



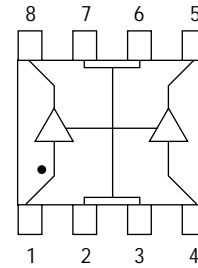
### Product Features

- 50-860 MHz Bandwidth
- -61 dBc CTB, 110 Channels, 40 dBmV
- -63 dBc CSO, 110 Channels, 40 dBmV
- 4.5 dB Noise Figure
- 11.3 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		
S21-Gain	dB		11.3		50 MHz
S21-Gain	dB		11.0		860 MHz
S11-Input Return Loss	dB		-12		
S22-Output Return Loss	dB		-12		
Output IP3	dBm		41		
Output IP2	dBm		65		
Noise Figure	dB		4.5		
Output P1dB	dBm		23		71.7 dBmV
CSO	dBc		-63		110 channels, 50-750 MHz, 40 dBmV output/channel
CSO	dBc		-58		135 channels, 50-860 MHz, 39 dBmV output/channel
CTB	dBc		-61		110 channels, 50-750 MHz, 40 dBmV output/channel
CTB	dBc		-59		135 channels, 50-860 MHz, 39 dBmV output/channel
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 8 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
Thermal Resistance (θ <sub>JC</sub> )	28°C/W
Supply Voltage	+6.0 V
Input RF Power (continuous)	+13 dBm

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

### Ordering Information

Part No.	Description
AH22	High Dynamic CATV Range Amplifier (Available in tape and reel)
AH22-PCB	Fully Assembled Application Circuit 50-860 MHz
AH22DUAL-PCB	Fully Assembled Application Circuit, Dual AH22

# AH22

## Push-Pull Circuit: 50-860 MHz

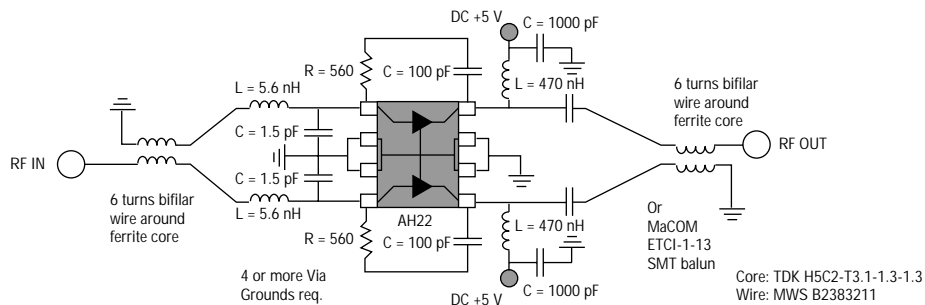
### Typical Performance (75 Ohm System)

