



AH116

1/2 Watt, High Gain HBT Amplifier

The Communications Edge™

Preliminary Product Information

Product Features

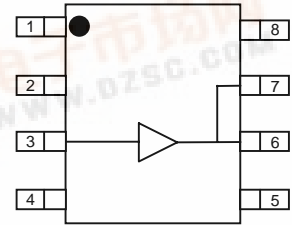
- 800 – 1000 MHz
- +28 dBm P1dB
- +42 dBm Output IP3
- 17 dB Gain
- Single Positive Supply (+5 V)
- MTBF >100 Years
- SOIC-8 SMT Package

Product Description

The AH116 is a high dynamic range driver amplifier in a low-cost surface mount package. The InGaP/GaAs HBT is able to achieve high performance over a broad frequency range with +42 dBm OIP3 and +28 dBm of compressed 1-dB power and is housed in an industry standard SOIC-8 SMT package. All devices are 100% RF and DC tested.

The product is targeted for use as a driver amplifier for wireless infrastructure where high linearity and medium power is required. The internal active bias allows the AH116 to maintain high linearity over temperature and operate directly off a +5 V supply. This combination makes the device an excellent fit for transceiver line cards and power amplifiers in current and next generation multi-carrier 3G base stations.

Functional Diagram



Function	Pin No.
Vref	1
Input	3
Output	6, 7
Vbias	8
GND	Slug
N/C	2, 4, 5

Typical Specifications

Parameters	Units	Min	Typ	Max
Frequency Range	MHz	800	880	1000
S21 - Gain	dB	15.5	18	
S11 - Input R.L.	dB		-15	
S22 - Output R.L.	dB		-8	
Output P1dB	dBm		+28	
Output IP3 ²	dBm		+42	
Noise Figure	dB		7.0	
IS-95 Channel Power	dBm		+16	
@ -65 dBc ACPR, 9 Ch. Fwd				
Operating Current Range	mA	200	250	300
Device Voltage	V		5	

Test conditions unless otherwise noted.

1. T = 25°C, Vsupply = +5 V, Frequency = 880 MHz in recommended application circuit.
2. 3OIP measured with two tones at an output power of +13 dBm/tone separated by 1 MHz. The suppression on the largest IM3 product is used to calculate the 3OIP using a 2:1 rule.

Absolute Maximum Rating

Parameters	Rating
RF Input Power (continuous)	+20 dBm
DC Voltage / Current	+8 V / 400 mA
DC Dissipation Power	2W

Operation of this device above any of these parameters may cause permanent damage.

Ordering Information

Part No.	Description
AH116	1/2 Watt, High Linearity HBT Amplifier (Available in Tape & Reel)
AH116-PCB880	Fully Assembled Evaluation Board, 900 MHz





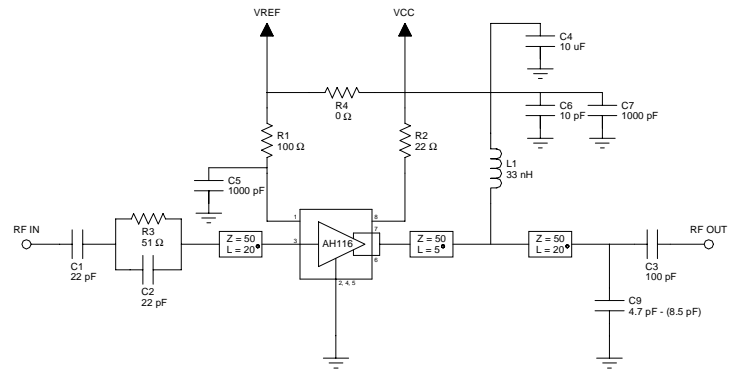
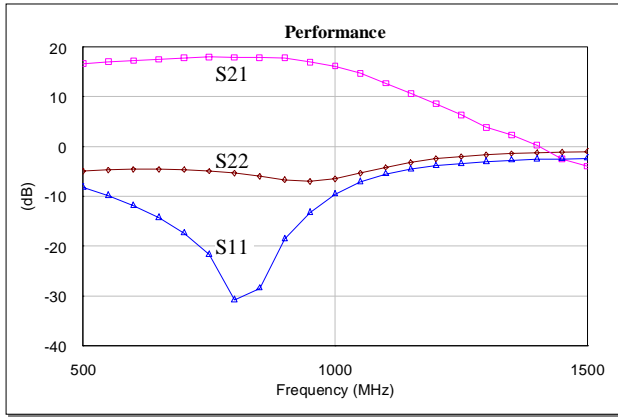
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880 MHz Application Circuit



