

SJM PREWELL PW470

Wideband Gain Block

Features

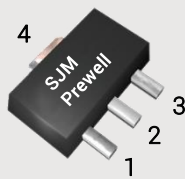
- 5 to 4000MHz
- Gain 16.3dB @ 75MHz
- P1dB 19.4dBm @ 75MHz
- OIP3 35.7dBm @ 75MHz
- Lead-free / Green / **RoHS** 
compliant SOT-89 Package

Applications

- Base station / Repeater / Mobile / Automotive / Military
 - FDD-LTE, TD-LTE, TDS-CDMA, CDMA, WCDMA, WiMAX, PCS, GSM, GPS, GPRS, TETRA
- IoT / Broadcasting / WLAN
 - FM, DMB, DVB, ISM

Functional Diagram

RF IN 1 RF OUT / Bias 3
GND 2,4



ESD/MSL

- 1 ESD sensitive device. Observe handling precautions.
- 2 HBM: Class 2, JESD22-A114
- 3 CDM: Class C3, JESD22-C101F
- 4 MSL 3, J-STD-020

Description

The PW470 is a high performance InGaP HBT MMIC Amplifier and consists of Darlington pair amplifiers. The features of PW470 are high linear performance, wideband operation and high reliability. The PW470 operates from a single voltage supply and requires only two DC-blocking capacitors, a bias resistor and an inductor for operation. The device is a general purpose buffer amplifier that offers high dynamic range in a low cost surface-mounted plastic SOT-89 package. All devices are 100% RF and DC tested.

Specifications

| Parameter | Units | Frequency (MHz) | | | | | |
|-----------|-------|-----------------|------|------|------|------|------|
| | | 75 | 900 | 1900 | 2300 | 2600 | 3500 |
| S21 | dB | 16.3 | 16.0 | 15.5 | 14.9 | 14.4 | 13.5 |
| S11 | dB | -28 | -18 | -18 | -13 | -11 | -12 |
| S22 | dB | -17 | -19 | -14 | -11 | -10 | -10 |
| P1dB | dBm | 19.4 | 19.2 | 18.4 | 17.7 | 17.1 | 14.5 |
| OIP3 | dBm | 35.7 | 35 | 32.8 | 31.5 | 30.3 | 27.8 |
| NF | dB | 3.4 | 3.5 | 3.7 | 3.8 | 3.9 | - |
| V/I | V/mA | 5/69 | | | | | |
| Rth | °C/W | 57 | | | | | |

1) Test Conditions : T=25°C, Supply Voltage=5.3V, Rbias=4.7ohm, 50ohm System

2) OIP3 measured with two tones at an output power of 3dBm/tone separated by 1MHz.

Absolute Maximum Ratings

| Parameter | Rating | Unit |
|-------------------------------|------------|------|
| Supply Voltage | 11 | V |
| Supply Current | 250 | mA |
| RF Power Input | 10 | dBm |
| Storage Temperature | -55 to 150 | °C |
| Ambient Operating Temperature | -40 to 85 | °C |
| Junction Temperature | 187 | °C |

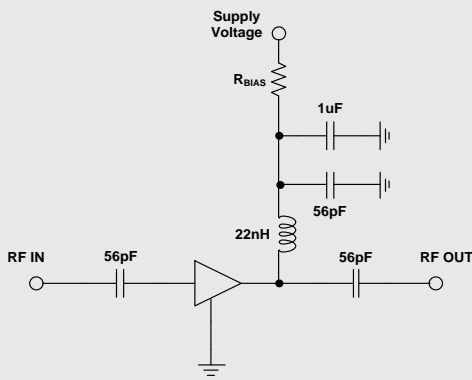
1) Stresses above the maximum values listed have may cause permanent damage to the device.

2) MTTF is more than 100 years.

