Product/Process Change Notice - PCN 23_0026 Rev. -

Analog Devices, Inc. One Analog Way, Wilmington, MA 01887, USA

This notice is to inform you of a change that will be made to certain ADI products (see Appendix A) that you may have purchased in the last 2 years. **Any inquiries or requests with this PCN (additional data or samples) must be sent to ADI within 30 days of publication date.** ADI contact information is listed below.

PCN Title:	HMC963LC4 Data Sheet Revision
Publication Date:	20-Feb-2023
Effectivity Date:	20-Feb-2023 *(the earliest date that a customer could expect to receive changed material)*
Revision Description:	Initial Release.

Description Of Change:

Electrical Specifications Table page 1:
1)Change Max specification for Supply Current (Idd) from 65 mA to 70 mA.

Reason For Change:

Changed specification to match test program limits and performance.

Impact of the change (positive or negative) on fit, form, function & reliability:

No impact on fit, form, function and reliability.

Summary of Supporting Information:

Changes are reflected in Product Data Sheet revision v03.0223. See attached in the Supporting Document section of this PCN.

Supporting Documents

Attachment 1: Type: Revised Datasheet Specification

ADI_PCN_23_0026_Rev_-_HMC963LC4_v03_0223 (003).pdf...

Note: If applicable, the device material declaration will be updated due to material change.

ADI Contact Information:

For questions on this PCN, please send an email to the regional contacts below or contact your local ADI sales representatives.

Americas:	Europe:	Japan:	Rest of Asia:
PCN_Americas@analog.com	PCN_Europe@analog.com	PCN_Japan@analog.com	PCN_ROA@analog.com

Appendix A - Affected ADI Models:

Added Parts On This Revision - Product Family / Model Number (3)

HMC963 / HMC963LC4	HMC963 / HMC963LC4TR	HMC963 / HMC963LC4TR-R5

Appendix B - Revision History:			
Rev	**Publish Date**	**Effectivity Date**	**Rev Description**
Rev. -	20-Feb-2023	20-Feb-2023	Initial Release.

HMC963LC4

v03.0223

GaAs pHEMT MMIC LOW NOISE AMPLIFIER, 6 - 26.5 GHz

Typical Applications

This HMC963LC4 is ideal for:

- Point-to-Point Radios
- Point-to-Multi-Point Radios
- Military & Space
- Test Instrumentation

Features

Low Noise Figure: 2.5 dB

High Gain: 22 dB

P1dB Output Power: 10 dBm

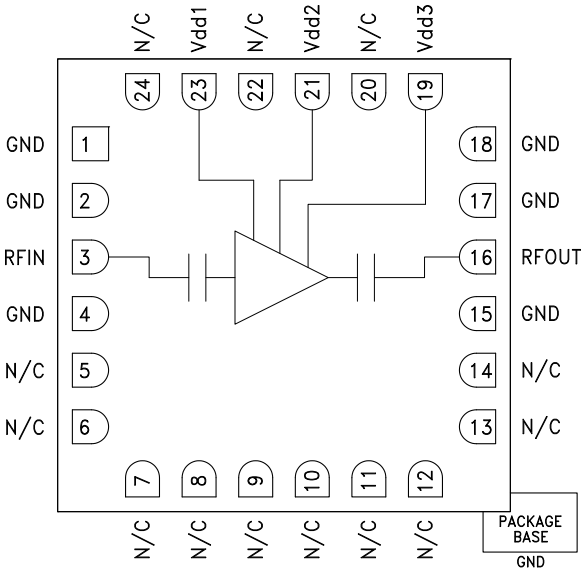
Single Supply Voltage: +3.5V @ 45mA

Output IP3: +18 dBm

50 Ohm matched Input/Output

24 Lead 4x4 mm SMT Package: 16mm²

Functional Diagram



General Description

The HMC963LC4 is a self-biased GaAs MMIC Low Noise Amplifier housed in a leadless 4x4 mm ceramic surface mount package. The amplifier operates between 6 and 26.5 GHz, providing 20 dB of small signal gain, 2.5 dB noise figure, and output IP3 of +18 dBm, while requiring only 45 mA from a +3.5 V supply. The P1dB output power of +10 dBm enables the LNA to function as a LO driver for balanced, I/Q or image reject mixers. The HMC963LC4 also features I/Os that are DC blocked and internally matched to 50 Ohms, making it ideal for high capacity microwave radios and VSAT applications.

