



Product Features

- 50-450 MHz
- +40 dBm Output IP3
- No Matching Elements Required
- 3.0 dB Noise Figure
- 13.5 dB Gain
- +20 dBm P1dB
- MTBF >100 Years
- SOT-89 SMT Package
- Single Bias Supply (+5 V)

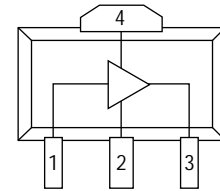


Actual Size

Product Description

The AH3 is a high dynamic range amplifier for IF requirements. The product achieves low noise figure and high output IP3 at the same bias point, making it ideal for receiver and transmitter applications. In addition, the device is internally matched for 50 ohms in a low cost SOT-89 package. The AH3 is manufactured using GaAs MESFET technology and boasts an MTBF of >100 years³ at a mounting temperature of 85°C. The package is a SOT-89. All devices are 100% RF and DC tested.

Functional Diagram



Function	Pin No.
Input	1
Ground	2
Output/Bias	3
Ground	4

Specifications

Parameter	Units	Minimum	Typical	Maximum	Condition
Frequency Range	MHz		50-450		
S21 - Gain	dB	12	13.5	16	
S11 - Input Return Loss ¹	dB		-10		
S22 - Output Return Loss	dB		-20		
Output IP3	dBm	+37	+40		
Output P1dB	dBm		+20		
Noise Figure ¹	dB		4.5		50 MHz
Noise Figure	dB		3.0		450 MHz
Operating Current Range	mA	120	150	180	Vdd = 5.0 V
Supply Voltage	V		5		

Test conditions unless otherwise noted, T = 25°C, Vdd = 5.0 V, 50 Ω system, 800 MHz.

1. S11 and Noise Figure can be improved using an optional input matching network.

2. OIP3 measured with 2 tones at an output power of 5 dBm/tone separated by 10 MHz. The suppression on the largest IM3 product is used to calculate OIP3 using a 2:1 slope rule.

3. MTBF calculated with ground lead temperature at 85°C.

Absolute Maximum Ratings

Parameter	Rating
Operating Case Temperature	-40 to +85°C
Storage Temperature	-55 to +125°C
Supply Voltage	+6.0 V
Input RF Power (continuous)	+10 dBm

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

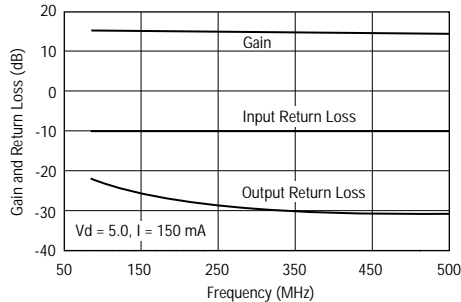
Ordering Information

Part No.	Description
AH3	High Dynamic Range Amplifier (Available in tape and reel)
AH3WB-PCB	Fully Assembled Application Circuit

AH3

Performance Charts ($V_{ds} = 5\text{ V}$, $I_{ds} = 150\text{ mA}$, $T = 22^\circ\text{C}$, unmatched device in a 50 ohm system)

Gain and Return Loss vs. Frequency

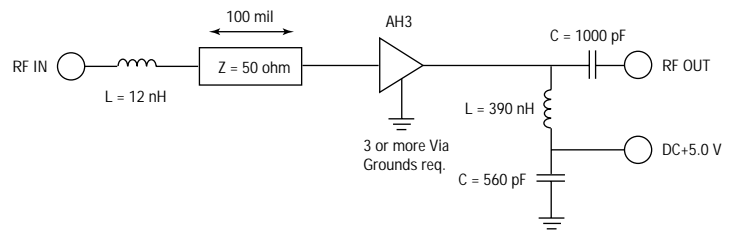


Application Circuit: 50 to 450 MHz

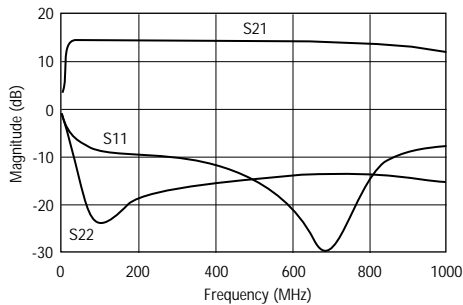
Typical Specifications

	50 MHz	450 MHz
Frequency	50 MHz	450 MHz
Magnitude S21	13.7 dB	13.7 dB
Magnitude S11	-8.3 dB	-13.3 dB
Magnitude S22	-18.0 dB	-15.2 dB
OIP3	36 dBm	40 dBm
Noise Figure	3.6 dB	2.7 dB
Bias	$V_{ds} = 5.0\text{ V}$, $I_{d} = 150\text{ mA}$	

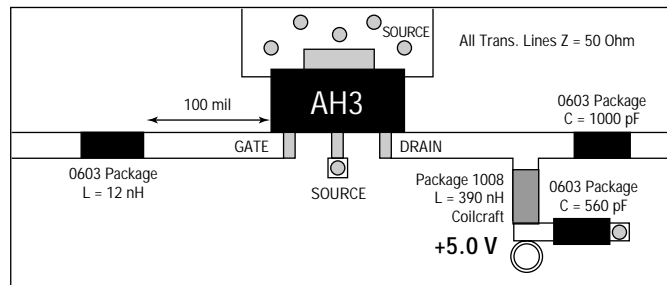
Schematic



S-Parameters



FR4 Board Layout (T = 14 Mils)



NOTE: The application circuit is designed for wide bandwidth. For narrow band applications, S11 and S21 can be improved with an input shunt microstrip element to ground.

