



Product Features

- 50-860 MHz
- -75 dBc CTB, 83 Channels
- -53 dBc CSO, 83 Channels
- 3.5 dB Noise Figure
- 14.5 dB Gain
- +20 dBm P1dB
- MTBF >100 Years
- Single +5 V Supply

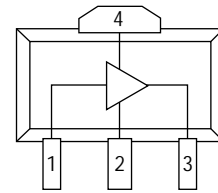


Actual Size

Product Description

The AH2 is a general purpose, high dynamic range amplifier targeting cable TV markets. The combination of gain flatness, high linearity and bandwidth make it ideal for CATV distribution, cable modem and laser diode driver applications. The AH2 is designed for 75 ohm systems and requires minimal off chip biasing elements. The device is manufactured using GaAs MESFET technology and boasts an MTBF of >100 years³ at a mounting temperature of 85°C. 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		50-860		
Supply Voltage	V		5		
Operating Current Range	mA	120	150	180	Vdd = 5.0 V
Packaged Device into 75 Ohms					
S21 - Gain	dB		14.5		50 MHz
S21 - Gain	dB	13.0	14.0		860 MHz
Output IP3	dBm	36	40		
Output P1dB	dBm		21		
Noise Figure	dB		3.5		
Single Ended CATV Evaluation Circuit					
Current	mA		150		
S21 - Gain	dB		14.5		50 MHz
S21 - Gain	dB		13.7		860 MHz
S11 - Input Return Loss	dB		-12.0		Average Across Band
S22 - Output Return Loss	dB		-15.0		Average Across Band
Output IP3	dBm		40		
Output IP2	dBm		47		
Output P1dB	dBm		20		68.7 dBmV
Noise Figure	dB		3.5		
CSO	dBc		-53		83 channels, 30 dBmV/ch, single
CTB	dBc		-75		83 channels, 30 dBmV/ch, single

1. Test conditions unless otherwise noted. T = 25°C, Vdd = 5.0 V.

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 channel temperature at 155°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
AH2	High Dynamic Range CATV Amplifier (Available in tape and reel)
AH2-PCB	Fully Assembled Single Ended CATV Application Circuit

Single Ended CATV Evaluation Circuit: 50-860 MHz

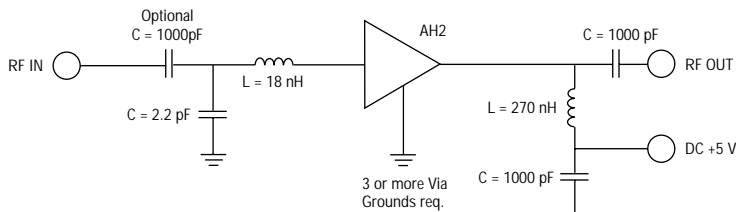
Typical Performance (75 Ohm System)

Frequency	50 MHz	450 MHz	750 MHz	860 MHz
Magnitude S21	14.5 dB	14.4 dB	14.0 dB	13.7 dB
Magnitude S11	-10.0 dB	-11.2 dB	-12.8 dB	-16.9 dB
Magnitude S22	-8.8 dB	-20.0 dB	-11.6 dB	-9.8 dB
OIP2	46.8 dBm	46.9 dBm	47.7 dBm	48.1 dBm
OIP3	39.8 dBm	40.7 dBm	41.0 dBm	40.8 dBm
Noise Figure	4.3 dB	3.4 dB	3.5 dB	3.6 dB
Bias	Vds = 5 V, Id = 150 mA			

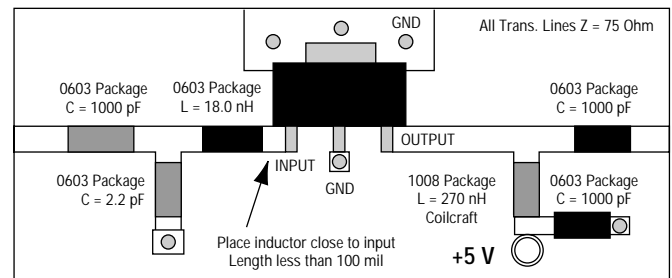
Multi-channel Measurements

CSO	-53 dBc	550 MHz	83 channels	+30 dBmV/ch, Flat
CTB	-75 dBc	550 MHz	83 channels	+30 dBmV/ch, Flat
XMOD	-70 dBc	550 MHz	83 channels	+30 dBmV/ch, Flat