Typical RF Performance for 1.9GHz Tuned Application Circuit

Supply Bias Voltage = 6V, R(bias)= 15 ohm, Current= 69mA

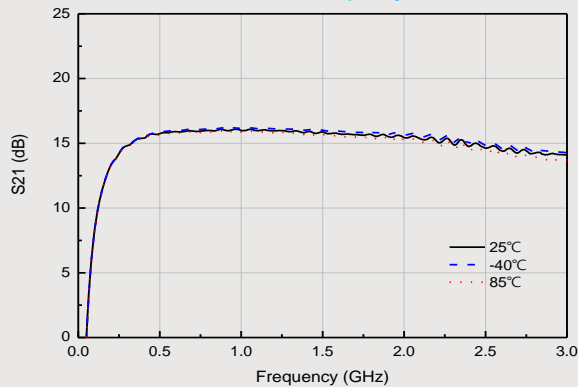
| Parameters | Units | Frequency(MHz) | | | | | | |
|------------|-------|----------------|------|------|------|------|------|------|
| | | 500 | 900 | 1500 | 1900 | 2300 | 2600 | 3000 |
| S21 | dB | 15.7 | 16.0 | 15.8 | 15.5 | 14.9 | 14.4 | 14.1 |
| S11 | dB | -12 | -18 | -23 | -18 | -13 | -11 | -10 |
| S22 | dB | -11 | -19 | -18 | -14 | -11 | -10 | -10 |
| P1dB | dBm | 18.5 | 19.2 | 18.7 | 18.4 | 17.7 | 17.1 | 16.4 |
| OIP3@3dBm | dBm | 34.3 | 35 | 34 | 32.8 | 31.5 | 30.3 | 29.5 |
| NF | dB | 3.5 | 3.5 | 3.6 | 3.7 | 3.8 | 3.9 | 4.0 |



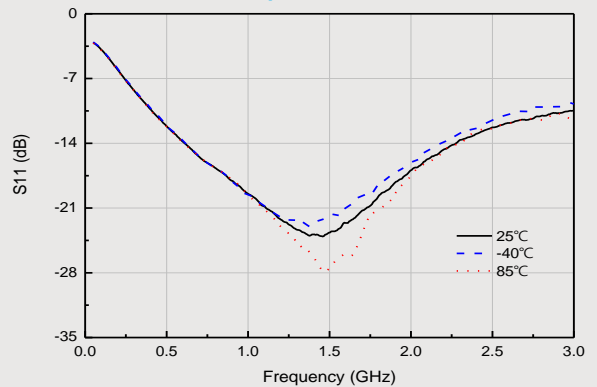
Recommended Bias Values

| Supply Voltage(V) | R bias Value(ohm) | Size |
|-------------------|-------------------|------|
| 5.3 | 47 | 0805 |
| 6 | 15 | 0805 |
| 7 | 30 | 1210 |
| 8 | 45 | 1210 |
| 9 | 58 | 2010 |
| 10 | 74 | 2010 |
| 12 | 115 | 2512 |

