



AH22

High Dynamic Range Amplifier

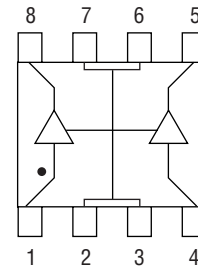
Product Features

- 50-860 MHz Bandwidth
- -61 dBc CTB, 110 Channels, 40 dBmV
- -63 dBc CSO, 110 Channels, 40 dBmV
- 4.5 dB Noise Figure
- 12 dB Gain
- 23 dBm P1dB
- Surface Mount
- Thermally enhanced SOIC-8 pkg
- Single +5 Volt Supply

Product Description

The AH22 is a high dynamic range amplifier targeting cable TV markets. A combination of gain flatness, high linearity and bandwidth make it ideal for CATV distribution, cable modem and laser diode driver applications. The device is designed for 75 Ω systems and packaged for push-pull operation. A mature and reliable GaAs MESFET technology is employed to maximize linearity at low power dissipation. The package is a thermally enhanced SOIC-8 and all devices are 100% RF tested.

Functional Diagram



Function	Pin No.
Input 1	1
Ground	2,3,6,7
Input 2	4
Output/Bias2	5
Output/Bias1	8

Specifications

Parameter	Units	Minimum	Typical	Maximum	Condition
Frequency Range	MHz	50		860	
Gain	dB		11.7		50 MHz, Using CATV application circuit
Gain	dB		11.3		860 MHz, Using CATV application circuit
S11	dB		-12	-11	Using specified application circuit 50-860 MHz
S22	dB		-12	-11.4	Using specified application circuit 50-860 MHz
Output IP3	dBm		41		
Output IP2	dBm		70		
Noise Figure	dB		4.5		
Output P1dB	dBm		23		71.7 dBmV
CSO	dBc		-63		110 channels, 50-750 dBmV/ch, 40 dBmV output/chan
CSO	dBc		-58		135 channels, 50-860 dBmV/ch, 39 dBmV output/chan
CTB	dBc		-61		110 channels, 50-750 dBmV/ch, 40 dBmV output/chan
CTB	dBc		-59		135 channels, 50-860 dBmV/ch, 39 dBmV output/chan
Operating Current Range	mA	240	300	360	Vdd = 5.0 V
Supply Voltage	V		5		

Test conditions unless otherwise noted. T = 25°C, Vdd = 5.0 V, 75 Ω system.

1. Typical specifications reflect AH22 measured with external matching circuits.

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.

Absolute Maximum Ratings

Parameter	Rating
Operating Case	-40 to +85°C
Storage Temperature	-40 to +125°C
Junction Temperature	+155°C
Supply Voltage	+6.0 V
Input RF Power (continuous)	+18 dBm

Ordering Information

Part No.	Description
AH22	Linear Amplifier, 500 pieces per reel
AH22-PCB	Fully assembled application circuit 50-860 MHz
AH22D-PCB	Full assembled application circuit, Dual AH22

AH22

Preliminary Information

Push-Pull Circuit: 50-860 MHz

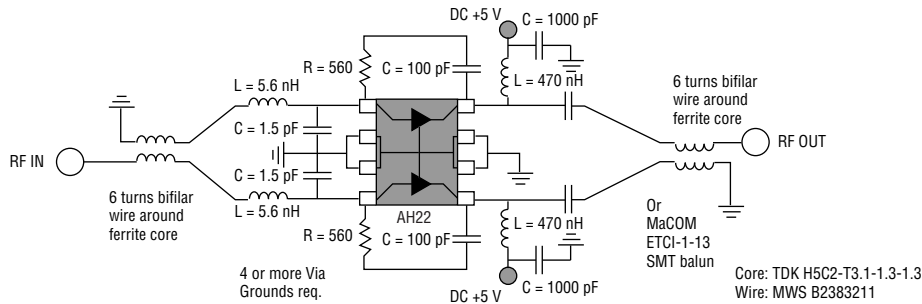
Typical Performance (75 Ohm System)

