

LOW NOISE AMPLIFIER with AGC 5.0 - 6.0 GHz

FEBRUARY 2001

v00.0900

Features

- LNA with 18 dB Gain Control
- +3V Operation
- Low Noise Figure: 2.5 dB
- No External Components
- Ultra Small 8 Lead MSOP:
14.8 mm² x 1mm High



General Description

The HMC318MS8G is a surface mount low cost C-band variable gain low noise amplifier (VGLNA) that serves the full UNII and HiperLAN bands. The HMC318MS8G operates using a single positive supply that can be set between +3V or +5V. When a control voltage of 0V to +3V is applied, the gain of the amplifier will decrease while maintaining excellent return loss performance. A maximum gain of 9 dB is achieved when VCTL is set to 0V and a minimum gain of -9 dB is achieved when Vctl is set to +3V.

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Guaranteed Performance, $V_{dd} = +3V, -40$ to $+85$ deg C

Parameter *	Min.	Typ.	Max.	Units
Frequency Range	5.0 - 6.0			GHz
Gain @ 25°C	6	9	12	dB
Gain Variation over Temperature		0.03	0.04	dB/ °C
Gain Control Range	11	18	23	dB
Noise Figure		2.5	4.0	dB
Input Return Loss	6	12		dB
Output Return Loss	7	13		dB
Output Power for 1dB Compression (P1dB)	-1	2		dBm
Output Third Order Intercept (OIP3)	10	13		dBm
Recommended Supply Voltage (Vdd)	2.75	3.0	3.25	Vdc
Supply Current (Idd)		6	10	mA

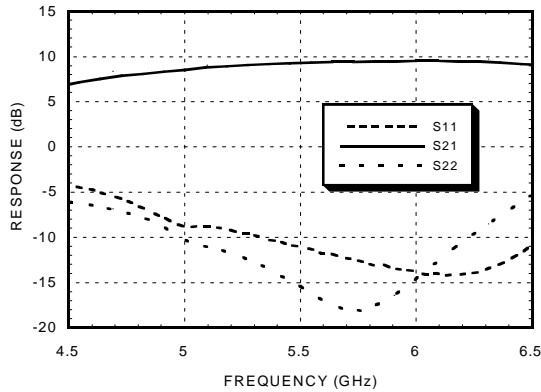
* Specifications refer to the maximum gain state ($V_{ctl} = 0V$) unless otherwise noted.

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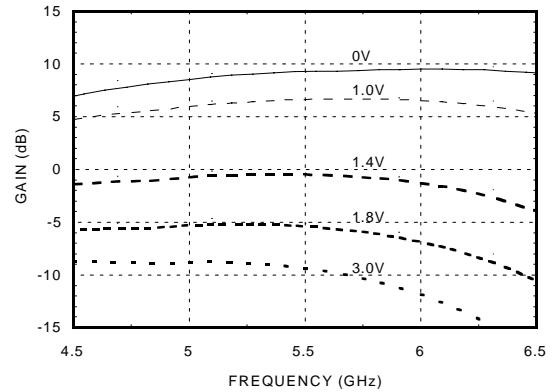
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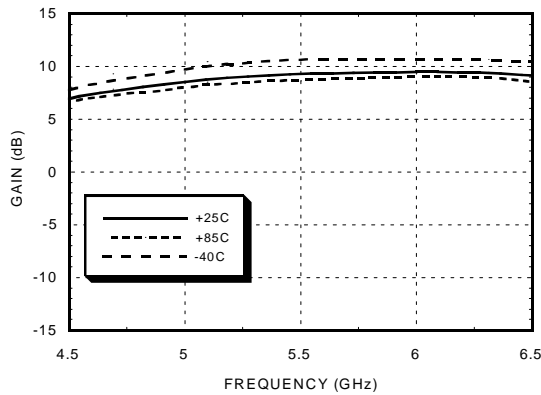
Gain & Return Loss, $V_{ctl} = 0V$



