



## Product Features

- Small size
- 5MHz ~ 2655MHz
- High gain
- High linearity
- Higher productivity
- Low cost

## Applications

- Low Noise Amplifier for CATV, Satellite
- Cable Modem
- FTTH (G-PON, GE-PON)
- Optical node



Package Type : SOT-89

## Description

AE312 is designed as low cost drive amplifiers for many applications including FTTH, CATV System.

This MMIC is based on Gallium Arsenide Enhancement Mode pHEMT which shows low current draw and very low noise.

The data in this spec sheet is valid only for 75 ohm application. 50 ohm data is in a separate spec sheet.

## Electrical Specifications

| PARAMETER             |             | UNIT | MIN | TYP | MAX  | CONDITION                  |
|-----------------------|-------------|------|-----|-----|------|----------------------------|
| Frequency             |             | MHz  | 30  | -   | 2655 | -                          |
| Gain                  |             | dB   | 18  | 20  | -    | 30 ~ 1000MHz<br>5 ~ 100MHz |
| Gain Flatness         |             | dB   | -   | 0.4 | -    | 30 ~ 1000MHz               |
| Input Return Loss     |             | dB   | -   | -18 | -    | -                          |
| Output Return Loss    |             | dB   | -   | -15 | -    | -                          |
| Output IP3            |             | dBm  | 29  | 32  | -    | @ 500MHz/5dBm 2tone        |
| 1dB Compression Point |             | dBm  | 16  | 19  | -    | @ 500MHz                   |
| Noise Figure          |             | dB   | -   | 1   | 2    | 30MHz ~ 1000MHz            |
| CSO                   | 50 ~ 870MHz | -    | -   | -60 | -55  | 135Channel@15dBmV/Ch       |
| CTB                   |             | -    | -   | -80 | -75  |                            |
| XMOD                  |             | -    | -   | -83 | -77  |                            |
| DC Current            |             | mA   | -   | 50  | -    | Vdd = 5.0V                 |

### Note

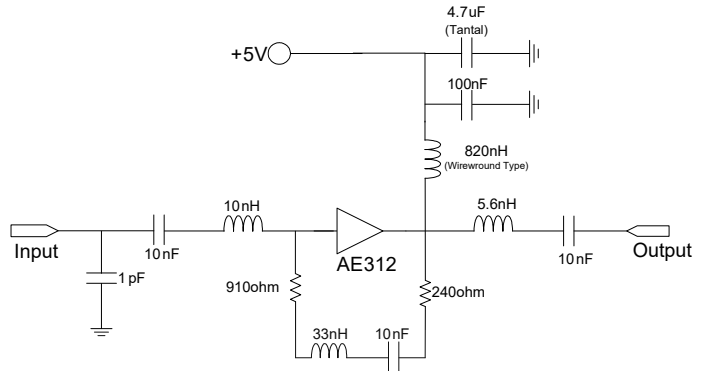
1. Test conditions unless otherwise noted. Test Freq = 500MHz, T=25°C, Vdd=5V, 75Ω system
2. OIP3 measured with 2 tones at an output power of +5dBm/tone separated by 1MHz, Test Freq = 500MHz

## Absolute Maximum Ratings

| PARAMETER                  | UNIT | MIN | TYP      | MAX |
|----------------------------|------|-----|----------|-----|
| Device Voltage             | V    | -   | 5        | 8   |
| Operating Case Temperature | °C   | -40 | -        | 85  |
| Storage Temperature        | °C   | -40 | -        | 150 |
| ESD Human Body Model       | -    | -   | Class 1A | -   |
| Moisture sensitivity Level | -    | -   | MSL1     | -   |
| Junction temperature       | °C   | -   | -        | 180 |
| Thermal Resistance (Rth)   | °C/W | -   | 100      | -   |