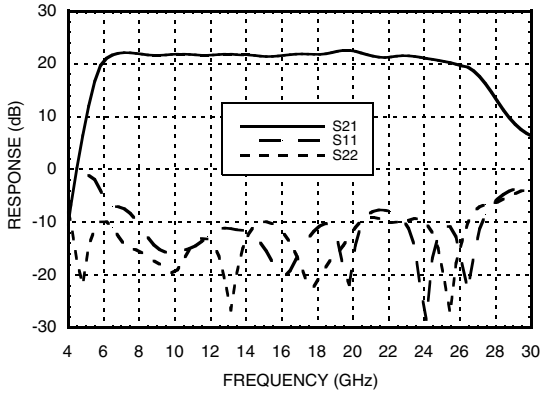
Electrical Specifications, T_A = +25° C, Vdd1 = Vdd2 = +3.5V, Idd = 45 mA

Parameter	Min.	Typ.	Max.	Units
Frequency Range		6 - 26.5		GHz
Gain	16.5	22		dB
Gain Variation over Temperature		0.03		dB / °C
Noise Figure [1]		2.5	3.5	dB
Input Return Loss		10		dB
Output Return Loss		10		dB
Output Power for 1 dB Compression	7	10		dBm
Saturated Output Power (Psat)		12		dBm
Output Third Order Intercept (IP3)		18		dBm
Supply Current (Idd) (Vdd = 3.5V, Vgg1 = Vgg2 = Open)		45	70	mA

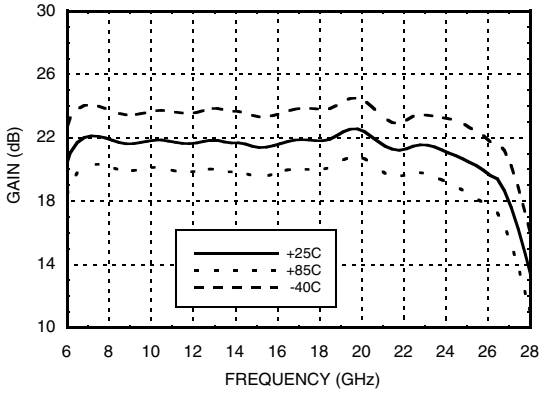
[1] Board loss subtracted out.

For price, delivery, and to place orders:
Analog Devices, Inc., One Analog Way, Wilmington, MA 01887
Phone: 781-937-1428 • Order online at www.analog.com
Application Support: Phone: 1-800-ANALOG-D

