HBT DARLINGTON AMPLIFIER DC - 7.0 GHz

FEBRUARY 2001 v00.1100

Features

Saturated Output Power: + 17 dBm

Output IP3: +33 dBm

Single Supply: +5V to +7V

Ultra Small SOT26 Package

General Description

The HMC315 is an ultra broadband GaAs InGaP Heterojunction Bipolar Transistor (HBT) MMIC amplifier that operates from a single positive supply. The surface mount SOT26 amplifier can be used as a broadband gain stage, or used with external matching for optimized narrow band applications. The Darlington configuration results in reduced sensitivity to normal process variations and provides a good 50-ohm input/output port match. The amplifier provides 15 dB of gain and +17 dBm of saturated power while operating from a single positive +7V supply. The HMC315 is ideal for fiber optic OC-48 systems, microwave test instrumentation, or broadband mobile radio platforms.

Guaranteed Performance, *As a Function of Vcc, -40 to +70 deg C*

Parameter	Vcc= +5V			Vcc= +7V			Units
	Min.	Typ.	Max.	Min.	Typ.	Max.	
Frequency Range		DC - 7			DC - 7		GHz
Gain @ 25 °C	11	14	17	11	15	18	dB
Gain Variation over Temperature		0.015	0.025		0.015	0.025	dB/ °C
Input Return Loss	7	10		7	10		dB
Output Return Loss	3	7		3	7		dB
Reverse Isolation	18	21		18	21		dB
Output Power for 1dB Compression (P1dB) @ 1.0 GHz	8	11		13	16		dBm
Saturated Output Power (Psat) @ 1.0 GHz	10	13		15	17.5		dBm
Output Third Order Intercept (OIP3) @ 1.0 GHz	23	26		30	33		dBm
Noise Figure		6.5			6.5		dB
Supply Current (Icc)		30			50		mA

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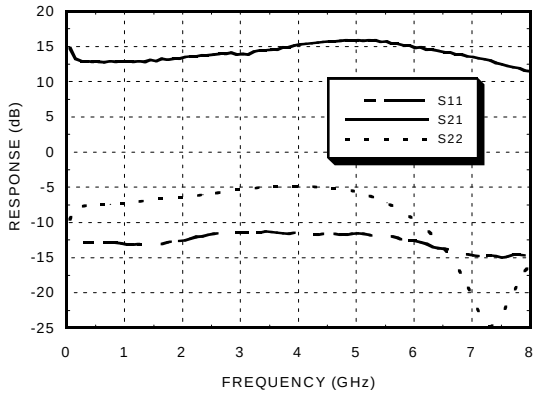
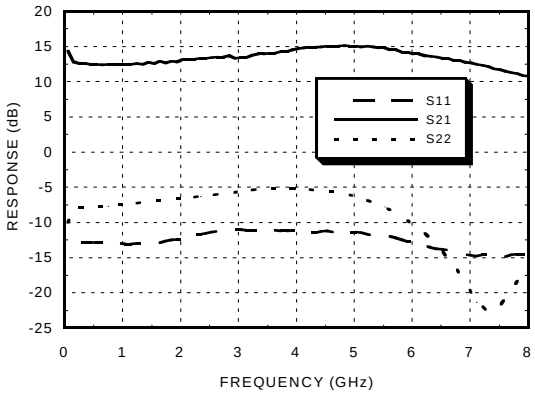
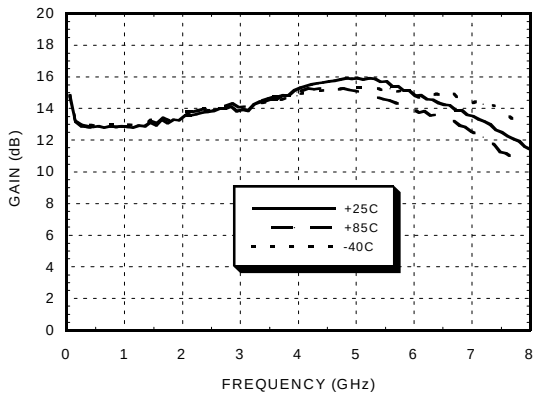
Gain & Return Loss @ Vcc= +7V



