

GaAs pHEMT MMIC MEDIUM POWER AMPLIFIER, 6 - 18 GHz

Typical Applications

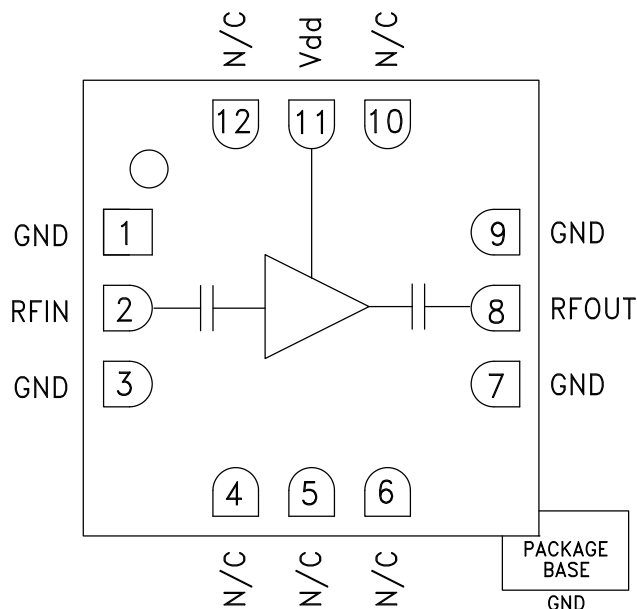
The HMC441LC3B is ideal for use as a medium power amplifier for:

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

Features

- Gain: 14 dB
- Saturated Output Power: +21.5 dBm @ 27% PAE
- Single Positive Supply: +5V @ 90 mA
- 50 Ohm Matched Input/Output
- 12 Lead Ceramic 3x3mm SMT Package: 9mm²

Functional Diagram



General Description

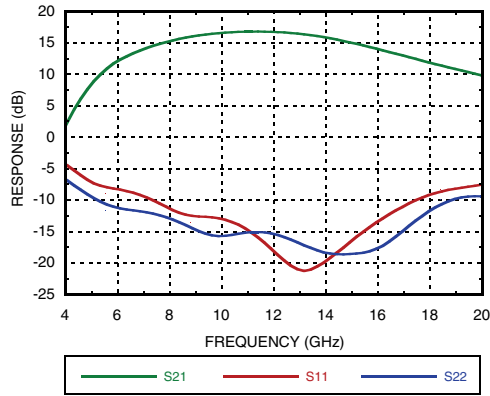
The HMC441LC3B is an efficient GaAs PHEMT MMIC Medium Power Amplifier housed in a leadless RoHS compliant SMT package. Operating between 6 and 18 GHz, the amplifier provides 14 dB of gain, +21.5 dBm of saturated power and 27% PAE from a +5V supply. This 50 Ohm matched amplifier does not require any external components and operates from a single positive supply, making it an ideal linear gain block or driver for HMC SMT mixers. The HMC441LC3B is compatible with high volume surface mount manufacturing techniques, and the I/Os are DC blocked for further ease of integration.

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

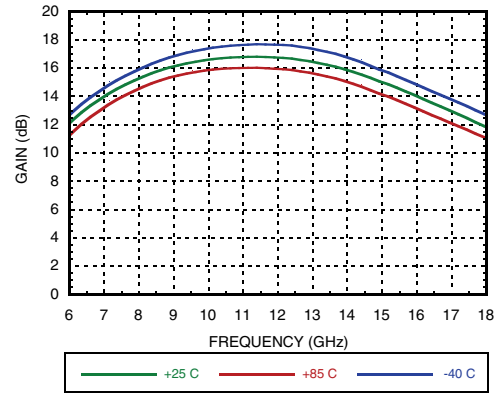
| Parameter | Min. | Typ. | Max. | Min. | Typ. | Max. | Min. | Typ. | Max. | Min. | Typ. | Max. | Units |
|--|-----------|-------|------|------------|-------|------|-------------|-------|------|-------------|-------|------|-------|
| Frequency Range | 6.0 - 8.5 | | | 8.5 - 12.5 | | | 12.5 - 14.0 | | | 14.0 - 18.0 | | | GHz |
| Gain | 10 | 14 | 19 | 13 | 17 | 21 | 13 | 17 | 21 | 10 | 14 | 19 | 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) | 28 | 30 | | 29 | 32 | | 29 | 32 | | 29 | 32 | | dBm |
| Noise Figure | | 4.5 | 6 | | 4.5 | 6 | | 4.5 | 6 | | 4.5 | 6 | dB |
| Supply Current (I _{dd}) | | 90 | 115 | | 90 | 115 | | 90 | 115 | | 90 | 115 | mA |

