

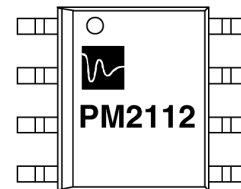
**Single Supply RFIC Power Amplifier
1880 to 1990 MHz Operation**

Features

- 3 to 5 Volt Operation
- 28 dBm Output Power @ 3V
- 45% Efficiency
- Class A Bias
- Low IMD / ACP

Applications

- DECT
- PHS / PACS
- PCS-1900
- Upbanded IS-54 / IS-136



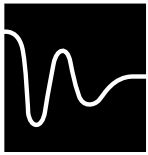
SO-8 Plastic Package

Description

The PM2112 is a 3 to 5 volt single supply, high efficiency GaAs RFIC power amplifier developed for commercial wireless products in the 1900 MHz frequency range. The PM2112 provides +28 dBm output power with efficiencies exceeding 45% at 3.0 volts and +30 dBm at 5.0 volts. Class A operation insures low distortion operation for linear applications.

Electrical Characteristics $V_{DD}=3.0V, T_A = +25^{\circ}C, 50 \Omega$ System

| Characteristics | Symbol | Conditions | Min | Typ | Max | Units |
|-----------------------------|---------------|---------------------------------|------|-----|------|-------|
| Frequency Range | F | | 1880 | | 1990 | MHz |
| Input Return Loss | RL | | | 10 | | dB |
| Small Signal Gain | G | | | 27 | | dB |
| Power Output (P_{1dB}) | P_{1dB} | F=1900 MHz | | 26 | | dBm |
| Power Output (Saturated) | P_{SAT} | F=1900 MHz, $P_{in} = +5.0$ dBm | 27 | 28 | | dBm |
| Third Order Intermodulation | IM3 | $P_{OUT} = +26$ dBm | | -19 | | dBc |
| Fifth Order Intermodulation | IM5 | $P_{OUT} = +26$ dBm | | -50 | | dBc |
| Power Added Efficiency | P_{AE} | F=1900 MHz, $P_{in} = +5.0$ dBm | 40 | 45 | | % |
| Supply Current | I_{DD} | | | 450 | | mA |
| Thermal Resistance | θ_{JC} | T= 85°C, $P_{DISS} = 1.9W$ | | 35 | | °C/W |



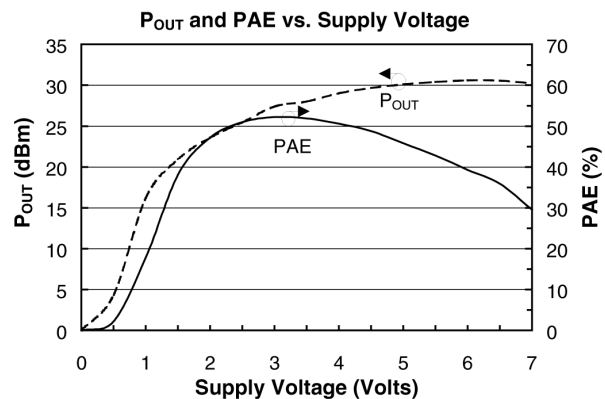
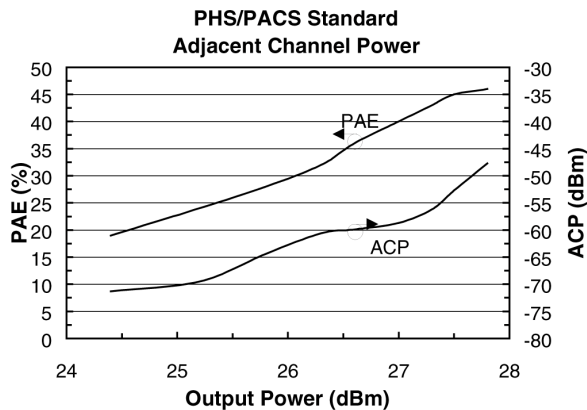
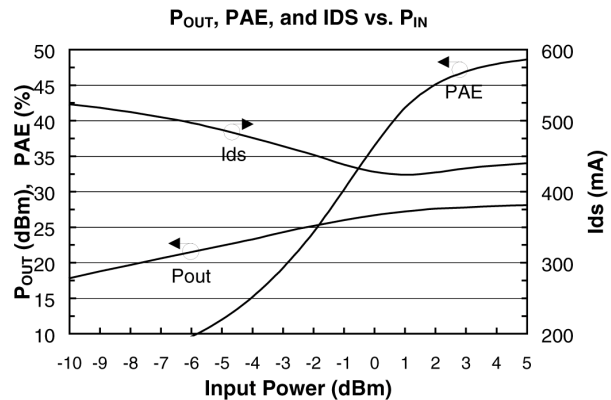
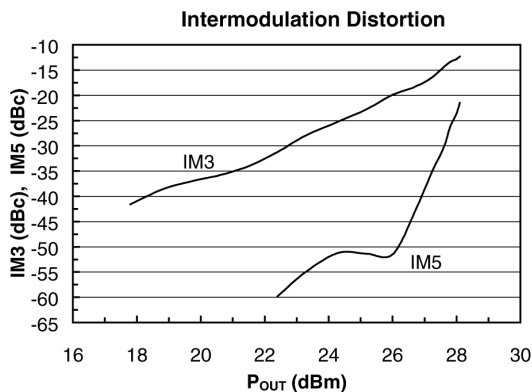
Absolute Maximum Ratings*