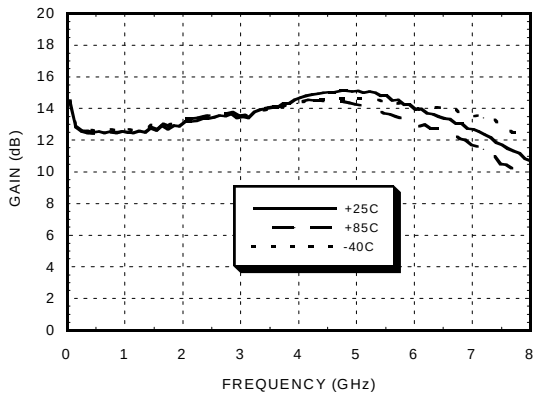
Gain & Return Loss @ Vcc= +5V



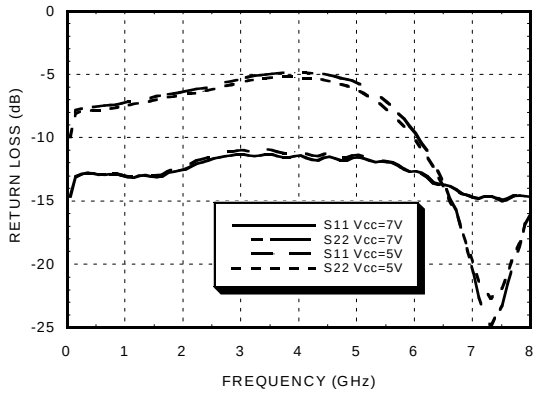
Gain vs. Temperature @ Vcc= +7V



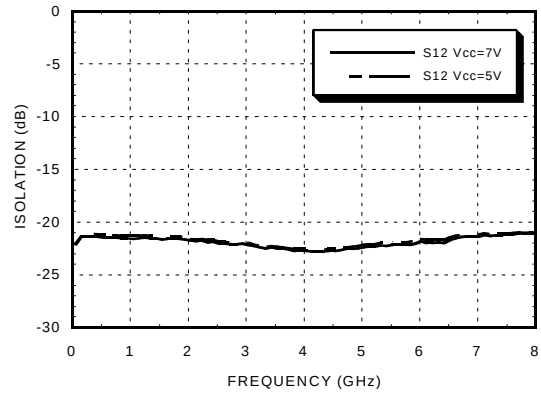
Gain vs. Temperature @ Vcc= +5V



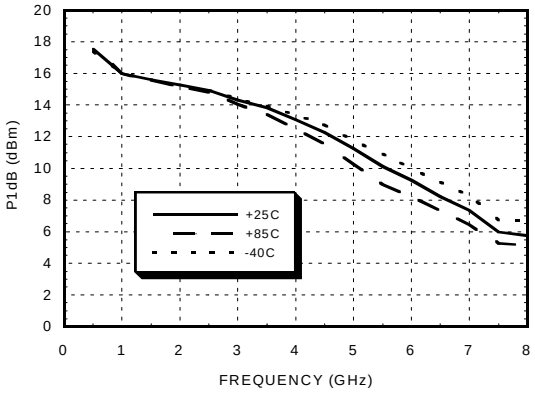
Input & Output Return Loss vs. Vcc Bias



Reverse Isolation vs. Vcc Bias



P1dB vs. Temperature @ Vcc= +7V



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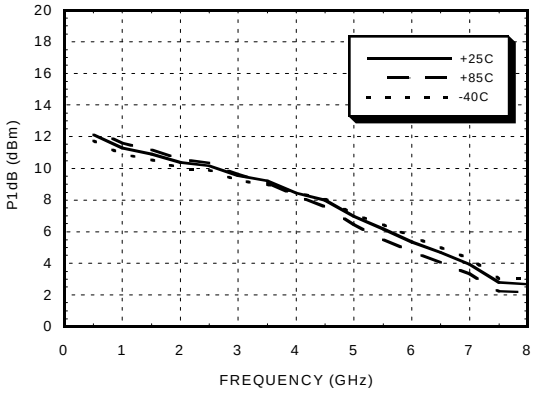
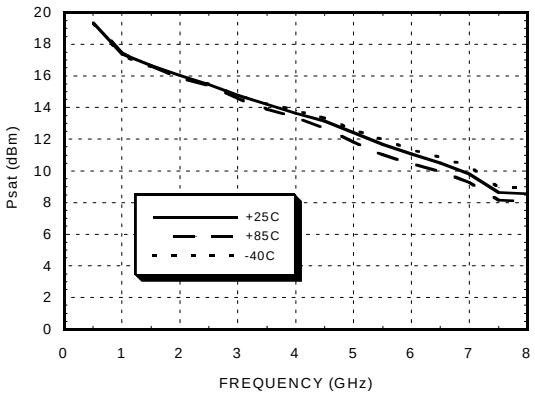
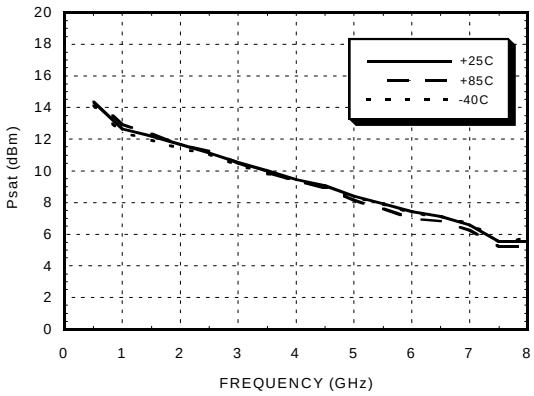


