

Features

- +3.5 V Operation
- Output Power of 33 dBm
- Power Added Efficiency of 50%
- Outstanding Efficiency vs. Supply Voltage
- Thermally Enhanced Package (SSOP-16 with Exposed Pad)
- Wide Power Control Range (50 dB)
- External Matching Elements Optimize Performance for Either DCS1800 or DCS1900 Bands

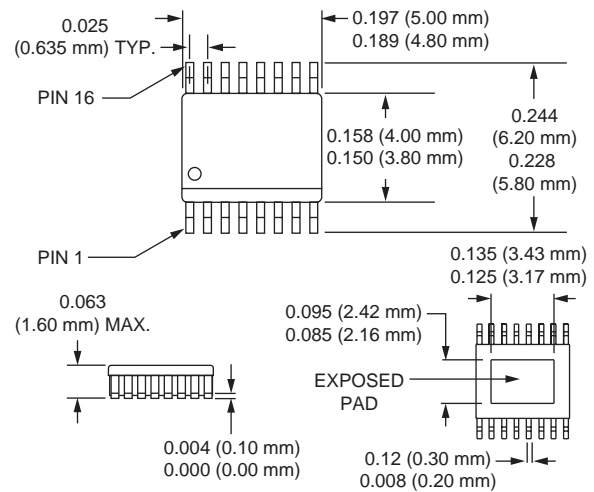
Description

The AP119-89 is a low cost IC power amplifier designed for the 1700–1900 MHz frequency band. It features 3.5 V battery operation, and exceptional efficiency. The AP119-89 is designed to be stable over a temperature range of -40 to +85°C and over a 10:1 output VSWR load. External matching is used for improved performance, flexibility, and multi-band operation.

Output Matching Circuit

The output match for the AP119-89 is provided externally in order to improve performance, reduce cost, and add flexibility. By making use of ceramic surface mount components with better Qs than GaAs matching elements, a lower loss matching network can be made. This lower loss results in higher power and efficiency for the amplifier. Also, by keeping these elements external the GaAs die size is reduced and the overall cost is less. This approach also permits the flexibility to tweak the amplifier for optimum performance at different powers, and/or frequencies.

SSOP-16 with Exposed Pad



Absolute Maximum Ratings

| Quantity | Value |
|---------------------------------------|---------------|
| Amplifier Supply Voltage (V_{DS}) | 10 V |
| Input RF Power (P_{IN}) | 17 dBm |
| Duty Cycle | 50% |
| Operating Temperature (T_{OP}) | -40 to +85°C |
| Storage Temperature (T_{ST}) | -65 to +150°C |

Electrical Specifications at 25°C

| Quantity | Symbol | Condition | Min. | Typ. | Max. | Unit |
|------------------------|---------------------|---|--|------|------|---------------|
| Output Power | P_{OUT} | $T_{OP} = +25^{\circ}\text{C}$ | 32.5 | 33 | | dBm |
| | | $V_{DS} = 2.8\text{ V}$, $T_{OP} = (-40\text{ to }+85^{\circ}\text{C})$ | 29.5 | 30.5 | | |
| Power Added Efficiency | η_{PAE} | | 45 | 50 | | % |
| Control Voltage Range | V_{GG} | | -3 | | -1 | V |
| 2nd Harmonic | H_2 | | | -40 | -35 | dBc |
| 3rd Harmonic | H_3 | | | -40 | -35 | dBc |
| Input VSWR | $VSWR_{IN}$ | P_{OUT} (0–32 dBm), Controlled by V_{GG} | 3:1 | 2:1 | | |
| Forward Isolation | P_{OUT} , STANDBY | $P_{IN} = 14\text{ dBm}$, $V_{GG} = -3.0\text{ V}$ | | -49 | -40 | dBm |
| Switching Time | t_R , t_F | Time from $P_{OUT} = -10\text{ dBm}$ to $P_{OUT} = 33\text{ dBm}$ | | 1 | 2 | μS |
| Burn Out | BO | $V_{DS} = 2.8\text{ V}$ to 6.0 V , $P_{IN} = 6\text{ dBm}$ to 16 dBm , $Z_S = 50\ \Omega$, Load $VSWR = 10:1$, All Phase Angles | No Module Damage or Permanent Degradation | | | |
| Stability | Stab. | All Combinations of the Following Parameters: $I_{DS} = 0\text{ A}$ to $x\text{ A}$, $x = \text{Current at } P_{OUT} = 33\text{ dBm}$ in $50\ \Omega$ $P_{IN} = 10\text{ dBm}$ to 16 dBm , $V_{DD} = 2.5\text{ V}$ to 4.5 V , $T_{OP} = -40\text{ to }+85^{\circ}\text{C}$, Load $VSWR = 10:1$, All Phase Angles | No Parasitic Oscillations Above -36 dBm | | | |
| Slope | P_{OUT}/V_{GG} | $P_{OUT} = -15\text{ dBm}$ to 33 dBm | 10 | 100 | 150 | dB/V |
| Noise Power | | 100 KHz BW 1805–1880 MHz Band | | -85 | -79 | dBm |
| Phase Change | | The Change in Phase When P_{OUT} Changes from 31 dBm to 32 dBm | | 5 | 10 | Deg. |

Characteristic Values:

