

Product Features

- Small size
- 5 ~ 1100MHz (1dB Flat)
- 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

AE417 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 | 5 | - | 1100 | - |
| Gain | dB | 13 | 15.5 14 | - | 5 ~ 200MHz 30 ~ 1000MHz |
| Gain Flatness | dB | - | 1 | - | 10 ~ 1100MHz |
| Input Return Loss | dB | - | -18 | -12 | - |
| Output Return Loss | dB | - | -16 | -14 | - |
| Output IP3 | dBm | 38 | 41 | - | @ 500MHz/5dBm 2tone |
| 1dB Compression Point | dBm | 22 | 25 | - | @ 500MHz |
| Noise Figure | dB | - | 3 | 4 | 5 ~ 1000MHz |
| CSO | 50 ~ 870MHz | dBc | - | -63 | 135Channel@30dBmV/Ch |
| CTB | | dBc | - | -73 | |
| XMOD | | dBc | - | -76 | |
| DC Current | mA | - | 120 | - | Vdd = 8.0V |

Note

1. Test conditions unless otherwise noted. Test Freq = 500MHz, T=25°C, Vdd=8V, 75Ω system
2. OIP3 measured with 2 tones at an output power of +5dBm/tone separated by 1MHz, Test Freq = 500MHz

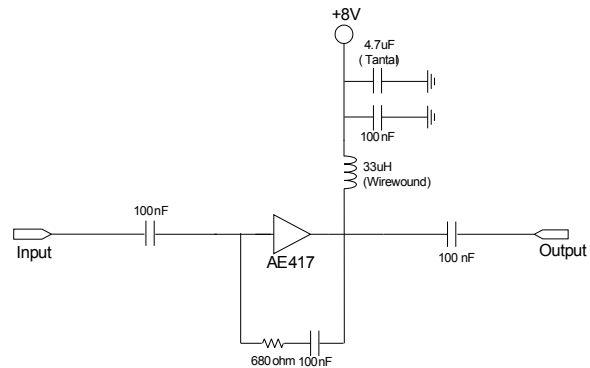
Absolute Maximum Ratings

| PARAMETER | UNIT | MIN | TYP | MAX |
|----------------------------|------|-----|----------|-----|
| Device Voltage | VDC | - | 8 | 12 |
| Operating Case Temperature | °C | -40 | - | 85 |
| Storage Temperature | °C | -40 | - | 150 |
| ESD Human Body Model | - | - | Class 1B | - |
| Moisture sensitivity Level | - | - | MSL1 | - |
| Junction temperature | °C | - | - | 180 |
| Thermal Resistance (Rth) | °C/W | - | 50 | - |

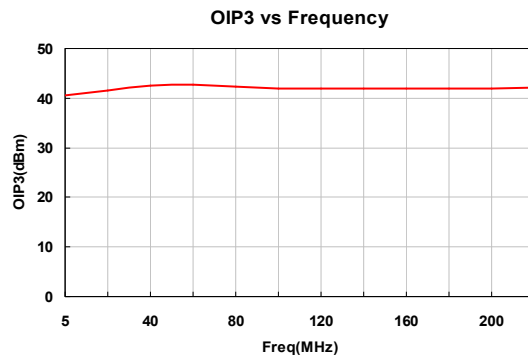
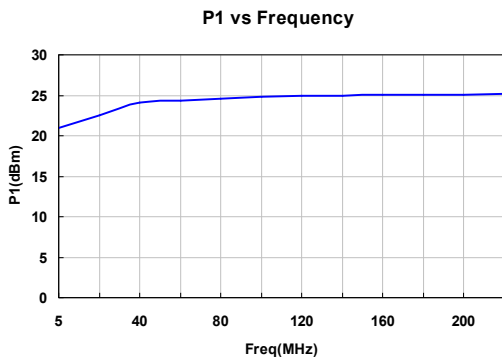
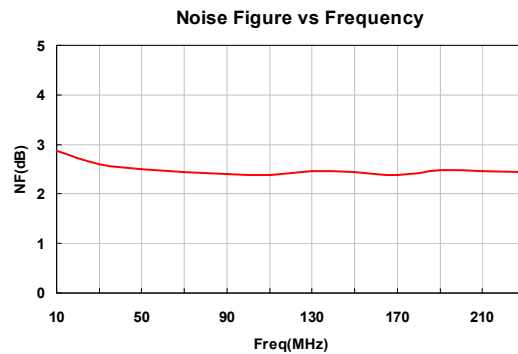
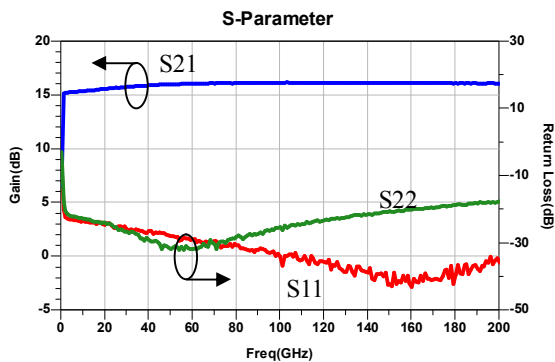
Application Circuit @ 5 ~ 200MHz, 75ohm System