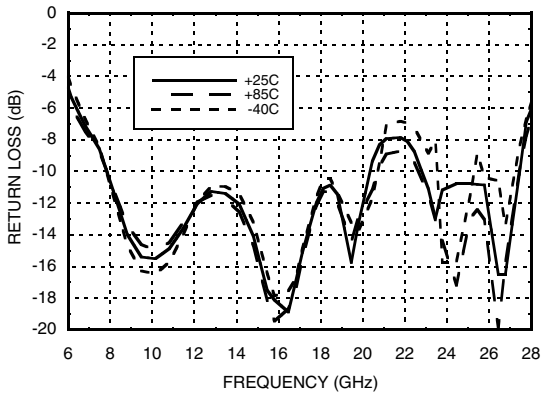
Broadband Gain & Return Loss



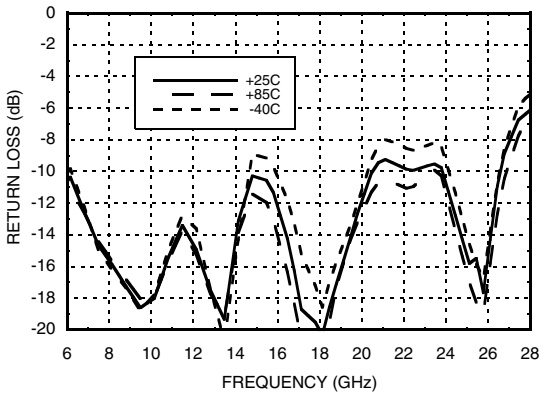
Gain vs. Temperature



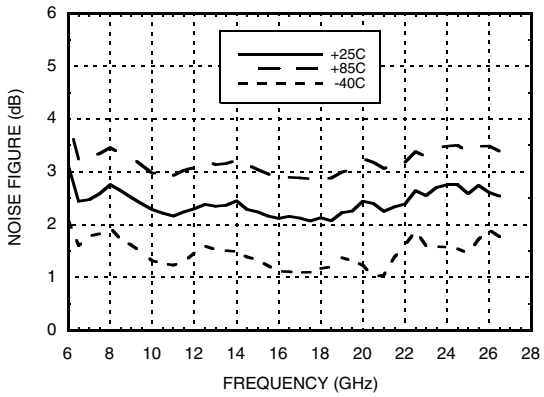
Input Return Loss vs. Temperature



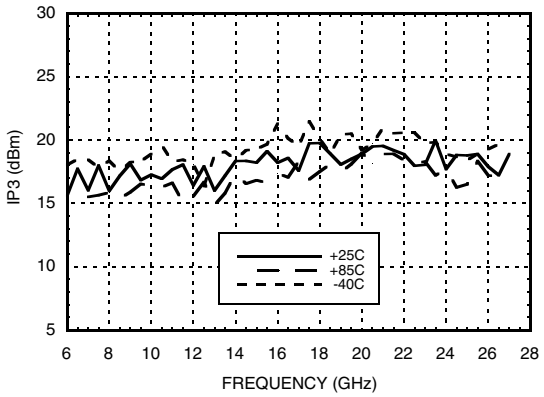
Output Return Loss vs. Temperature



Noise Figure vs. Temperature [1]

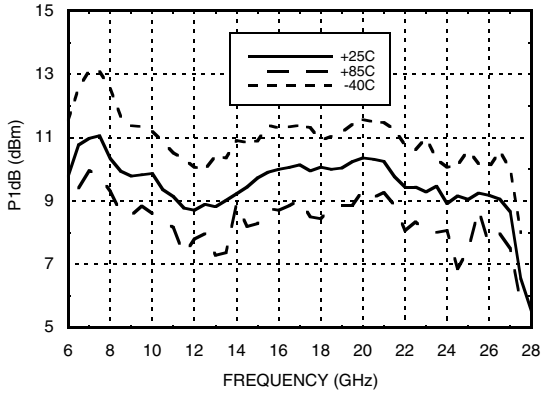


Output IP3 vs. Temperature

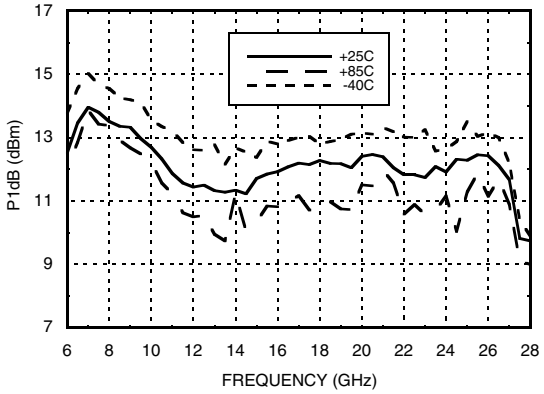


[1] Board loss subtracted out.