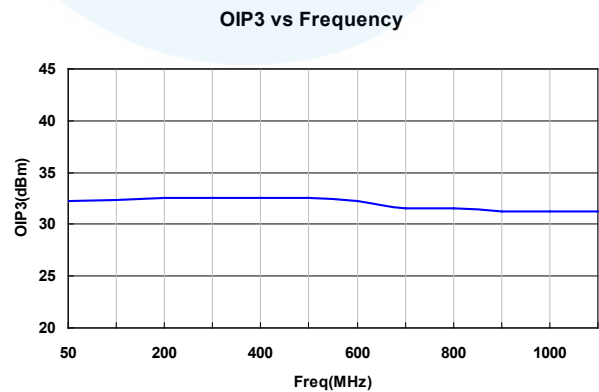
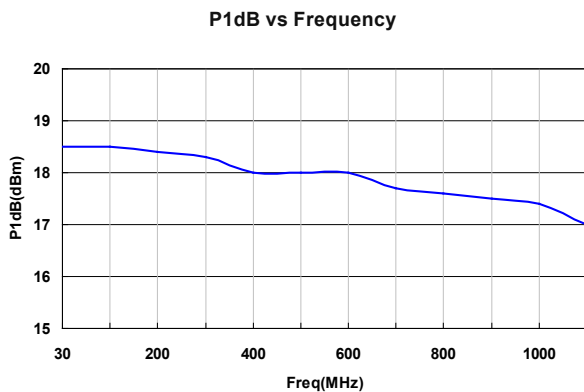
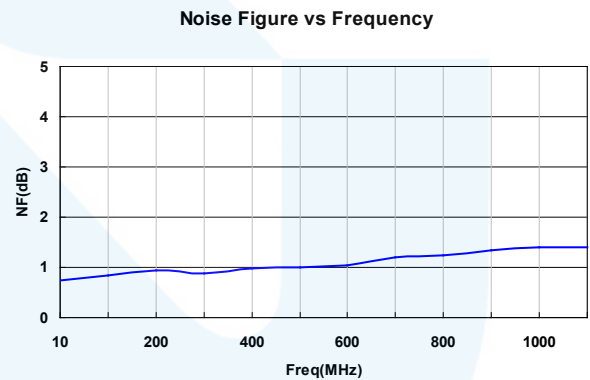
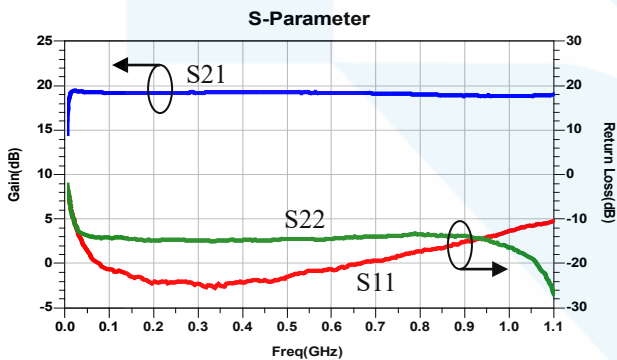
Application Circuit @ 30 ~ 1000MHz, 75ohm System

| PARAMETER    | UNIT | TYPICAL |     |      |
|--------------|------|---------|-----|------|
| Frequency    | MHz  | 30      | 500 | 1000 |
| Gain(S21)    | dB   | 20      | 20  | 20   |
| IRL(S11)     | dB   | -16     | -23 | -13  |
| ORL(S22)     | dB   | -14     | -15 | -16  |
| Output IP3   | dBm  | 32.5    | 32  | 31.5 |
| P1dB         | dBm  | 18.5    | 18  | 17   |
| Noise Figure | dB   | 0.9     | 1   | 1.3  |
| CSO(1)       | dBc  | -60     |     |      |
| CTB(1)       | dBc  | -80     |     |      |
| XMOD(1)      | dBc  | -83     |     |      |
| Current      | mA   | 50      |     |      |



