HMC278MS8G

100 mW MEDIUM POWER GaAs MMIC AMPLIFIER, 1.7 - 3.0 GHz

Typical Applications

The HMC278MS8G is ideal for:

- PCS/3G & WLAN
- MMDS & ISM Radios
- HomeRF & BLUETOOTH

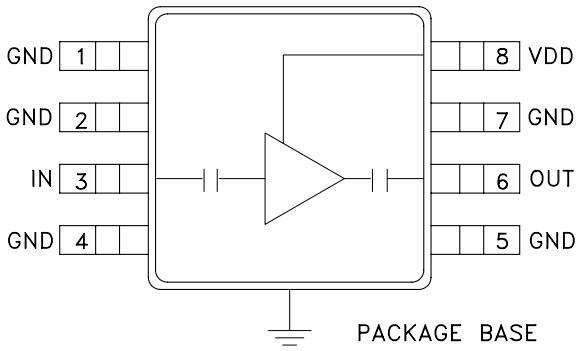
Features

P1dB Output Power: +20 dBm

Single Supply: +3V to +5V

Ultra Small 8 Lead MSOP Package

Functional Diagram



General Description

The HMC278MS8G is a 100mW GaAs MMIC medium power amplifier covering 1.7 to 3 GHz. The device is packaged in a low cost, surface mount 8 lead MSOP plastic package with an exposed base paddle for improved RF ground and thermal dissipation. The self-biased amplifier provides 21 dB of gain and +20 dBm P1dB output power while operating from a single positive supply of Vdd= +5V @ 130 mA. At Vdd = +3V the gain is 19 dB with a P1dB of +16dBm. With RF I/Os matched to 50 Ohm, external component requirements are minimal. At a height of 0.040" (1.0mm), the MSOP8 package is ideal for low profile portable wireless devices. Use the HMC278MS8G with the HMC309MS8 integrated LNA/TxRx switch front-end for BLUETOOTH Class I, HomeRF, 802.11 WLAN, and ISM 2.4 GHz radios.

Electrical Specification, T_A = +25° C, As a Function of Vdd

Parameter	Vdd = +5V			Vdd = +5V			Vdd = +3V			
	Min.	Typ.	Max.	Min.	Typ.	Max.	Min.	Typ.	Max.	Units
Frequency Range		1.7 - 3.0			2.3 - 2.5			2.3 - 2.5		GHz
Gain	15	20	25	16	21	25	15	19	23	dB
Gain Flatness (Over Any 200 MHz BW)		± 0.7			± 0.5			± 0.5		dB
Input Return Loss	5	10		7	10		7	10		dB
Output Return Loss	6	10		7	10		7	10		dB
Reverse Isolation	46	52		48	52		48	52		dB
Output Power for 1 dB Compression (P1dB)	13.5	19		16.5	20		12.5	16		dBm
Saturated Output Power (Psat)	16	21		19	22		15	18		dBm
Output Third Order Intercept (IP3)	26	32		29	32		28	32		dBm
Noise Figure		6			6			6		dB
Supply Current (Idd)		130	165		130	165		125	140	mA

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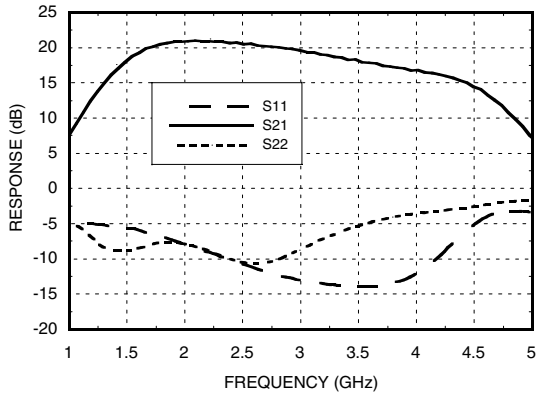
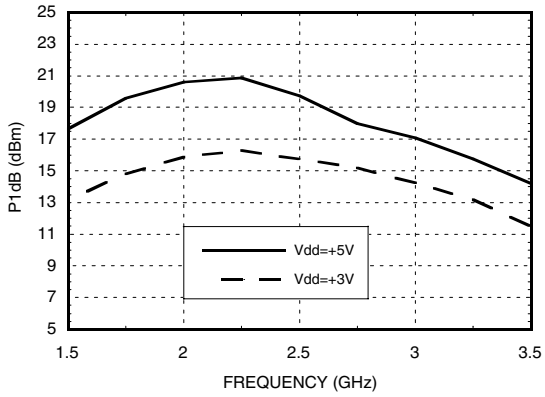
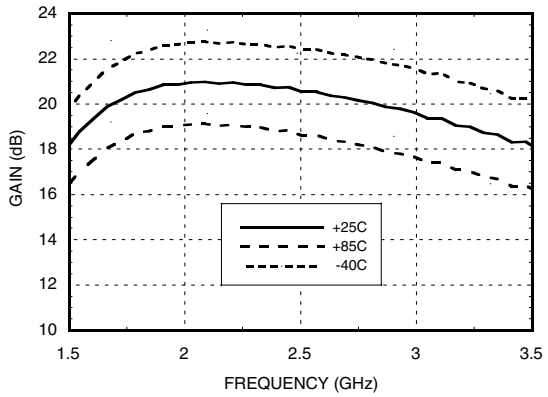
Broadband Gain & Return Loss @ Vdd = +5V



