HMC407MS8G

GaAs InGaP HBT MMIC POWER AMPLIFIER, 5.0 - 7.0 GHz

Typical Applications

This amplifier is ideal for use as a power amplifier for 5.0 - 7.0 GHz applications:

- UNII
- HiperLAN

Features

Gain: 15 dB

Saturated Power: +29 dBm

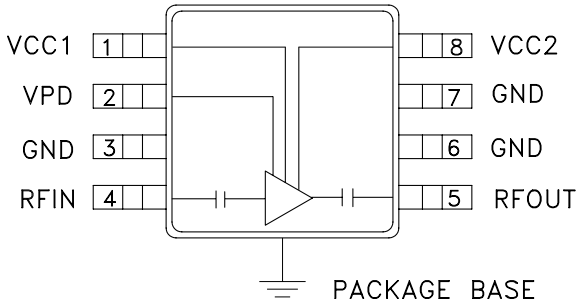
28% PAE

Supply Voltage: +5.0 V

Power Down Capability

No External Matching Required

Functional Diagram



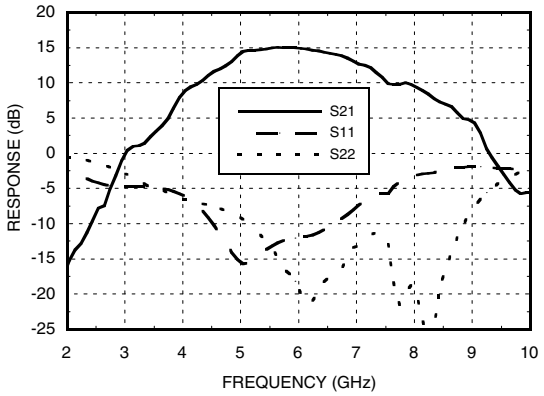
General Description

The HMC407MS8G is a high efficiency GaAs InGaP Heterojunction Bipolar Transistor (HBT) MMIC Power amplifier which operates between 5 and 7 GHz. The amplifier requires no external matching to achieve operation and is thus truly 50 Ohm matched at input and output. The amplifier is packaged in a low cost, surface mount 8 leaded package with an exposed base for improved RF and thermal performance. The amplifier provides 15 dB of gain, +29 dBm of saturated power at 28% PAE from a +5.0V supply voltage. Power down capability is available to conserve current consumption when the amplifier is not in use.

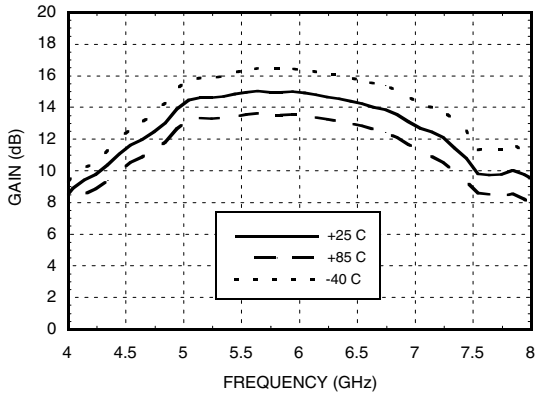
Electrical Specifications, T_A = +25° C, Vs = +5V

Parameter		Min.	Typ.	Max.	Min.	Typ.	Max.	Units
Frequency Range		5.0 - 7.0			5.6 - 6.0			GHz
Gain		10	15	18	12	15	18	dB
Gain Variation Over Temperature			0.025	0.035		0.025	0.035	dB/ °C
Input Return Loss		5	12		9	12		dB
Output Return Loss		6	15		10	15		dB
Output Power for 1 dB Compression (P1dB)		21	25		22	25		dBm
Saturated Output Power (Psat)		24	29		25	29		dBm
Output Third Order Intercept (IP3)		32	37		36	40		dBm
Noise Figure			5.5			5.5		dB
Supply Current (Icc)	Off/On		0.1 / 230			0.1 / 230		mA
Control Voltage (Vpd)	Off/On		0 / +5			0 / +5		Volts
Control Current (Ipd)	Off/On		0.001 / 7			0.001 / 7		mA