$P_{IN} = 14\text{ dBm}$

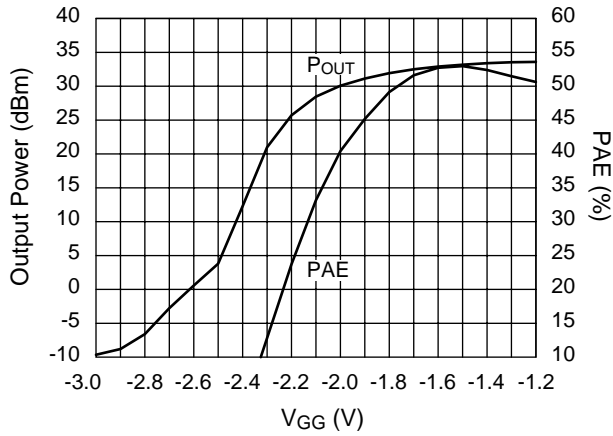
$f_c = 1710\text{--}1785\text{ MHz}$

$V_{DS} = 3.5\text{ V}$

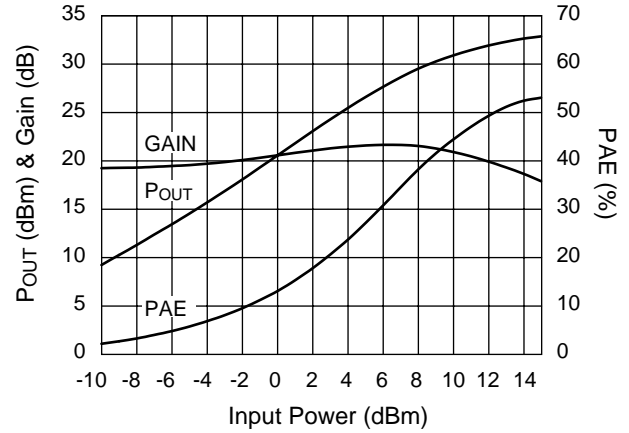
$T_{OP} = +25^{\circ}\text{C}$

$V_{GG} = \text{Switched at } 217\text{ Hz}$ with Duty Cycle of 12.5%

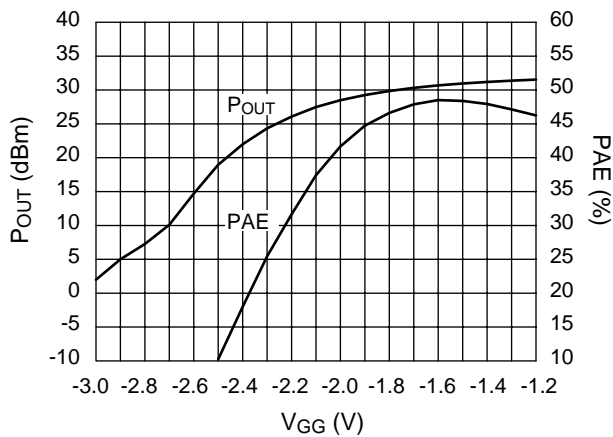
Typical Performance Data



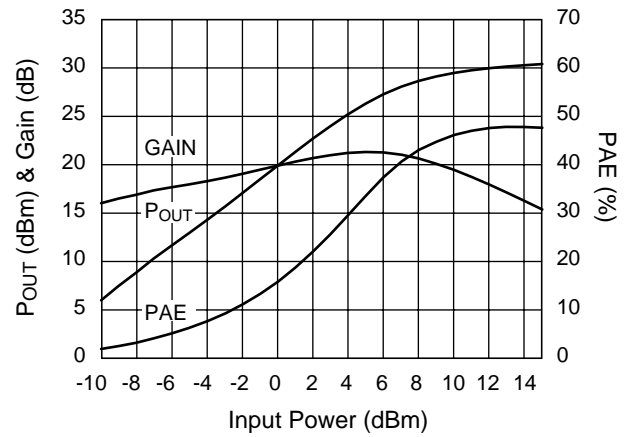
DCS 3.5 V Gate Sweep
 $P_{IN} = 14$ dBm, $V_{DD} = 3.5$ V,
 Frequency = 1.785 GHz



DCS 3.5 V Power Performance
 $V_G = -1.7$ V, $V_{DD} = 3.5$ V,
 Frequency = 1.785 GHz

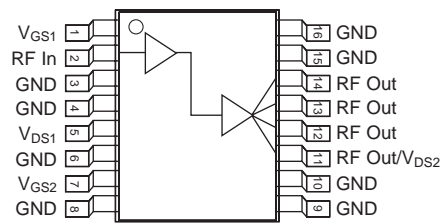


DCS 2.8 V Gate Sweep
 $P_{IN} = 14$ dBm, $V_{DD} = 2.8$ V,
 Frequency = 1.785 GHz



DCS 2.8 V Power Performance
 $V_G = -1.7$ V, $V_{DD} = 2.8$ V,
 Frequency = 1.785 GHz

Pin Out



Pin Configuration

| Terminal | Symbol | Function |
|----------|-------------------|---------------------------------|
| 1 | V_{GS1} | Stage 1 Gate Bias |
| 2 | RF In | RF Input |
| 3 | GND | Ground |
| 4 | GND | Ground |
| 5 | V_{DS1} | Stage 1 Drain Voltage |
| 6 | GND | Ground |
| 7 | V_{GS2} | Stage 2 Gate Voltage |
| 8 | GND | Ground |
| 9 | GND | Ground |
| 10 | GND | Ground |
| 11 | RF Out/ V_{DS2} | RF Output/Stage 2 Drain Voltage |
| 12 | RF Out | RF Output |
| 13 | RF Out | RF Output |
| 14 | RF Out | RF Output |
| 15 | GND | Ground |
| 16 | GND | Ground |