Frequency	50 MHz	450 MHz	750 MHz	860 MHz
Magnitude S21	11.7 dB	11.7 dB	11.4 dB	11.3 dB
Magnitude S11	-11.0 dB	-12.3 dB	-11.7 dB	-15.6 dB
Magnitude S22	-13.2 dB	-11.9 dB	-11.4 dB	-12.3 dB
OIP2	72.0 dBm	70 dBm	72 dBm	70 dBm
OIP3	42.0 dBm	43 dBm	41 dBm	40 dBm
Bias	Vds = 5 V, Id = 300 mA			

Multi-channel Measurements

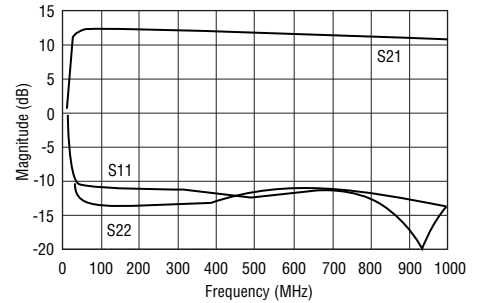
CSO	-63 dBc	750 MHz	110 channels	+40 dBmV/ch, Flat
CTB	-61 dBc	750 MHz	110 channels	+40 dBmV/ch, Flat
XMOD	-61 dBc	750 MHz	110 channels	+40 dBmV/ch, Flat

Schematic

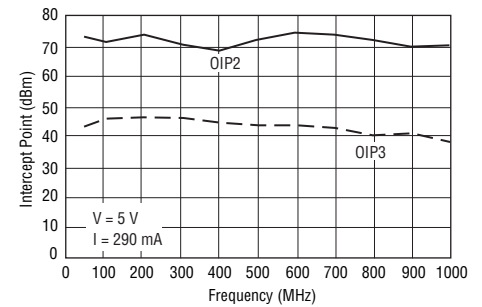


Performance Charts

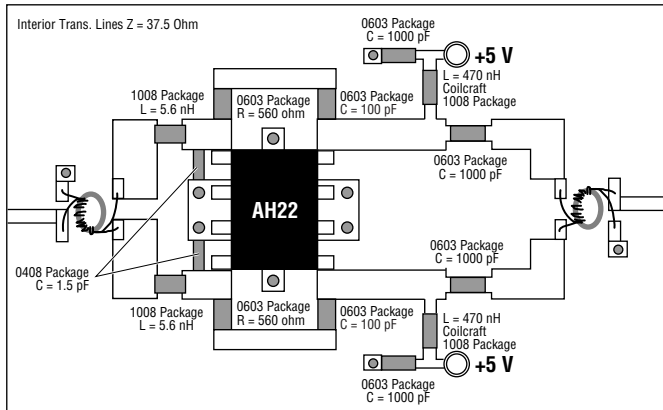
S-Parameters



Linearity vs. Frequency



FR4 Board Layout (T = 28 Mils to ground plane)



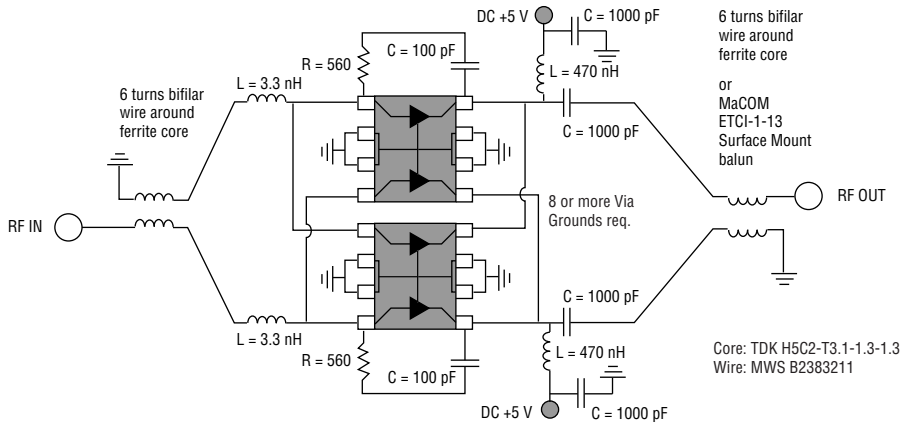
Note: Balun and board losses have not been extracted but typically account for 0.4 dB loss midband and 1.1 dB loss at 860 MHz.