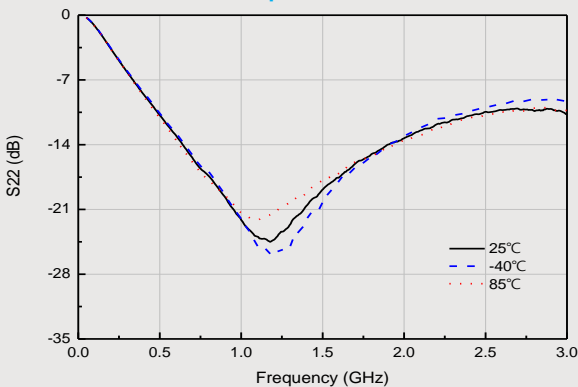
Gain vs. Frequency



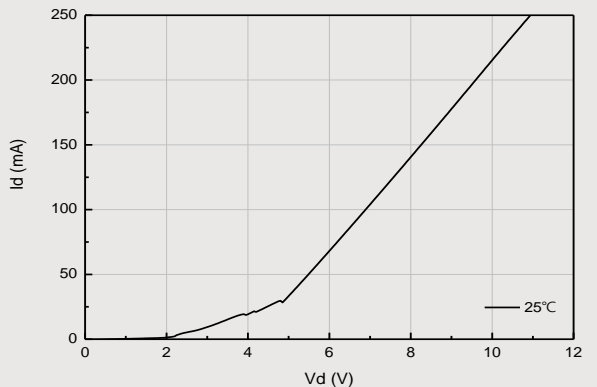
Input Return Loss



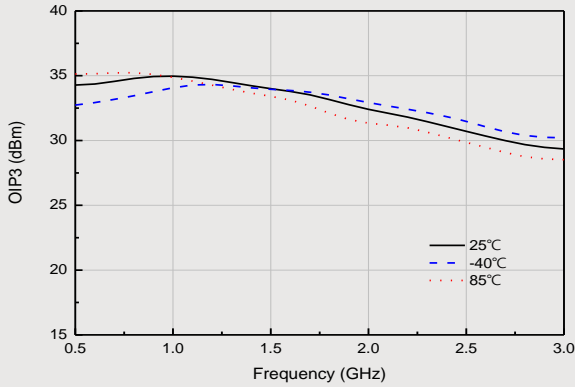
Output Return Loss



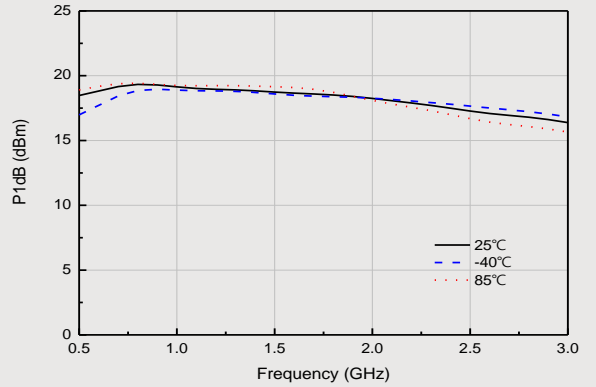
Id vs. Vd



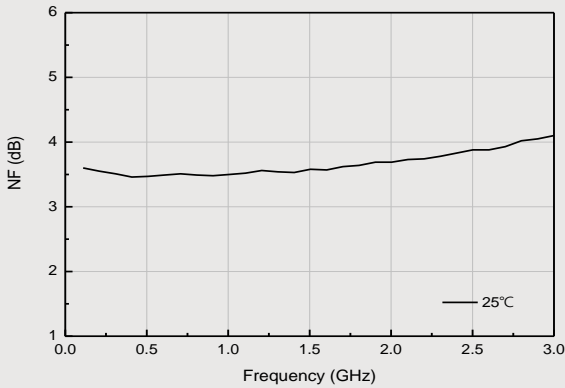
OIP3 vs. Frequency



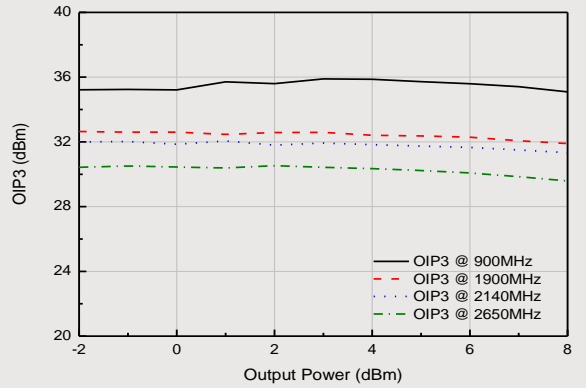