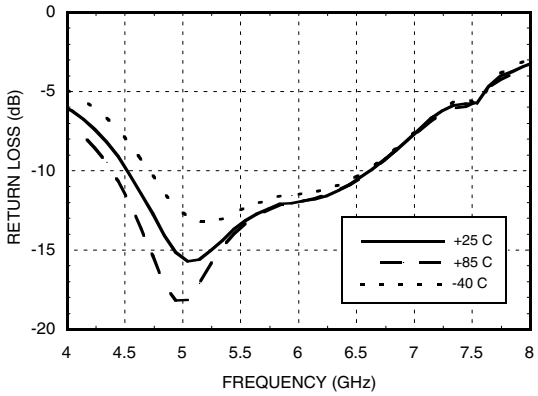
Broadband Gain & Return Loss



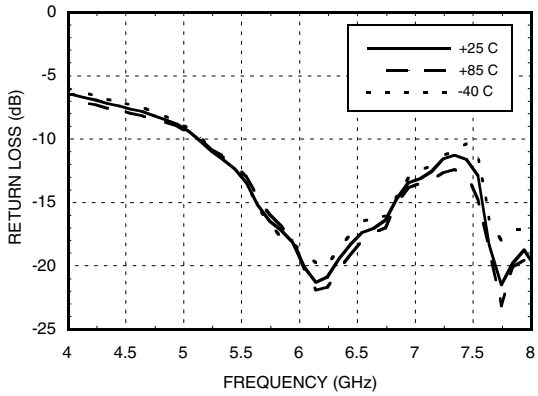
Gain vs. Temperature



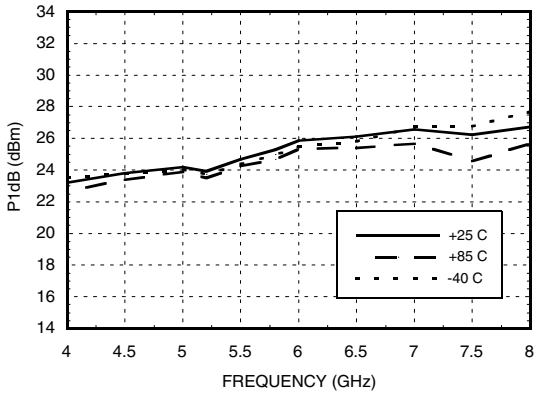
Input Return Loss vs. Temperature



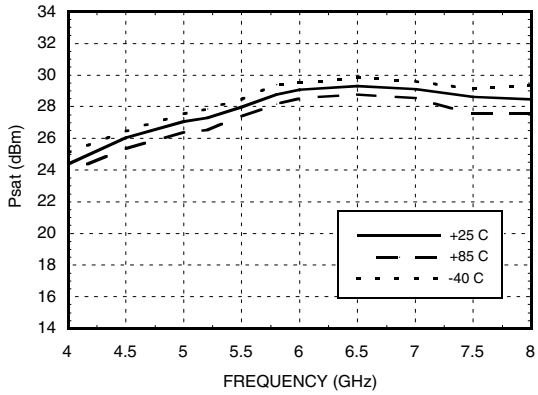
Output Return Loss vs. Temperature



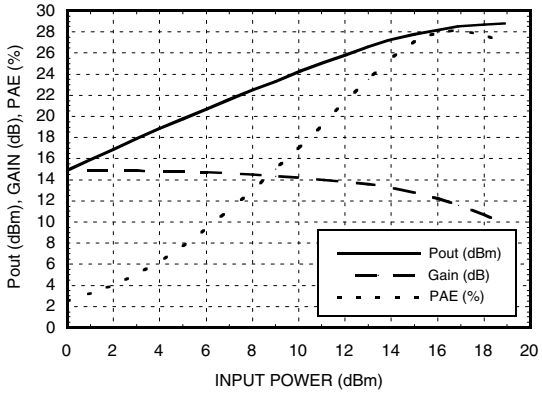
P1dB vs. Temperature



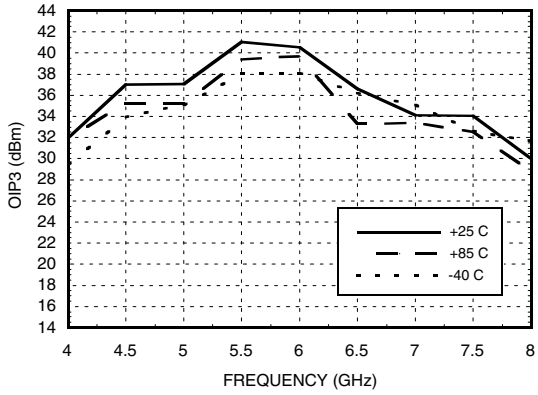
Psat vs. Temperature



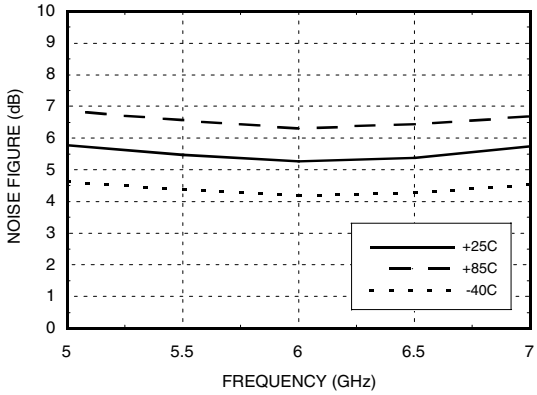
