



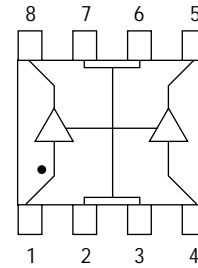
Product Features

- 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 _{JC}) | 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

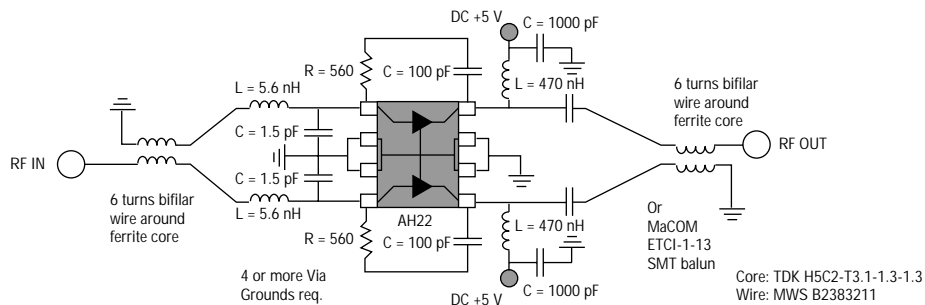
Typical Performance (75 Ohm System)

| 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

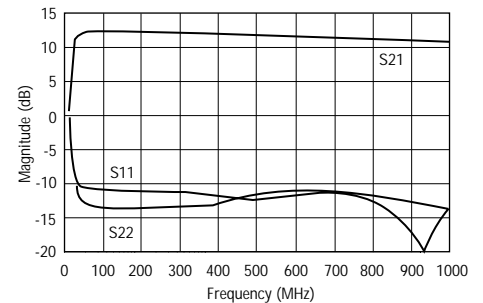
| | | | | |
|------|---------|---------|--------------|-------------------|
| CSO | -63 dBc | 750 MHz | 110 channels | +40 dBmV/ch, Flat |
| CTB | -61 dBc | 750 MHz | 110 channels | +40 dBmV/ch, Flat |
| XMOD | -61 dBc | 750 MHz | 110 channels | +40 dBmV/ch, Flat |

Schematic

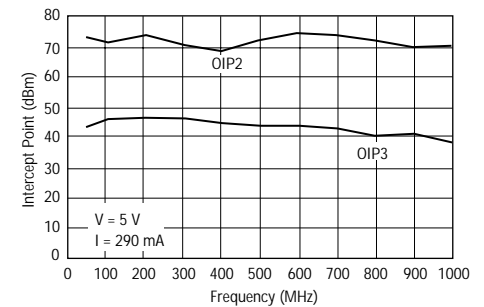


Performance Charts

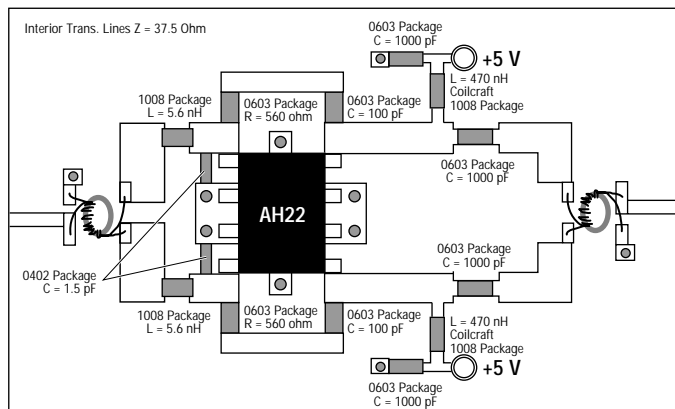
S-Parameters



Linearity vs. Frequency



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



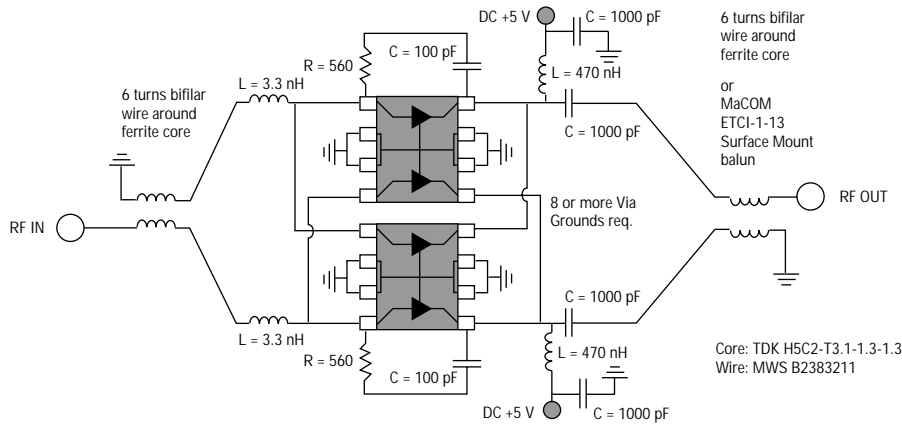
Note: Balun and board losses have not been extracted but typically account for 0.4 dB loss midband and 1.1 dB loss at 860 MHz.