P1dB vs. Frequency



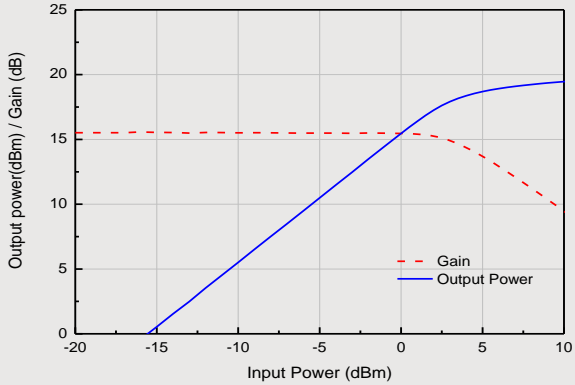
NF vs. Frequency



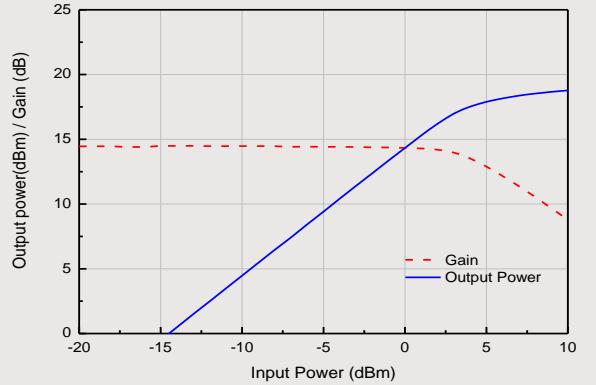
OIP3 vs. Output Power



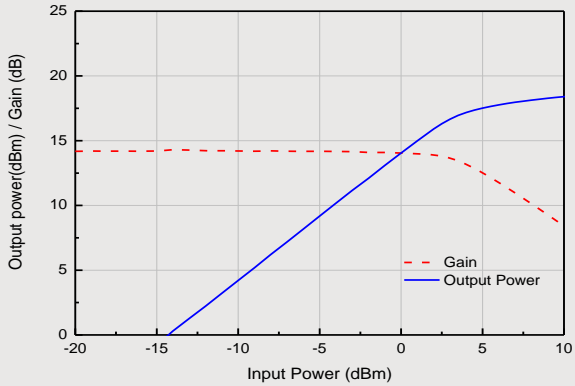
Output Power / Gain vs Input Power @ 900MHz



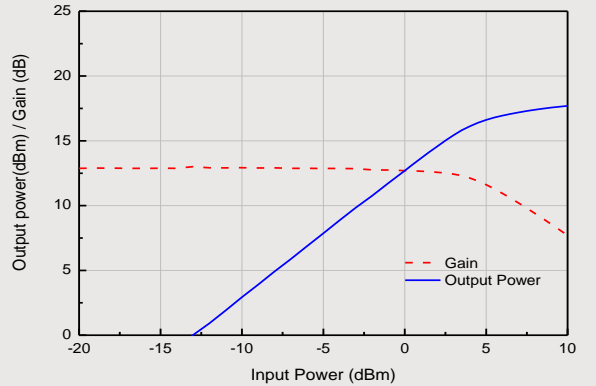
Output Power / Gain vs Input Power @ 1900MHz