| PARAMETER | UNIT | TYPICAL | | | |
|--------------|------|----------|----------|----------|----------|
| Frequency | MHz | 5 | 25 | 50 | 100 |
| Gain(S21) | dB | 15.5 | | | |
| IRL(S11) | dB | -23 | -25 | -28 | -34 |
| ORL(S22) | dB | -22 | -25 | -31 | -25 |
| Output IP3 | dBm | 40. 5 | 41. 5 | 42. 5 | 42 |
| P1dB | dBm | 21 | 22. 5 | 24 | 24. 5 |
| Noise Figure | dB | | 2.7 | 2.5 | 2.4 |
| CSO(1) | dBc | -67 | | | |
| CTB(1) | dBc | -81 | | | |
| XMOD(1) | dBc | -73 | | | |
| Current | mA | 120 | | | |

(1) 8channels, +45dBmV/ch



Typical Performance @ VDD=8V, IDS=120mA, T=25°C, 75ohm System



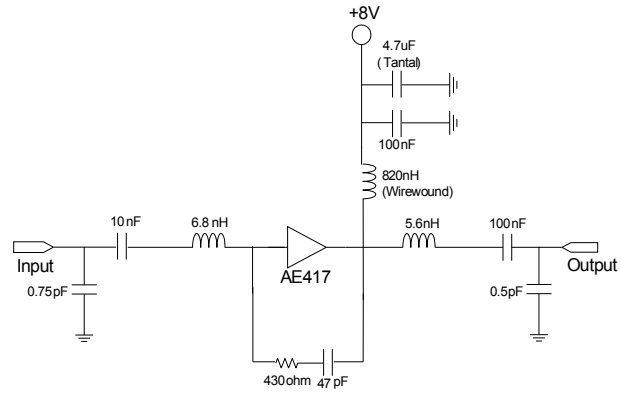
Multi-Tone : Test 8CH_FLAT@Output Power +45dBmV/Ch

| Level : +45dBmV Tilt : 135CH_FLAT | | | | | | | | | | |
|----------------------------------------|---------------|------------|------------|-------|------------|------------|------------|------------|------------|------------|
| FRQ | XMD (NCTA) | CTB RAW | CTB COR | N-FLR | CSU RAW | CSU COR | CSU FRQ | CSL RAW | CSL COR | CSL FRQ |
| 7 | 73.4 | 82.1 | 82.5 | 92.4 | 91.4 | 95.7 | 7.66 | 65.3 | 65.3 | 5.99 |
| 31 | 74.7 | 81.1 | 81.5 | 91.5 | 68.7 | 68.7 | 31.99 | 70.3 | 70.3 | 29.99 |
| 49 | 72.6 | 81.8 | 82.4 | 90.8 | 70.7 | 70.7 | 49.99 | 90.3 | 94.6 | 48.21 |
| Min | 72.6 | 81.1 | 81.5 | 90.8 | 68.7 | 68.7 | 7.66 | 65.3 | 65.3 | 5.99 |
| Max | 74.7 | 82.1 | 82.5 | 92.4 | 91.4 | 95.7 | 49.99 | 90.3 | 94.6 | 48.21 |