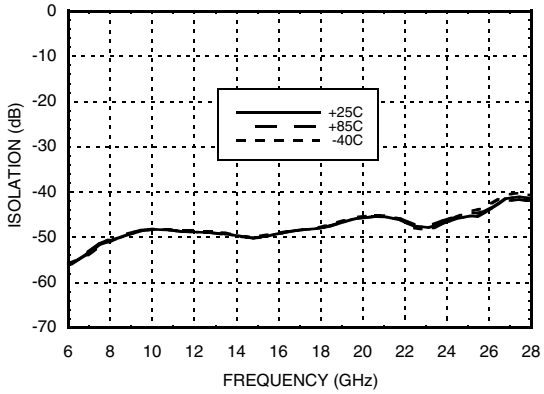
P1dB vs. Temperature



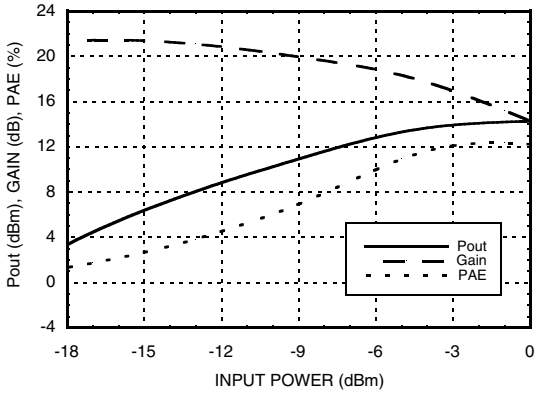
Psat vs. Temperature



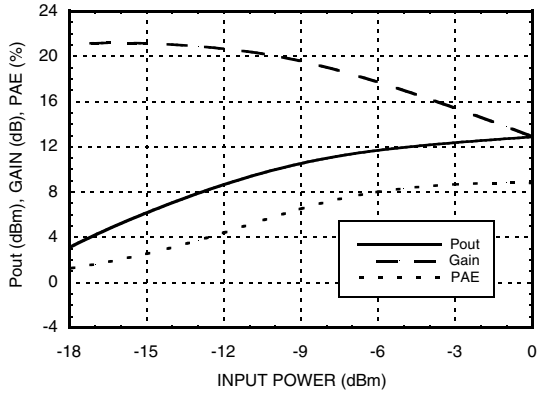
Reverse Isolation vs. Temperature



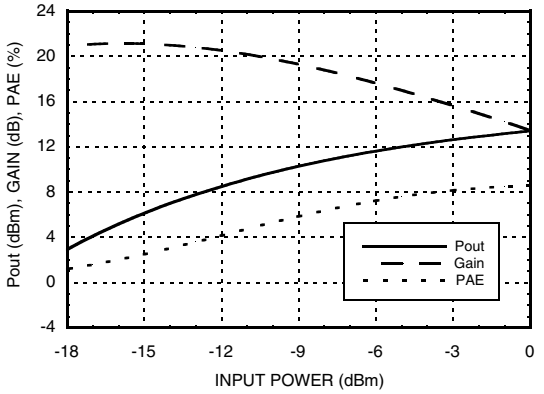
Power Compression @ 8 GHz



Power Compression @ 16 GHz

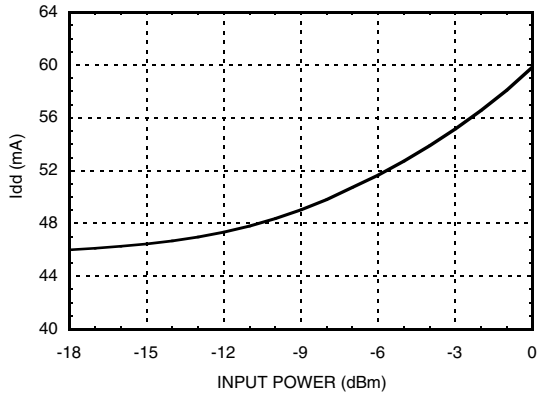


Power Compression @ 24 GHz



GaAs pHEMT MMIC LOW NOISE AMPLIFIER, 6 - 26.5 GHz