Dual Push-Pull Circuit: 50-860 MHz

Typical Performance (75 Ohm System)

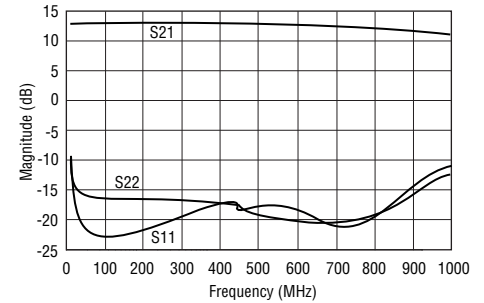
	50 MHz	450 MHz	750 MHz	860 MHz
Frequency	50 MHz	450 MHz	750 MHz	860 MHz
Magnitude S21	13.3 dB	13.3 dB	12.5 dB	12.3 dB
Magnitude S11	-21.0 dB	-18.0 dB	-21.0 dB	-16.2 dB
Magnitude S22	-16.4 dB	-18.2 dB	-20.2 dB	-17.1 dB
OIP2	73.0 dBm	72 dBm	75 dBm	76 dBm
OIP3	45.0 dBm	49 dBm	46 dBm	47 dBm
Bias	Vds = 5 V, Id = 600 mA			

Schematic

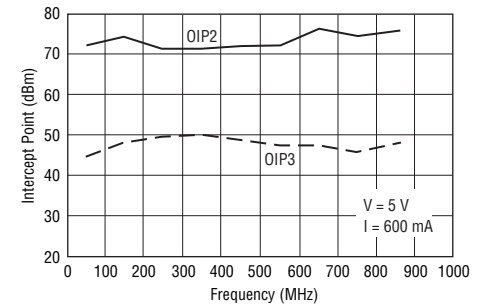


Performance Charts

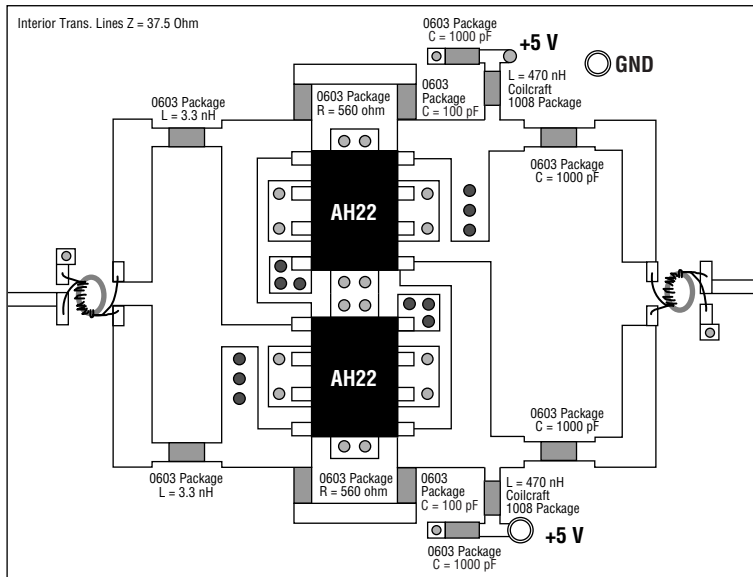
S-Parameters



Linearity vs. Frequency

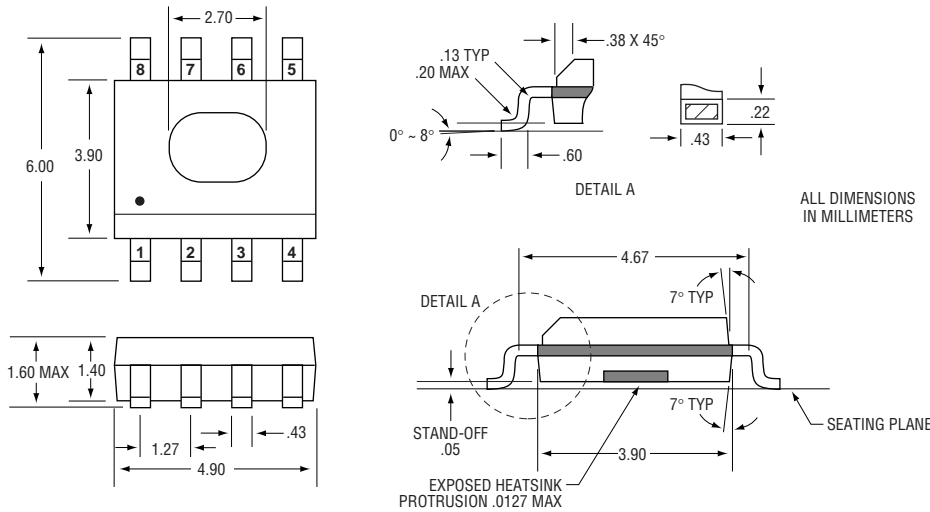


FR4 Board Layout (T = 28 Mils to ground plane)



Note: Balun and board losses have not been extracted but typically account for 0.4 dB loss midband and 1.1 dB loss at 860 MHz.

Outline Drawing



Typical Automatic Test Data

S-Parameters, single unmatched device (V_{dd} = +5 V, I_{ds} = 150 mA, T = 22°C)

Freq. (MHz)	S11 (dB)	S11 Ang	S21 (dB)	S21 Ang	S12 Mag	S12 Ang	S22 (dB)	S22 Ang
10	-12.892	-2.166	17.059	179.076	0.050	-0.502	-36.560	-65.063
50	-12.870	-11.286	17.067	176.030	0.051	0.301	-37.190	-72.212
100	-12.672	-23.045	17.043	172.073	0.051	0.703	-31.958	-82.160