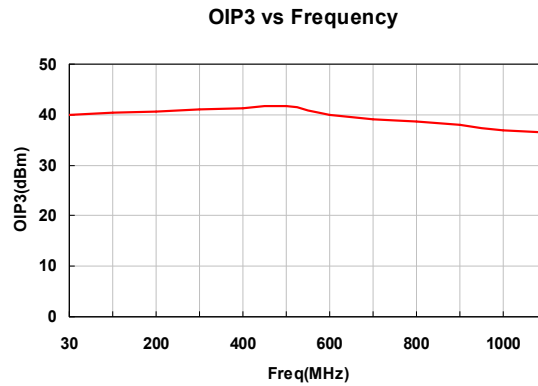
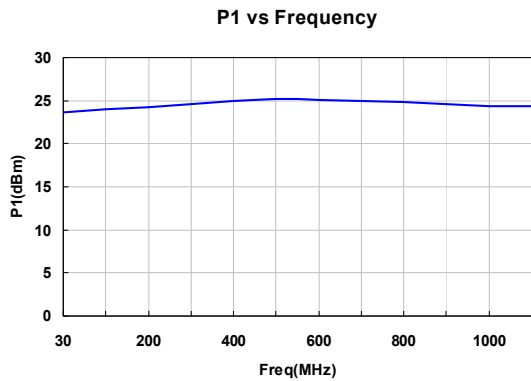
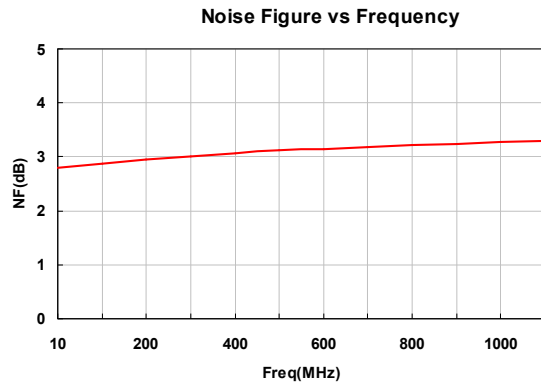
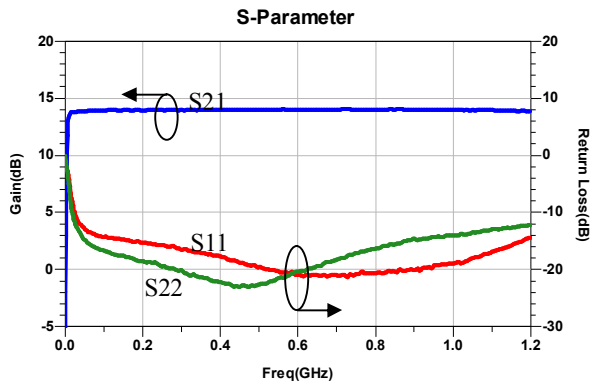
Application Circuit @ 30 ~ 1000MHz, 75ohm System

| PARAMETER | UNIT | TYPICAL | | |
|--------------|------|---------|------|------|
| Frequency | MHz | 30 | 500 | 1000 |
| Gain(S21) | dB | 14 | | |
| IRL(S11) | dB | -11 | -19 | -18 |
| ORL(S22) | dB | -12 | -22 | -14 |
| Output IP3 | dBm | 40.5 | 41.5 | 36.5 |
| P1dB | dBm | 22 | 25.5 | 24 |
| Noise Figure | dB | 2.8 | 3.1 | 3.3 |
| CSO(1) | dBc | -62 | | |
| CTB(1) | dBc | -73 | | |
| XMOD(1) | dBc | -76 | | |
| Current | mA | 120 | | |

