

GaAs InGaP HBT MMIC BROADBAND AMPLIFIER GAIN BLOCK, DC - 6 GHz

Typical Applications

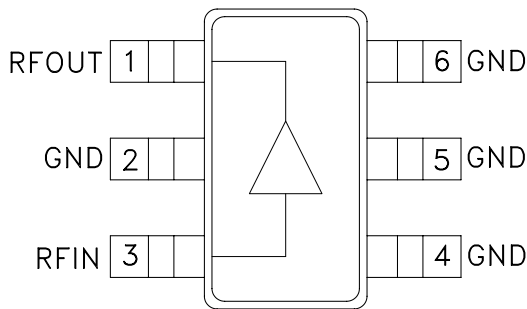
Ideal as a Driver & Amplifier for:

- 2.2 - 2.7 GHz MMDS
- 3.5 GHz Wireless Local Loop
- 5 - 6 GHz UNII & HiperLAN

Features

- P1dB Output Power: +14 dBm
- Output IP3: +27 dBm
- Gain: 17 dB
- Single Supply: +5V
- High Reliability GaAs HBT Process
- Ultra Small Package: SOT26
- Included in the HMC-DK001 Designer's Kit

Functional Diagram



General Description

The HMC313 & HMC313E are GaAs InGaP Heterojunction Bipolar Transistor (HBT) MMIC amplifiers that operate from a single Vcc supply. The surface mount SOT26 amplifier can be used as a broadband gain stage or used with external matching for optimized narrow band applications. With Vcc biased at +5V, the HMC313(E) offers 17 dB of gain and +15 dBm of saturated power while only requiring 50 mA of current.

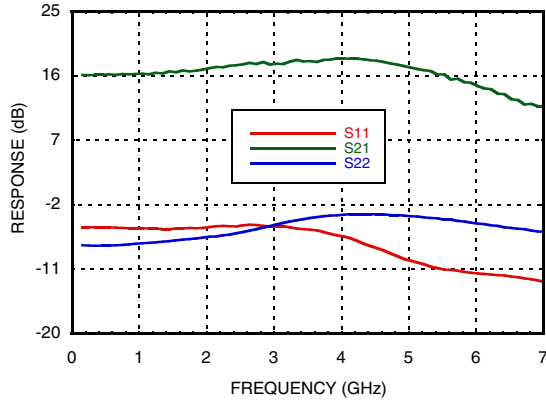
Electrical Specifications, $T_A = +25\text{ }^\circ\text{C}$, $V_{CC} = +5.0V$

Parameter	Vcc = +5V			Units
	Min.	Typ.	Max.	
Frequency Range	DC - 6			GHz
Gain	14	17	20	dB
Gain Variation Over Temperature		0.02	0.03	dB/°C
Input Return Loss		7		dB
Output Return Loss		6		dB
Reverse Isolation		30		dB
Output Power for 1 dB Compression (P1dB) @ 1.0 GHz	11	14		dBm
Saturated Output Power (Psat) @ 1.0 GHz		15		dBm
Output Third Order Intercept (IP3) @ 1.0 GHz	24	27		dBm
Noise Figure		6.5		dB
Supply Current (Icc)		50		mA

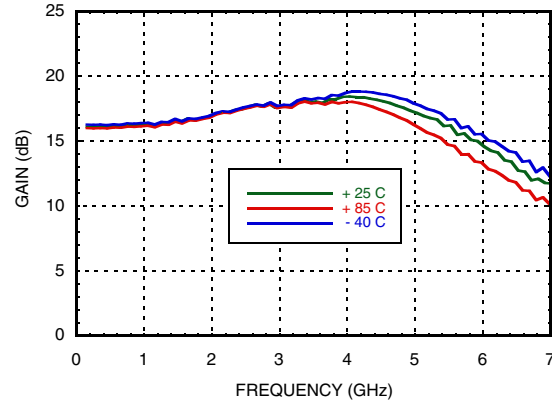
Note: Data taken with broadband bias tee on device output.

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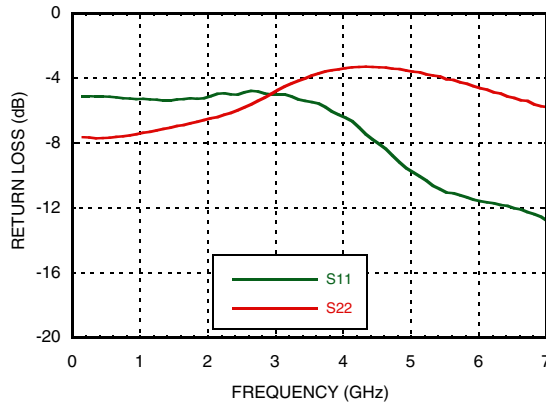
Gain & Return Loss