150	-12.356	-33.366	16.967	168.036	0.051	0.964	-28.320	-90.551
200	-11.872	-42.817	16.894	164.326	0.051	1.258	-26.196	-94.845
250	-11.476	-52.297	16.801	160.805	0.051	1.800	-24.523	-100.971
300	-11.056	-60.214	16.723	157.092	0.052	1.771	-23.104	-103.565
350	-10.449	-67.937	16.619	153.456	0.053	1.858	-21.819	-105.985
400	-9.960	-74.745	16.514	149.951	0.053	2.304	-20.846	-108.359
450	-9.505	-80.896	16.376	146.241	0.054	1.529	-20.003	-110.824
500	-9.051	-86.735	16.220	142.910	0.055	1.348	-19.114	-114.155
550	-8.599	-92.061	16.067	139.571	0.056	1.105	-18.350	-115.873
600	-8.188	-97.267	15.918	136.143	0.057	0.884	-17.773	-119.083
650	-7.855	-101.536	15.725	132.858	0.057	-0.090	-17.233	-120.438
700	-7.497	-106.143	15.515	129.818	0.058	-0.565	-16.631	-122.901
750	-7.154	-110.057	15.370	126.785	0.058	-0.719	-16.162	-125.464
800	-6.889	-114.001	15.171	123.633	0.059	-1.741	-15.749	-127.412
850	-6.565	-117.238	14.956	120.846	0.059	-2.484	-15.276	-129.278
900	-6.298	-120.930	14.785	118.193	0.060	-3.030	-14.928	-131.457
950	-6.104	-124.039	14.586	115.177	0.060	-4.081	-14.636	-133.161
1000	-5.852	-127.205	14.378	112.740	0.061	-4.826	-14.283	-135.168



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