Power Compression @ 5.8 GHz



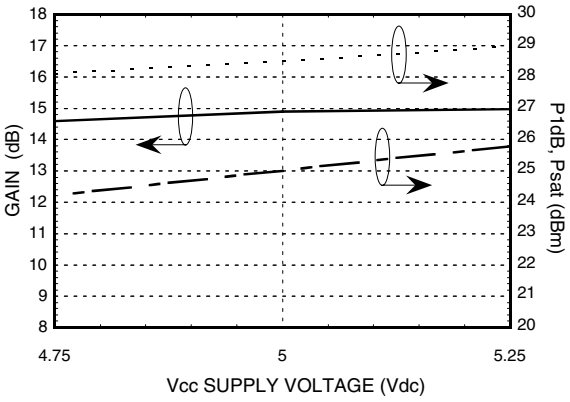
Output IP3 vs. Temperature



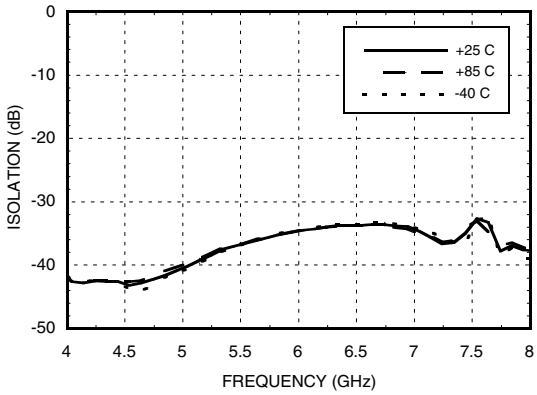
Noise Figure vs. Temperature



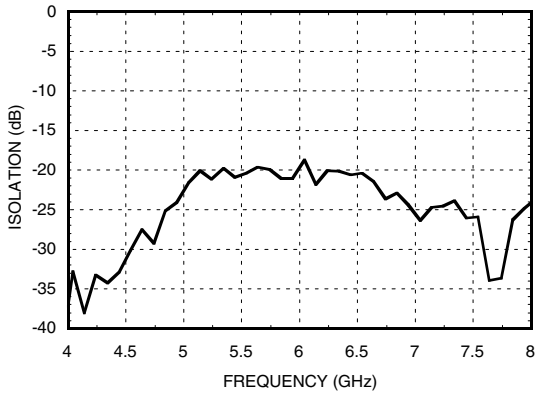
Gain & Power vs. Supply Voltage



Reverse Isolation vs. Temperature



Power Down Isolation



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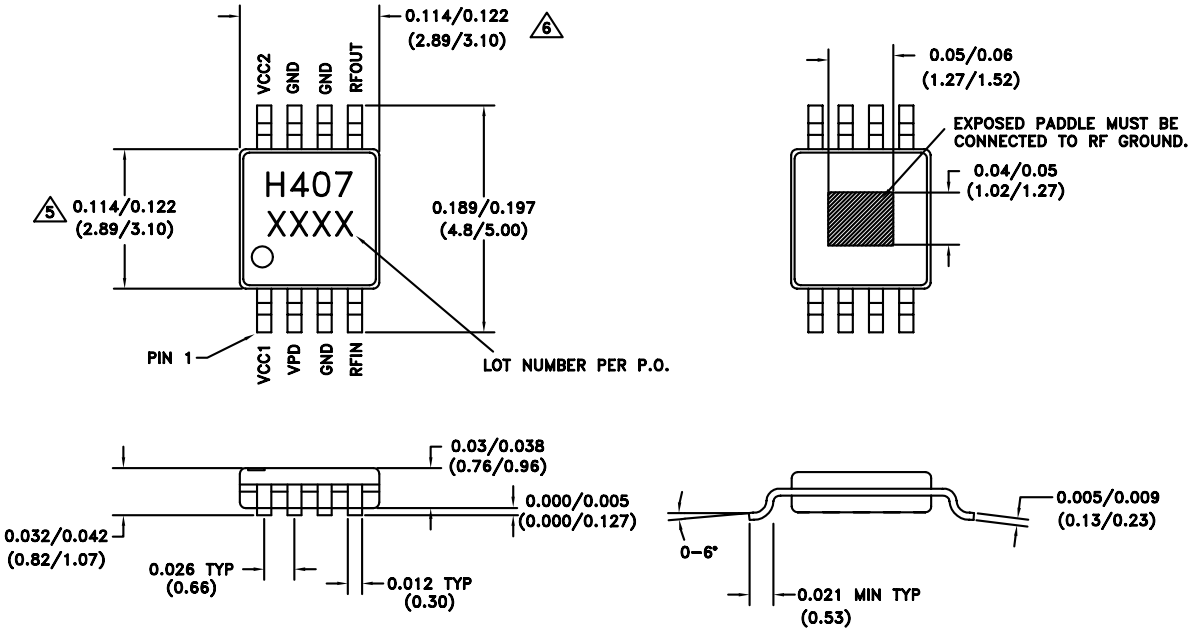
Absolute Maximum Ratings