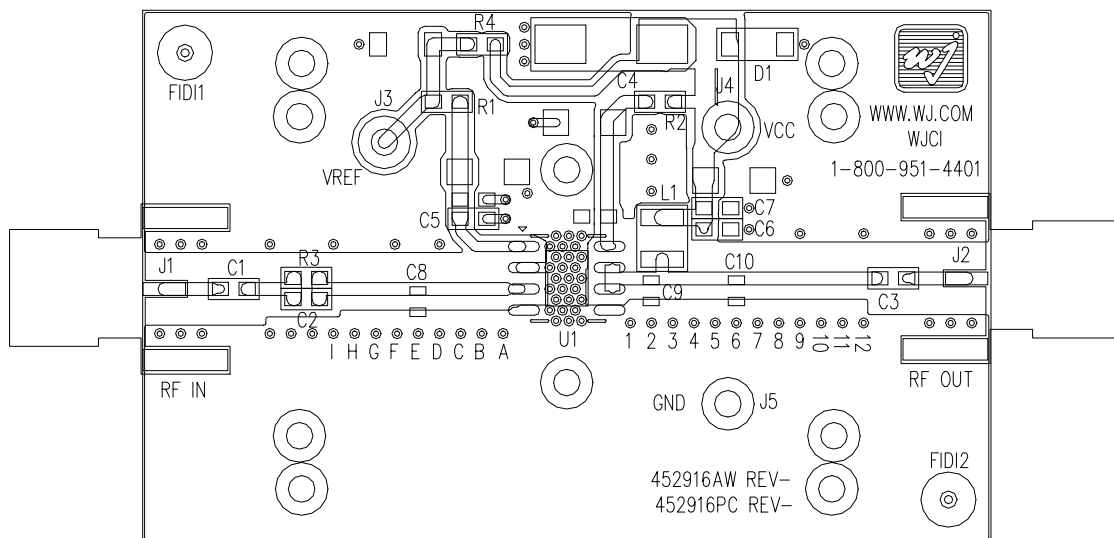
Typical Performance

Frequency	880 MHz
S21 - Gain	18 dB
S11	-15 dB
S22	-8 dB
Output P1dB	28 dBm
Output IP3	42 dBm
DC Bias	5V, 250mA

NOTES:

Install R4 for single supply voltage control. Remove R4 to adjust bias using V_{REF} OR adjust bias by changing R1. Align C9 at point 11.

Application Circuit PC Board Layout



Circuit Board Material: .014" FR-4, 4 layers (others added for rigidity), .062" total thickness, 1 oz copper



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Outline Drawing

Product Marking

The component will be marked with an “AH116” designator with a four- or five-digit alphanumeric lot code on the top surface of the package. Tape and reel specifications for this part is located on the website in the “Application Notes” section.

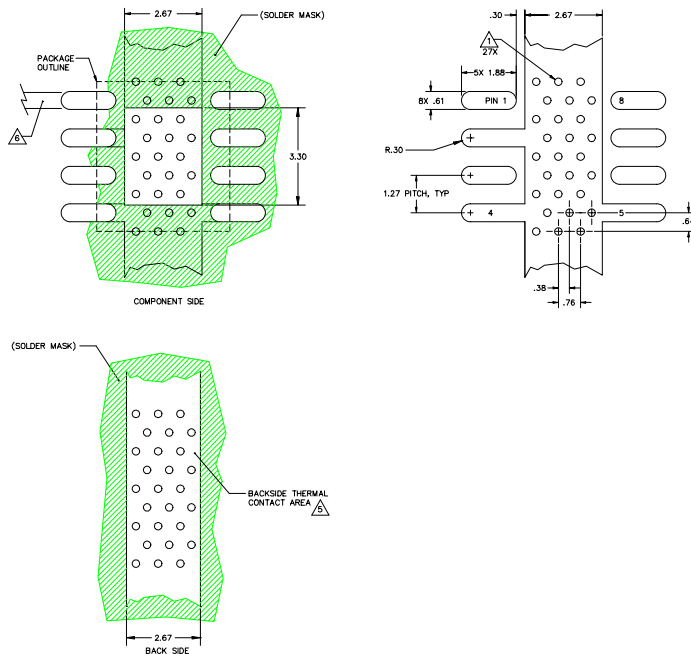
SYMBOL	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	1.30	1.50	.051	.059
A1	0	.10	0	.004
b	.38	.43	.015	.017
C	.18	.23	.007	.009
D	4.80	5.00	.189	.197
E	3.80	4.00	.150	.157
e	1.27 BSC		.050 BSC	
H	5.80	6.20	.228	.244
h	.25	.50	.01	.02
L	.40	1.27	.016	.050
M	2.95	3.15	.116	.124
N	2.03	2.54	.080	.100
α	0	8°	0	8°