(1) 135channels, +30dBmV/ch



Typical Performance @ VDD=8V, IDS=120mA, T=25°C, 75ohm System



Multi-Tone Test : 135CH_FLAT@Output Power +30dBmV/Ch

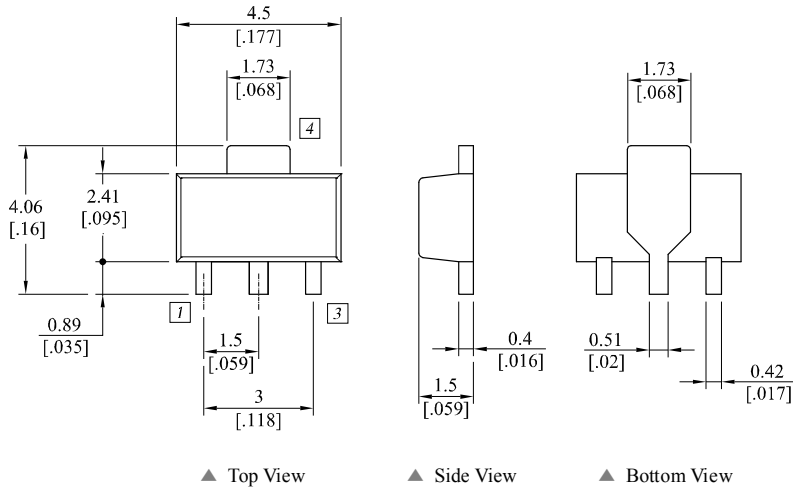
| Level : +30dBmV Tilt : 135CH_FLAT | | | | | | | | | | |
|-----------------------------------|------------|---------|---------|-------|---------|---------|---------|---------|---------|---------|
| FRQ | XMD (NCTA) | CTB RAW | CTB COR | N-FLR | CSU RAW | CSU COR | CSU FRQ | CSL RAW | CSL COR | CSL FRQ |
| 55.25 | 76.8 | 76.5 | 80.8 | 77 | 76 | 80.3 | 55.99 | 62.6 | 62.7 | 53.99 |
| 77.25 | 79 | 76.2 | 80.5 | 76.5 | 62.2 | 62.3 | 77.99 | 76.3 | 80.7 | 76.38 |
| 109.25 | 79.3 | 76.5 | 80.8 | 77.3 | 75.2 | 79.5 | 109.99 | 62.2 | 62.3 | 107.99 |
| 211.25 | 78.7 | 76.4 | 80.7 | 77.1 | 75.2 | 79.6 | 211.99 | 62.7 | 62.9 | 209.99 |
| 331.25 | 78.5 | 74.4 | 78.7 | 75.7 | 73.5 | 77.9 | 332.49 | 63 | 63.2 | 329.98 |
| 445.25 | 78.6 | 74.9 | 79.3 | 76.6 | 72.9 | 75.5 | 446.48 | 63.2 | 63.4 | 443.99 |
| 547.25 | 78 | 72.9 | 77.3 | 74.3 | 70.5 | 72.7 | 548.49 | 63.3 | 63.6 | 545.98 |
| 637.25 | 77.6 | 73.1 | 77.4 | 75 | 69.1 | 70.4 | 638.49 | 64.8 | 65.2 | 635.98 |
| 745.25 | 77.3 | 72.4 | 76.7 | 74.5 | 67.4 | 68.4 | 746.49 | 67.2 | 68.1 | 743.98 |
| 859.25 | 75.9 | 71.1 | 75.4 | 72.6 | 65.5 | 66.3 | 860.49 | 71.8 | 76.1 | 858.49 |
| Min | 75.9 | 71.1 | 75.4 | 72.6 | 62.2 | 62.3 | 55.99 | 62.2 | 62.3 | 53.99 |
| Max | 79.3 | 76.5 | 80.8 | 77.3 | 76 | 80.3 | 860.49 | 76.3 | 80.7 | 858.49 |

