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## GAAS PHEMT MMIC LOW NOISE AMPLIFIER, 18 - 31 GHz

#### **Typical Applications**

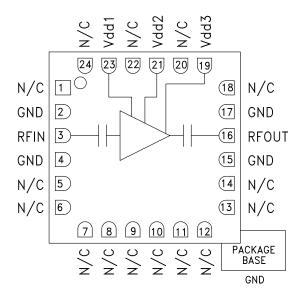
The HMC519LC4 is ideal for:

- Point-to-Point Radios
- Point-to-Multi-Point Radios & VSAT
- Test Equipment & Sensors
- Military & Space

#### Features

Noise Figure: 3.5 dB Gain: 14 dB Output IP3: +23 dBm Single Supply: +3V @ 75 mA 50 Ohm Matched Input/Output 24 Lead Ceramic 4x4mm SMT Package: 16mm<sup>2</sup>

#### Functional Diagram



#### **General Description**

The HMC519LC4 is a high dynamic range GaAs pHEMT MMIC Low Noise Amplifier (LNA) housed in a leadless 4 x 4 mm ceramic surface mount package. The amplifier operates between 18 and 31 GHz, providing 14 dB of small signal gain, 3.5 dB noise figure and output IP3 of +23 dBm, while requiring only 75 mA from a +3V single supply. The P1dB output power of +11 dBm, enables the LNA to function as a LO driver for balanced, I/Q or image reject mixers. The HMC519LC4 also features I/Os that are DC blocked and internally matched to 50 Ohms, making it ideal for microwave radio and VSAT applications.

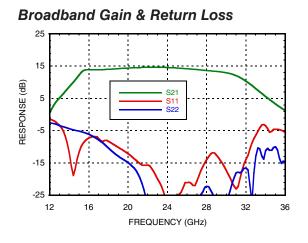
#### Electrical Specifications, $T_A = +25^{\circ}$ C, Vdd 1, 2, 3 = +3V

Parameter	Min.	Тур.	Max.	Min.	Тур.	Max.	Units
Frequency Range		18 - 28		28 - 31		GHz	
Gain	11.4	14.4		10.2	13.2		dB
Gain Variation Over Temperature		0.016	0.026		0.016	0.026	dB/ °C
Noise Figure		3.5	5.5		3	5	dB
Input Return Loss		15			17		dB
Output Return Loss		20			22		dB
Output Power for 1 dB Compression (P1dB)	8	11		9.2	12.2		dBm
Saturated Output Power (Psat)		14			15.4		dBm
Output Third Order Intercept (IP3)		23			24		dBm
Supply Current (Idd)		75	95		75	95	mA

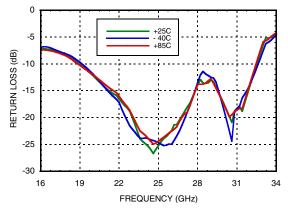
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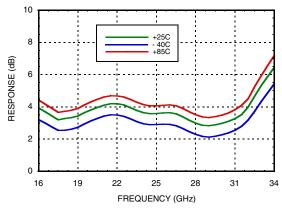
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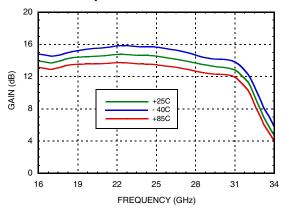
Input Return Loss vs. Temperature



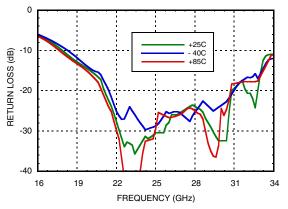
Noise Figure vs. Temperature



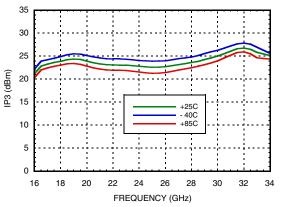
Gain vs. Temperature



Output Return Loss vs. Temperature

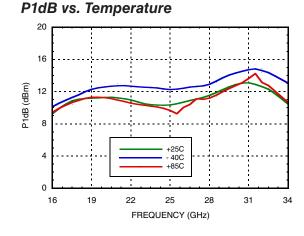


Output IP3 vs. Temperature

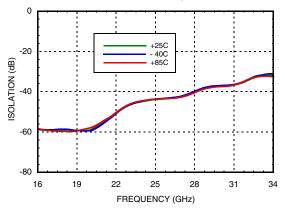




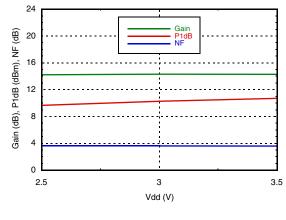
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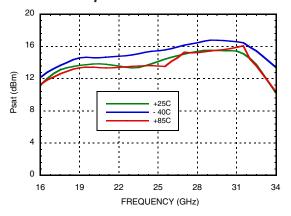
**Reverse Isolation vs. Temperature** 



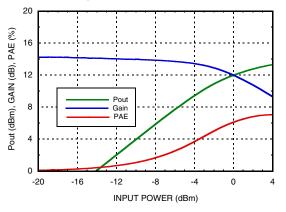
Gain, Noise Figure & Power vs. Supply Voltage @ 24 GHz