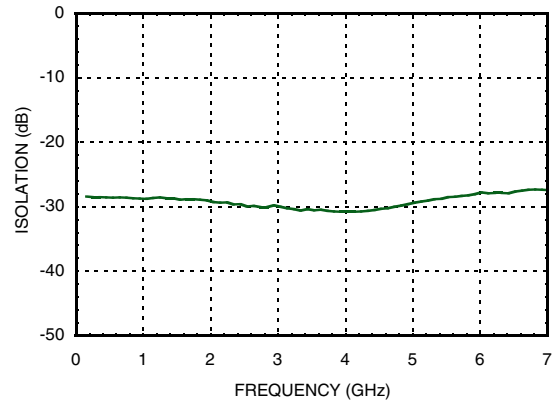
Gain vs. Temperature



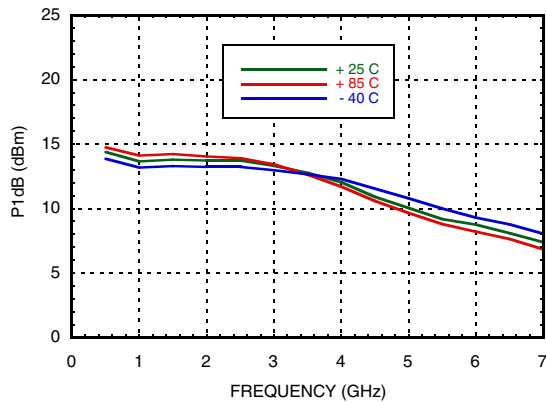
Input & Output Return Loss



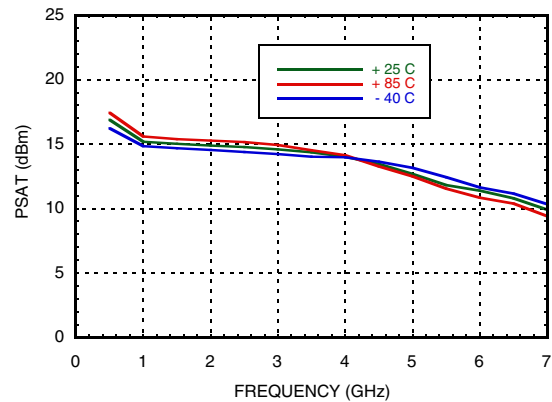
Reverse Isolation



P1dB vs. Temperature

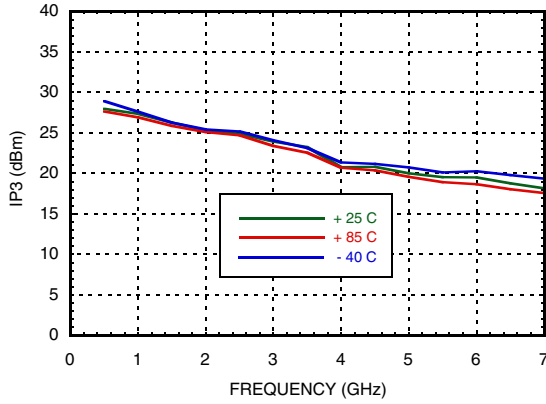


Psat vs. Temperature

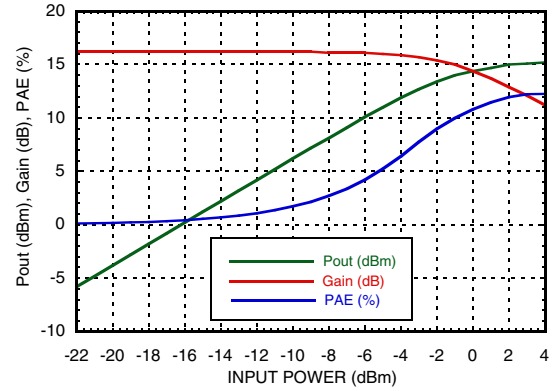


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AMPLIFIER GAIN BLOCK, DC - 6 GHz**

