

## 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

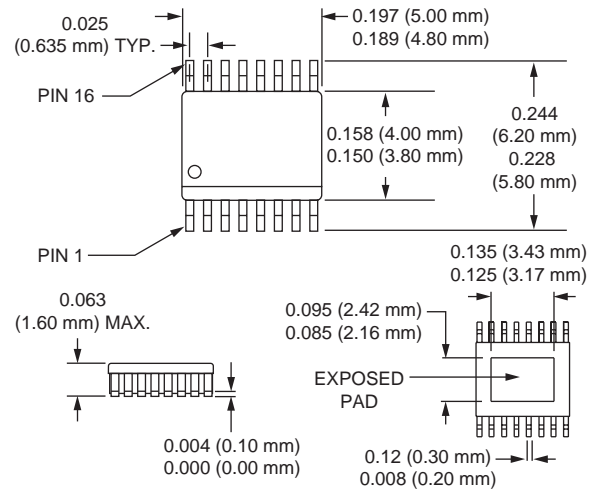
## Description

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

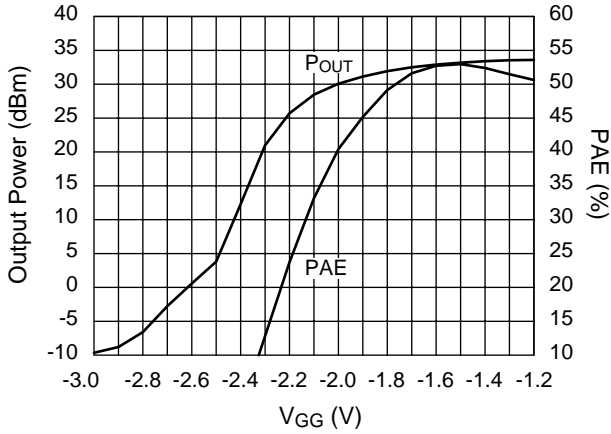
**Electrical Specifications at 25°C**

Quantity	Symbol	Condition	Min.	Typ.	Max.	Unit
Output Power	$P_{OUT}$	$T_{OP} = +25^{\circ}C$	32.5	33		dBm
		$V_{DS} = 2.8 V$ , $T_{OP} = (-40 \text{ to } +85^{\circ}C)$	29.5	30.5		
Power Added Efficiency	$\eta_{PAE}$		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	$P_{OUT, STANDBY}$	$P_{IN} = 14 \text{ dBm}$ , $V_{GG} = -3.0 V$		-49	-40	dBm
Switching Time	$t_R, t_F$	Time from $P_{OUT} = -10 \text{ dBm}$ to $P_{OUT} = 33 \text{ dBm}$		1	2	$\mu S$
Burn Out	BO	$V_{DS} = 2.8 V$ to $6.0 V$ , $P_{IN} = 6 \text{ dBm}$ to $16 \text{ dBm}$ , $Z_S = 50 \Omega$ , Load $VSWR = 10:1$ , All Phase Angles	No Module Damage or Permanent Degradation			
Stability	Stab.	All Combinations of the Following Parameters: $I_{DS} = 0A$ to $xA$ , $x = \text{Current at } P_{OUT} = 33 \text{ dBm}$ in $50 \Omega$ $P_{IN} = 10 \text{ dBm}$ to $16 \text{ dBm}$ , $V_{DD} = 2.5 V$ to $4.5 V$ , $T_{OP} = -40$ to $+85^{\circ}C$ , Load $VSWR = 10:1$ , All Phase Angles	No Parasitic Oscillations Above $-36 \text{ dBm}$			
Slope	$P_{OUT}/V_{GG}$	$P_{OUT} = -15 \text{ dBm}$ to $33 \text{ dBm}$	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 $31 \text{ dBm}$ to $32 \text{ dBm}$		5	10	Deg.

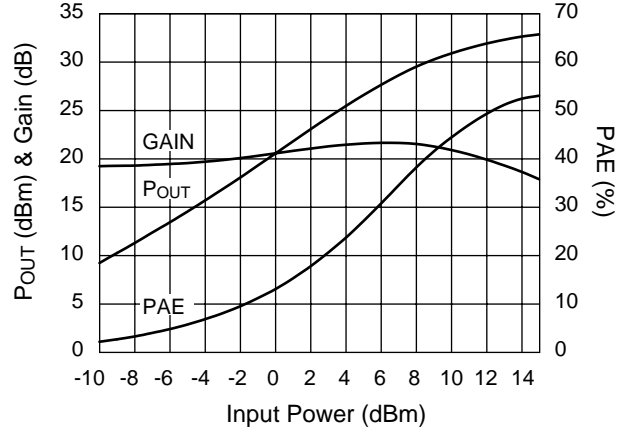
Characteristic Values:

 $P_{IN} = 14 \text{ dBm}$  $f_c = 1710\text{--}1785 \text{ MHz}$  $V_{DS} = 3.5 V$  $T_{OP} = +25^{\circ}C$  $V_{GG} = \text{Switched at } 217 \text{ Hz}$  with Duty Cycle of 12.5%

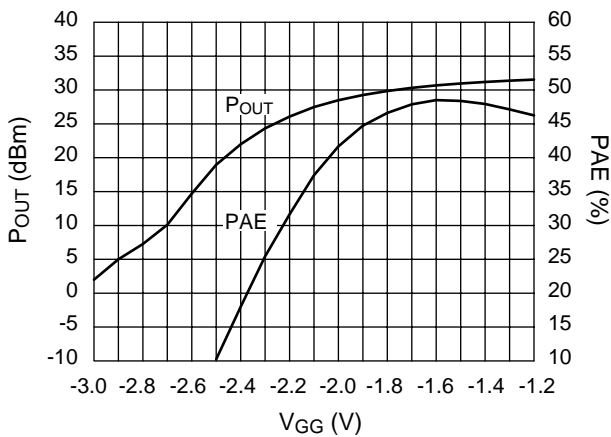
### Typical Performance Data



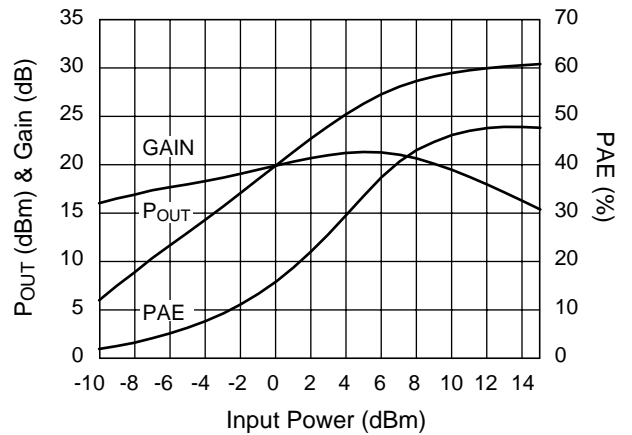
**DCS 3.5 V Gate Sweep**  
 $P_{IN} = 14$  dBm,  $V_{DD} = 3.5$  V,  
 Frequency = 1.785 GHz



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

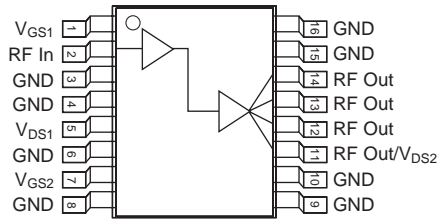


**DCS 2.8 V Gate Sweep**  
 $P_{IN} = 14$  dBm,  $V_{DD} = 2.8$  V,  
 Frequency = 1.785 GHz



**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