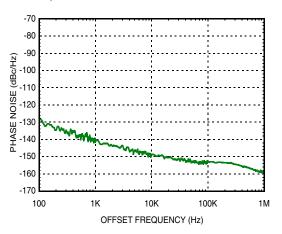
Psat vs. Temperature



Power Compression @ 24 GHz



Additive Phase Noise Vs Offset Frequency, RF Frequency = 26.5 GHz, RF Input Power = 5 dBm (Psat)



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



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### GAAS PHEMT MMIC LOW NOISE AMPLIFIER, 18 - 31 GHz

#### Absolute Maximum Ratings

Drain Bias Voltage (Vdd1, Vdd2, Vdd3)	+3.5 Vdc		
RF Input Power (RFIN)(Vdd = +3.0 Vdc)	+20 dBm		
Channel Temperature	175 °C		
Continuous Pdiss (T= 85 °C) (derate 13 mW/°C above 85 °C)	1.2 W		
Thermal Resistance (channel to package bottom)	76.9 °C/W		
Storage Temperature	-65 to 150 °C		
Operating Temperature	-40 to 85 °C		
ESD Sensitivity (HBM)	Class 1B		

#### Typical Supply Current vs. Vdd

Vdd (V)	ldd (mA)		
2.5	72		
3.0	75		
3.5	78		

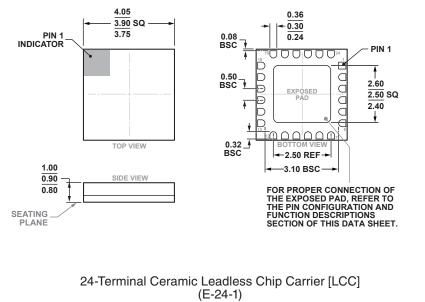
Note: Amplifier will operate over full voltage ranges shown above.



ELECTROSTATIC SENSITIVE DEVICE OBSERVE HANDLING PRECAUTIONS

12-27-2017-B

#### **Outline Drawing**



Dimensions shown in millimeters.

#### **Package Information**

Part Number	Package Body Material	Lead Finish	MSL Rating	Package Marking <sup>[2]</sup>
HMC519LC4	Alumina, White	Gold over Nickel	MSL3 <sup>[1]</sup>	H519 XXXX
[1] Max peak reflew temperature of 260 °C				

Max peak reflow temperature of 260 °C
4-Digit lot number XXXX

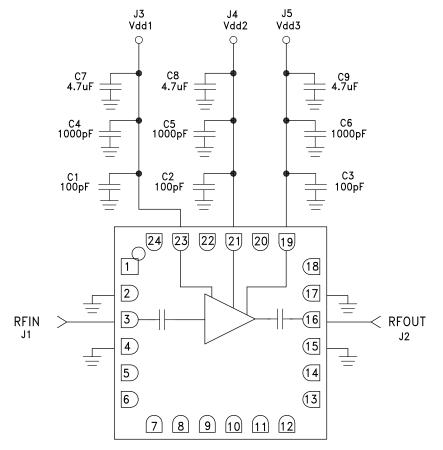


## GAAS PHEMT MMIC LOW NOISE AMPLIFIER, 18 - 31 GHz

#### **Pad Descriptions**

Pad Number	Function	Description	Interface Schematic
1, 5 - 14, 18, 20, 22, 24	N/C	Not Connected	
2, 4, 15, 17	GND	Package bottom has exposed metal paddle that must be connected to RF/DC ground.	⊖ GND 
3	RFIN	This pad is AC coupled and matched to 50 Ohms	
16	RFOUT	This pad is AC coupled and matched to 50 Ohms	
19, 21, 23	Vdd3, Vdd2, Vdd1	Power Supply Voltage for the amplifier. See application circuit for required external components.	0Vdd1,2,3 

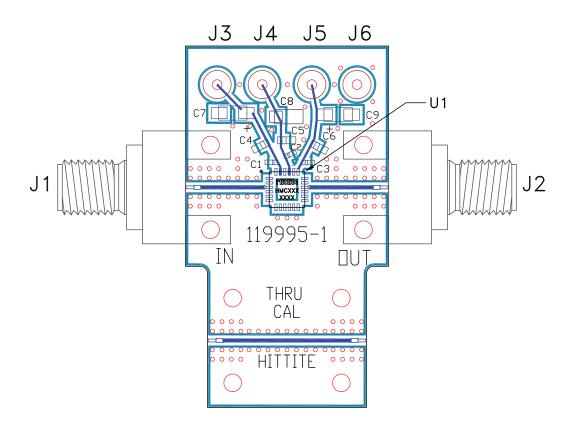
#### **Application Circuit**





### GAAS PHEMT MMIC LOW NOISE AMPLIFIER, 18 - 31 GHz

#### **Evaluation PCB**



#### List of Material for Evaluation PCB 119667 [1]

Item	Description	
J1, J2	2.92mm PCB mount K-Connector	
J3 - J6	DC Pin	
C1, C2, C3	100pF Capacitor, 0402 Pkg.	
C4, C5, C6	1000pF Capacitor, 0603 Pkg.	
C7, C8, C9	4.7 μF Capacitor, Tantalum	
U1	HMC519LC4 Amplifier	
PCB [2]	11995 Evaluation PCB	

Reference this number when ordering complete evaluation PCB
Circuit Board Material: Rogers 4350.

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.

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Analog Devices Inc.: 119667-HMC519LC4