



GaAs PHEMT MMIC MEDIUM POWER AMPLIFIER, 6 - 18 GHz

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AMPLIFIERS - SMT

Typical Applications

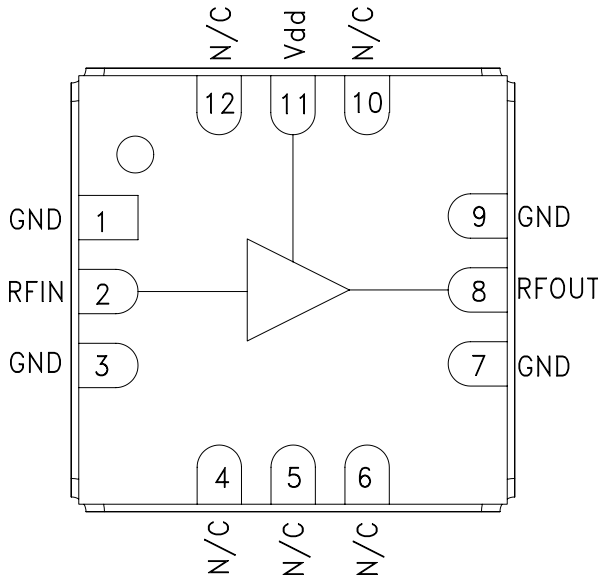
The HMC441LC3B is ideal for use as a medium power amplifier for:

- Point-to-Point Radios
- Point-to-Multi-Point Radios & VSAT
- LO Driver for HMC Mixers
- Military EW & ECM

Features

- Gain: 17 dB
- Saturated Power: +22 dBm @ 27% PAE
- Single Supply Voltage: +5.0 V
- 50 Ohm Matched Input/Output
- RoHS Compliant 3 x 3 mm SMT package

Functional Diagram



General Description

The HMC441LC3B is an efficient GaAs PHEMT MMIC Medium Power Amplifier housed in a leadless “Pb free” RoHS compliant SMT package. Operating between 6.0 and 18.0 GHz, the amplifier provides 17 dB of gain, +22 dBm of saturated power and 27% PAE from a +5.0 V supply voltage. This 50 Ohm matched amplifier does not require any external components, making it an ideal linear gain block or driver for HMC SMT mixers. The HMC441LC3B allows the use of surface mount manufacturing techniques.

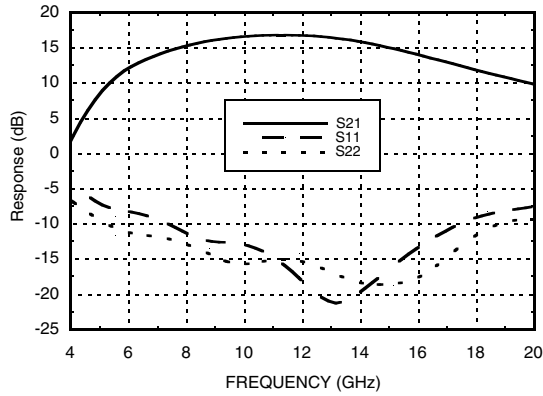
Electrical Specifications, $T_A = +25^\circ C$, $V_{dd} = +5V$

Parameter	Min.	Typ.	Max.	Min.	Typ.	Max.	Min.	Typ.	Max.	Min.	Typ.	Max.	Units
Frequency Range	6.0 - 8.5			8.5 - 12.5			12.5 - 14.0			14.0 - 18.0			GHz
Gain	10	14		13	17		14	17		10	14		dB
Gain Variation Over Temperature		0.015	0.02		0.015	0.02		0.015	0.02		0.015	0.02	dB/ °C
Input Return Loss		10			13			20			13		dB
Output Return Loss		12			15			17			14		dB
Output Power for 1 dB Compression (P1dB)	16	19		17	20		17	20		17	20		dBm
Saturated Output Power (Psat)		20			21.5			22.5			21.5		dBm
Output Third Order Intercept (IP3)		30			32			32			32		dBm
Noise Figure		4.5			4.5			4.5			4.5		dB
Supply Current (Idd)		95			95			95			95		mA