Schematic

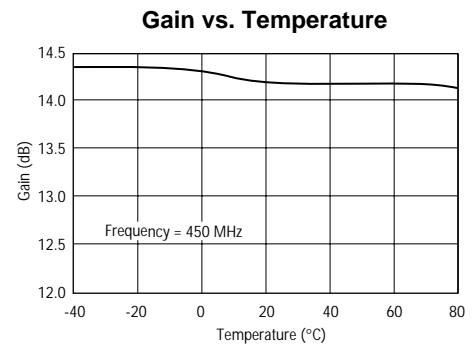
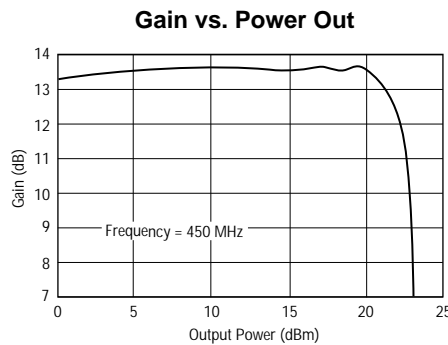
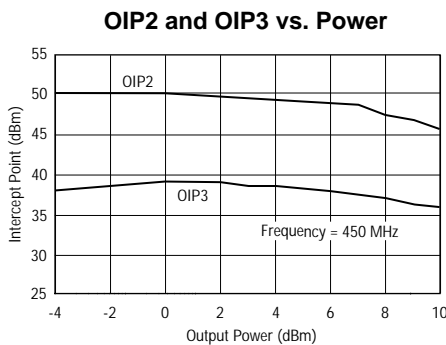
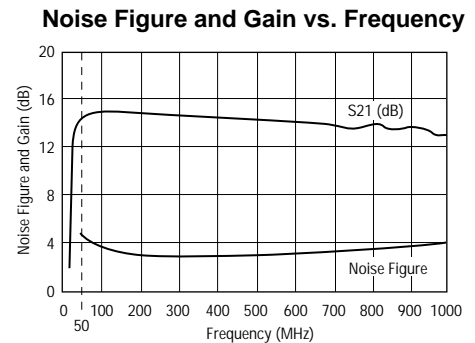
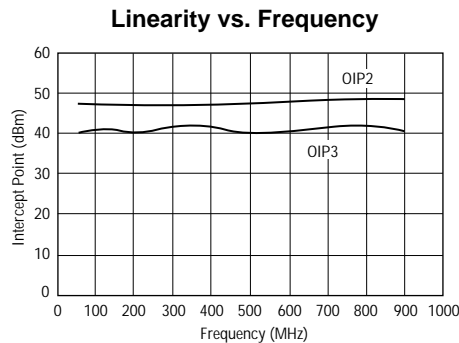
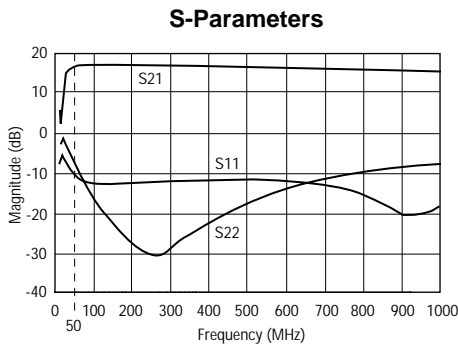


FR4 Board Layout (T = 28 Mils to ground plane)



Note: 0.5 dB of gain slope is due to the connector and board losses.

Performance Charts (Single Ended CATV Evaluation Circuit)



Push-Pull CATV Evaluation Circuit: 50-860 MHz

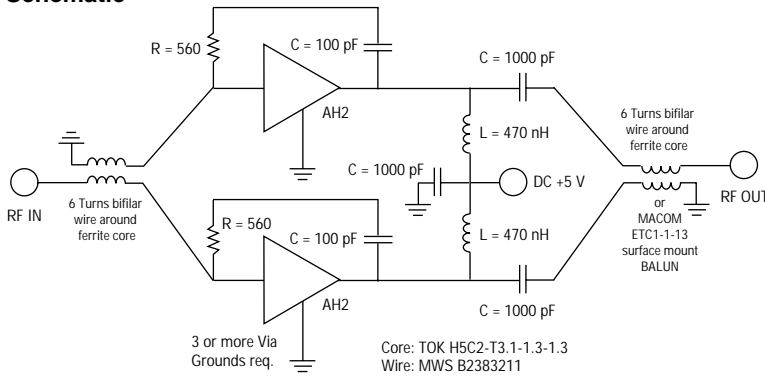
Typical Performance (75 Ohm System)