Current vs. Input Power @ 16 GHz

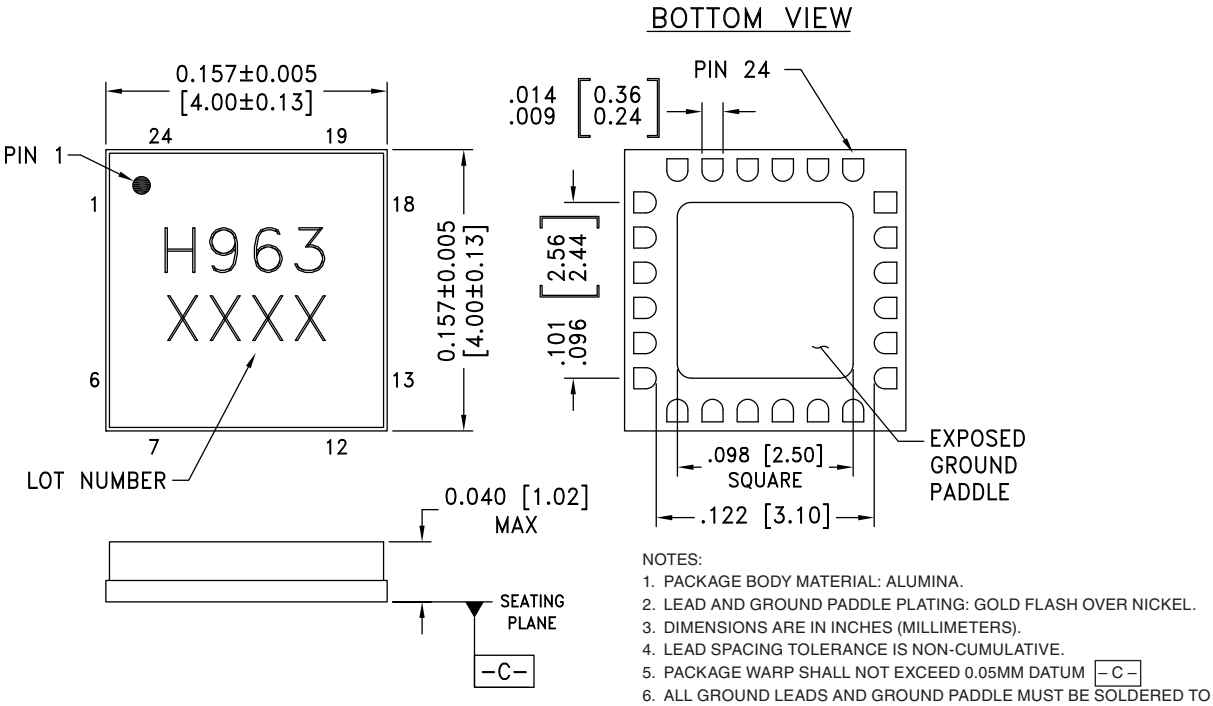


Absolute Maximum Ratings

Drain Bias Voltage	+4V
RF Input Power	0 dBm
Channel Temperature	150 °C
Continuous Pdiss (T = 85 °C) (derate 8 mW/°C above 85 °C)	0.52 W
Thermal Resistance (Channel to ground paddle)	125 °C/W
Storage Temperature	-65 to +150 °C
Operating Temperature	-40 to +85 °C
ESD Sensitivity (HBM)	Class 0 <150 V