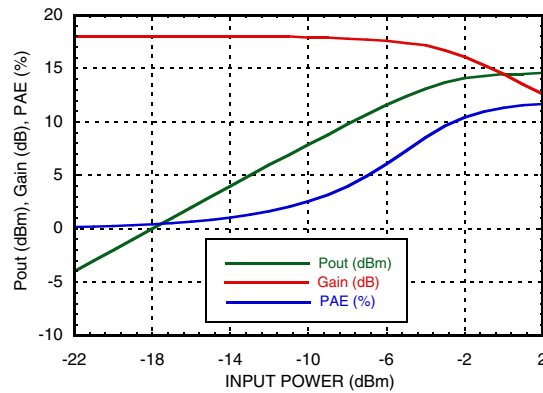
Output IP3 vs. Temperature



Power Compression @ 1 GHz



Power Compression @ 3 GHz



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Absolute Maximum Ratings

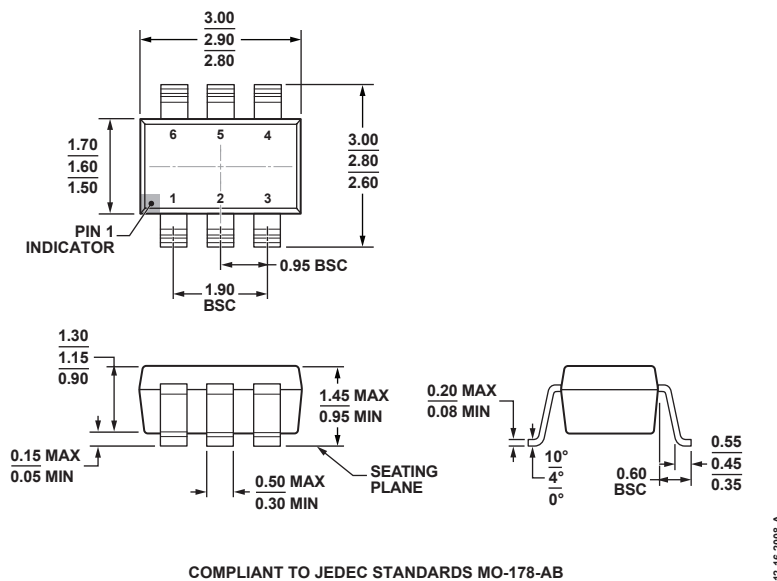
Collector Bias Voltage (Vcc)	+5.5 Vdc
RF Input Power (RFIN)(Vcc = +5Vdc)	+20 dBm
Junction Temperature	150 °C
Continuous Pdiss (T = 85 °C) (derate 3.99 mW/°C above 85 °C)	0.259 W
Thermal Resistance (junction to pin 2 lead) ^[1]	251 °C/W
Storage Temperature	-65 to +150 °C
Operating Temperature	-40 to +85 °C
ESD Sensitivity (HBM)	Class 1A



ELECTROSTATIC SENSITIVE DEVICE
OBSERVE HANDLING PRECAUTIONS

[1] Pin 2 REQUIRES good thermal attachment to the PCB

Outline Drawing



6-Lead Small Outline Transistor Package [SOT-23] (RJ-6)
Dimensions shown in millimeters.

Package Information

Part Number	Package Body Material	Lead Finish	MSL Rating	Package Marking ^[3]
HMC313	Low Stress Injection Molding Plastic	Sn/Pb Solder	MSL1 ^[1]	H313 XXXX
HMC313TR	Low Stress Injection Molding Plastic	Sn/Pb Solder	MSL1 ^[1]	313 XXXX
HMC313E	RoHS-compliant Low Stress Injection Molding Plastic	100% matte Sn	MSL1 ^[2]	313E XXXX
HMC313ETR	RoHS-compliant Low Stress Injection Molding Plastic	100% matte Sn	MSL1 ^[2]	313E XXXX

[1] Max peak reflow temperature of 235 °C
 [2] Max peak reflow temperature of 260 °C
 [3] 4-Digit lot number XXXX

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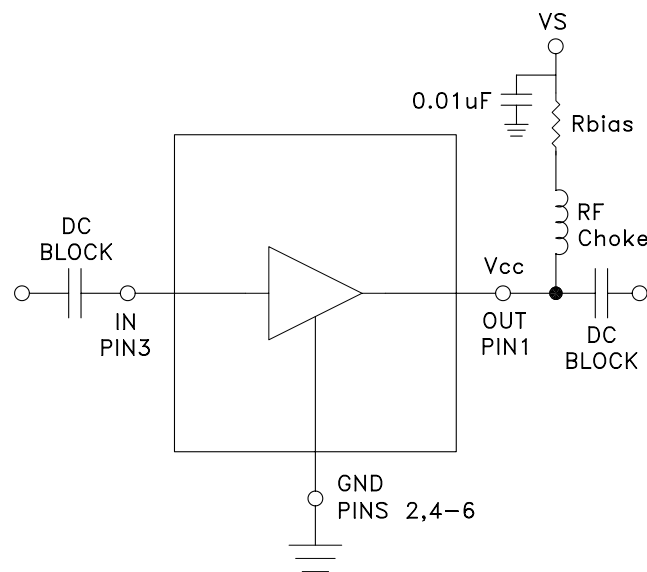
Pin Descriptions

Pin Number	Function	Description	Interface Schematic
1	RFOUT	This pin is DC coupled. An off chip DC blocking capacitor is required.	
3	RFIN	This pin is DC coupled. An off chip DC blocking capacitor is required.	
2, 4-6	GND	These pins must be connected to RF/DC ground.	

Application Circuit

Recommended Bias Resistor Values for $I_{cc} = 50 \text{ mA}$, $R_{bias} = (V_s - 5.0) / I_{cc}$

Supply Voltage (V_s)	5V	6V	8V
RBIAS VALUE	0 Ω	20 Ω	62 Ω
RBIAS POWER RATING		¼ W	½ W



Note:

1. Select R_{bias} to achieve desired V_{cc} voltage on Pin 1.
2. External Blocking Capacitors are required on Pins 1 & 3.