Output Power / Gain vs Input Power @ 2140MHz



Output Power / Gain vs Input Power @ 2600MHz

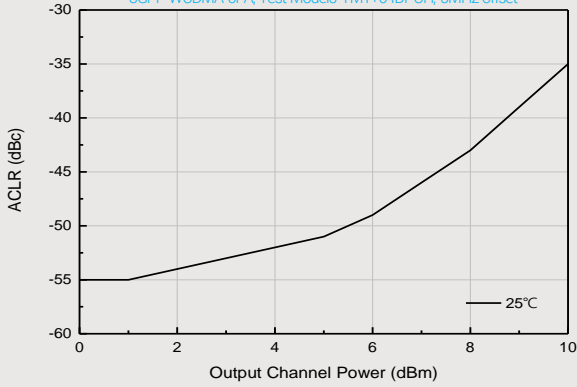


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Wideband Gain Block

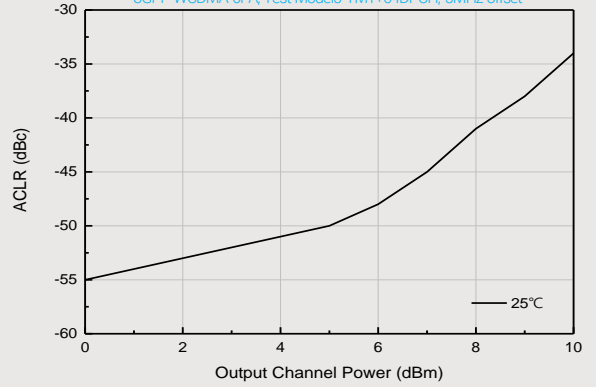
ACLR vs. Channel Power @ 1850MHz

3GPP WCDMA 6FA, Test Model5 TM1+64DPCH, 5MHz offset



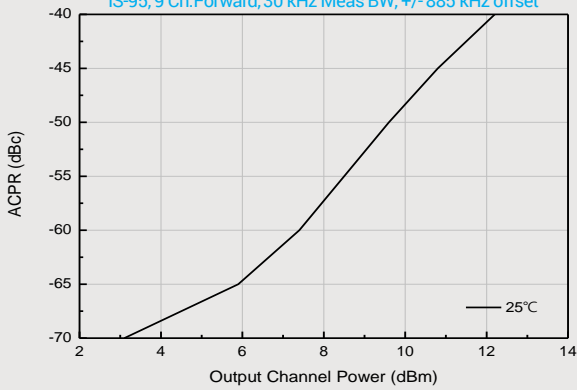
ACLR vs. Channel Power @ 2140MHz

3GPP WCDMA 6FA, Test Model5 TM1+64DPCH, 5MHz offset



ACPR IS-95A vs. Channel Power

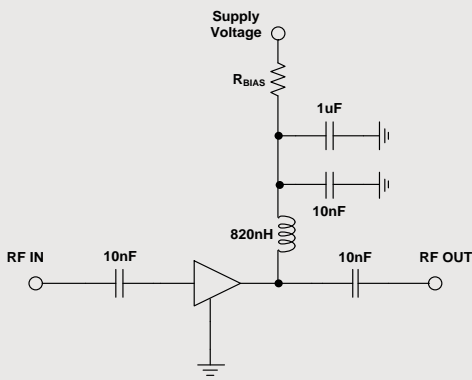
IS-95, 9 Ch. Forward, 30 kHz Meas BW, +/- 885 kHz offset



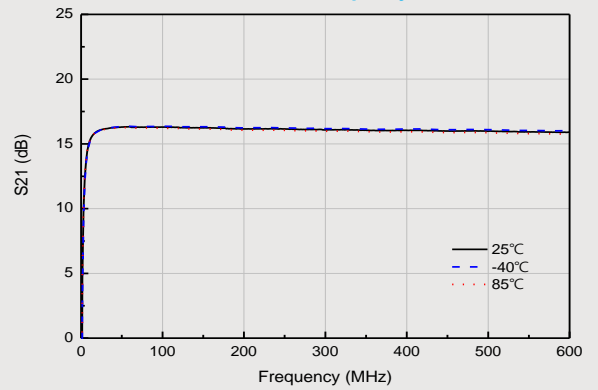
Typical RF Performance for 50 - 500MHz Tuned Application Circuit

Supply Bias Voltage = 6V, R(bias)= 15 ohm, Current= 69mA

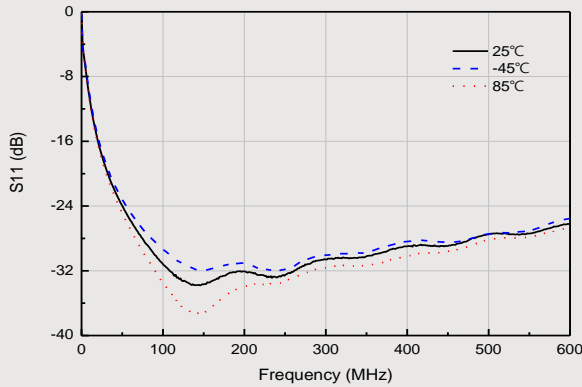
| Parameters | Units | Frequency(MHz) | | | |
|------------|-------|----------------|------|------|------|
| | | 75 | 125 | 300 | 500 |
| S21 | dB | 16.3 | 16.2 | 16.1 | 16.0 |
| S11 | dB | -28 | -33 | -30 | -27 |
| S22 | dB | -17 | -17 | -17 | -16 |
| P1dB | dBm | 19.4 | 19.3 | 19.0 | 18.8 |
| OIP3@3dBm | dBm | 35.7 | 35.7 | 35.5 | 34.5 |
| NF | dB | 3.4 | 3.5 | 3.5 | 3.5 |