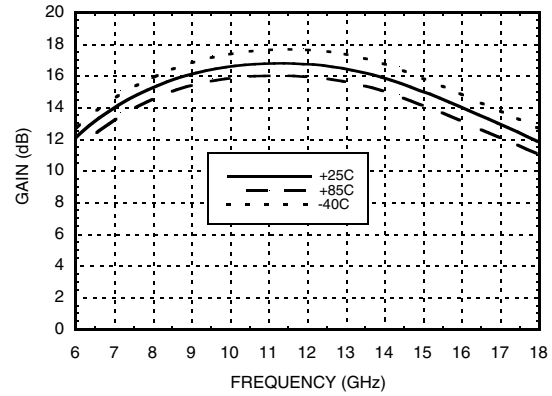
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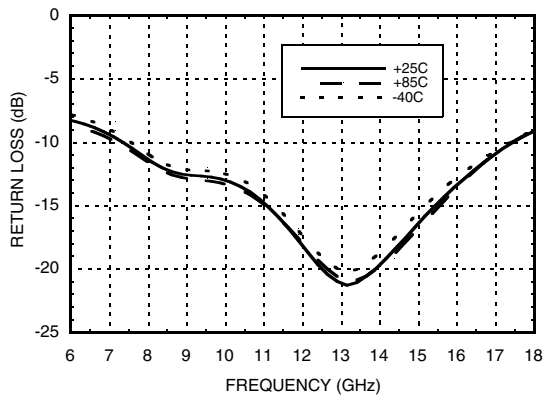
Broadband Gain & Return Loss