Multi-Tone Test : 135CH_FLAT@Output Power +20dBmV/Ch

| Level : +20dBmV Tilt : 135CH_FLAT | | | | | | | | | | |
|-----------------------------------|------------|---------|---------|-------|---------|---------|---------|---------|---------|---------|
| FRQ | XMD (NCTA) | CTB RAW | CTB COR | N-FLR | CSU RAW | CSU COR | CSU FRQ | CSL RAW | CSL COR | CSL FRQ |
| 55.25 | 94.4 | 80.3 | 84.6 | 80.4 | 79.5 | 83.8 | 55.99 | 71 | 71.5 | 53.99 |
| 77.25 | 99.5 | 80.4 | 84.8 | 80.8 | 71.4 | 72 | 77.99 | 80.2 | 84.5 | 76.17 |
| 109.25 | 95.5 | 80.1 | 84.5 | 80.6 | 80.2 | 84.5 | 109.99 | 71.5 | 72.1 | 107.99 |
| 211.25 | 97.8 | 79.9 | 84.2 | 80.2 | 79.5 | 83.8 | 211.98 | 72.8 | 73.6 | 209.98 |
| 331.25 | 95.7 | 79.2 | 83.6 | 79.6 | 78.9 | 83.3 | 331.99 | 72.8 | 73.7 | 329.99 |
| 445.25 | 96 | 80 | 84.3 | 80.6 | 79.2 | 83.6 | 446.49 | 73.2 | 74 | 443.99 |
| 547.25 | 97.6 | 78.6 | 82.9 | 78.8 | 77.2 | 81.6 | 548.49 | 72.6 | 73.8 | 545.98 |
| 637.25 | 94.1 | 78.5 | 82.8 | 78.6 | 76.7 | 81.1 | 638.49 | 73.9 | 75.5 | 635.98 |
| 745.25 | 97.2 | 78.3 | 82.6 | 78.6 | 75.5 | 78.6 | 746.49 | 75.8 | 78.8 | 743.99 |
| 859.25 | 94.3 | 76.6 | 81 | 77.1 | 73.7 | 76.7 | 860.48 | 76.6 | 81 | 858.5 |
| Min | 94.1 | 76.6 | 81 | 77.1 | 71.4 | 72 | 55.99 | 71 | 71.5 | 53.99 |
| Max | 99.5 | 80.4 | 84.8 | 80.8 | 80.2 | 84.5 | 860.48 | 80.2 | 84.5 | 858.5 |

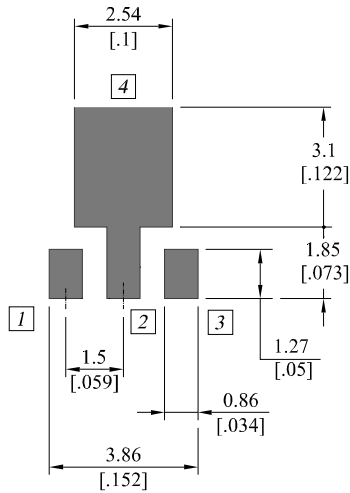
Package Dimensions (Type: SOT-89)

* Unit: mm[inch] | Tolerance ±0.2[.008]

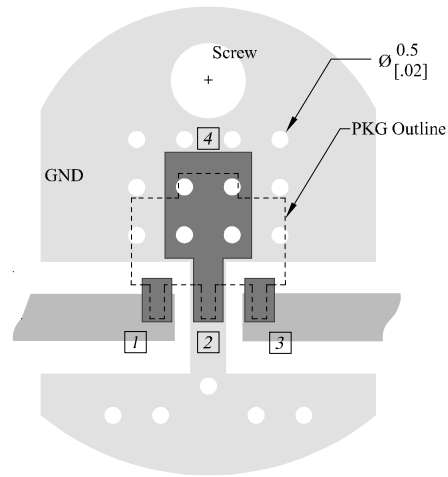


| Pin Description | | | |
|-----------------|---------------|--------|----------|
| Pin No | Function | Pin No | Function |
| 1 | Input | 4 | GND |
| 2 | GND | - | - |
| 3 | Output / Bias | - | - |

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 |
|-------------|--------------|---------|------------------------------------------|-------------------|
| AE417 | 2014.04.22 | 1.2 | Absolute Maximum Ratings (Delete Tj Typ) | - |
| AE417 | 2012.10.15 | 1.1 | New datasheet format | - |
| | | | | |

RFHIC Corporation reserves the right to make changes to any products herein or to discontinue any product at any time without notice. While product specifications have been thoroughly examined for reliability, RFHIC Corporation strongly recommends buyers to verify that the information they are using is accurate before ordering. RFHIC Corporation does not assume any liability for the suitability of its products for any particular purpose, and disclaims any and all liability, including without limitation consequential or incidental damages. RFHIC products are not intended for use in life support equipment or application where malfunction of the product can be expected to result in personal injury or death. Buyer uses or sells such products for any such unintended or unauthorized application, buyer shall indemnify, protect and hold RFHIC Corporation and its directors, officers, stockholders, employees, representatives and distributors harmless against any and all claims arising out of such unauthorized use.

Sales, inquiries and support should be directed to the local authorized geographic distributor for RFHIC Corporation. For customers in the US, please contact the US Sales Team at 919-677-8780. For all other inquiries, please contact the International Sales Team at 82-31-250-5078