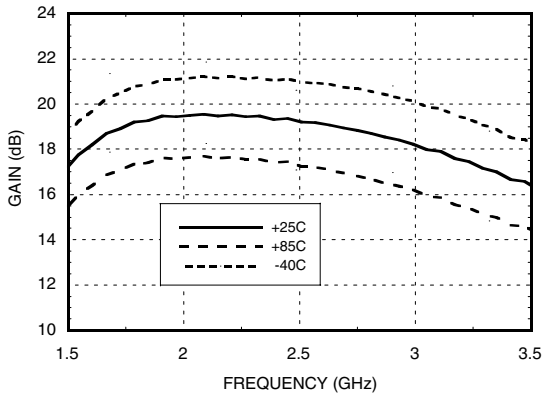
P1dB vs. Vdd Bias



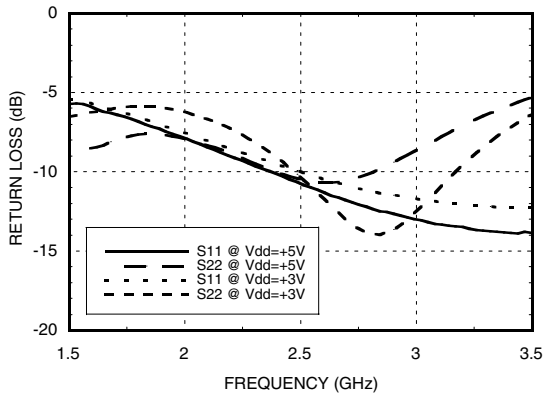
Gain vs. Temperature @ Vdd = +5V



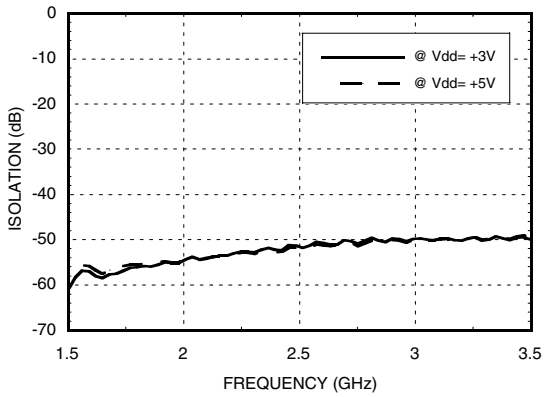
Gain vs. Temperature @ Vdd = +3V



Input & Output Return Loss vs. Vdd Bias



Reverse Isolation vs. Vdd Bias



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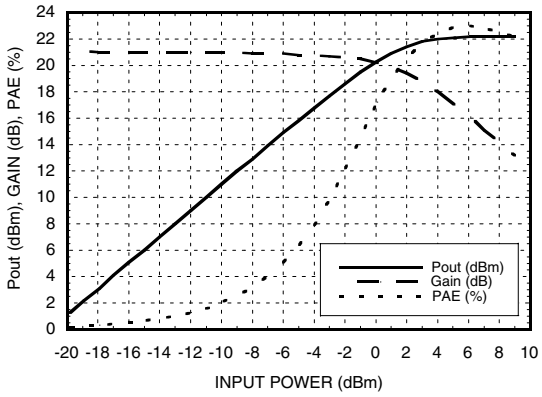
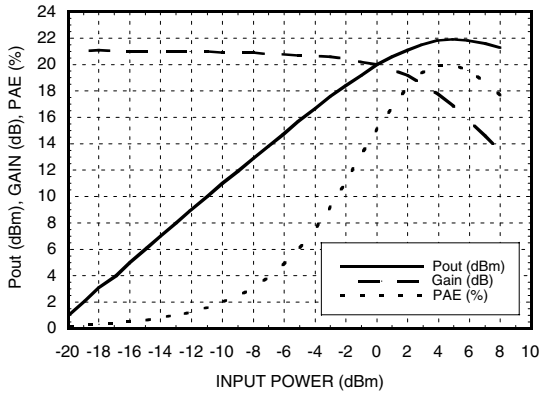
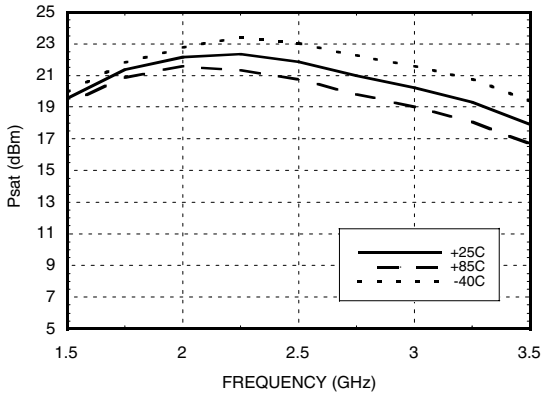
Power Compression @ 2.0 GHz, Vdd = +5V