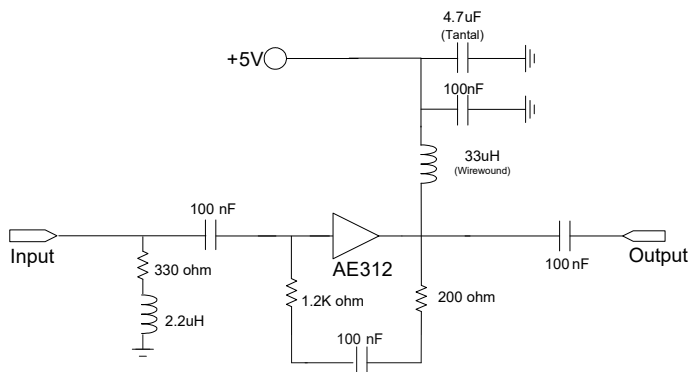
(1) 135channels, +15dBmV/ch

Typical Performance @ VDD=5V, IDS=50mA, T=25°C, 75ohm System



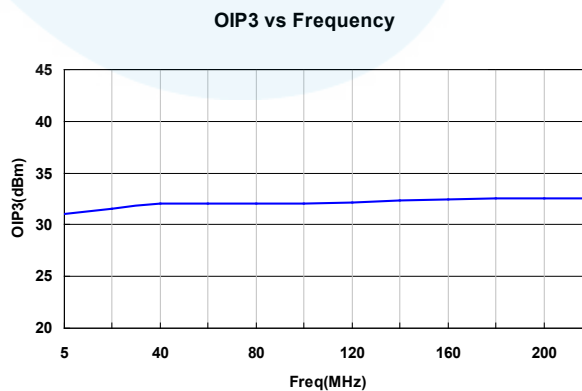
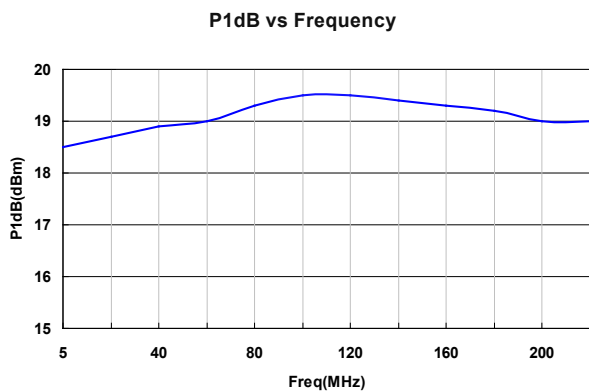
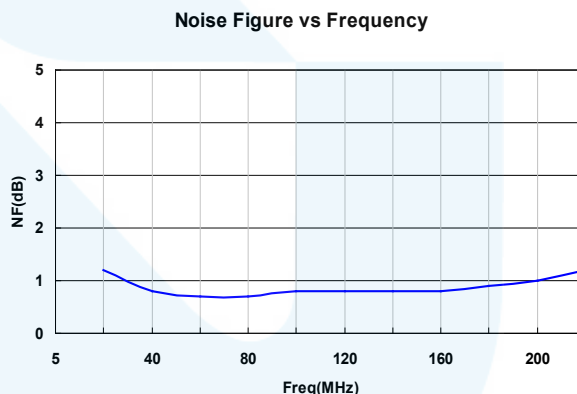
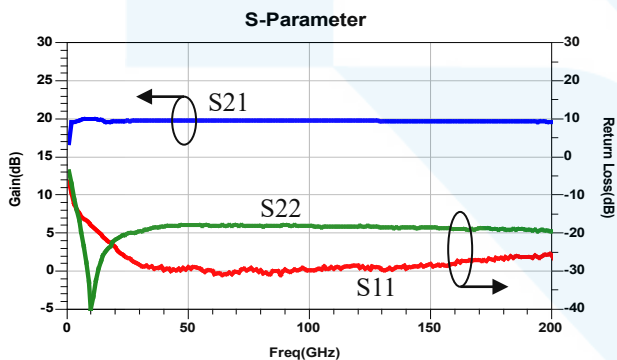
Application Circuit @ 50 ~ 200MHz, 75ohm System

| PARAMETER    | UNIT | TYPICAL |      |      |
|--------------|------|---------|------|------|
| Frequency    | MHz  | 5       | 50   | 100  |
| Gain(S21)    | dB   | 19.8    | 19.8 | 19.7 |
| IRL(S11)     | dB   | -15     | -29  | -29  |
| ORL(S22)     | dB   | -17     | -18  | -18  |
| Output IP3   | dBm  | 31      | 32   | 32.2 |
| P1dB         | dBm  | 18.5    | 19   | 19.5 |
| Noise Figure | dB   | 1.3     | 0.8  | 0.8  |
| CSO(1)       | dBc  | -60     |      |      |
| CTB(1)       | dBc  | -76     |      |      |
| XMOD(1)      | dBc  | -81     |      |      |
| Current      | mA   | 50      |      |      |