ELECTROSTATIC SENSITIVE DEVICE
OBSERVE HANDLING PRECAUTIONS

Outline Drawing



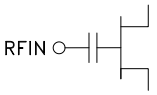
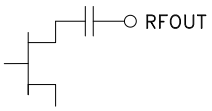
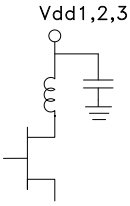
NOTES:
1. PACKAGE BODY MATERIAL: ALUMINA.
2. LEAD AND GROUND PADDLE PLATING: GOLD FLASH OVER NICKEL.
3. DIMENSIONS ARE IN INCHES (MILLIMETERS).
4. LEAD SPACING TOLERANCE IS NON-CUMULATIVE.
5. PACKAGE WARP SHALL NOT EXCEED 0.05MM DATUM [- C -]
6. ALL GROUND LEADS AND GROUND PADDLE MUST BE SOLDERED TO PCB RF GROUND.

Package Information

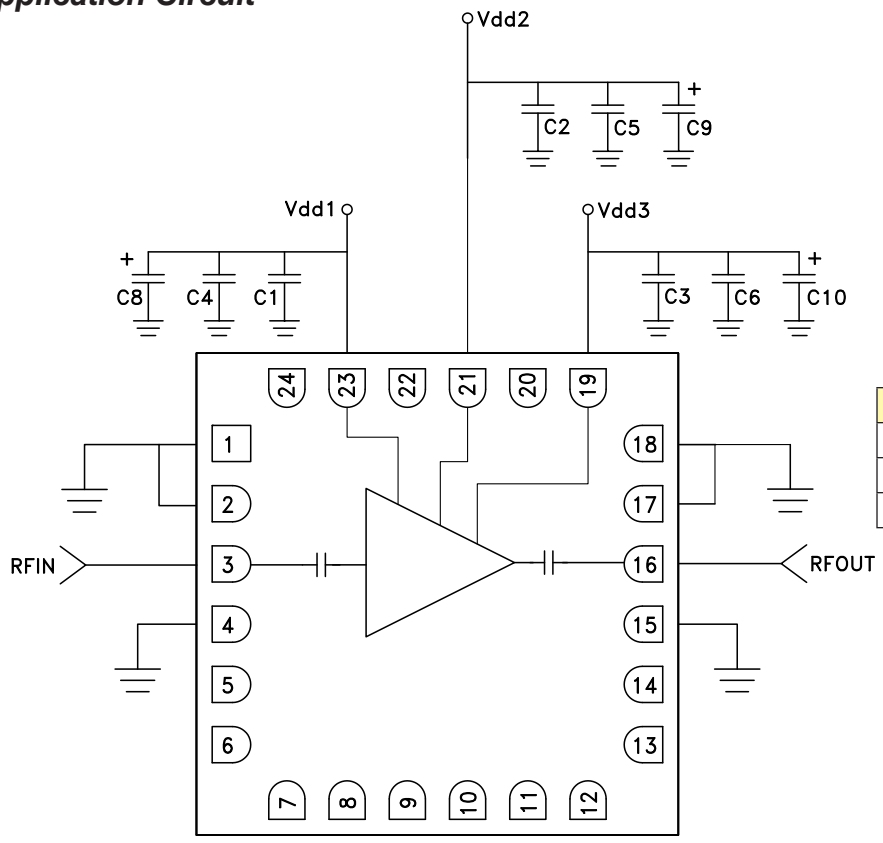
Part Number	Package Body Material	Lead Finish	MSL Rating	Package Marking [2]
HMC963LC4	Alumina, White	Gold over Nickel	MSL3 [1]	H963 XXXX

