AH312

2 Watt, High Gain HBT Amplifier

The Communications Edge ™

Preliminary Product Information

Product Features

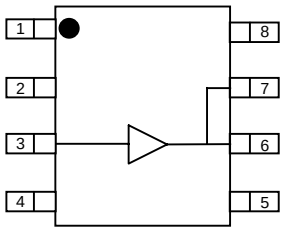
- 400 – 2300 MHz
- +33 dBm P1dB
- +49 dBm Output IP3
- 17 dB Gain @ 900 MHz
- Single Positive Supply (+5 V)
- SOIC-8 SMT Package

Product Description

The AH312 is a high dynamic range driver amplifier in a low-cost surface mount package. The InGaP/GaAs HBT is able to superior achieve performance over a broad frequency range with +49 dBm OIP3 and +33 dBm of 1-dB compressed output power. It 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 driver amplifier for various current and next generation wireless technologies such as GPRS, GSM, CDMA, W-CDMA, and UMTS, where high linearity and high power is required. The internal active bias allows the AH312 to maintain high linearity over temperature and operate directly off a +5 V supply.

Functional Diagram



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

Specifications

Parameters	Units	Min	Typ	Max
Frequency Range	MHz	400	2140	2300
S21 - Gain	dB	9	11	
S11 - Input R.L.	dB		-15	
S22 - Output R.L.	dB		-8	
Output P1dB	dBm		+33	
Output IP3[2]	dBm		+49	
Noise Figure	dB		9.0	
IS-95 Channel Power @ -65 dBc ACPR, 9 Ch .Fwd., 1960MHz	dBm		+22	
W-CDMA Channel Power @ -55 dBc ACPR, 2140 MHz	dBm		+21	
Operating Current Range	mA	700	800	900
Device Voltage	V		5	

Test conditions unless otherwise noted. Specifications apply across entire frequency band.
1. T = 25ºC, Vsupply = +5 V, Frequency = 2140 MHz, in recommended application circuit
2. 3OIP measured with two tones at an output power of +17 dBm/tone separated by 1 MHz. The suppression on the largest IM3 product is used to calculate the 3OIP using a 2:1 rule.

Typical Performance

Parameters	Units	Typical		
Frequency	MHz	880	1960	2140
S21 - Gain	dB	18	12	11
S11 - Input R.L.	dB	-15	-15	-15
S22 - Output R.L.	dB	-12	-8	-8
Output P1dB	dBm	+33	+33	+33
Output IP3[2]	dBm	+46	+49	+49
Noise Figure	dB	8.0	8.0	9.0
Supply Bias		+5 V @ 800 mA		

Typical parameters reflect performance in recommended application circuit:

Absolute Maximum Rating

Parameters	Rating
RF Input Power (continuous)	+28 dBm
DC Voltage	+8 V
DC Power	8 W

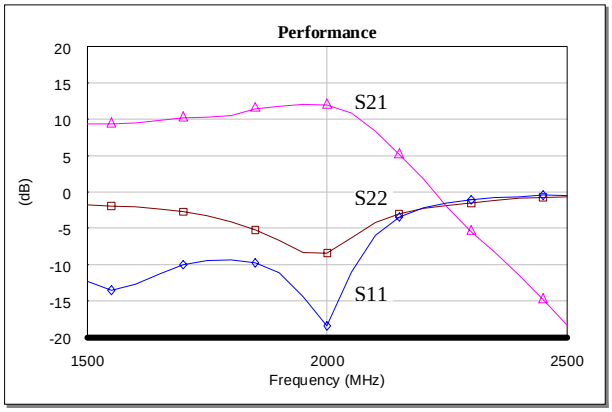
Operation of this device above any of these parameters may cause permanent damage.

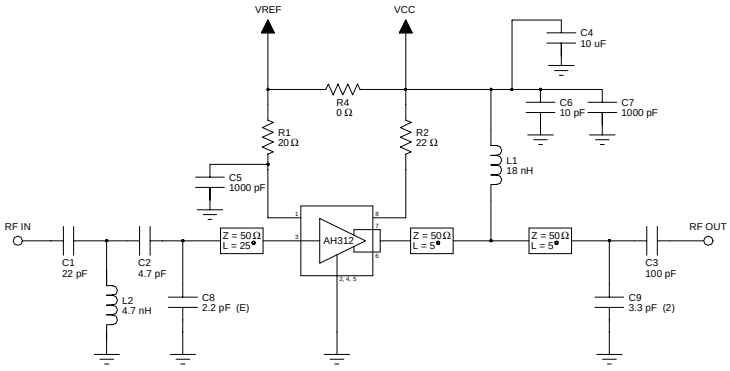
Ordering Information

Part No.	Description
AH312	2 Watt, High Linearity HBT Amplifier (Available in Tape & Reel)
AH312-PCB1960	Fully assembled Evaluation Board

This document contains information on a new product.
Specifications and information are subject to change without notice