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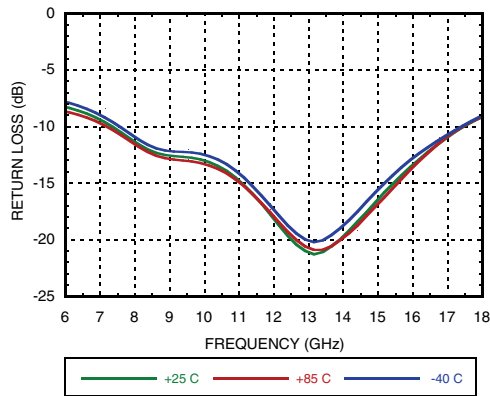
Broadband Gain & Return Loss



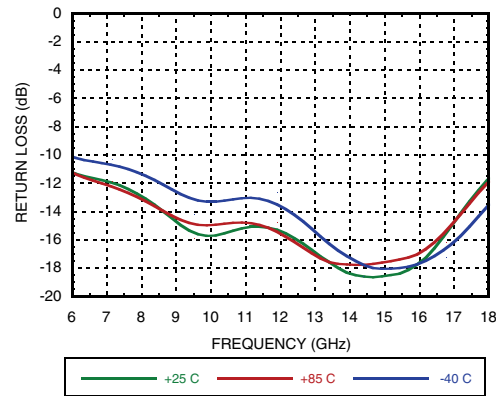
Gain vs. Temperature



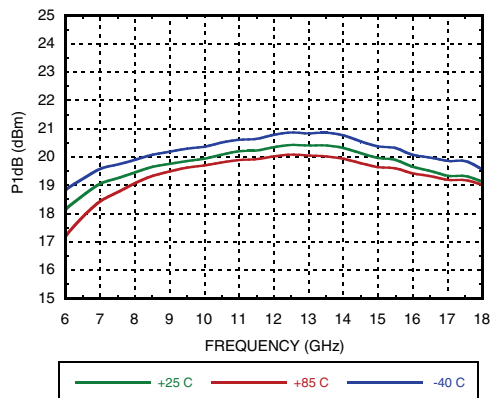
Input Return Loss vs. Temperature



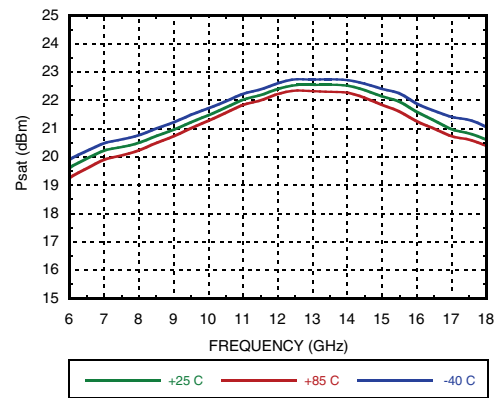
Output Return Loss vs. Temperature



P1dB vs. Temperature

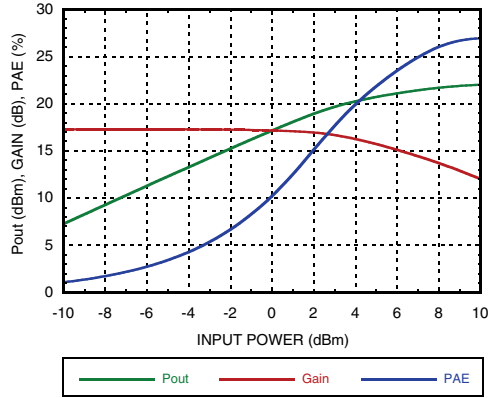


Psat vs. Temperature

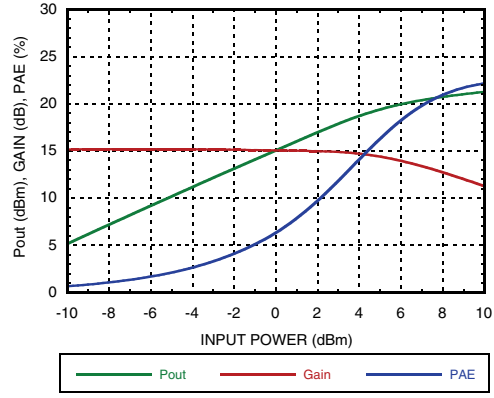


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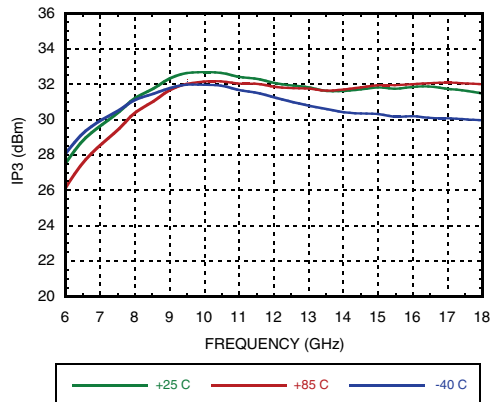
Power Compression @ 11 GHz