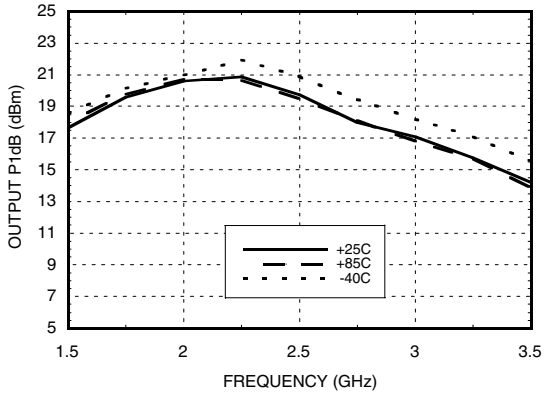
Power Compression @ 2.5 GHz, Vdd = +5V



PSAT vs. Temperature @ Vdd = +5V



P1dB vs. Temperature @ Vdd = +5V



Output IP3 vs. Temperature @ Vdd = +5V

	GH		
	2.0	2.5	3.0
-40 °C	32.7	32.4	29.4
+25 °C	32.5	31.9	29.1
+85 °C	32.7	31.4	28.5
All levels in d m			

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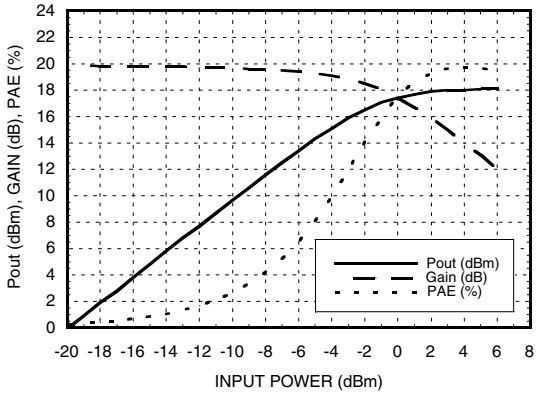
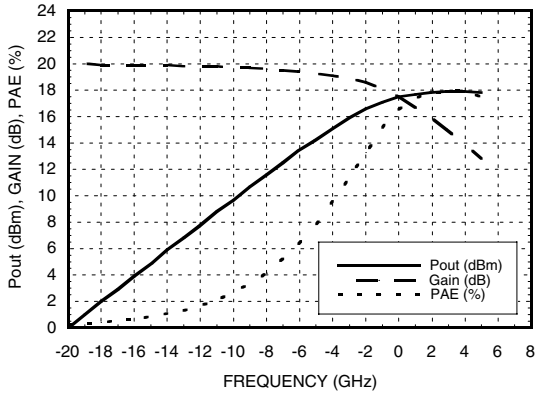
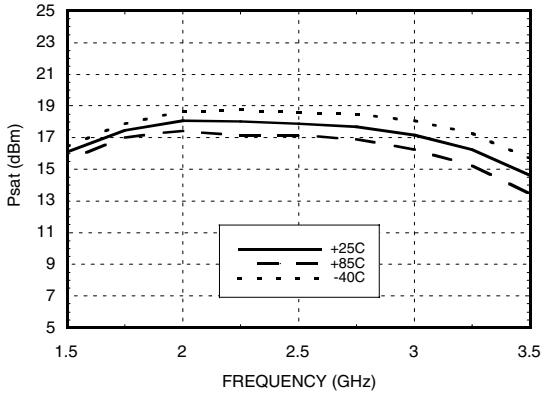
Power Compression @ 2.0 GHz, Vdd = +3V