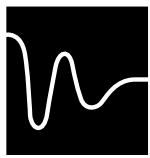
| Characteristics | Symbol | Value | Units |
|--|-------------------|-------------|-------|
| DC Drain Voltage | V _{DD} | +9.0 | V |
| DC Drain Current | I _{DS} | 900 | mA |
| Average Power Dissipation (P _{DISS} = P _{DC} - P _{RF}) | P _{DISS} | 1.9 | W |
| RF Input Power | P _{IN} | 15.0 | dBm |
| Operating Baseplate Temperature | T _{OP} | -40 to +85 | °C |
| Junction Temperature | T _J | 150 | °C |
| Storage Temperature Range | T _{STG} | -65 to +150 | °C |

*Operation beyond the ratings for any one of these parameters may cause permanent damage to the device

Typical Performance Characteristics

Test Conditions: T_A = +25°C, V_{DD} = 3.0V, F=1900 MHz, 50Ω system unless otherwise noted.

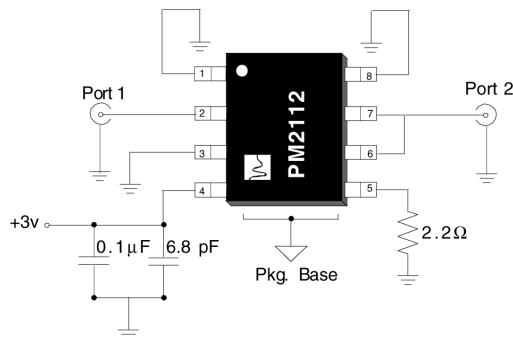




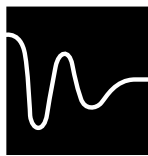
PM2112 Typical Scattering Parameters, $V_{DD}= 3.0V$, $T_A= +25^{\circ}C$, 50Ω System

