GaAs IC GSM Power Amplifier

Alpha

AP120-89

Features

- +3.5 V Operation
- Output Power of 35 dBm
- Efficiency Typically 55%
- Outstanding Efficiency vs. Supply Voltage
- High Power SSOP-16 Package with Exposed Pad
- Wide Power Control Range (50 dB)

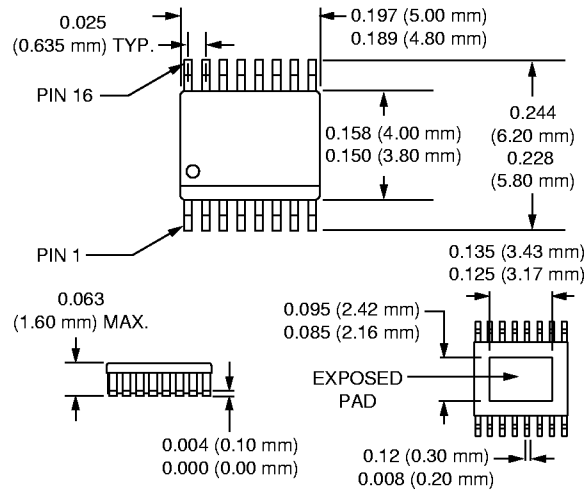
Description

The AP120-89 is a low cost IC power amplifier designed for the 880–915 MHz frequency band. It features 3 cell battery operation and high efficiency. The AP120 has external matching for improved performance and flexibility.

Output Matching Circuit

The output match for the AP120-89 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

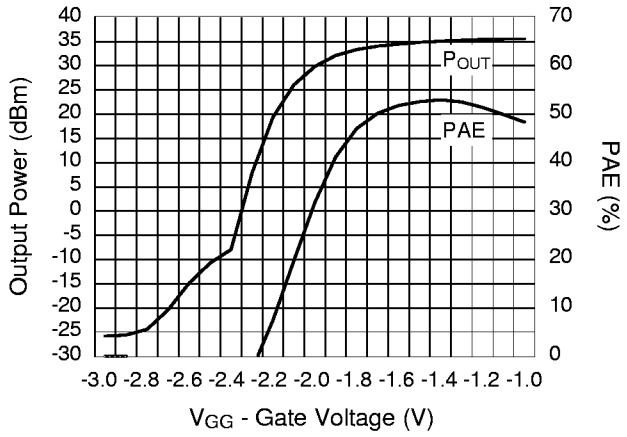
Quantity	Value	Unit
Amplifier Supply Voltage (V_{DS})	10	V
Input RF Power (P_{IN})	15	dBm
Duty Cycle	50	%
Operating Temperature (T_{OP})	-40 to +85	°C
Storage Temperature (T_{ST})	-65 to +150	°C

Electrical Specifications at 25°C

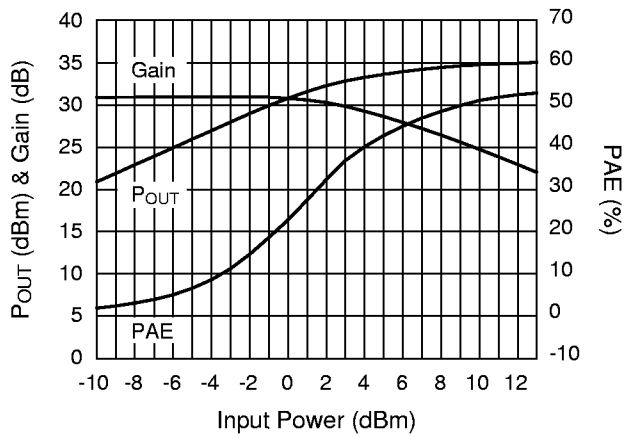
Quantity	Symbol	Condition	Min.	Typ.	Max.	Unit
Output Power	P_{OUT}	T_{OP} = +25°C	34.5	35		dBm
		V_{DS} = 2.8 V, T_{OP} = (-40 to +85°C)	32.5	33		
Power Added Efficiency	n_{PAE}		50	55		%
Control Voltage Range	V_{GG}		-3		-1	V
2nd Harmonic	H_2			-43	-40	dBc
3rd Harmonic	H_3			-48	-45	dBc
Input VSWR	$VSWR_{IN}$	P_{OUT} (5–35 dBm), Controlled by V_{GG}	3:1	2:1		
Forward Isolation	$P_{OUT, STANDBY}$	P_{IN} = 12 dBm, V_{GG} = -3.0 V		-39	-30	dBm
Switching Time	t_R, t_F	Time from P_{OUT} = -10 dBm to P_{OUT} = 34.5 dBm		1	2	µS
Burn Out	BO	V_{DS} = 2.8 V to 6.0 V, P_{IN} = 8 dBm to 14 dBm, Z_S = 50 Ω, 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 = Current at P_{OUT} = 34.5 dBm in 50 Ω P_{IN} = 10 dBm to 14 dBm, V_{DS} = 2.8 V to 4.5 V, T_{OP} = -40 to +85°C, Load VSWR = 10:1, All Phase Angles	No Parasitic Oscillations Above -36 dBm			
Slope P_{OUT}/V_{GG}		P_{OUT} = -15 dBm to 35 dBm	10	100	150	dB/V
Noise Power		100 KHz BW 925-960 MHz Band		-90	-85	dBm
Phase Change	AM-PM	The Change in Phase When P_{OUT} Changes from 33 dBm to 34 dBm		5	10	Deg.