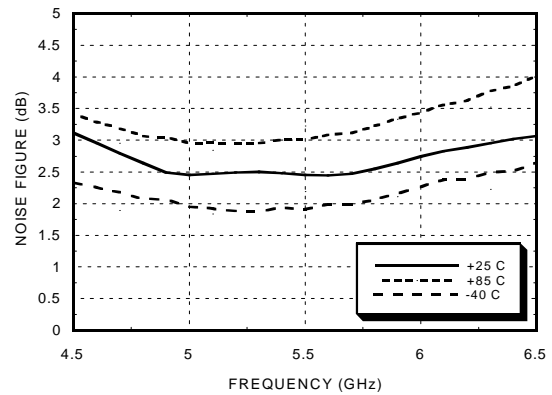
Gain over Control Range



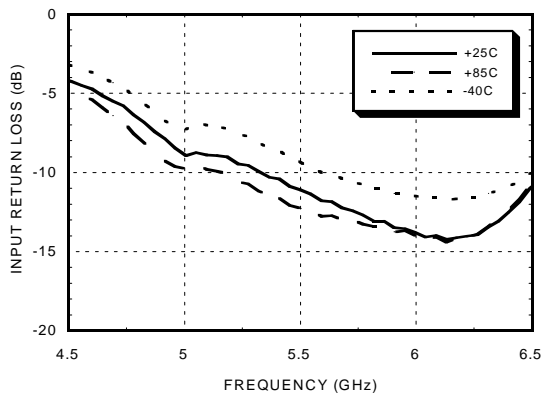
Gain vs. Temperature, $V_{ctl} = 0V$



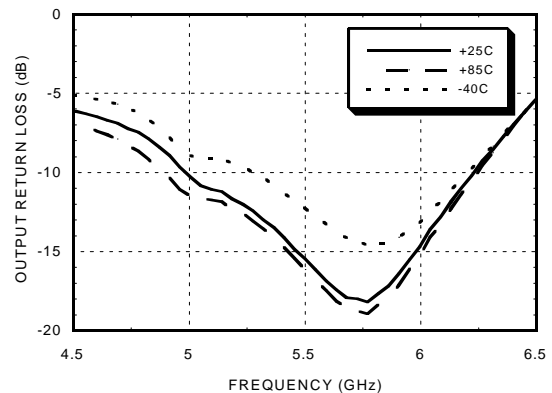
Noise Figure vs. Temperature, $V_{ctl} = 0V$



Input Return Loss vs. Temperature, $V_{ctl} = 0V$



Output Return Loss vs. Temperature, $V_{ctl} = 0V$



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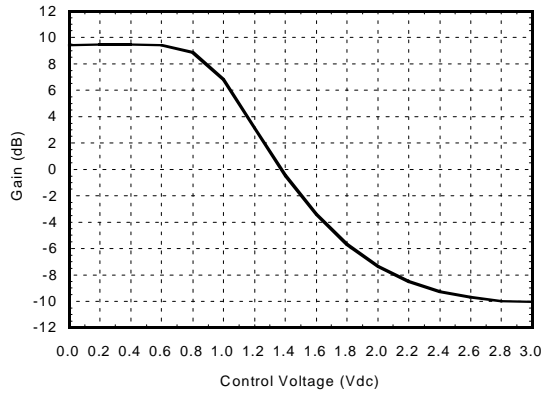
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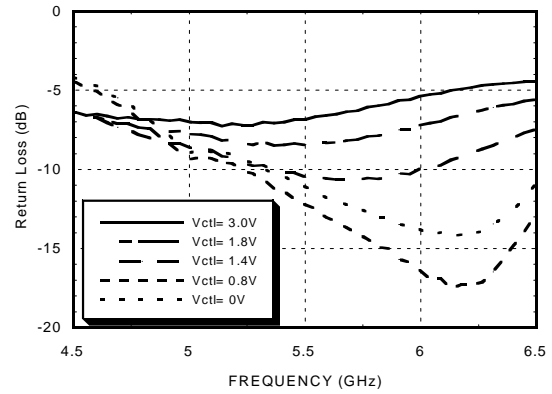
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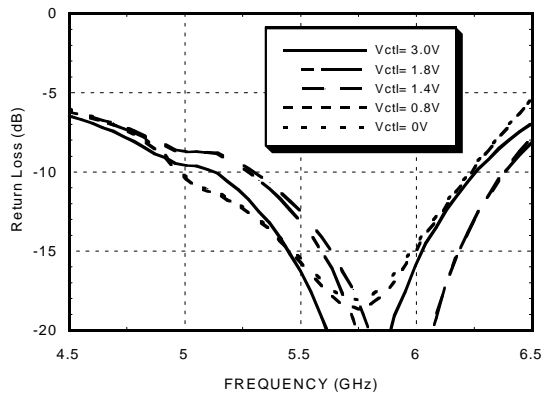
Gain vs. Control Voltage @ 5.8 GHz



