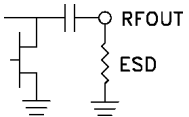
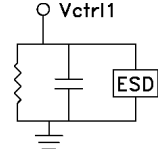
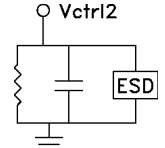
ELECTROSTATIC SENSITIVE DEVICE
OBSERVE HANDLING PRECAUTIONS

Outline Drawing



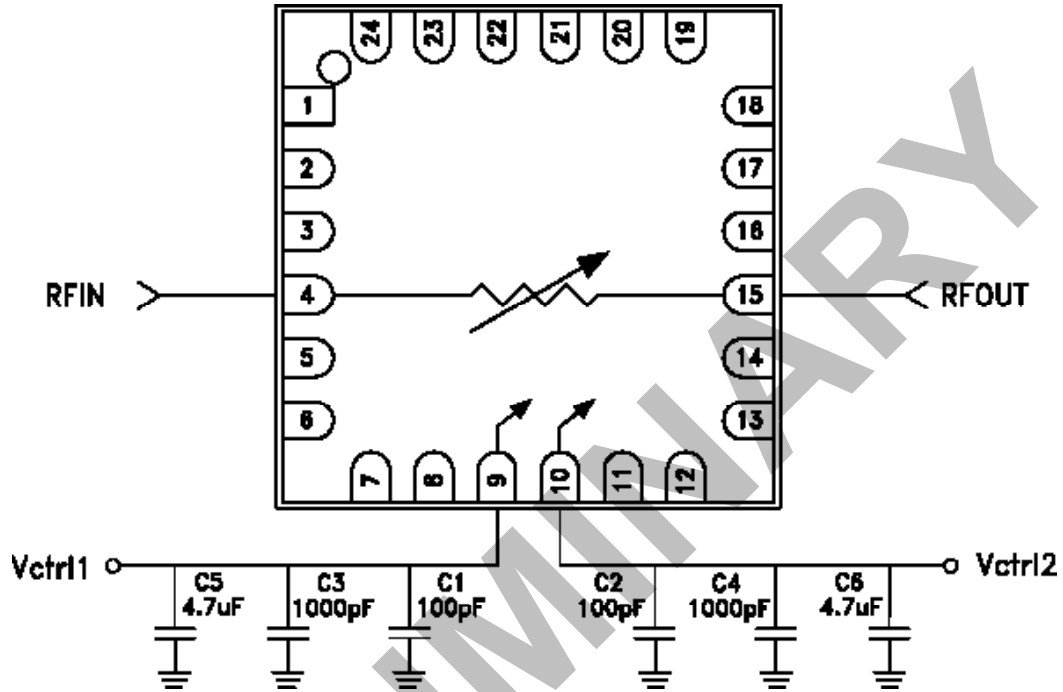
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Pin Descriptions

Pin Number	Function	Description	Interface Schematic
1, 2, 6 - 8, 11 - 13, 17 - 24	N/C	These pins are not connected internally, however these pins must be connected to RF/DC ground externally.	
3, 5, 14, 16	GND	These pins and the exposed ground paddle must be connected to RF/DC ground.	
4	RFIN	This pad is DC coupled and matched to 50 Ohms. A blocking capacitor is required if RF line potential is not equal to 0V.	
15	RFOUT		
9	Vctrl1	Control Voltage 1	
10	Vctrl2	Control Voltage 2	

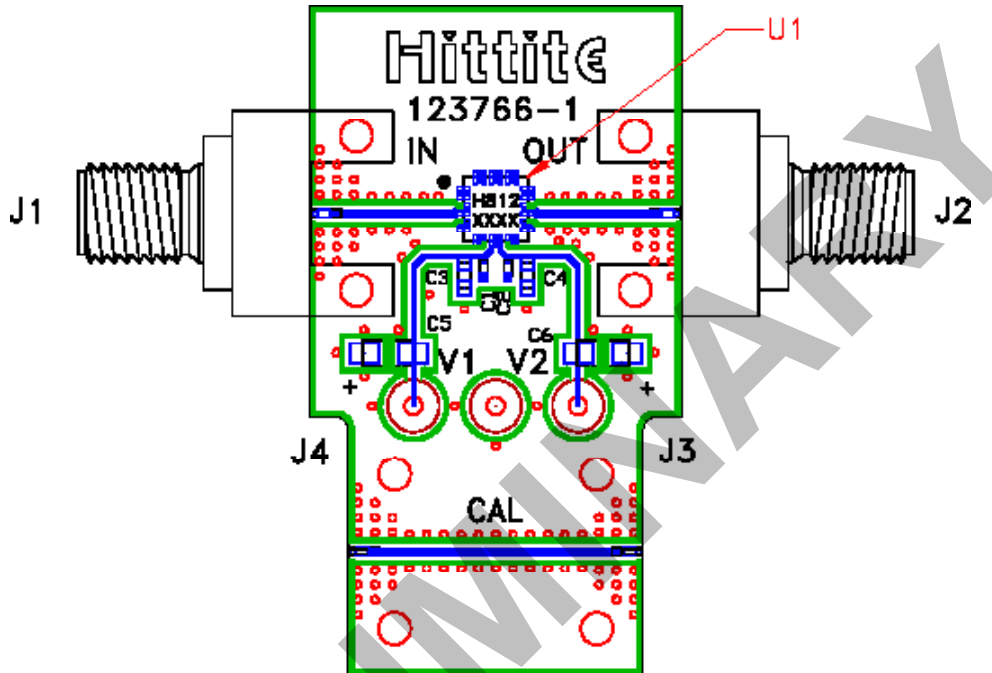
PRELIMINARY

Application Circuit



PRELIMINARY

Evaluation PCB



List of Materials for Evaluation PCB

Item	Description
J1, J2	2.9 mm PC Mount RF Connector
J3, J4	DC Pin
C1, C2	100 pF Capacitor, 0402 Pkg.
C3, C4	1000 pF Capacitor, 0402 Pkg.
C5, C6	4.7 μF Capacitor, CASE A
U1	HMC812ALC4 Analog VVA
PCB [1]	123766 Evaluation PCB

[1] Circuit Board Material: Arlon 25FR or Rogers 4350

The circuit board used in the final application should use RF circuit design techniques. Signal lines should have 50 Ohm impedance while the package ground leads and exposed paddle should be connected directly to the ground plane similar to that shown. A sufficient number of via holes should be used to connect the top and bottom ground planes. The evaluation circuit board shown is available from Analog Devices upon request.