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			

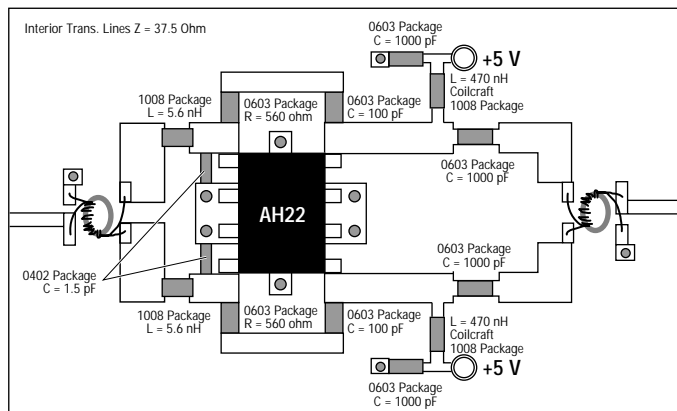
### Multi-channel Measurements

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

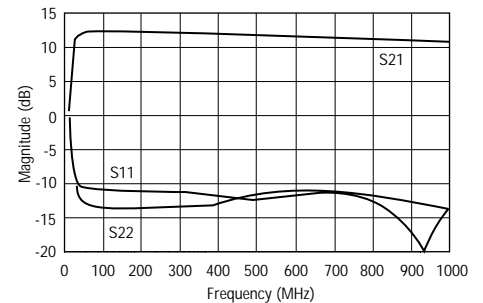


### FR4 Board Layout (T = 28 Mils to ground plane)

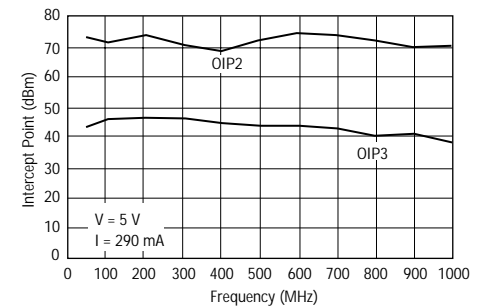


## Performance Charts

### S-Parameters



### Linearity vs. Frequency

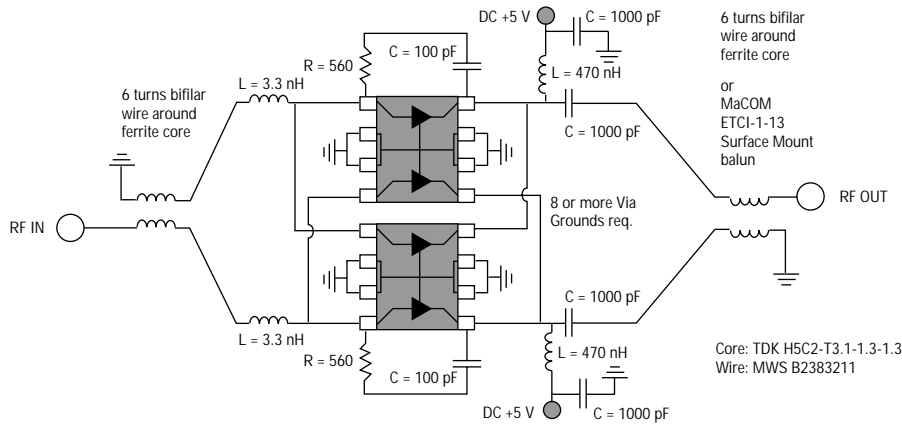


# Dual Push-Pull Circuit: 50-860 MHz

## Typical Performance (75 Ohm System)

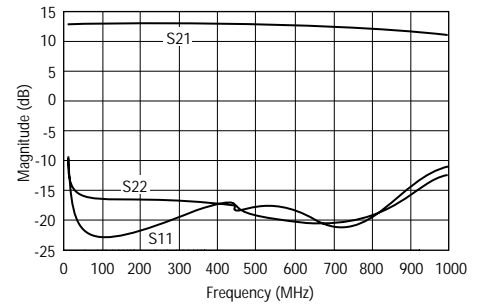
Frequency	50 MHz	450 MHz	750 MHz	860 MHz
Magnitude S21	13.3 dB	13.3 dB	12.5 dB	12.3 dB
Magnitude S11	-21.0 dB	-18.0 dB	-21.0 dB	-16.2 dB
Magnitude S22	-16.4 dB	-18.2 dB	-20.2 dB	-17.1 dB
OIP2	73.0 dBm	72 dBm	75 dBm	76 dBm
OIP3	45.0 dBm	49 dBm	46 dBm	47 dBm
Bias	Vds = 5 V, Id = 600 mA			