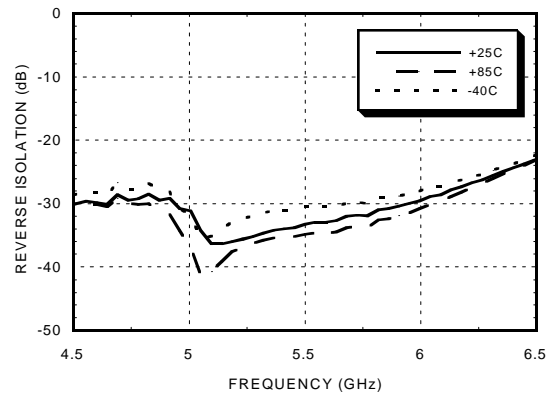
Input Return Loss over Control Range



Output Return Loss over Control Range



Reverse Isolation vs. Temperature, Vctl = 0V



Noise Figure and OIP3 vs. Control Voltage

Frequency = 5.8 GHz		
VCTL	Noise Figure (dB)	OIP3 (dBm)*
0V	2.5	13.0
1.4V	4.5	1.2
3.0V	10.5	-6.7

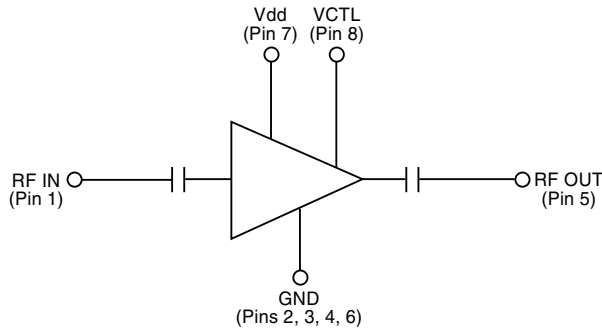
* Two-tone input power = -20 dBm per tone.

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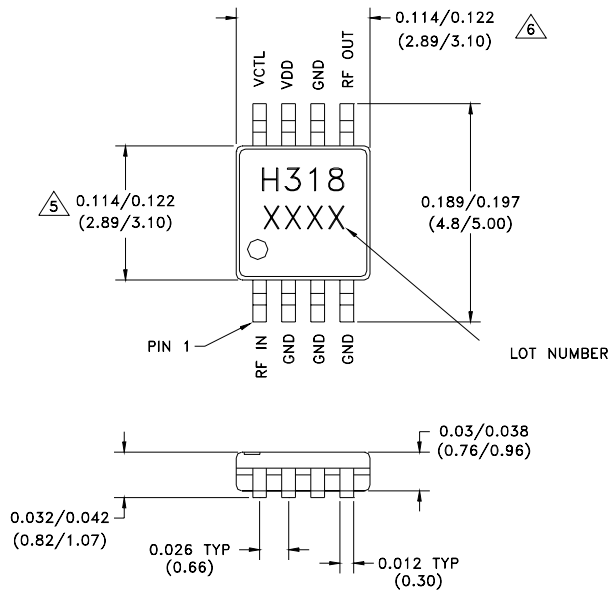
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Functional Diagram