1960 MHz Application Circuit



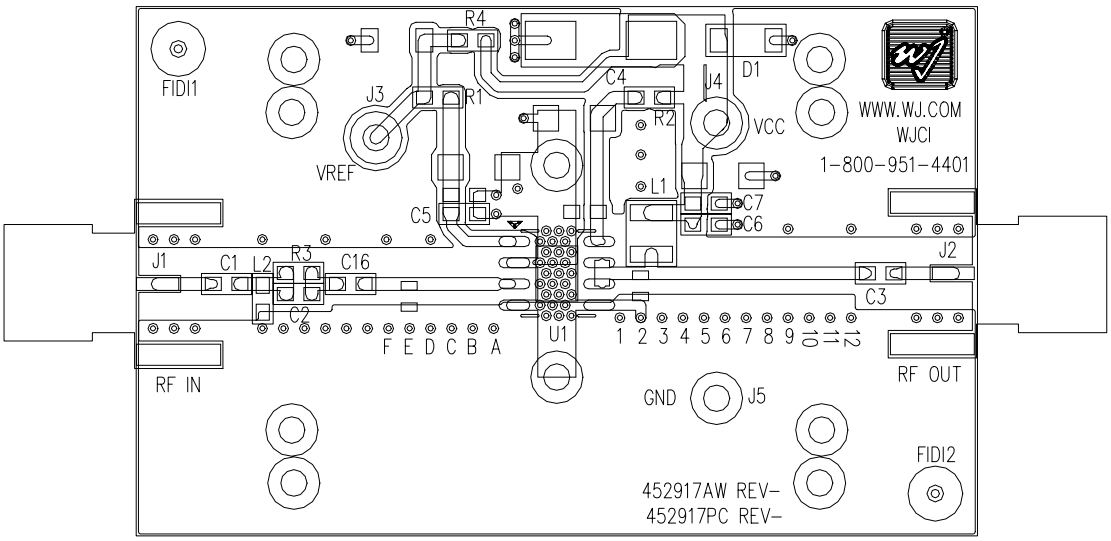


Typical Performance

Frequency	1960 MHz
S21 - Gain	11 dB
S11	-12 dB
S22	-10 dB
Output P1dB	+33 dBm
Output IP3	+49 dBm

NOTES:
Install R4 for single supply voltage control.. Remove R4 to adjust bias using V_{REF} or adjust bias by changing R1. Align C8 at point E and C9 at point 2.

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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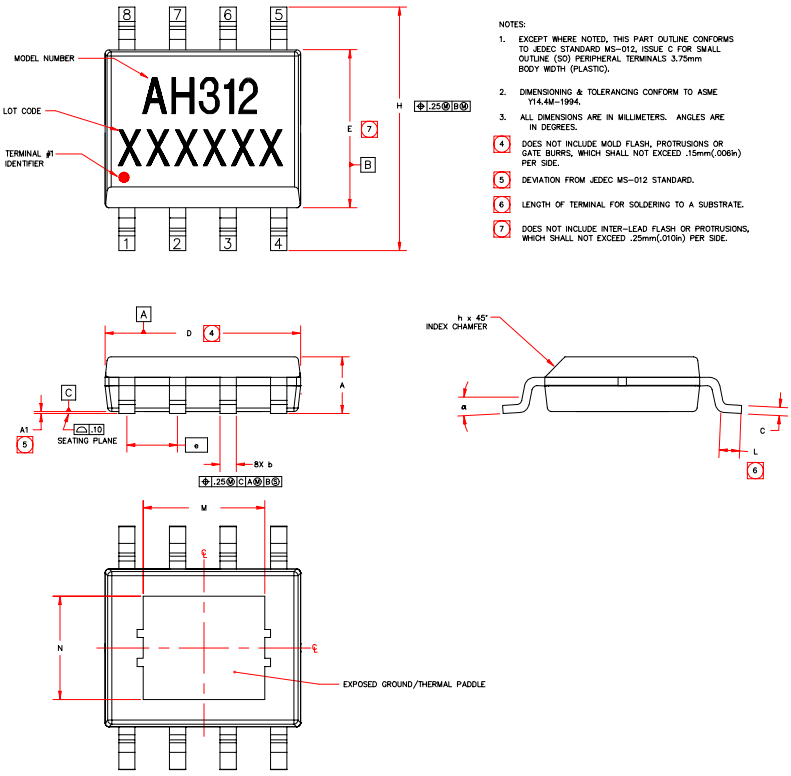
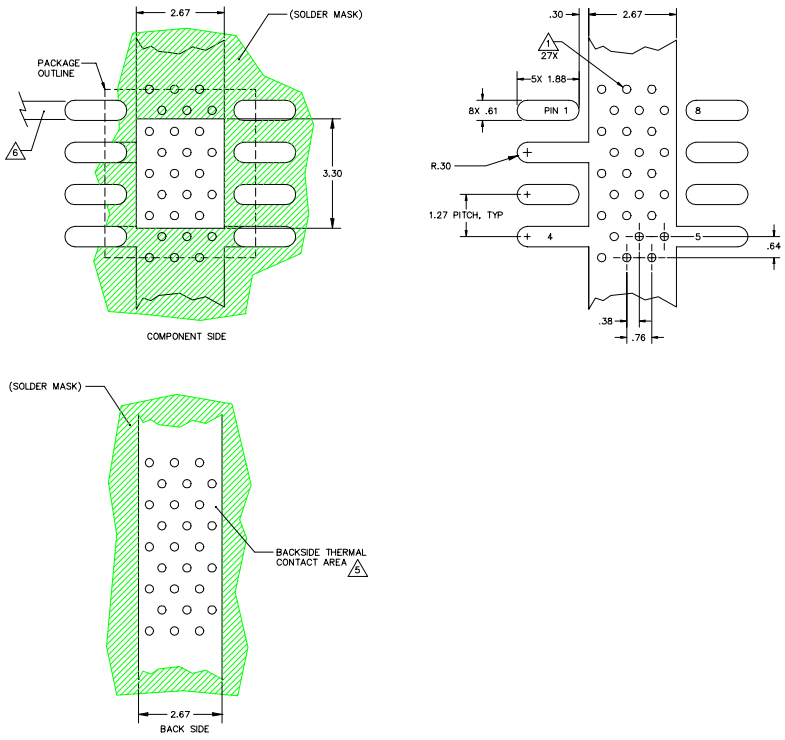
Outline Drawing