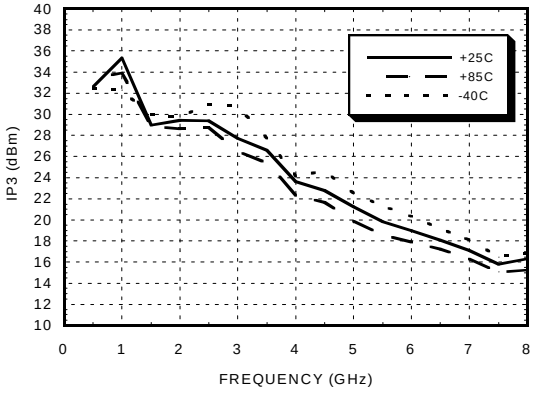
Psat vs. Temperature @ Vcc= +7V



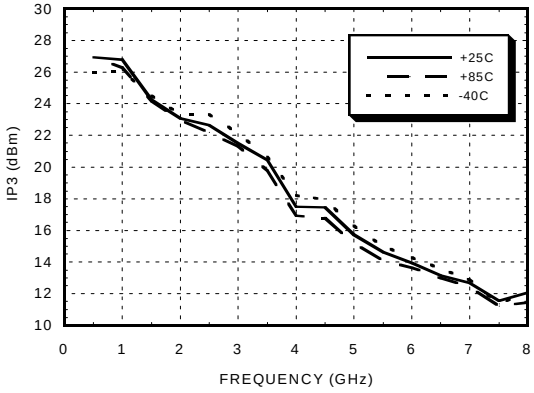
Psat vs. Temperature @ Vcc= +5V



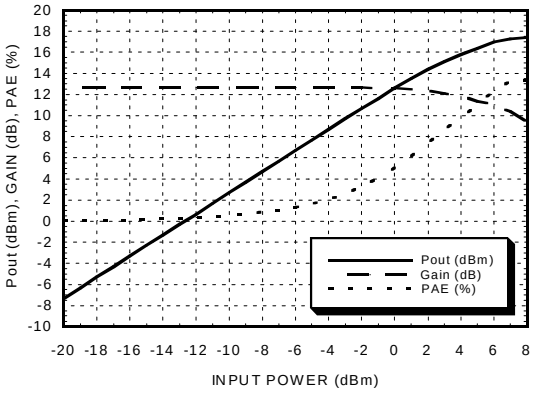
Output IP3 vs. Temperature @ Vcc= +7V



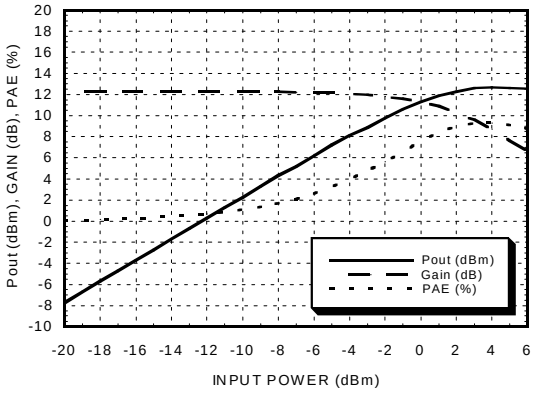
Output IP3 vs. Temperature @ Vcc= +5V