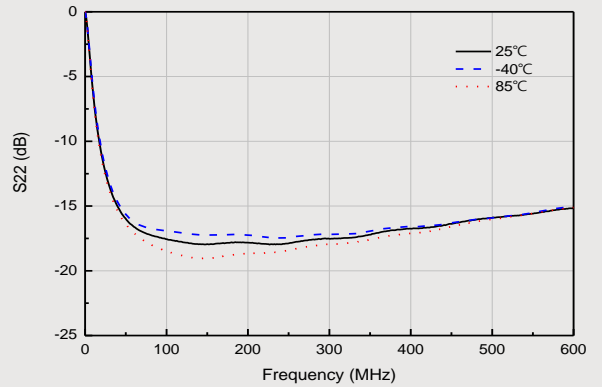
Gain vs. Frequency



Input Return Loss



Output Return Loss



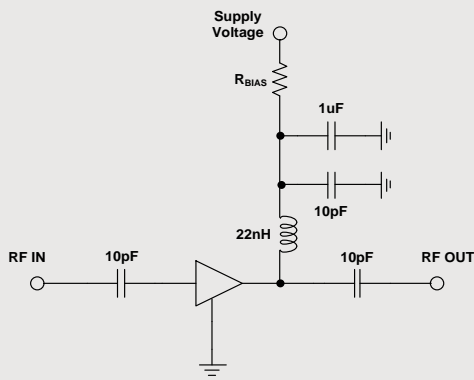
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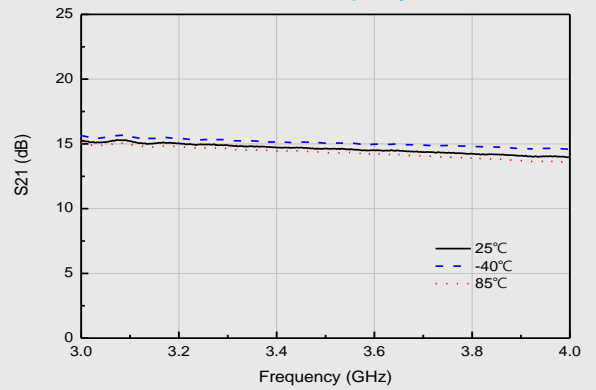
Typical RF Performance for 3500MHz Tuned Application Circuit

Supply Bias Voltage = 6V, R(bias)= 15 ohm, Current= 69mA

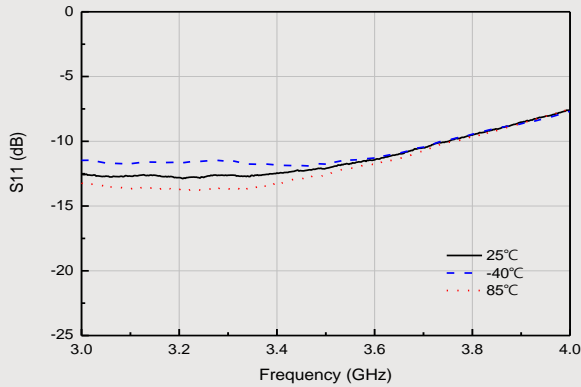
| Parameters | Units | Frequency(MHz) | | |
|------------|-------|----------------|------|------|
| | | 3000 | 3500 | 4000 |
| S21 | dB | 14.0 | 13.5 | 13.0 |
| S11 | dB | -12 | -12 | -8 |
| S22 | dB | -9 | -10 | -12 |
| P1dB | dBm | 16.0 | 14.5 | 14.2 |
| OIP3@3dBm | dBm | 29.4 | 27.8 | 26.8 |