Note: Internal DC Blocks on RF I/O's are included on HMC318MS8G

Outline



Absolute Maximum Ratings

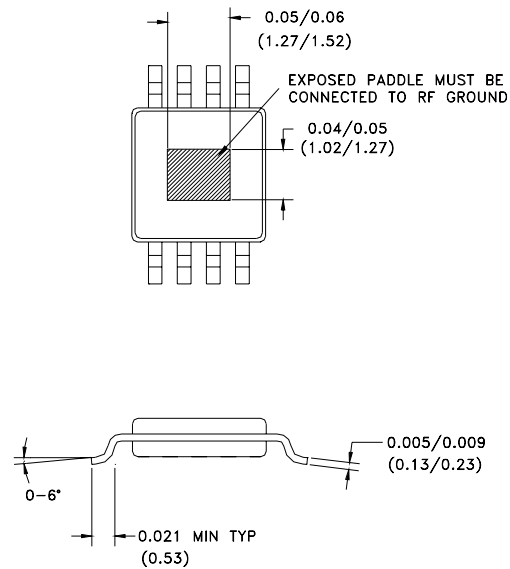
Supply Voltage (Vdd)	+7.0 Vdc
Control Voltage Range (CTL)	-0.2V to Vdd
Input Power	0 dBm
Channel Temperature (Tc)	175 °C
Continuous P _{diss} (T _a = 85 °C) (derate 9.76 mW/°C above 85 °C)	878 mW
Storage Temperature	-65 to +150 °C
Operating Temperature	-55 to +85 °C

Gain Control

VCTL (Vdc)	Gain State	Typical I _{CTL} (µA)
0	Maximum	25
Vdd	Minimum	25

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- MATERIAL:
A) PACKAGE BODY - LOW STRESS INJECTION MOLDED PLASTIC, SILICA & SILICONE IMPREGNATED.
B) LEADFRAME MATERIAL: COPPER ALLOY
- PLATING: LEAD - TIN SOLDER PLATE
- DIMENSIONS ARE IN INCHES (MILLIMETERS).
UNLESS OTHERWISE SPECIFIED ALL TOL. ARE ±0.005 (±0.13).
- CHARACTERS TO BE HELVETICA MEDIUM, APPROX. .020 HIGH WHITE INK, LOCATED APPROXIMATELY AS SHOWN.
 DIMENSION DOES NOT INCLUDE MOLDFLASH OF 0.15 MM PER SIDE
 DIMENSION DOES NOT INCLUDE MOLDFLASH OF 0.25 MM PER SIDE

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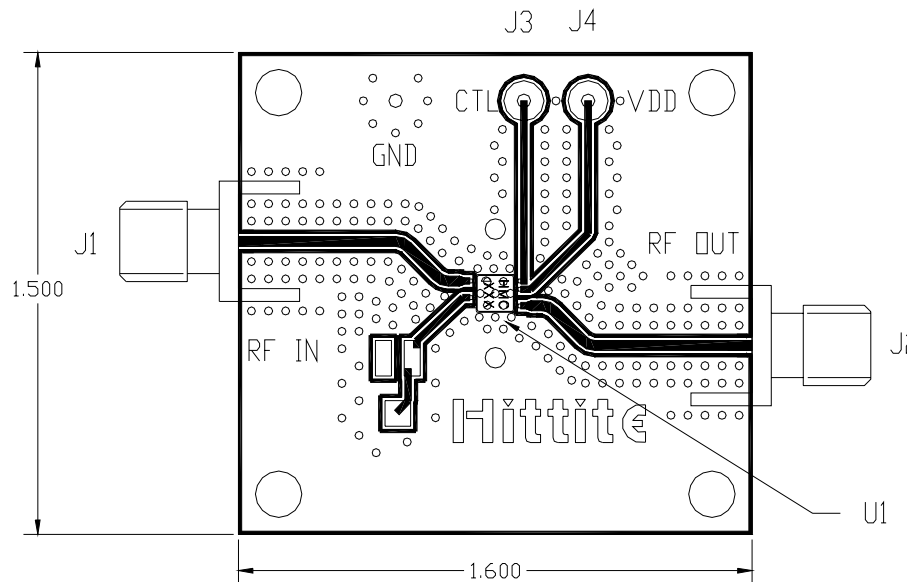
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Evaluation PCB for HMC318MS8G

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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 above. A sufficient number of VIA holes should be used to connect the top and bottom ground planes. The evaluation circuit board as shown is available from Hittite upon request.

Evaluation Circuit Board Layout Design Details

Item	Description
J1, J2	PC Mount SMA Connector
J3, J4	DC Pin
U1	HMC318MS8G Amplifier
PCB*	Evaluation PCB 1.6" x 1.5"
*Circuit Board Material: Rogers 4350	

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NOTES:

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