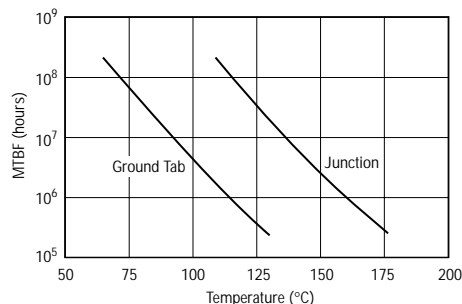
Thermal Specifications

Parameter	Rating
Operating Case Temperature	-40 to +85°C
Thermal Resistance (Maximum)	59°C/W
Junction Temperature (Recommended Maximum)	+155°C

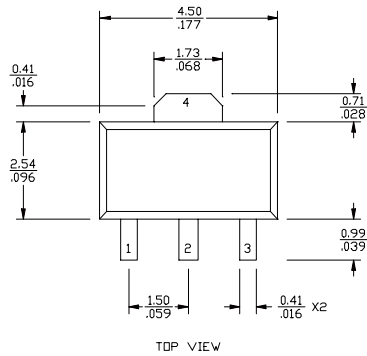
Notes:

- Thermal Resistance determined at Maximum Tab Temperature and Maximum Power Dissipation.
- Recommended Maximum Junction Temperature insures a MTBF of 1 million hours.
- Refer to WJ Application Note "AH3 Temperature Effects on Reliability" for more information.

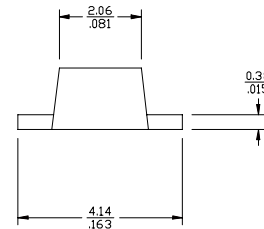
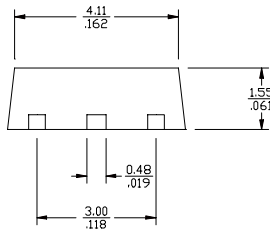
MTBF vs. Temperature



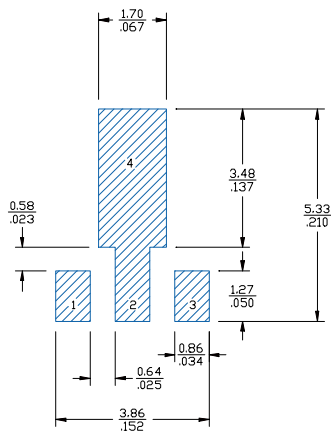
Outline Drawing



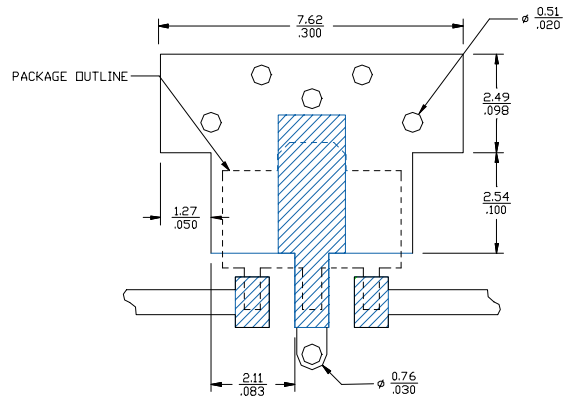
mm
inch



Land Pattern



Mounting Configuration



FUNCTION	PIN NO.
INPUT	1
GROUND	2
OUTPUT (BIAS)	3
GROUND	4

- Notes:
1. Ground vias are critical for thermal and RF grounding considerations.
 2. A minimum of 6 ground vias are required for 14 mil and 28 mil FR4 board.
 3. If your PCB design rules allow, ground vias should be placed under the land pattern for better RF and thermal performance. Otherwise ground vias should be placed as close to land pattern as possible.
 4. Trace width depends on PC board.

Specifications and information are subject to change without notice.



Caution! ESD sensitive device.