Land Pattern



Product Marking

The component will be marked with an "AH312" 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

Caution! ESD sensitive device.

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.

Typical Device Data

S-Parameters (V_D = +5 V, I_D = 800 mA, T = 25°C, calibrated to device leads)

Freq (MHz)	S11 (dB)	S11 (ang)	S21 (dB)	S21 (ang)	S12 (dB)	S12 (ang)	S22 (dB)	S22 (ang)
50	-0.86	-178.06	27.55	113.72	-45.75	30.91	-0.38	-130.98
100	-0.64	178.18	22.16	98.81	-45.46	12.80	-0.38	-157.30
200	-0.68	172.85	16.13	89.06	-42.65	6.09	-0.48	-172.51
300	-0.77	168.33	12.84	82.24	-42.87	9.36	-0.41	-178.09
400	-0.76	164.33	10.61	77.31	-43.96	4.69	-0.48	177.51
500	-0.83	160.16	8.90	72.58	-43.96	5.99	-0.52	175.47
600	-0.93	155.56	7.46	67.94	-41.17	6.70	-0.61	173.63
700	-1.00	150.80	6.52	63.48	-41.65	5.77	-0.67	171.65
800	-1.15	146.04	5.78	57.62	-41.65	-5.78	-0.66	170.49
900	-1.36	140.85	5.24	52.43	-41.32	-15.90	-0.76	169.86
1000	-1.50	134.58	4.87	46.90	-40.36	-7.84	-0.71	169.31
1100	-1.83	128.47	4.69	40.14	-40.84	-29.07	-0.79	168.48
1200	-2.39	121.66	4.74	32.96	-40.22	-16.51	-0.80	168.22
1300	-3.13	112.88	4.92	24.06	-39.22	-26.86	-0.72	168.91
1400	-4.47	104.01	5.33	14.01	-38.97	-48.82	-0.76	167.91
1500	-6.80	89.44	5.78	0.40	-38.05	-63.59	-0.81	170.99
1600	-11.96	86.06	5.96	-17.55	-38.96	-86.32	-0.60	170.63
1700	-17.27	155.02	5.51	-36.29	-37.45	-117.58	-0.55	168.54
1800	-8.66	-179.11	4.41	-56.78	-39.35	-144.53	-0.52	167.41
1900	-4.77	171.18	2.70	-74.04	-40.75	-179.69	-0.52	166.26
2000	-2.76	159.91	0.53	-89.86	-43.55	145.94	-0.41	164.50
2100	-1.77	150.36	-1.59	-100.76	-41.51	125.36	-0.46	162.43
2200	-1.21	142.90	-3.21	-107.99	-41.56	104.25	-0.54	160.11
2300	-0.90	136.33	-5.51	-117.09	-41.82	89.18	-0.70	159.22
2400	-0.68	130.93	-7.27	-123.14	-42.46	73.64	-0.68	157.84
2500	-0.55	126.46	-8.99	-128.85	-39.74	71.79	-0.63	156.29
2600	-0.43	121.91	-10.41	-134.93	-39.71	64.28	-0.73	154.66
2700	-0.39	118.06	-12.11	-138.26	-41.60	58.20	-0.67	153.37
2800	-0.32	114.61	-13.28	-143.22	-40.99	58.20	-0.73	151.14
2900	-0.28	111.40	-15.19	-146.48	-39.43	54.78	-0.74	149.16
3000	-0.29	108.16	-15.94	-149.93	-39.65	48.40	-0.79	147.52

Thermal Information

Parameters	Rating
Operating Case Temperature	-40 to +85 °C
Storage Temperature	-55 to +150 °C
Thermal Resistance	17.5 °C/W

. To ensure MTTF > 1x10e6 hrs.
The thermal impedance of this device is a function of the Voltage applied at pins 6 and 7 and the Current applied to pins 6,7, and 8. To calculate junction temperature, use the following formula:

Tj = Tcase + Thetajc*(Vpin6,7*(Ipin6,7+Ipin8))