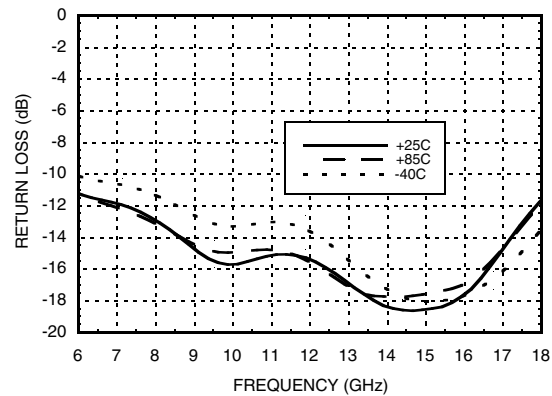
Gain vs. Temperature



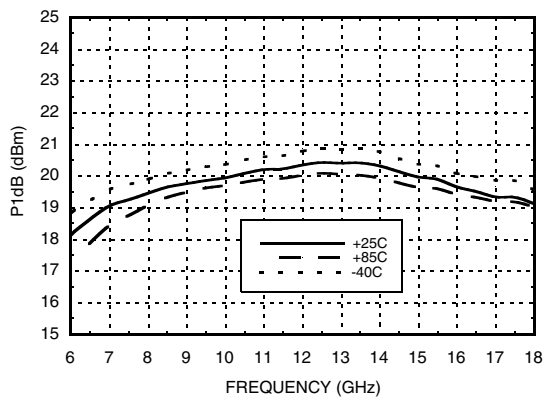
Input Return Loss vs. Temperature



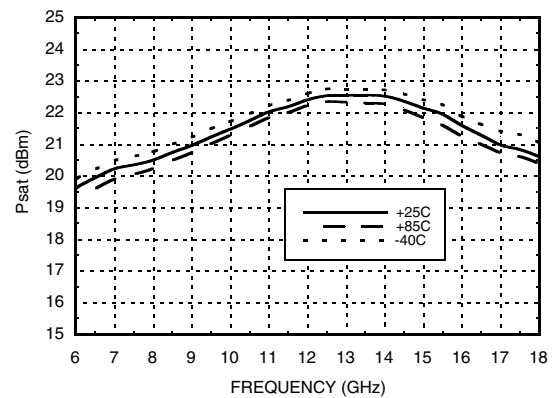
Output Return Loss vs. Temperature



P1dB vs. Temperature



Psat vs. Temperature



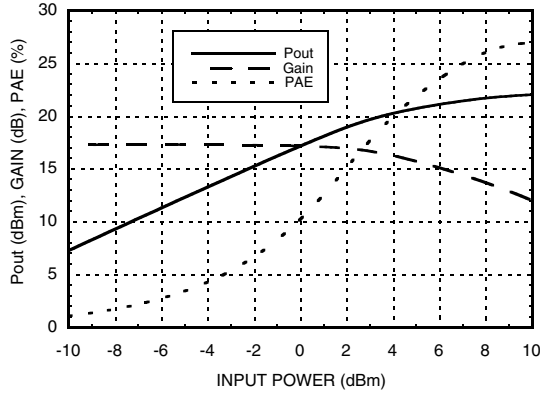
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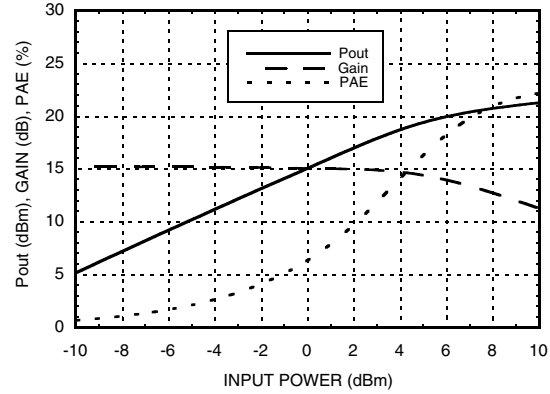
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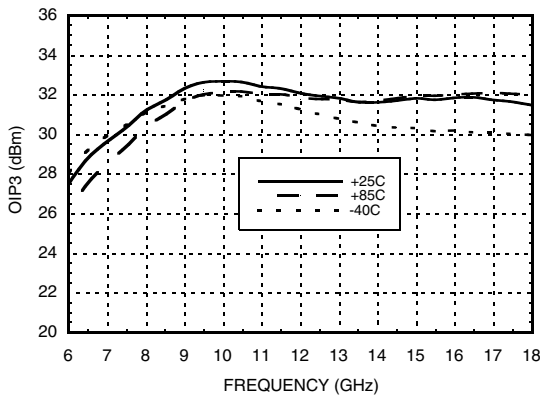
Power Compression @ 11 GHz



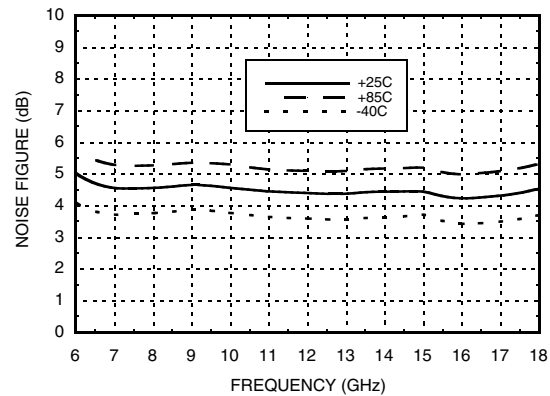
Power Compression @ 15 GHz



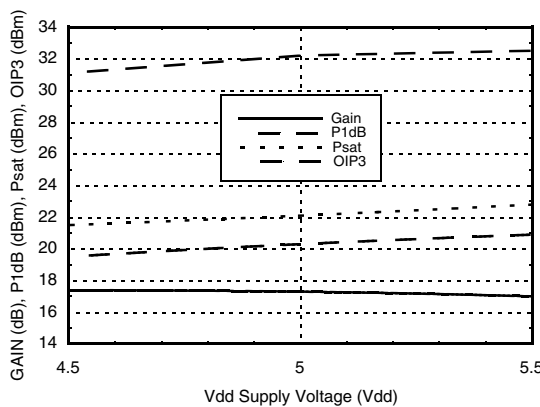
Output IP3 vs. Temperature



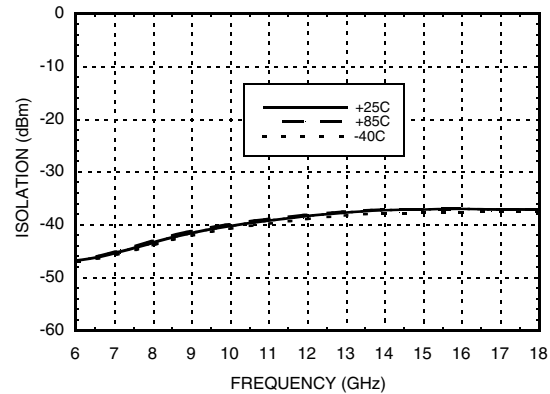
Noise Figure vs. Temperature



Gain, Power & OIP3 vs. Supply Voltage @ 11 GHz



Reverse Isolation vs. Temperature



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Absolute Maximum Ratings

Drain Bias Voltage (Vdd)	+6.0 Vdc
RF Input Power (RFIn)(Vdd = +5.0 Vdc)	+20 dBm
Channel Temperature	150 °C
Continuous Pdiss (T = 85 °C) (derate 10 mW/°C above 85 °C)	0.65 W
Thermal Resistance (channel to ground paddle)	100 °C/W
Storage Temperature	-65 to +150 °C
Operating Temperature	-40 to +85 °C
ESD Sensitivity (HBM)	Class 1A