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

Pin Descriptions

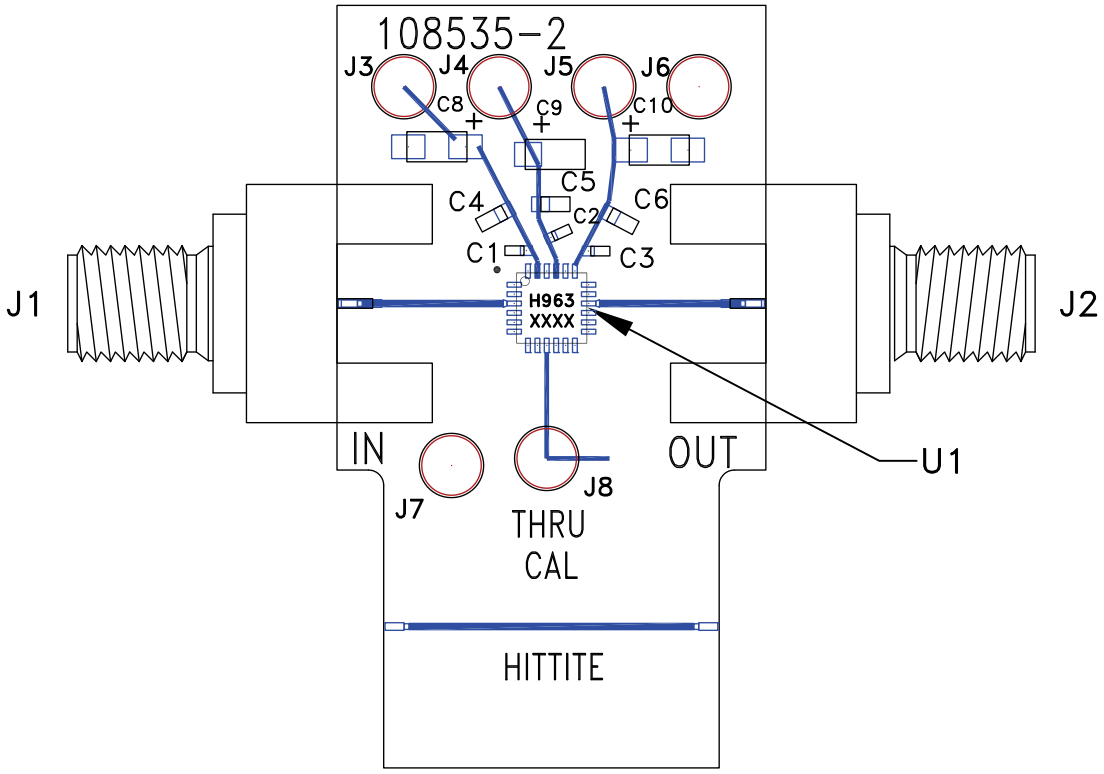
Pin Number	Function	Description	Interface Schematic
1, 2, 4, 15, 17, 18	GND	These pins and package bottom must be connected to RF/DC ground.	
3	RFIN	This pin AC coupled and matched to 50 Ohms	
5 - 14, 20, 22, 24	N/C	No connection necessary. These pins may be connected to RF/DC ground. Performance will not be affected.	
16	RFOUT	This pin AC coupled and matched to 50 Ohms	
19, 21, 23	Vdd1, Vdd2, Vdd3	Power supply voltages for the amplifier. Bypass capacitors are required. See application circuit herein.	

Application Circuit



Capacitor	Value
C1 - C3	100 pF
C4 - C6	1000 pF
C8 - C10	2.2 µF

Evaluation PCB



List of Material for Evaluation PCB EVAL01-HMC963LC4 [1]

Item	Description
J1, J2	2.92 mm Connectors
J3 - J8	DC Pin
C1 - C3	100 pF Capacitor, 0402 Pkg.
C4 - C6	1000 pF Capacitor, 0603 Pkg.
C8 - C10	2.2 µF Capacitor, Tantalum
U1	HMC963LC4 Amplifier
PCB [2]	108535 Evaluation PCB

[1] Reference this number when ordering complete evaluation PCB

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

The circuit board used in this 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 board should be mounted to an appropriate heat sink. The evaluation circuit board shown is available from Analog Devices upon request.