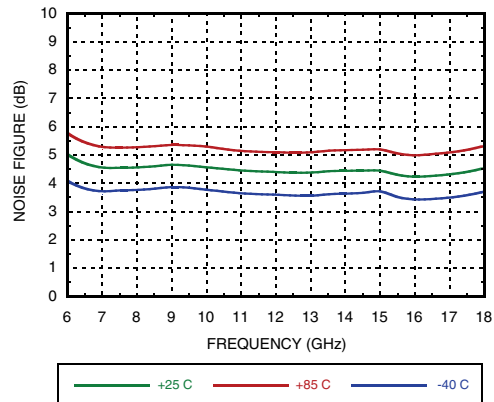
Power Compression @ 15 GHz



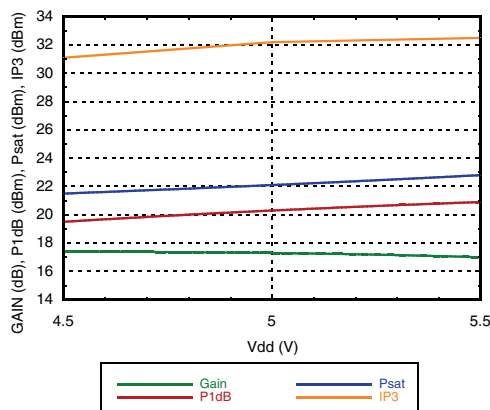
Output IP3 vs. Temperature



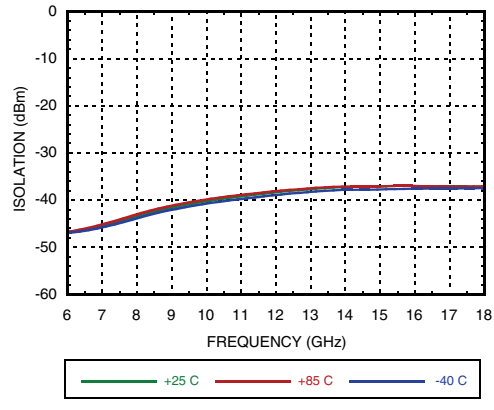
Noise Figure vs. Temperature



Gain, Power & Output IP3 vs. Supply Voltage @ 11 GHz

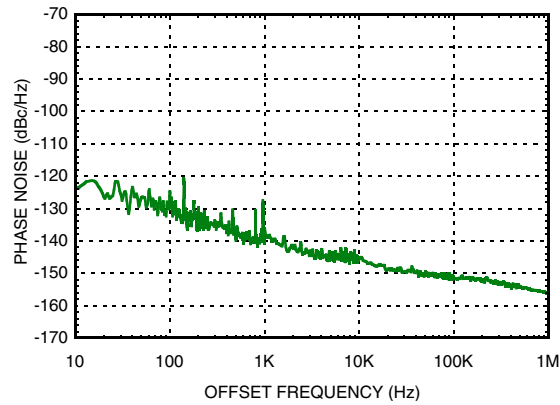


Reverse Isolation vs. Temperature



**GaAs pHEMT MMIC MEDIUM
POWER AMPLIFIER, 6 - 18 GHz**

**Additive Phase Noise Vs Offset Frequency,
RF Frequency = 8 GHz,
RF Input Power = 5 dBm (P1dB)**



Notes:

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Absolute Maximum Ratings

| | |
|--|----------------------|
| Drain Bias Voltage (Vdd) | +6 Vdc |
| RF Input Power (RFIN)(Vdd = +5 Vdc) | +15 dBm |
| Channel Temperature | 175 °C |
| Continuous P _{diss} (T = 85 °C) (derate 8.2 mW/°C above 85 °C) | 0.74 W |
| Thermal Resistance (channel to ground paddle) | 122 °C/W |
| Storage Temperature | -65 to +150 °C |
| Operating Temperature | -40 to +85 °C |
| ESD Sensitivity (HBM) | Class 0, Passed 100V |

Typical Supply Current vs. Vdd

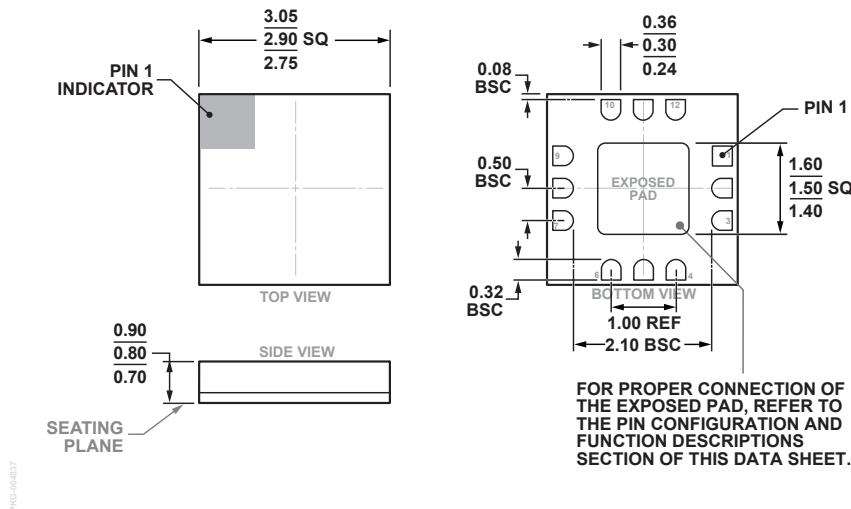
| Vdd (V) | I _{dd} (mA) |
|---------|----------------------|
| +5.5 | 92 |
| +5.0 | 90 |
| +4.5 | 88 |

Note: Amplifier will operate over full voltage range shown above



**ELECTROSTATIC SENSITIVE DEVICE
OBSERVE HANDLING PRECAUTIONS**

Outline Drawing



12-Terminal Ceramic Leadless Chip Carrier [LCC]
(E-12-4)
Dimensions shown in millimeters

Package Information

| Part Number | Package Body Material | Lead Finish | MSL Rating | Package Marking ^[2] |
|-------------|-----------------------|------------------|---------------------|--------------------------------|
| HMC441LC3B | Alumina, White | Gold over Nickel | MSL3 ^[1] | H441 XXXX |

[1] Max peak reflow temperature of 260 °C

[2] 4-Digit lot number XXXX

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Pin Descriptions

| Pin Number | Function | Description | Interface Schematic |
|-----------------|----------|--|---------------------|
| 1, 3, 7, 9 | GND | Package bottom must also be connected to RF/DC ground | |
| 2 | RFIN | This pin is AC coupled and matched to 50 Ohms. | |
| 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. | |
| 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 |