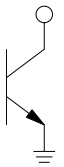
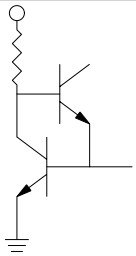
Supply Voltage (Vcc)	+5.5 Vdc
Control Voltage (Vpd)	+5.5 Vdc
Input Power (RFin)	+20 dBm
Channel Temperature (Tc)	150 °C
Continuous Pdiss (T= 85 °C) (derate 31 mW/°C above 85 °C)	2 W
Storage Temperature	-65 to +150° C
Operating Temperature	-40 to +85° C

Pin Locations & Outline Drawing

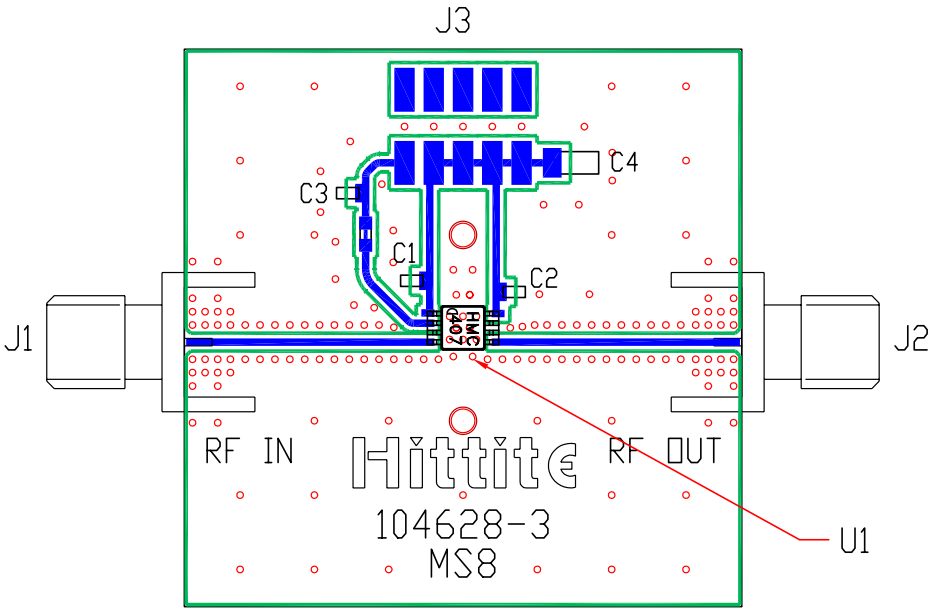


1. MATERIAL:
   A. PACKAGE BODY - LOW STRESS INJECTION-MOLDED PLASTIC, SILICA & SILICONE INPREGNATED.
   B. LEADFRAME MATERIAL: COPPER ALLOY
2. PLATING: LEAD-TIN SOLDER PLATE
3. DIMENSIONS ARE IN INCHES (MILLIMETERS)
4. CHARACTERS TO BE HELVETICA MEDIUM, .030 HIGH USING WHITE INK, LOCATED APPROX AS SHOWN
5. DIMENSION DOES NOT INCLUDE MOLDFLASH OF 0.15mm PER SIDE.
6. DIMENSION DOES NOT INCLUDE MOLDFLASH OF 0.25mm PER SIDE.