| Freq. (MHz) | S_{11} | | S_{21} | | S_{12} | | S_{22} | | K Factor |
|----------------|----------|---------|----------|---------|----------|--------|----------|---------|-------------|
| | MAG | ANG | MAG | ANG | MAG | ANG | MAG | ANG | |
| 500 | 0.917 | -31.82 | 33.99 | 34.21 | 0.0005 | 82.63 | 0.277 | -138.75 | 4.55 |
| 750 | 0.925 | -44.49 | 30.86 | -37.79 | 0.0009 | 168.42 | 0.709 | -144.55 | 0.77 |
| 1000 | 0.921 | -54.21 | 8.88 | -94.96 | 0.0022 | 156.91 | 0.806 | -167.62 | 1.22 |
| 1250 | 0.970 | -68.65 | 4.83 | -37.76 | 0.0033 | 158.34 | 0.745 | -176.36 | 0.10 |
| 1500 | 0.976 | -94.42 | 14.83 | -53.09 | 0.0064 | 159.45 | 0.697 | -174.98 | -0.48 |
| 1750 | 0.653 | -114.66 | 16.09 | -110.08 | 0.0099 | 132.76 | 0.802 | -178.78 | 0.34 |
| 1800 | 0.609 | -114.71 | 14.97 | -117.63 | 0.0096 | 129.17 | 0.808 | 179.11 | 0.54 |
| 1850 | 0.578 | -115.12 | 14.19 | -124.80 | 0.0104 | 122.76 | 0.812 | 178.01 | 0.64 |
| 1900 | 0.556 | -115.62 | 13.32 | -131.55 | 0.0099 | 119.04 | 0.816 | 175.79 | 0.80 |
| 1950 | 0.542 | -115.67 | 12.30 | -136.92 | 0.0103 | 121.23 | 0.809 | 173.92 | 0.90 |
| 2000 | 0.533 | -116.19 | 11.49 | -141.17 | 0.0096 | 114.54 | 0.806 | 172.40 | 1.14 |
| 2250 | 0.507 | -123.66 | 8.70 | -160.85 | 0.0115 | 111.83 | 0.802 | 166.46 | 1.39 |
| 2500 | 0.493 | -135.57 | 6.77 | -176.78 | 0.0129 | 102.51 | 0.783 | 160.20 | 1.78 |
| 2750 | 0.490 | -148.03 | 5.35 | 170.89 | 0.0132 | 94.63 | 0.761 | 156.61 | 2.39 |
| 3000 | 0.495 | -161.10 | 4.46 | 160.35 | 0.0141 | 90.41 | 0.761 | 153.27 | 2.62 |
| 3250 | 0.515 | -172.51 | 3.69 | 148.95 | 0.0146 | 83.03 | 0.753 | 148.96 | 3.07 |
| 3500 | 0.538 | 176.34 | 3.05 | 140.22 | 0.0143 | 72.79 | 0.740 | 146.20 | 3.85 |
| 3750 | 0.566 | 170.08 | 2.62 | 133.23 | 0.0146 | 72.03 | 0.750 | 144.32 | 4.05 |
| 4000 | 0.591 | 164.39 | 2.30 | 125.04 | 0.0153 | 66.08 | 0.747 | 140.72 | 4.28 |
| 4250 | 0.619 | 160.57 | 1.97 | 118.20 | 0.0153 | 66.41 | 0.744 | 138.04 | 4.77 |
| 4500 | 0.640 | 157.56 | 1.77 | 113.29 | 0.0160 | 60.77 | 0.735 | 135.84 | 5.05 |
| 4750 | 0.652 | 155.42 | 1.62 | 106.33 | 0.0166 | 58.37 | 0.746 | 131.18 | 5.03 |
| 5000 | 0.657 | 154.50 | 1.45 | 98.98 | 0.0184 | 53.99 | 0.730 | 126.82 | 5.28 |
| 5250 | 0.655 | 153.22 | 1.31 | 94.34 | 0.0195 | 49.24 | 0.721 | 122.84 | 5.69 |
| 5500 | 0.650 | 152.83 | 1.25 | 88.41 | 0.0223 | 42.01 | 0.723 | 117.70 | 5.32 |
| 5750 | 0.643 | 152.88 | 1.16 | 80.66 | 0.0207 | 27.77 | 0.714 | 111.21 | 6.41 |
| 6000 | 0.644 | 150.69 | 1.06 | 74.84 | 0.0199 | 33.18 | 0.705 | 105.60 | 7.36 |

S-Parameter Measurement Setup:



Note: V_{DD2} and GND return for V_{GG1} are supplied through bias tee.