Frequency	50 MHz	450 MHz	750 MHz	860 MHz
Magnitude S21	11.1 dB	10.8 dB	10.6 dB	10.5 dB
Magnitude S11	-10.2 dB	-9.7 dB	-10.8 dB	-11.0 dB
Magnitude S22	-13.3 dB	-14.1 dB	-15.4 dB	-16.4 dB
OIP2	72.0 dBm	70 dBm	72 dBm	70 dBm
OIP3	42.0 dBm	43 dBm	41 dBm	40 dBm
Noise Figure	5.5 dB	4.3 dB	5.0 dB	5.4 dB
Bias	Vds = 5 V, Id = 300 mA			

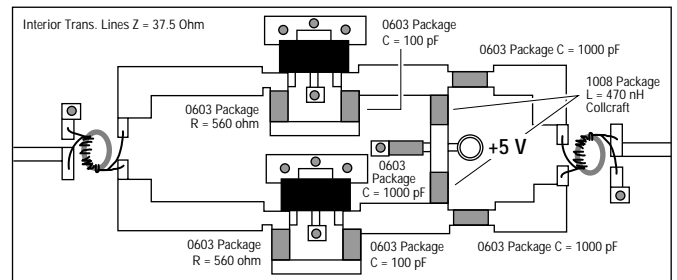
Multi-channel Measurements

CSO	-63 dBc	750 MHz	110 channels	+40 dBmV/ch, Flat
CTB	-61 dBc	750 MHz	110 channels	+40 dBmV/ch, Flat
XMOD	-81 dBc	750 MHz	110 channels	+40 dBmV/ch, Flat

Schematic

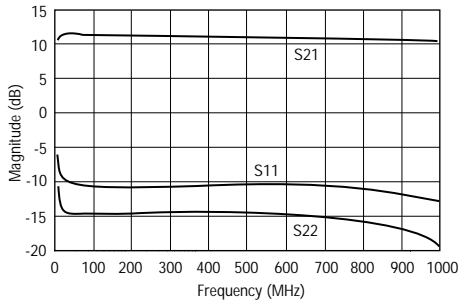


FR4 Board Layout (T = 28 Mils to ground plane)

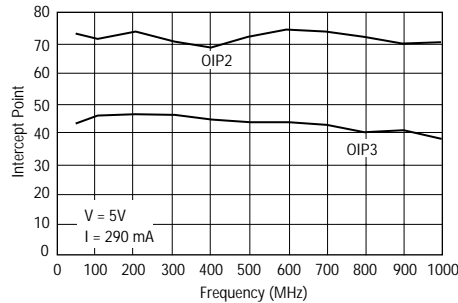


Performance Charts (Push-Pull CATV Evaluation Circuit)

S-Parameters



Linearity vs. Frequency



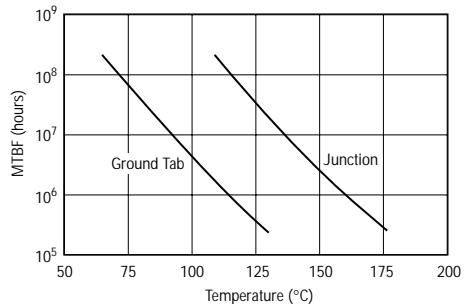
Thermal Specifications

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

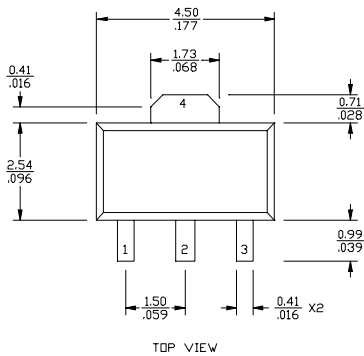
Notes:

1. Thermal Resistance determined at Maximum Tab Temperature and Maximum Power Dissipation.
2. Recommended Maximum Junction Temperature insures a MTBF of 1 million hours.
3. Refer to WJ Application Note "AH2 Temperature Effects on Reliability" for more information.