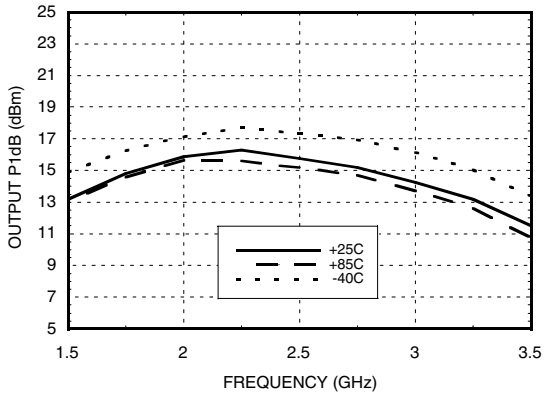
Power Compression @ 2.5 GHz, Vdd = +3V



PSAT vs. Temperature @ Vdd = +3V



P1dB vs. Temperature @ Vdd = +3V



Output IP3 vs. Temperature @ Vdd = +3V

	2.0	2.5	3.0
-40 °C	27.8	27.8	25.7
+25 °C	27.7	27.5	25.5
+85 °C	27.3	26.9	24.6

All levels in d m

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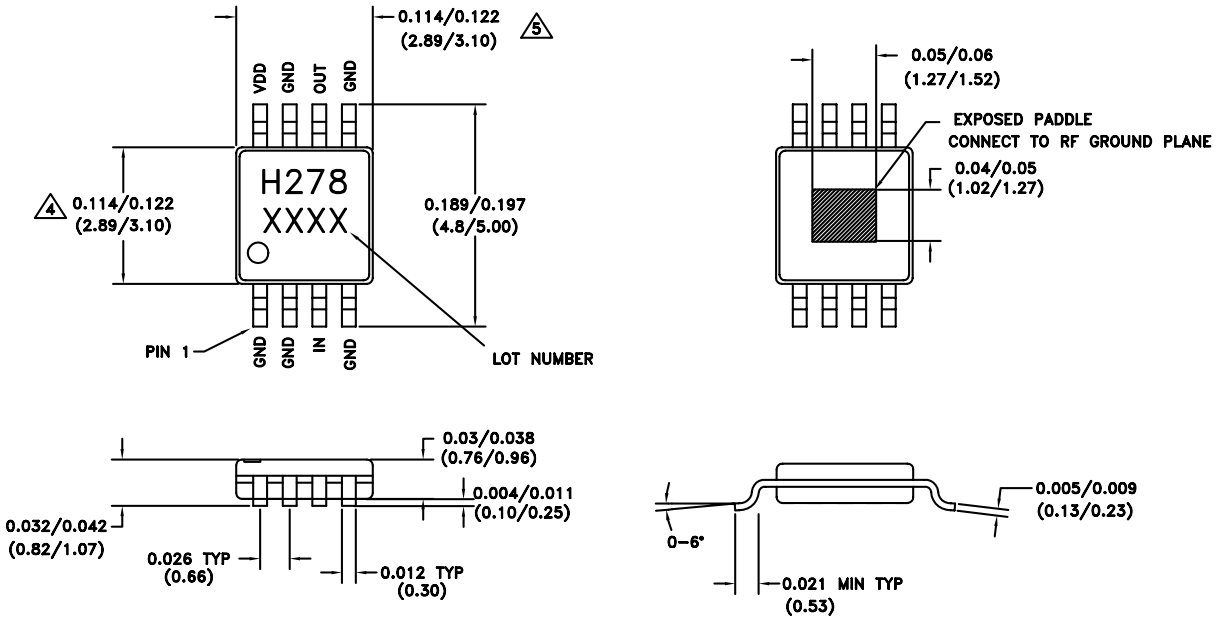
Absolute Maximum Ratings