Typical Test Data

S-Parameters (Vds = +5 V, Ids = 150 mA, Vds = +5 V, T = 22°C, unmatched device in a 50 ohm system)

Freq (MHz)	S11 (dB)	S11 (Ang)	S21 (dB)	S21 (Ang)	S12 (dB)	S12 (Ang)	S22 (dB)	S22 (Ang)
10	-2.530	-27.743	18.006	165.650	-24.219	47.465	-7.854	-41.178
20	-5.360	-34.617	16.548	164.710	-21.904	28.449	-11.561	-57.965
30	-7.146	-33.940	15.878	166.540	-21.304	19.597	-14.429	-64.686
40	-8.272	-31.787	15.564	167.950	-21.056	14.734	-16.616	-67.287
50	-8.913	-29.549	15.389	168.780	-20.936	11.417	-18.343	-69.016
60	-9.323	-28.201	15.282	169.330	-20.881	9.429	-19.736	-69.098
70	-9.627	-27.238	15.207	169.600	-20.852	7.568	-20.943	-69.025
80	-9.813	-26.483	15.173	169.600	-20.843	6.415	-21.935	-68.672
90	-9.961	-26.149	15.137	169.540	-20.802	5.182	-22.729	-68.056
100	-10.046	-26.190	15.118	169.360	-20.793	4.339	-23.484	-67.324
110	-10.128	-26.224	15.102	169.040	-20.786	3.538	-24.103	-66.366
120	-10.184	-26.163	15.074	168.700	-20.764	2.903	-24.634	-66.106
130	-10.242	-26.641	15.070	168.310	-20.768	2.329	-25.055	-64.929
140	-10.226	-27.245	15.059	167.860	-20.752	1.733	-25.426	-65.650
150	-10.294	-28.086	15.036	167.360	-20.735	1.163	-25.889	-65.519
160	-10.269	-28.741	15.019	166.910	-20.751	0.987	-26.221	-65.007
170	-10.257	-29.077	15.007	166.490	-20.763	0.413	-26.613	-64.748
180	-10.310	-29.991	14.995	166.070	-20.752	0.005	-26.830	-64.337
190	-10.301	-30.544	14.981	165.590	-20.760	-0.451	-27.101	-64.336
200	-10.272	-31.453	14.965	165.070	-20.766	-0.838	-27.295	-65.225
210	-10.290	-32.422	14.954	164.590	-20.776	-1.054	-27.595	-64.672
220	-10.289	-33.275	14.953	163.990	-20.786	-1.431	-27.783	-65.233
230	-10.340	-34.491	14.915	163.590	-20.752	-1.523	-28.024	-67.769
240	-10.265	-35.226	14.930	162.990	-20.763	-2.062	-28.402	-66.306
250	-10.301	-36.310	14.928	162.510	-20.761	-2.114	-28.556	-65.739
260	-10.289	-37.198	14.920	161.780	-20.766	-2.567	-28.724	-66.872
270	-10.280	-38.284	14.910	161.380	-20.746	-2.924	-28.899	-66.403
280	-10.267	-39.078	14.912	160.760	-20.742	-3.082	-29.125	-67.517
290	-10.269	-40.329	14.896	160.110	-20.731	-3.442	-29.270	-67.635
300	-10.247	-41.322	14.893	159.560	-20.751	-3.708	-29.315	-66.567
310	-10.244	-42.477	14.877	159.060	-20.739	-3.997	-29.553	-67.442
320	-10.234	-43.257	14.869	158.480	-20.739	-4.204	-29.668	-67.745
330	-10.211	-44.361	14.848	157.900	-20.750	-4.549	-29.642	-68.462
340	-10.209	-45.284	14.830	157.400	-20.740	-4.737	-29.770	-68.852
350	-10.190	-46.406	14.835	156.850	-20.756	-5.043	-29.860	-69.355
360	-10.190	-47.389	14.818	156.300	-20.730	-5.115	-29.972	-70.060
370	-10.096	-48.510	14.813	155.630	-20.736	-5.669	-30.217	-70.769
380	-10.125	-49.505	14.809	155.070	-20.731	-5.639	-30.176	-71.251
390	-10.069	-50.448	14.804	154.520	-20.706	-5.940	-30.147	-71.839
400	-10.037	-51.503	14.799	153.880	-20.726	-6.180	-30.320	-72.002
410	-10.009	-52.645	14.772	153.220	-20.731	-6.471	-30.463	-72.484
420	-10.042	-53.633	14.769	152.630	-20.703	-6.842	-30.488	-73.831
430	-10.003	-54.608	14.755	151.990	-20.727	-7.052	-30.490	-74.433
440	-9.981	-55.914	14.749	151.430	-20.723	-7.190	-30.626	-75.605
450	-9.999	-56.888	14.724	150.780	-20.749	-7.483	-30.629	-76.007
460	-9.945	-57.864	14.712	150.230	-20.736	-7.717	-30.691	-77.373
470	-9.897	-58.974	14.701	149.610	-20.733	-7.927	-30.690	-78.350
480	-9.902	-59.988	14.667	149.060	-20.743	-8.242	-30.789	-80.021
490	-9.856	-61.009	14.664	148.480	-20.725	-8.424	-30.891	-80.993
500	-9.812	-62.011	14.652	147.990	-20.754	-8.530	-30.973	-81.750