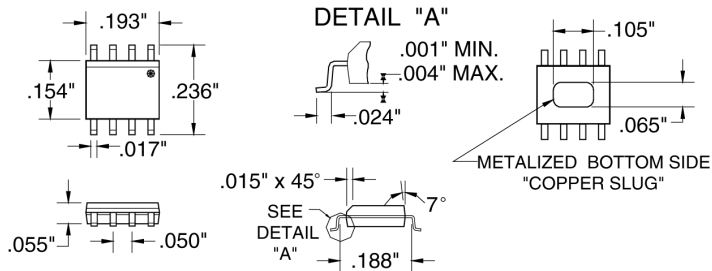


Package Specifications

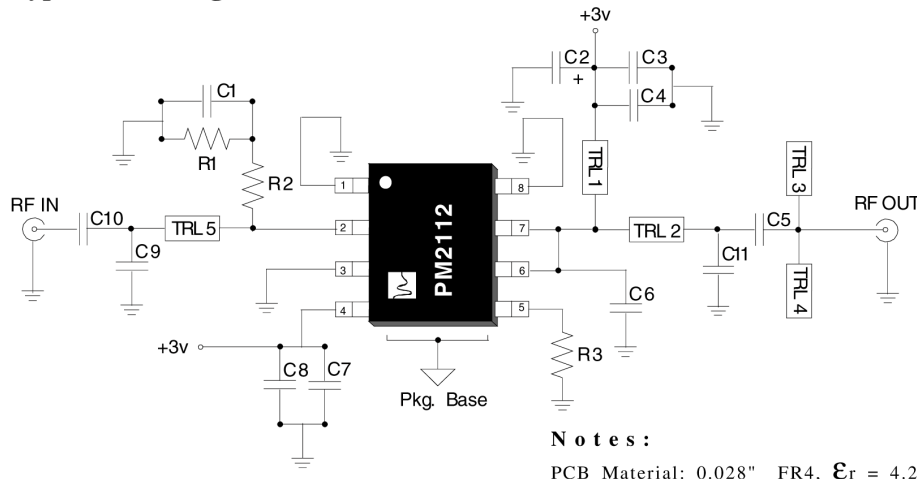
Pin Connections

| Pin # | Function |
|-------|--------------------------------------|
| 1 | GND |
| 2 | RF _{IN} |
| 3 | GND |
| 4 | V _{DD1} |
| 5 | V _{GG2} |
| 6, 7 | RF _{OUT} / V _{DD2} |
| 8 | GND |
| Base | GND |

SO-8 Outline Drawing



Typical Matching Network for the PM2112 at 1880-1990 MHz



Notes:
PCB Material: 0.028" FR4, $\epsilon_r = 4.2$

List of Components

| Part | Value | Size |
|--------|--------------|------|
| C1, C4 | 33 pF | 0603 |
| C10 | 33 pF | 0603 |
| C2 | 6.8 μ F | 1238 |
| C3, C7 | 1000 pF | 0603 |
| C5 | 6.8 pF | 0603 |
| C6 | 3.0 pF | 0603 |
| C8 | 0.1 μ F | 0603 |
| C9 | 1.5 pF | 0603 |
| C11 | 1.0 pF | 0603 |
| R1 | 51 Ω | 0603 |
| R2 | 5.6 Ω | 0603 |
| R3 | 2.2 Ω | 0603 |

Technical Information

The area beneath the amplifier and the associated matching networks must have a continuous ground plane or the resulting performance of the amplifier may be degraded. Terminate pins 1, 3, 8 and package base to a common ground pad. This ground pad must provide a connection to the back side of the ground plane with plated via holes. It is important to provide a good thermal path for the PM2112 since the device can dissipate up to 1.9 Watts of continuous average power.

The PM2112 requires external input and output matching for proper operation. Input match is accomplished using C9 and TRL5. R1, R2, and C1 provide added stability. The output match consists of C5, C6, TRL1, and TRL2. Harmonic termination is improved by TRL3 and TRL4. Interstage matching is on-chip with R3 added to improve inband stability. Extensive bypassing is recommended for linear digitally modulated applications requiring good IMD performance. The TRL values at 1900 MHz are as follows;

- TRL1:** W=.015 L=.450 ($Z=90\Omega$, $\theta=44^\circ$) **TRL3,4:** W=.050 L=.175 ($Z=50\Omega$, $\theta=18^\circ$)
- TRL2:** W=.050 L=.225 ($Z=50\Omega$, $\theta=23^\circ$) **TRL5:** W=.050 L=.170 ($Z=50\Omega$, $\theta=17^\circ$)