Supply Voltage (Vdd)	+8 Vdc
Input Power (RFin)(Vdd = +5V)	+10 dBm
Channel Temperature (Tc)	175 °C
Thermal Resistance (⊖jc) (Channel Backside)	65 °C/W
Storage Temperature	-65 to +150° C
Operating Temperature	-55 to +85° C

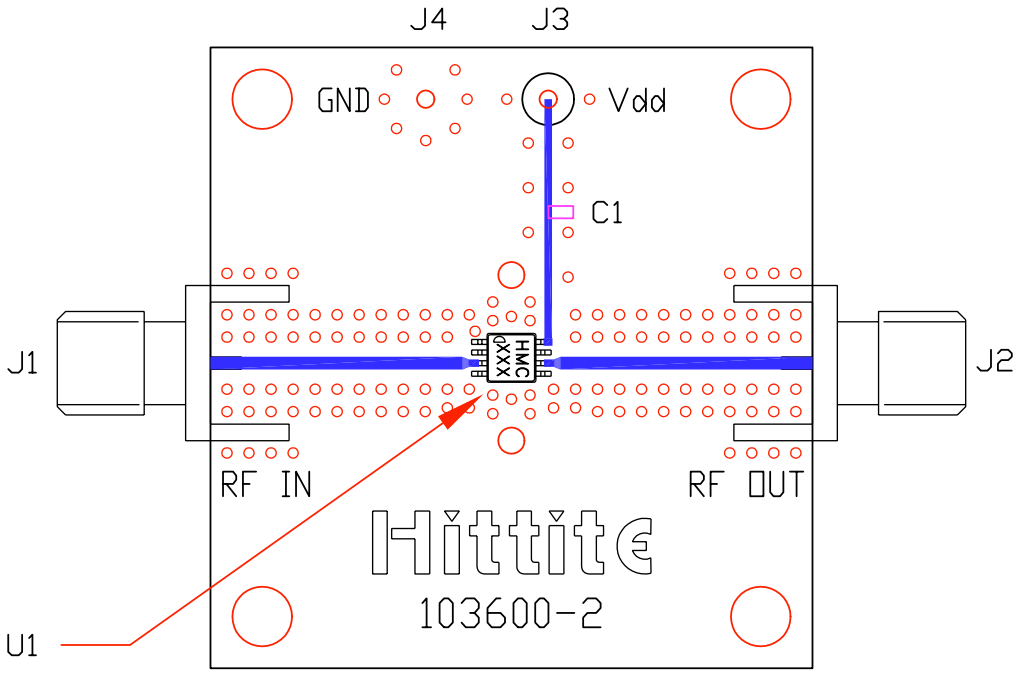
Note: 100 pF bypass capacitor to ground on Vdd line is recommended.

Outline Drawing



1. MATERIAL:
   A. PACKAGE BODY - LOW STRESS INJECTION-MOLDED PLASTIC.
   B. LEADFRAME & PADDLE MATERIAL: COPPER ALLOY
2. PLATING: LEAD & PADDLE - TIN SOLDER PLATE
3. DIMENSIONS ARE IN INCHES (MILLIMETER). UNLESS OTHERWISE SPECIFIED, ALL TOL. ARE ± 0.005 (± 0.13).
4. DIMENSION DOES NOT INCLUDE MOLDFLASH OF 0.15mm PER SIDE.
5. DIMENSION DOES NOT INCLUDE MOLDFLASH OF 0.25mm PER SIDE.

Recommended PCB Layout for HMC278MS8G



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 circuit board 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
C1	10,000 pF Capacitor, 0603 Pkg.
U1	HMC278MS8G Amplifier
PCB*	103600 Evaluation Board
*Circuit Board Material: Roger 4350	