Typical Supply Current vs. Vdd

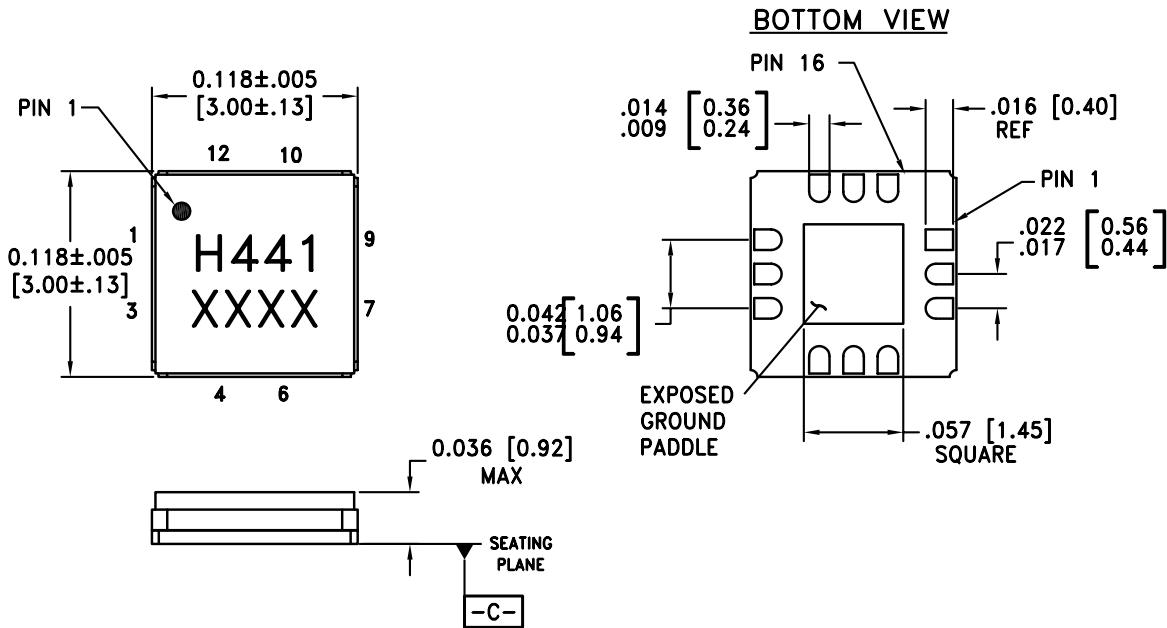
Vdd (V)	Idd (mA)
+5.5	96
+5.0	95
+4.5	94

Note: Amplifier will operate over full voltage range shown above



ELECTROSTATIC SENSITIVE DEVICE
OBSERVE HANDLING PRECAUTIONS

Outline Drawing



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



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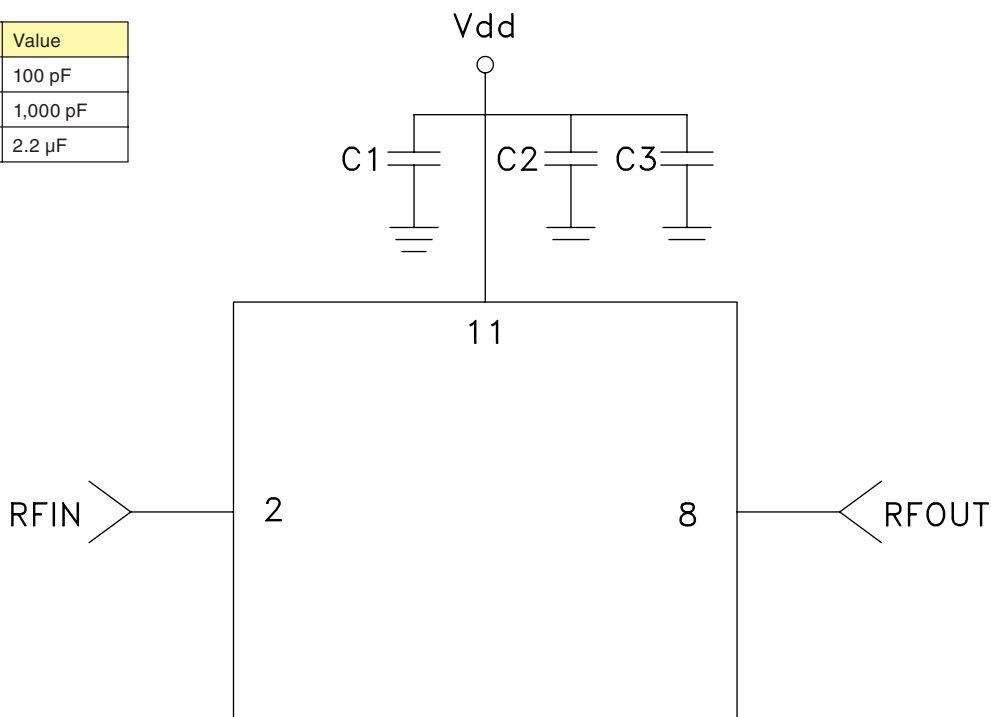
AMPLIFIERS - SMT