Characteristic Values:
P_{IN} = 12 dBm
fc = 880–915 MHz
V_{DS} = 3.5 V
T_{OP} = +25°C
V_{GG} = Switched at 217 Hz with Duty Cycle of 12.5%

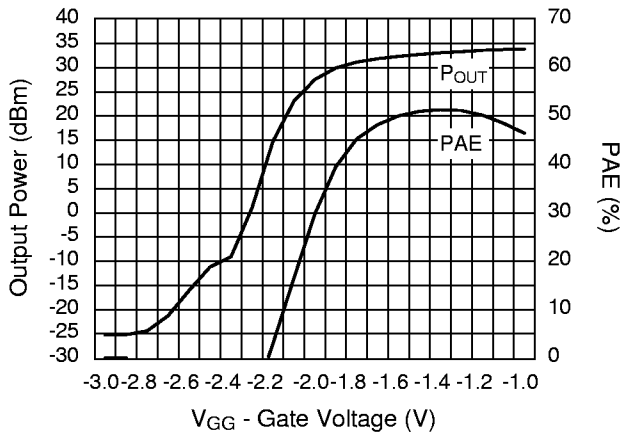
Typical Performance Data



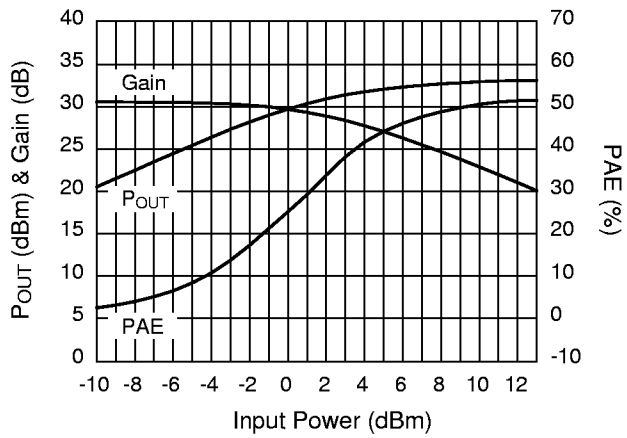
GSM PA - Gate Sweep
P_{IN} = 12 dBm, V_{DD} = 3.5 V,
Frequency = 902 MHz



GSM PA - Power Sweep
V_G = -1.4 V, V_{DD} = 3.5 V,
Frequency = 902 MHz

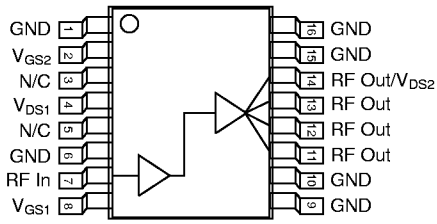


GSM PA - Gate Sweep
P_{IN} = 12 dBm, V_{DD} = 2.8 V,
Frequency = 902 MHz



GSM PA - Power Sweep
V_G = -1.4 V, V_{DD} = 2.8 V,
Frequency = 902 MHz

Pin Out



Pin Configuration

Terminal	Symbol	Function
1	GND	Ground
2	V_{GS2}	Gate Voltage 2
3	N/C	Not Connected
4	V_{DS1}	Drain Voltage 1
5	N/C	Not Connected
6	GND	Ground
7	RF In	RF Input
8	V_{GS1}	Gate Voltage 1
9	GND	Ground
10	GND	Ground
11	RF Out	RF Output
12	RF Out	RF Output
13	RF Out	RF Output
14	RF Out/V_{DS2}	RF Output/Drain Voltage 2
15	GND	Ground
16	GND	Ground