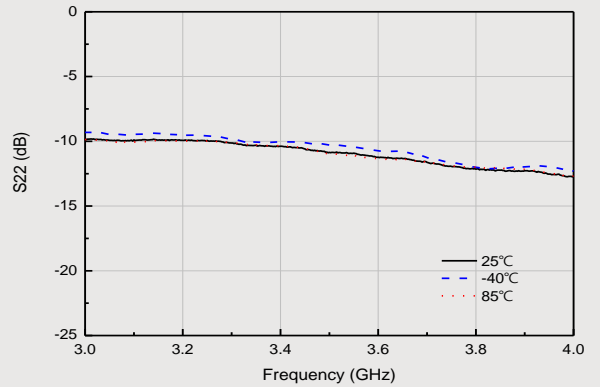
Gain vs. Frequency



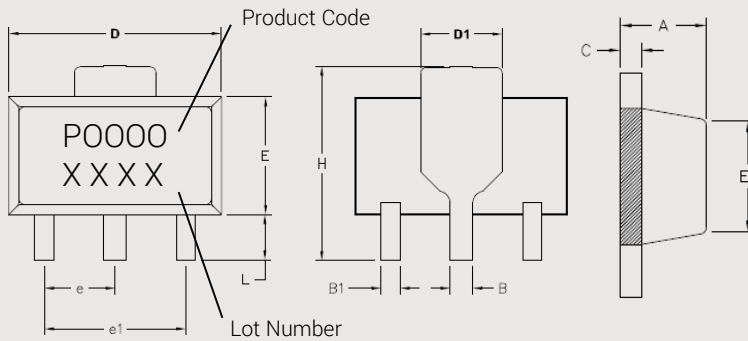
Input Return Loss



Output Return Loss

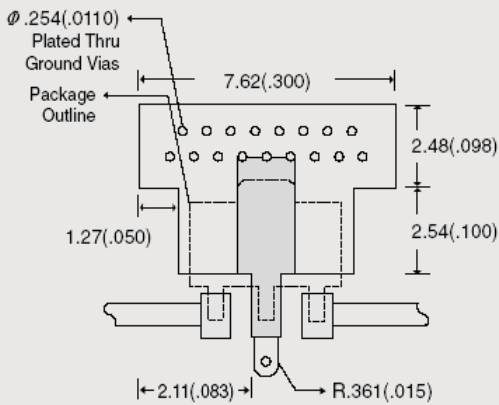


Lead-free /RoHS Compliant / Green SOT-89 Package Outline

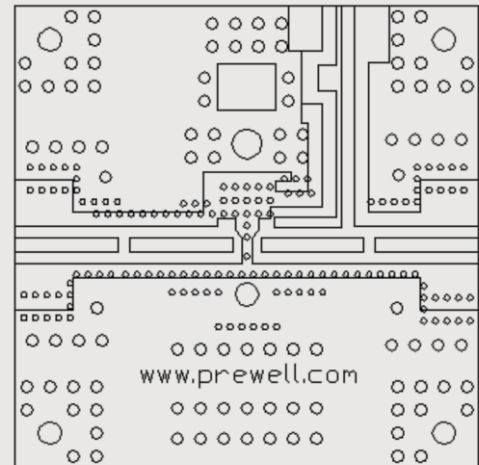


| REF. | DIMENSIONS (mm) | |
|------|-----------------|------|
| | Min. | Max. |
| A | 1.40 | 1.60 |
| B | 0.43 | 0.58 |
| B1 | 0.36 | 0.54 |
| C | 0.35 | 0.46 |
| D | 4.30 | 4.70 |
| D1 | 1.50 | 1.87 |
| E | 2.29 | 2.70 |
| E1 | 2.13 | 2.18 |
| e | 1.5 | |
| e1 | 3.0 | |
| H | 3.43 | 5.10 |
| L | 0.74 | 1.20 |

Land Pattern



Evaluation Board Layout (40x40)



Mounting Instructions

- 1 Use a large ground pad area with many plated through-holes as shown.
- 2 We recommend 1 oz copper minimum.
- 3 Measurement for our data sheet was made on 0.8mm thick FR-4 Board.
- 4 RF trace width depends on the board material and construction.
- 5 Add mounting screws near the part to fasten the board to a heatsink.
- 6 Add as much copper as possible to inner and outer layers near the part to ensure optimal thermal performance.