Pin Descriptions

Pin Number	Function	Description	Interface Schematic
1, 3, 7, 8	GND	Package bottom must also be connected to RF/DC ground	
2	RFIN	This pin is AC coupled and matched to 50 Ohms from 6 - 18 GHz.	
4 - 6, 10 - 12	N/C	This pin may be connected to RF/DC ground. Performance will not be affected.	
8	RFOUT	This pin is AC coupled and matched to 50 Ohms from 6 - 18 GHz.	
11	Vdd	Power Supply Voltage for the amplifier. External bypass capacitors are required.	

Application Circuit

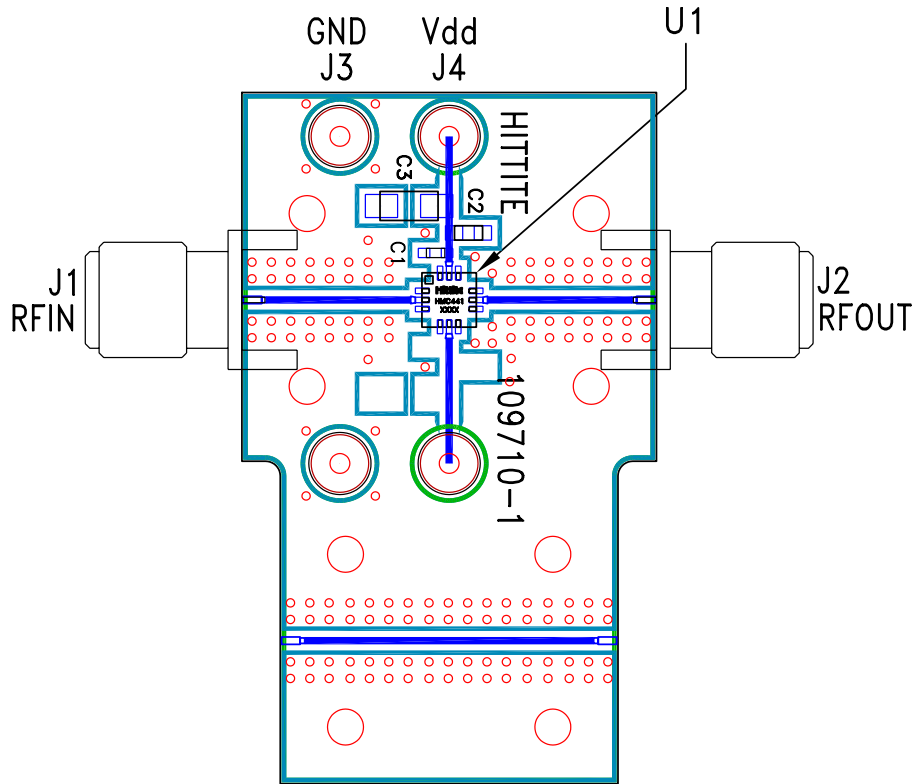
Component	Value
C1	100 pF
C2	1,000 pF
C3	2.2 μF





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Evaluation PCB



List of Material for Evaluation PCB 109712*

Item	Description
J1 - J2	PC Mount SMA Connector
J3 - J4	DC Pin
C1	100 pF Capacitor, 0402 Pkg.
C2	1000 pF Capacitor, 0603 Pkg.
C3	2.2 μ F Capacitor, Tantalum
U1	HMC441LC3B Amplifier
PCB*	109710 Evaluation PCB, 10 mils

** Circuit Board Material: Rogers 4350

** Reference this number when ordering complete evaluation PCB

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 board should be mounted to an appropriate heat sink. The evaluation circuit board shown is available from Hittite upon request.