Pin Descriptions

Pin Number	Function	Description	Interface Schematic
1	Vcc1	Power supply voltage for the first amplifier stage. An external bypass capacitor of 330 pF is required as shown in the application schematic.	
2	Vpd	Power control pin. For maximum power, this pin should be connected to 5.0V. A higher voltage is not recommended. For lower idle current, this voltage can be reduced.	
3, 6, 7	GND	Ground: Backside of package has exposed metal ground slug that must be connected to ground thru a short path. Vias under the device are required.	
4	RF IN	This pin is AC coupled and matched to 50 Ohms from 5.0 to 7.0 GHz.	
5	RF OUT	This pin is AC coupled and matched to 50 Ohms from 5.0 to 7.0 GHz.	
8	Vcc 2	Power supply voltage for the output amplifier stage. An external bypass capacitor of 330 pF is required. This capacitor should be placed no more than 20 mils from package lead.	

Evaluation PCB for HMC407MS8G

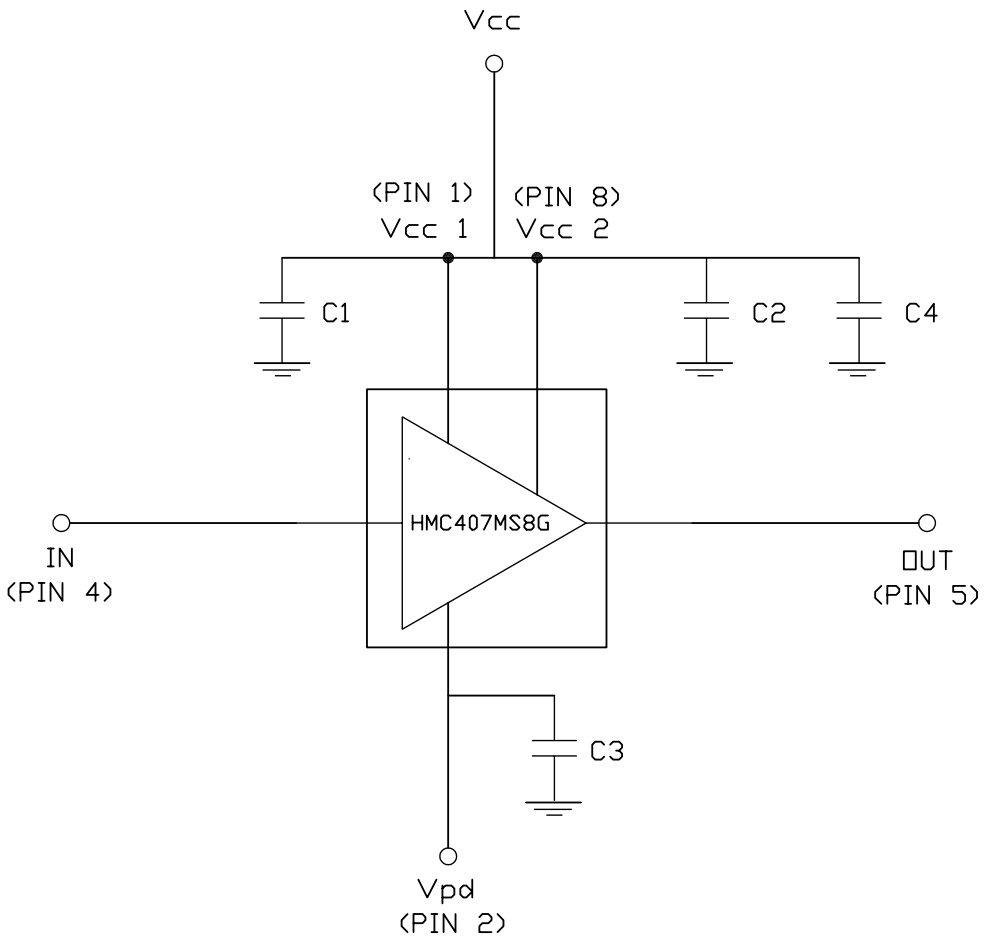


The circuit board used in the final application should use RF circuit design techniques. Signal lines should have 50 ohm impedance while the package ground leads and exposed paddle should be connected directly to the ground plane similar to that shown. A sufficient number of VIA holes should be used 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.

List of Material

Item	Description
J1 - J2	PC Mount SMA RF Connector
J3	2 mm DC Header
C1 - C3	330 pF Capacitor, 0603 Pkg.
C4	2.2 µF Capacitor, Tantalum
U1	HMC407MS8G Amplifier
PCB*	104628 Eval Board
* Circuit Board Material: Rogers 4350	

HMC407MS8G Application Circuit



Note 1: Vcc1 and Vcc2 may be connected to a common Vcc.
Note 2: C2 should be located < 0.020" from Pin 8 (Vcc2).

Notes: