GaAs InGaP HBT MMIC ULTRA LOW PHASE NOISE, DISTRIBUTED AMPLIFIER, 2 - 18 GHz

Typical Applications

The HMC606 is ideal for:

- Radar, EW & ECM
- Microwave Radio
- Test Instrumentation
- Military & Space
- Fiber Optic Systems

Features

Ultra Low Phase Noise: -160 dBc/Hz @ 10 kHz

P1dB Output Power: +15 dBm

Gain: 14 dB

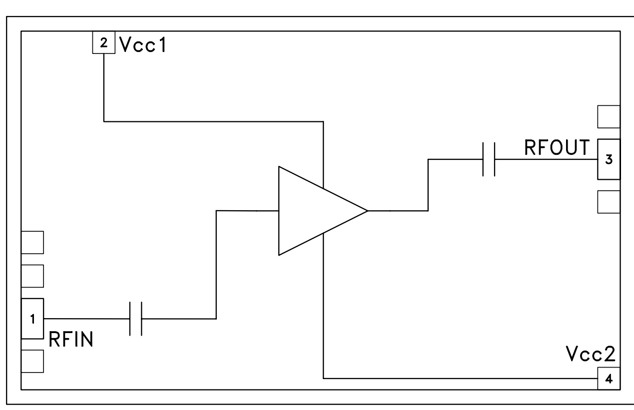
Output IP3: +27 dBm

Supply Voltage: +5V @ 64 mA

50 Ohm Matched Input/Output

Die Size: 2.80 x 1.73 x 0.1 mm

Functional Diagram



General Description

The HMC606 is a GaAs InGaP HBT MMIC Distributed Amplifier die which operates between 2 and 18 GHz. With an input signal of 12 GHz, the amplifier provides ultra low phase noise performance of -160 dBc/Hz at 10 kHz offset, representing a significant improvement over FET-based distributed amplifiers. The HMC606 provides 14 dB of small signal gain, +27 dBm output IP3 and +15 dBm of output power at 1 dB gain compression while requiring 64 mA from a +5V supply. The HMC606 amplifier I/Os are internally matched to 50 Ohms facilitating easy integration into Multi-Chip-Modules (MCMs). All data is taken with the chip in a 50 Ohm test fixture connected via 0.025 mm (1mil) diameter wire bonds of minimal length 0.31 mm (12 mils).

Electrical Specifications, T_A = +25° C, Vcc1= Vcc2= 5V

Parameter	Min.	Typ.	Max.	Min.	Typ.	Max.	Units
Frequency Range		2 - 12			12 - 18		GHz
Gain	11	14.0		10	13		dB
Gain Flatness		±1.0			±1.0		dB
Gain Variation Over Temperature		0.021			0.25		dB/ °C
Noise Figure		4.5			6.5		dB
Input Return Loss		20			22		dB
Output Return Loss		15			15		dB
Output Power for 1 dB Compression (P1dB)	12	15		10	13		dBm
Saturated Output Power (Psat)		18			15		dBm
Output Third Order Intercept (IP3)		27			22		dBm
Phase Noise @ 100 Hz		-140			-140		dBc/Hz
Phase Noise @ 1 kHz		-150			-150		dBc/Hz
Phase Noise @ 10 kHz		-160			-160		dBc/Hz
Phase Noise @ 1 MHz		-170			-170		dBc/Hz
Supply Current		64	95		64	95	mA

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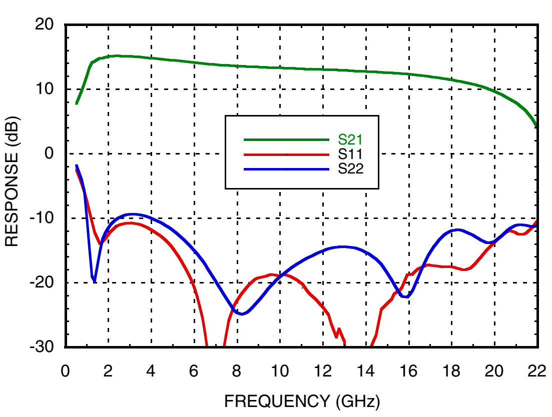
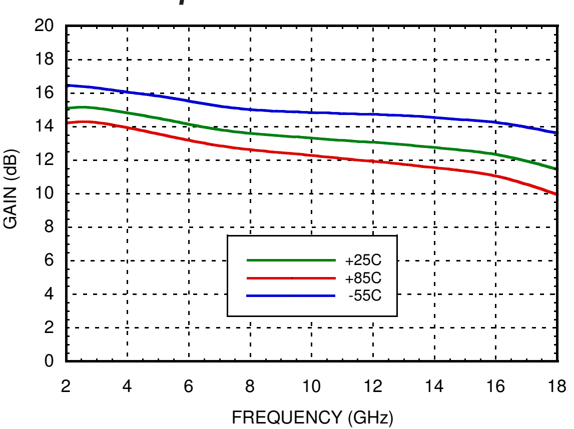
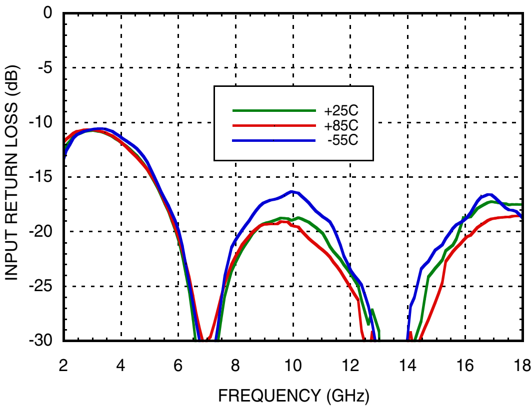
Gain & Return Loss