Dual Push-Pull Circuit: 50-860 MHz

Typical Performance (75 Ohm System)

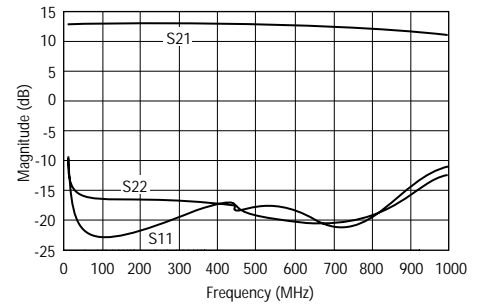
| Frequency | 50 MHz | 450 MHz | 750 MHz | 860 MHz |
|---------------|------------------------|----------|----------|----------|
| Magnitude S21 | 13.3 dB | 13.3 dB | 12.5 dB | 12.3 dB |
| Magnitude S11 | -21.0 dB | -18.0 dB | -21.0 dB | -16.2 dB |
| Magnitude S22 | -16.4 dB | -18.2 dB | -20.2 dB | -17.1 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

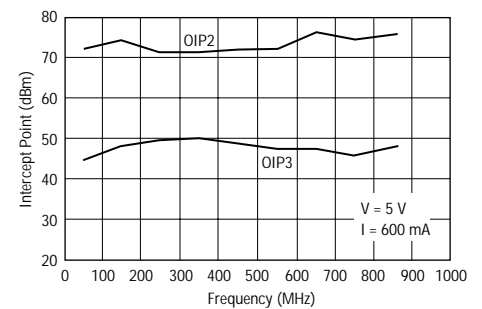


Performance Charts

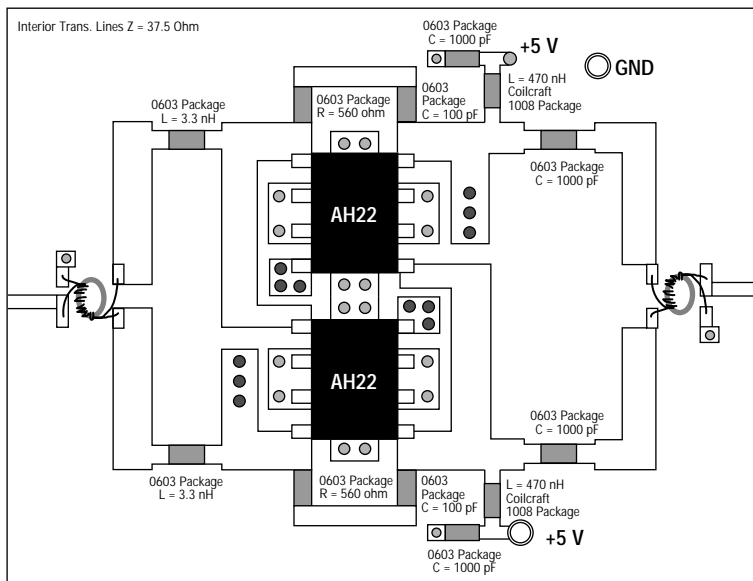
S-Parameters



Linearity vs. Frequency

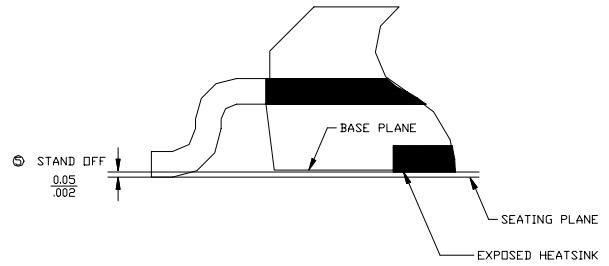
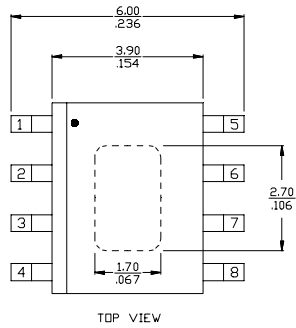


FR4 Board Layout (T = 28 Mils to ground plane)

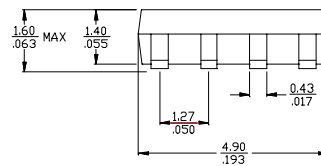
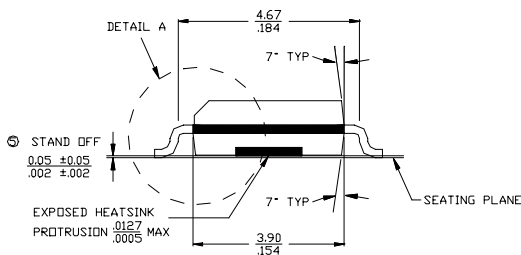


Note: Balun and board losses have not been extracted but typically account for 0.4 dB loss midband and 1.1 dB loss at 860 MHz.

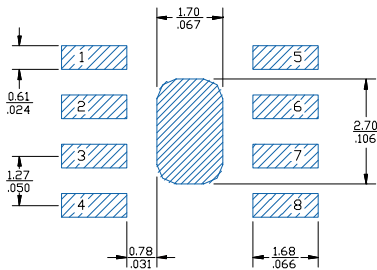
Outline Drawing



mm
inch

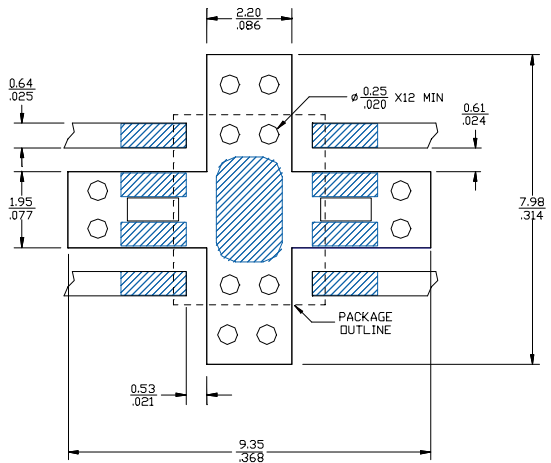


Land Pattern



| 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 PC board.
- Ⓢ 'Stand-off' is the distance between 'seating plane' and the 'exposed heatsink', or base plane of the package, which ever is lower.

Typical Test Data

S-Parameters, single unmatched device (V_{dd} = +5 V, I_{ds} = 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.