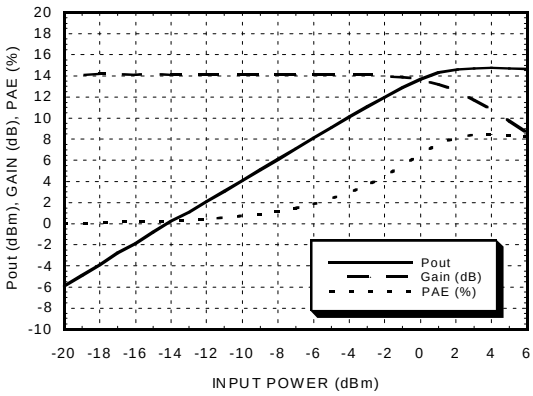
Power Compression @ 1.0 GHz, Vcc= +7V



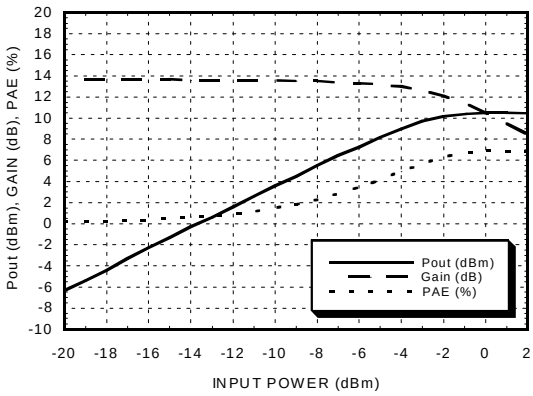
Power Compression @ 1.0 GHz, Vcc= +5V



Power Compression @ 3.0 GHz, Vcc= +7V



Power Compression @ 3.0 GHz, Vcc= +5V



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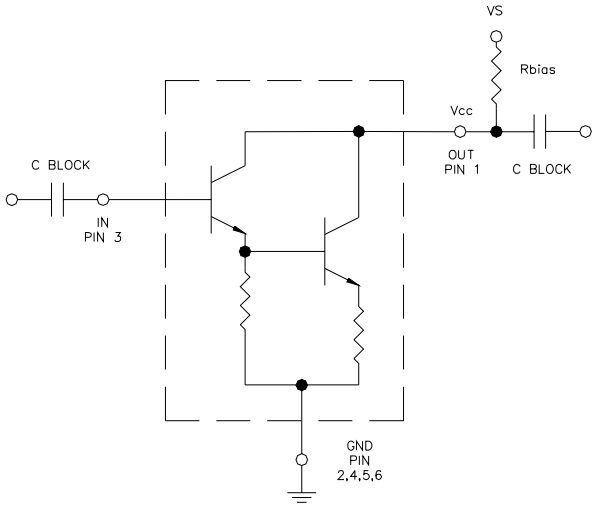
Schematic