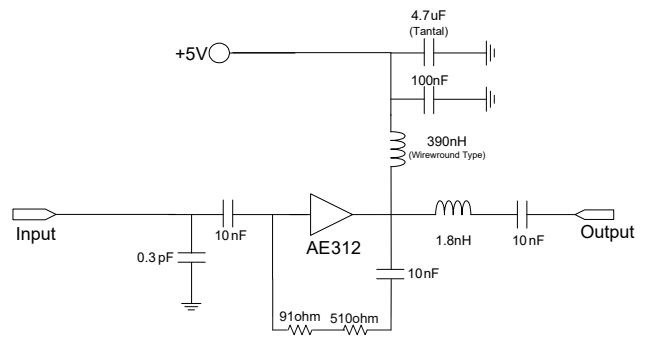
(1) 8channels, +30dBmV/ch

Typical Performance @ VDD=5V, IDS=50mA, T=25°C, 75ohm System



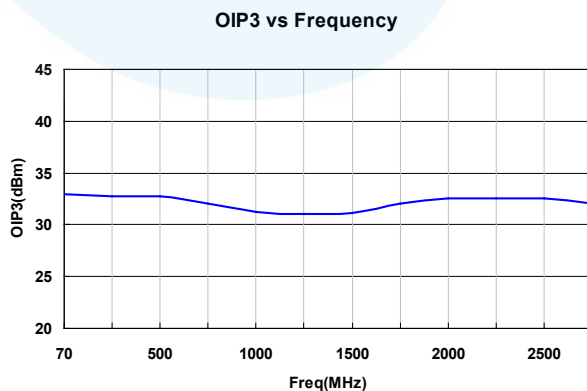
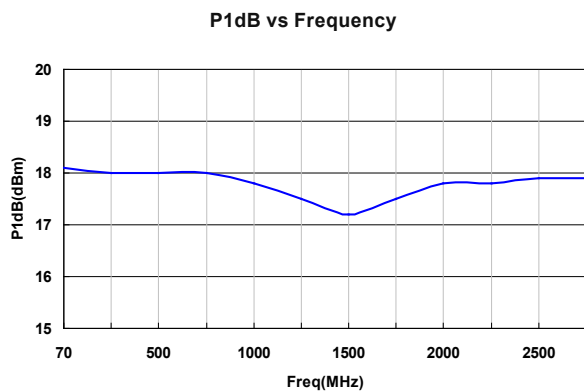
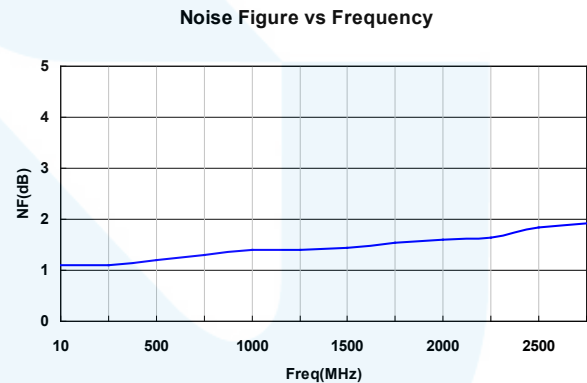
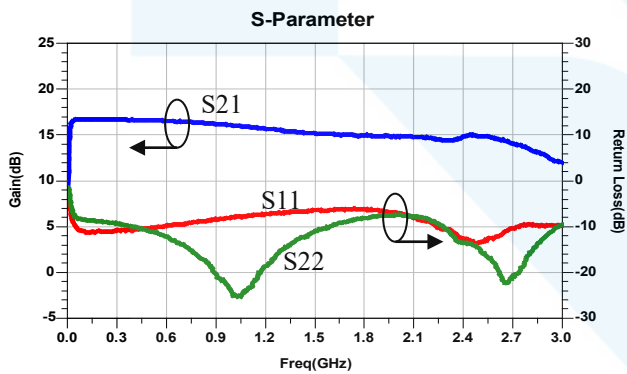
Application Circuit @ 70 ~ 2655MHz, 75ohm System

| PARAMETER    | UNIT | TYPICAL |      |      |      |
|--------------|------|---------|------|------|------|
| Frequency    | GHz  | 0.07    | 1    | 2    | 2.6  |
| Gain(S21)    | dB   | 16.5    | 16   | 15   | 14.5 |
| IRL(S11)     | dB   | -11     | -8   | -7   | -12  |
| ORL(S22)     | dB   | -9      | -25  | -8   | -19  |
| Output IP3   | dBm  | 33      | 31.2 | 32.5 | 32.5 |
| P1dB         | dBm  | 18.1    | 17.8 | 17.8 | 17.9 |
| Noise Figure | dB   | 1.1     | 1.4  | 1.6  | 1.9  |
| CSO(1)       | dBc  | -60     |      |      |      |
| CTB(1)       | dBc  | -71     |      |      |      |
| XMOD(1)      | dBc  | -84     |      |      |      |
| Current      | mA   | 50      |      |      |      |