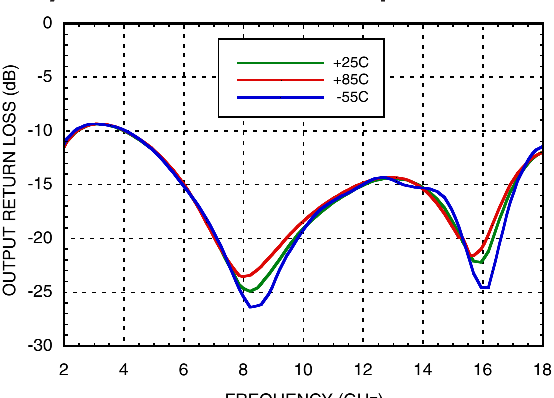
Gain vs. Temperature



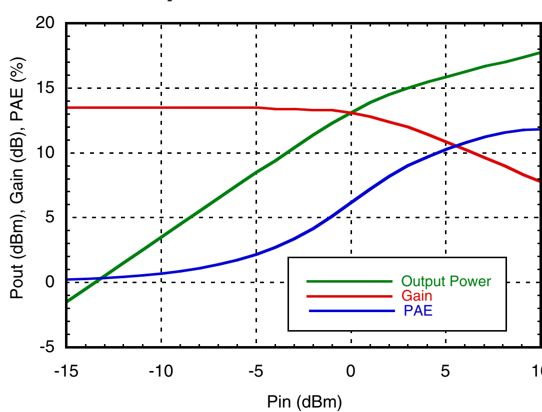
Input Return Loss vs. Temperature



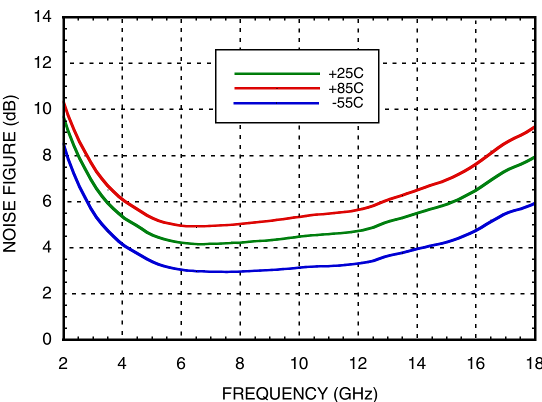
Output Return Loss vs. Temperature



Power Compression



Noise Figure vs. Temperature



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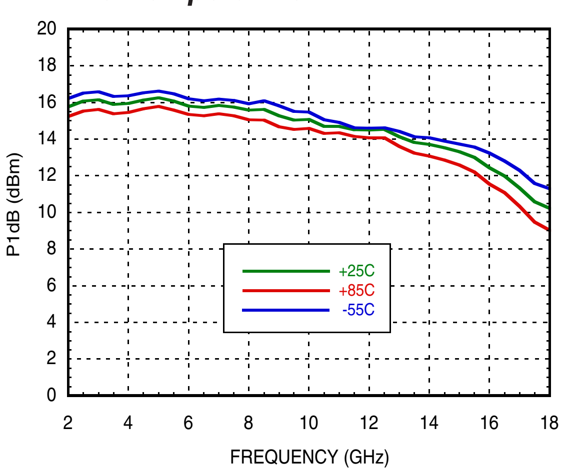
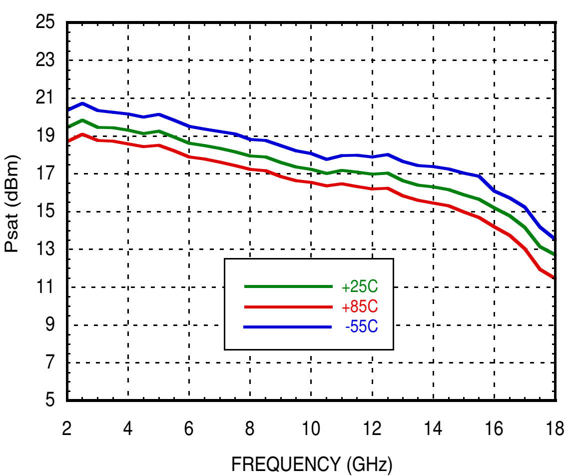
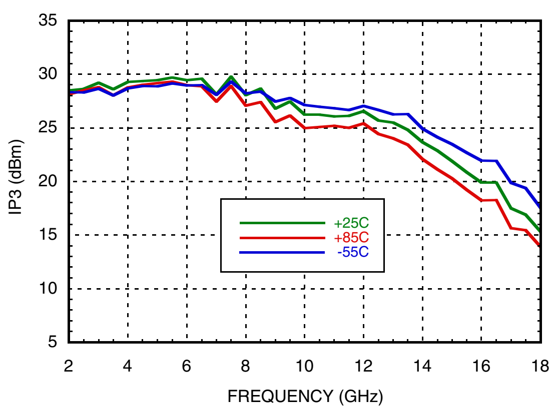
P1dB vs. Temperature



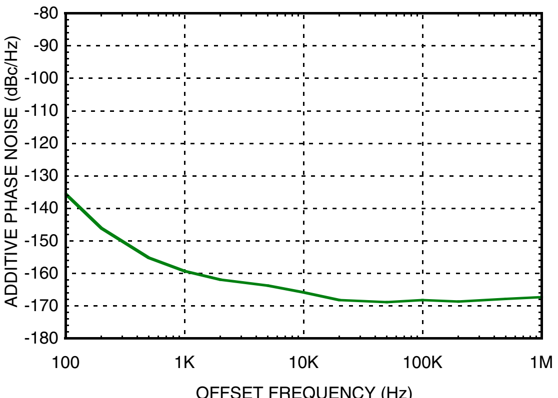
Psat vs. Temperature



Output IP3 vs. Temperature



Additive Phase Noise Vs Offset Frequency, RF Frequency = 8 GHz, RF Input Power = 12 dBm (Psat



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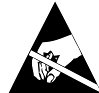
Absolute Maximum Ratings

Vdd1= Vdd2= 5V	7V
RF Input Power (RFIN)	+15 dBm
Channel Temperature	175 °C
Continuous Pdiss (T = 85 °C) (derate 14.6 mW/°C above 85 °C)	1.32 W
Thermal Resistance (channel to die bottom)	68.37 °C/W
Storage Temperature	-65 to +150 °C
Operating Temperature	-55 to +85 °C