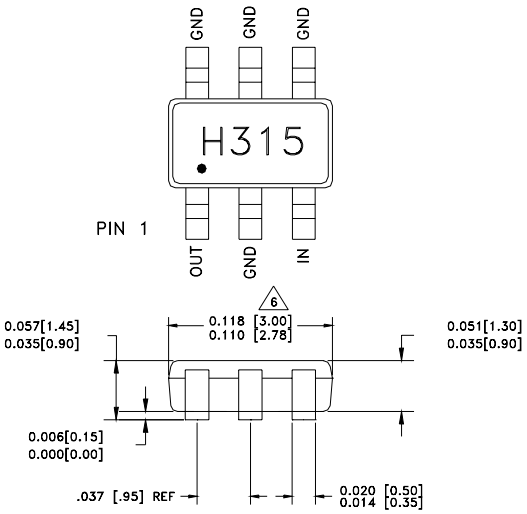


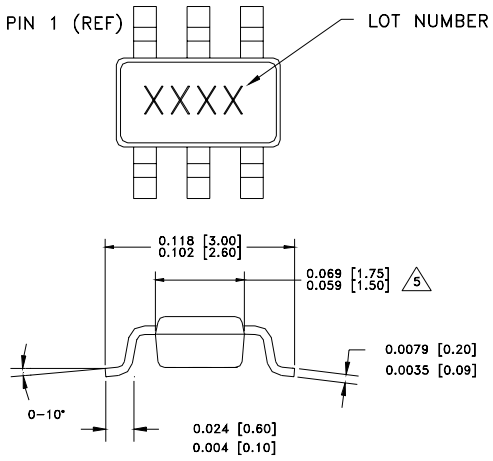
Absolute Maximum Ratings

Supply Voltage (Vcc)	+7.5 Vdc
Input Power	+20 dBm
Channel Temperature (Tc)	175 °C
Continuous Pdiss (Ta= 85 °C) (derate 4.14 mW/ °C above 85 °C)	373 mW
Storage Temperature	-65 to +150 °C
Operating Temperature	-55 to +70 °C

Note:
1. Select RBIAS to achieve desired Vcc voltage on Pin 1.
2. External blocking capacitors are required on Pins 1 and 3.

Outline



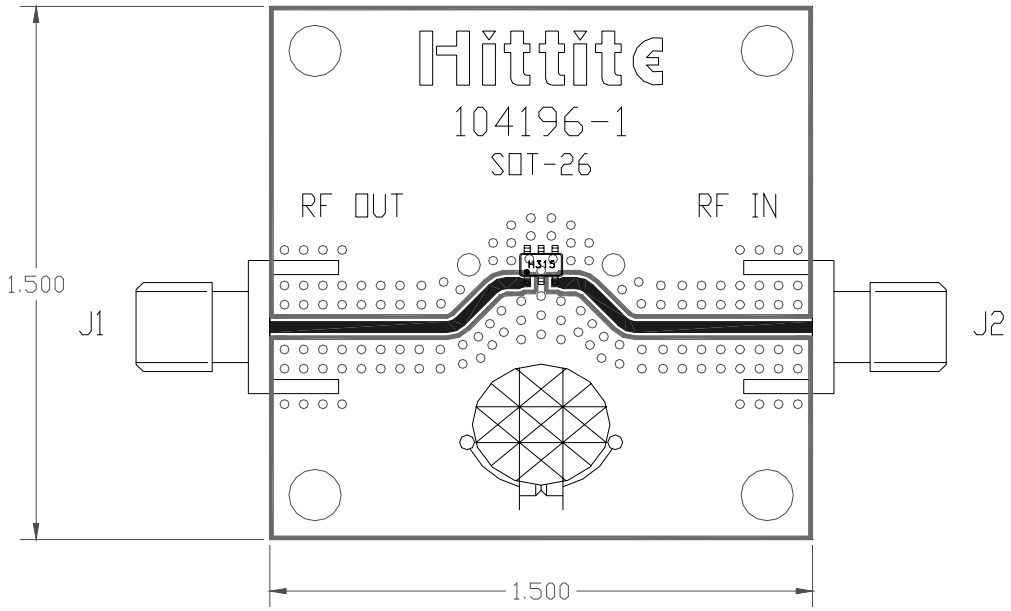


1. MATERIAL:
   A) PACKAGE BODY - LOW STRESS INJECTION-MOLDED PLASTIC.
   B) LEADFRAME & PADDLE MATERIAL: COPPER ALLOY
2. PLATING : LEAD & PADDLE- TIN SOLDER PLATE
3. DIMENSIONS ARE IN INCHES (MILLIMETERS).
   UNLESS OTHERWISE SPECIFIED ALL TOL. ARE ±0.005(±0.13).
4. CHARACTERS TO HELVETICA MEDIUM, .020 HIGH
   WHITE INK OR LASER MARK, LOCATED APPROX. AS SHOWN.

△5 DIMENSION DOES NOT INCLUDE MOLDFLASH OF 0.15 MM PER SIDE

△6 DIMENSION DOES NOT INCLUDE MOLDFLASH OF 0.25 MM PER SIDE

Evaluation Circuit Board Layout for HMC315



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 should be connected directly to the ground plane similar to that shown above. A sufficient number of VIA holes should be used to connect the top and bottom ground planes. The evaluation circuit board as shown is available from Hittite upon request.

Evaluation Circuit Board Layout Design Details

Item	Description
J1 - J2	PC Mount SMA Connector
U1	HMC315 Amplifier
PCB*	104196 Evaluation PCB 1.5" x 1.5"
*Circuit Board Material: Rogers 4350	