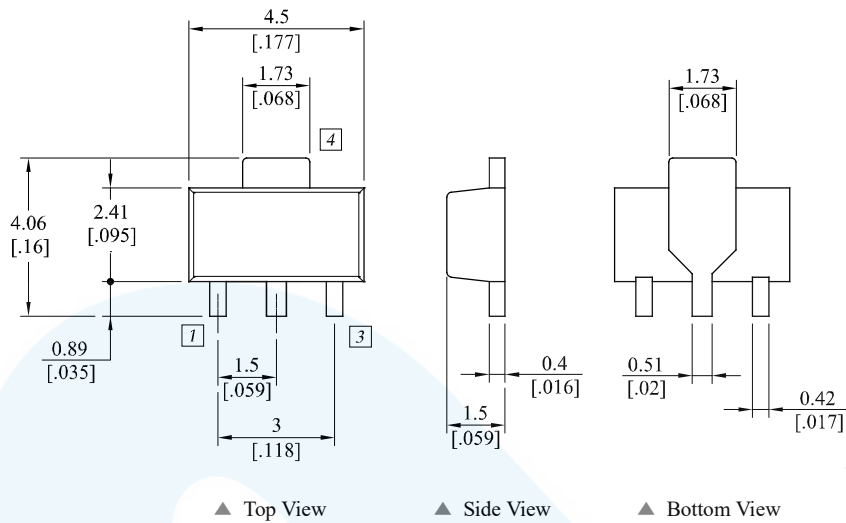
(1) 135channels, +15dBmV/ch

Typical Performance @ VDD=5V, IDS=50mA, T=25°C, 75ohm System



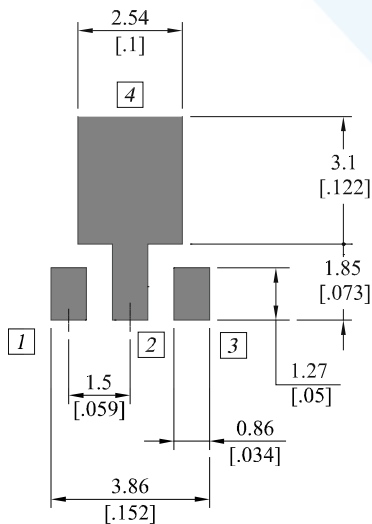
Package Dimensions (Type: SOT-89)

\* Unit: mm[inch] | Tolerance  $\pm 0.2$ [.008]

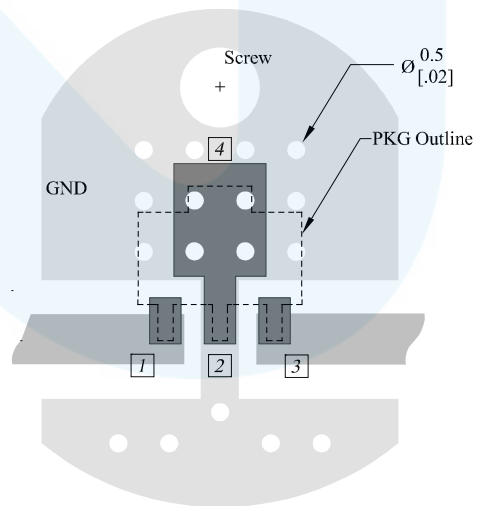


| Pin Description |               |        |          |
|-----------------|---------------|--------|----------|
| Pin No          | Function      | Pin No | Function |
| 1               | Input         | 4      | GND      |
| 2               | GND           | -      | -        |
| 3               | Output / Bias | -      | -        |

Recommended Pattern



Recommended Mounting Configuration



\* Mounting Configuration Notes

1. Ground / thermal via holes are critical for the proper performance of this device.
2. Add as much copper as possible to inner and outer layers near the part to ensure optimal thermal performance.
3. Mounting screws can be added near the part to fasten the board to a heatsink. Ensure that the ground / thermal via hole region contacts the heatsink.
4. Do not put solder mask on the backside of the PCB in the region where the board contacts the heatsink.
5. RF trace width depends upon the PCB material and construction.
6. Use 1 oz. Copper minimum.

**Revision History**

| Part Number | Release Date | Version | Modification   | Data Sheet Status |
|-------------|--------------|---------|--|-------------------|
| AE312       | 2014.04.22   | 1.3     | Absolute Maximum Ratings<br>(Delete Tj Typ & Revise Rth Typ) | -                 |
| AE312       | 2012.10.15   | 1.2     | New datasheet format   | -                 |
|             |              |         |  |                   |



**Certification**

This product is manufactured by a company that is certified for the AS9100D quality management system.

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