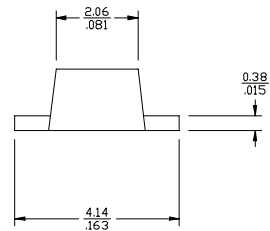
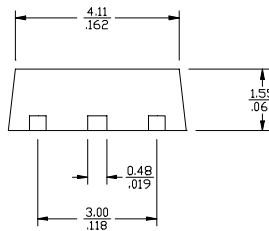
MTBF vs. Temperature



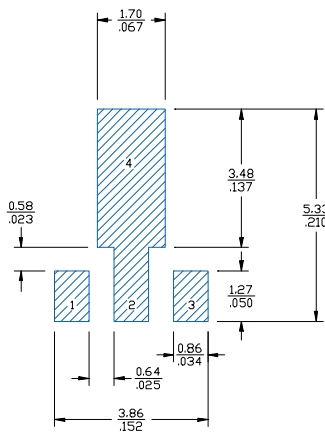
Outline Drawing



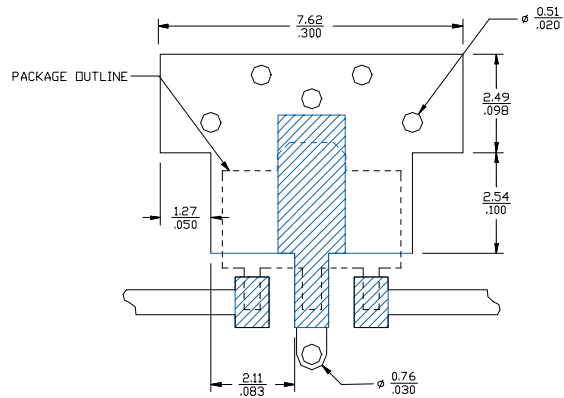
mm
inch



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, T = 22°C, unmatched device in a 75 ohm system)

Freq. (MHz)	S11 (dB)	S11 (Ang)	S21 (dB)	S21 (Ang)	S12 (dB)	S12 (Ang)	S22 (dB)	S22 (Ang)
50	-17.954	-34.607	15.494	173.263	-24.196	4.594	-24.261	-85.838
100	-17.783	-42.76	15.43	171.185	-24.137	2.039	-24.748	-86.372
150	-16.899	-48.969	15.372	168.082	-24.164	0.988	-23.994	-88.738
200	-15.938	-53.877	15.31	164.88	-24.169	0.271	-22.806	-91.71
250	-14.555	-58.607	15.222	162.051	-24.145	0.077	-22.955	-92.444
300	-12.921	-65.219	15.144	158.919	-24.172	-0.223	-22.997	-92.447
350	-12.349	-71.823	15.06	155.7	-24.073	-0.741	-22.025	-96.123
400	-11.647	-77.234	14.965	152.522	-24.104	-1.021	-21.072	-98.239
450	-10.998	-82.951	14.861	149.397	-23.993	-1.512	-20.276	-100.752
500	-10.427	-87.242	14.748	146.284	-24.03	-1.438	-19.506	-102.717
550	-9.883	-91.75	14.626	143.332	-24.004	-2.108	-18.842	-104.75
600	-9.444	-95.68	14.506	140.182	-23.955	-2.402	-18.262	-106.873
650	-9.002	-99.684	14.365	137.266	-23.911	-2.752	-17.732	-108.739
700	-8.556	-102.92	14.227	134.371	-23.939	-3.239	-17.206	-110.422
750	-8.231	-106.2	14.091	131.522	-23.898	-3.684	-16.756	-111.979
800	-7.887	-109.41	13.927	128.747	-23.896	-3.953	-16.398	-113.698
850	-7.534	-112.2	13.763	126.182	-23.837	-4.267	-16.016	-115.374
900	-7.252	-114.93	13.621	123.478	-23.832	-5.011	-15.656	-117.106
950	-6.974	-117.87	13.45	120.848	-23.827	-5.792	-15.328	-118.962
1000	-6.721	-120.3	13.29	118.273	-23.808	-5.852	-15.035	-121.085