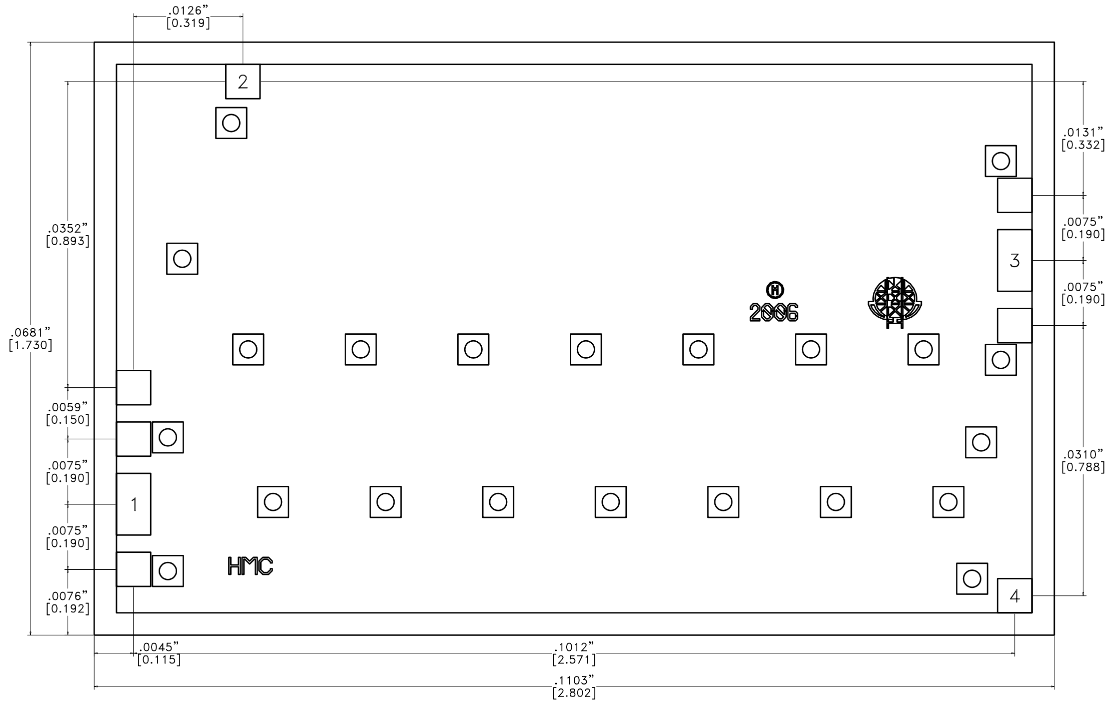
Typical Supply Current vs. Vcc1, Vcc2

Vcc1= Vcc2 (V)	Icc1 + Icc2 (mA)
+4.5	53
+5.0	64
+5.5	74



ELECTROSTATIC SENSITIVE DEVICE
OBSERVE HANDLING PRECAUTIONS

Outline Drawing



Die Packaging Information [1]

Standard	Alternate
GP-1 (Gel Pack)	[2]

[1] Refer to the "Packaging Information" section for die packaging dimensions.
[2] For alternate packaging information contact Analog Devices.

NOTES:
1. ALL DIMENSIONS IN INCHES [MILLIMETERS]
2. NO CONNECTION REQUIRED FOR UNLABELED BOND PADS
3. DIE THICKNESS IS 0.004 (0.100)
4. TYPICAL BOND PAD IS 0.004 (0.100) SQUARE
5. BACKSIDE METALLIZATION: GOLD
6. BACKSIDE METAL IS GROUND
7. BOND PAD METALIZATION: GOLD

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Pad Descriptions

Pad Number	Function	Description	Interface Schematic
1	RFIN	This Pad is AC coupled and matched to 50 Ohms.	RFIN
2, 4	Vcc1, Vcc2	Vcc1= Vcc2= 5V	Vcc1 Vcc2
3	RFOUT	This Pad is AC coupled and matched to 50 Ohms.	RFOUT

Assembly Diagram

0.1uF BYPASS CAPACITOR

100pF BYPASS CAPACITOR

1mil GOLD WIRE

1 mil GOLD WIRE

50 ohm TRANSMISSION LINE

HMC

3 mil NOMINAL GAP

1mil GOLD WIRE

100pF BYPASS CAPACITOR

0.1uF BYPASS CAPACITOR