## Schematic

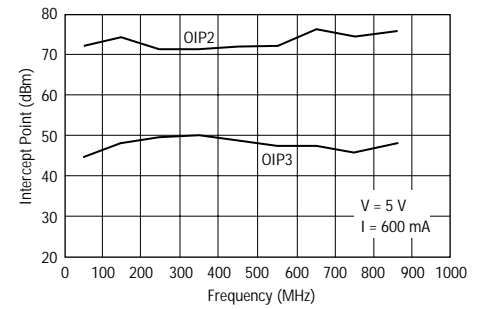


# Performance Charts

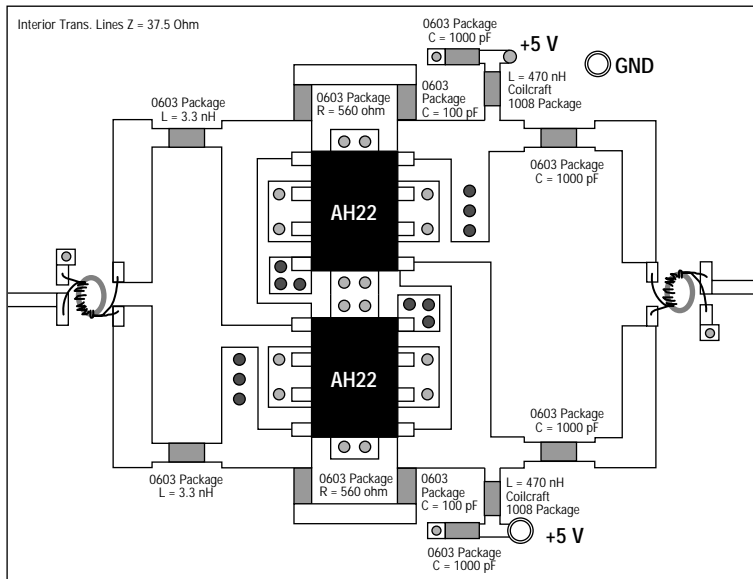
## S-Parameters



## Linearity vs. Frequency

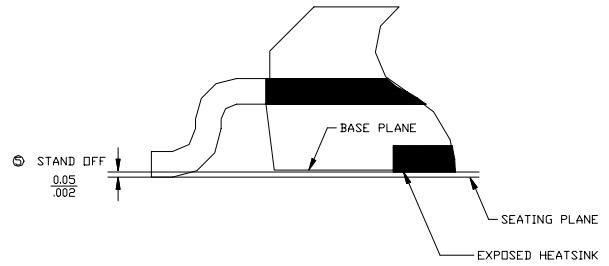
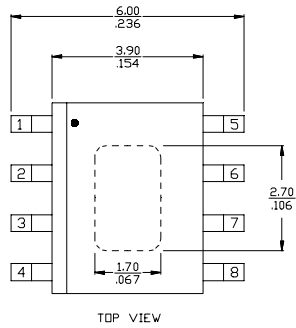


## FR4 Board Layout (T = 28 Mils to ground plane)

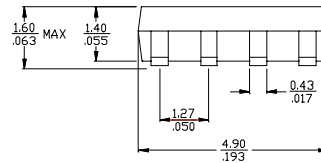
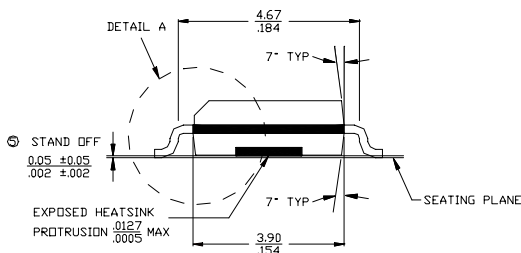


Note: Balun and board losses have not been extracted but typically account for 0.4 dB loss midband and 1.1 dB loss at 860 MHz.

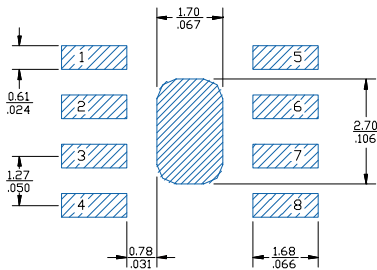
## Outline Drawing



mm  
inch

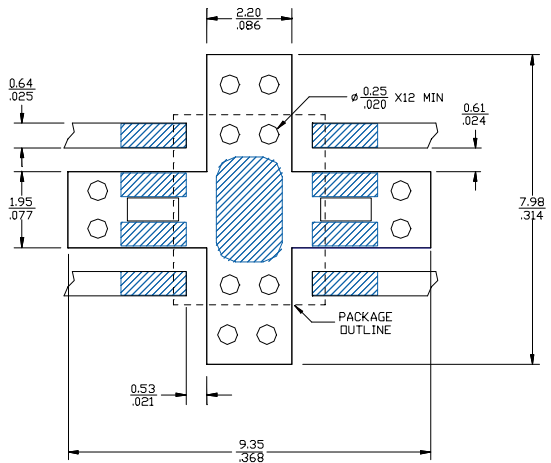


## Land Pattern



FUNCTION	PIN NO.
RF INPUT 1	1
GROUND	2-3
RF INPUT 2	4
RF OUTPUT 2/ BIAS 2	5
GROUND	6-7
RF OUTPUT 1/ BIAS 1	8

## Mounting Configuration



- Notes:
1. Ground vias are critical for thermal and RF grounding considerations.
  2. A minimum of 12 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 PCB board.
- Ⓢ 'Stand-off' is the distance between 'seating plane' and the 'exposed heatsink', or base plane of the package, whichever is lower.

## Typical Test Data

S-Parameters, single unmatched device (Vdd = +5 V, Ids = 150 mA, T = 22°C, Z = 75 Ω)

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

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



**Caution!** ESD sensitive device.