ESD / MSL Information

ESD Classification: Class 1B
 Value: Passes at 1000V
 Test: Human Body Model (HBM)
 Standard: JEDEC Standard JESD22-A114

MSL Rating: Level 2
 Standard: JEDEC Standard J-STD-020A

Land Pattern



Mounting Config. Notes

1. Ground / thermal vias are critical for the proper performance of this device. Vias should use a .35mm (#80 / .0135”) diameter drill and have a final plated thru diameter of .25 mm (.010”).
2. Add as much copper as possible to inner and outer layers near the part to ensure optimal thermal performance.
3. Mounting screws can be added near the part to fasten the board to a heatsink. Ensure that the ground / thermal via region contacts the heatsink.
4. Do not put solder mask on the backside of the PC board in the region where the board contacts the heatsink.
5. RF trace width depends upon the PC board material and construction.
6. Use 1 oz. Copper minimum.
7. All dimensions are in millimeters (inches). Angles are in degrees.



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Typical Device Data

S-Parameters ($V_D = +5\text{ V}$, $I_D = 250\text{ mA}$, $T = 25^\circ\text{C}$, calibrated to device leads)

Freq (MHz)	S11 (dB)	S21 (dB)	S21 (ang)	S12 (dB)	S12 (ang)	S22 (dB)	S22 (ang)
50	-2.72	24.16	133.35	-36.72	29.75	-2.23	-102.97
100	-2.25	20.33	124.95	-35.31	13.96	-3.08	-137.03
200	-2.31	17.23	119.37	-34.90	2.32	-3.32	-159.63
300	-2.63	16.23	109.23	-34.22	-7.29	-3.30	-168.57
400	-3.08	15.63	98.28	-33.62	-16.36	-3.48	-172.70
500	-3.99	15.42	85.62	-33.01	-27.30	-3.14	-174.26
600	-5.79	15.58	69.70	-32.10	-37.73	-2.87	-176.25
700	-9.55	15.67	49.65	-31.23	-58.55	-2.69	-178.40
800	-19.72	15.22	25.60	-31.19	-78.95	-2.27	-179.74
900	-12.00	13.95	0.36	-32.11	-103.80	-1.66	177.95
1000	-6.06	11.91	-22.67	-33.26	-129.67	-1.40	173.15
1100	-3.59	9.46	-41.25	-35.51	-153.55	-1.42	168.43
1200	-2.34	6.92	-56.59	-38.16	176.95	-1.49	165.12
1300	-1.64	4.56	-68.13	-39.28	161.81	-1.71	163.09
1400	-1.28	2.28	-78.59	-41.14	132.98	-1.96	160.84
1500	-1.06	0.49	-88.03	-40.57	126.72	-2.27	162.34
1600	-0.91	-1.17	-96.56	-42.62	113.65	-2.53	160.80
1700	-0.77	-2.82	-105.47	-41.90	95.09	-2.76	158.88
1800	-0.71	-4.40	-112.20	-40.78	98.57	-2.92	157.57
1900	-0.65	-5.44	-118.80	-40.43	79.36	-3.11	156.96
2000	-0.60	-6.78	-128.36	-40.27	74.44	-3.29	155.77
2100	-0.55	-7.67	-139.22	-39.29	71.89	-3.55	155.05
2200	-0.58	-8.70	-146.80	-37.79	53.03	-3.72	155.24
2300	-0.56	-9.29	-158.26	-38.86	56.76	-3.90	155.59
2400	-0.55	-9.87	-169.80	-39.90	53.88	-3.96	158.19
2500	-0.54	-10.32	176.24	-37.63	53.78	-3.63	160.31
2600	-0.51	-10.59	160.74	-37.66	41.18	-3.25	160.80
2700	-0.52	-11.19	145.13	-37.20	48.65	-2.59	160.37
2800	-0.51	-11.66	128.82	-35.78	31.88	-1.97	158.05
2900	-0.50	-12.28	111.46	-36.13	35.11	-1.48	154.48
3000	-0.54	-13.08	95.01	-35.88	27.61	-1.09	149.64

Thermal Information

Parameters	Rating
Operating Case Temperature	-40 to +85 °C
Storage Temperature	-55 to +150 °C
Thermal Resistance	62 °C/W

To ensure MTTF > 1x10e6 hrs.