**SJM PREWELL**

# PW125

CATV Amplifier

## Features

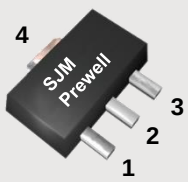
- 45 - 1500MHz
- Gain 22.95dB @ 50MHz
- CSO 54.1dBc @ 25dBmV
- CTB 70.8dBc @ 25dBmV
- NF 2.3dB @ 870MHz
- Lead-free / Green / RoHS compliant SOT-89 Package

## Applications

- Headend
- Drop Amplifier
- Cable Modem
- Laser Diode Driver
- FTTH Receiver
- Optical Transmitter
- RFoG / MOCA

## 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 PW125 is a high performance InGaP HBT MMIC Amplifier and consists of Darlington pair amplifiers with temperature compensation that is internally matched 75Ω input/output. The features of PW125 are broadband, high gain, high linear performance, high reliability and low noise as a CATV amplifier and provide stable current variation over temperature. The PW125 operates from a single voltage supply and requires minimal external components for operation. The device is a general purpose CATV 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 | Typ. | Condition |
|---|---|---|---|
| Forward (45MHz ~ 1000MHz) | | | |
| S21 | dB | 22.1 | 45 ~ 1000MHz |
| S11 | dB | -19 | 45 ~ 1000MHz |
| S22 | dB | -16 | 45 ~ 1000MHz |
| CSO | dBc | 54.1 | 25dBmV/132ch Flat |
| CTB | dBc | 70.8 | 25dBmV/132ch Flat |
| OIP3 | dBm | 31.7 | Note 1 [2)] |
| P1dB | dBm | 17.1 | |
| Vo | dBmV | 54.5 | Note 2 [3)] |
| d2 | dBc | 55.0 | Note 3 [4)] |
| NF | dB | 2.4 | |
| V / I | V / mA | 4.5 / 120 | |
| Reverse ( 5MHz ~ 100MHz) | | | |
| S21 | dB | 23.0 | 5 ~ 100MHz |
| S11&S22 | dB | -23 | 5 ~ 100MHz |
| OIP3 | dBm | 41.0 | Note 1 [2)] |
| P1dB | dBm | 18.3 | |
| NF | dB | 2.2 | |
| V / I | V / mA | 4.5 / 95 | |
| Rth | °C/W | 72 | |

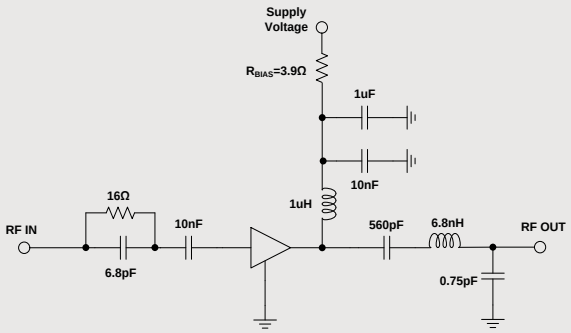
1) Test Conditions : T=25°C, Supply Voltage=5V, 75ohm System
2) Note 1. Two Tones, 1MHz Spacing, 5dBm per Tone at Output
3) Note 2. fp=851.25MHz; Vp=Vo; fq=858.25MHz; Vq=Vo-6dB; fr=860.25MHz; Vr=Vo-6dB; measured at fp+fq-fr =849.25MHz
4) Note 3. fp=55.25MHz; Vp=40dBmV, fq=805.25MHz; Vq=40dBmV, measured at fp+fq=860.5MHz

## Absolute Maximum Ratings

| Parameter | Rating | Unit |
|---|---|---|
| Device Voltage | 5 | V |
| Device Current | 200 | 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.

## 45 -1000MHz CATV Application Circuit new

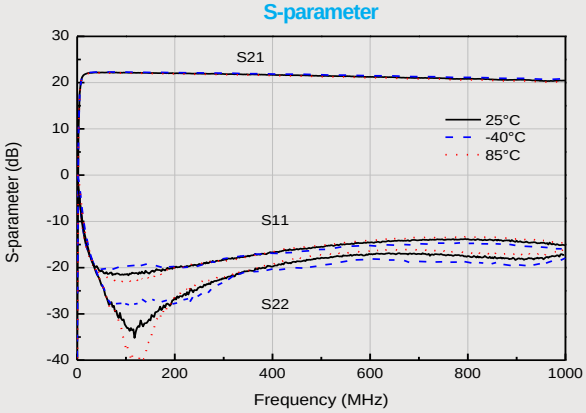



## Recommended Bias Values

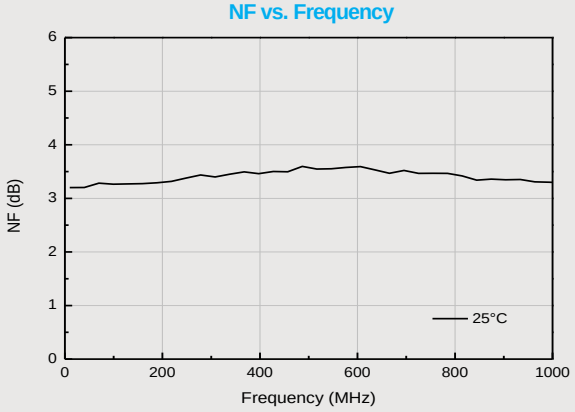
| Supply Voltage ( V ) | $R_{BIAS}$ Value (ohm) | Size |
|---|---|---|
| 5 | 3.9 | 0805 |
| 5.3 | 6.4 | 0805 |
| 6 | 12.3 | 0805 |
| 7 | 20.6 | 1210 |
| 8 | 28.9 | 1210 |
| 9 | 37.3 | 2010 |
| 10 | 45.6 | 2010 |
| 12 | 62.3 | 2512 |

1) Measurement for our datasheet was made on 1.6mm thick FR-4 Board and 75 ohm microstrip line.

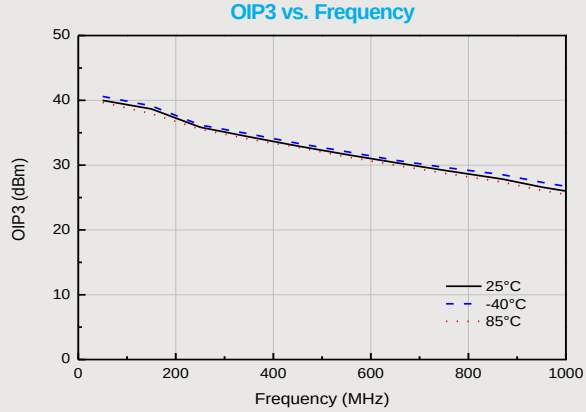
### S-parameter



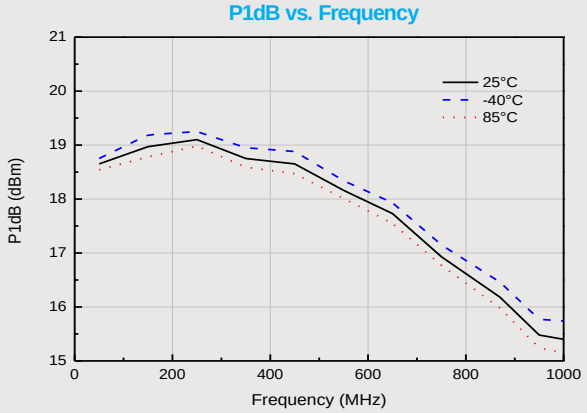

### NF vs. Frequency




### OIP3 vs. Frequency

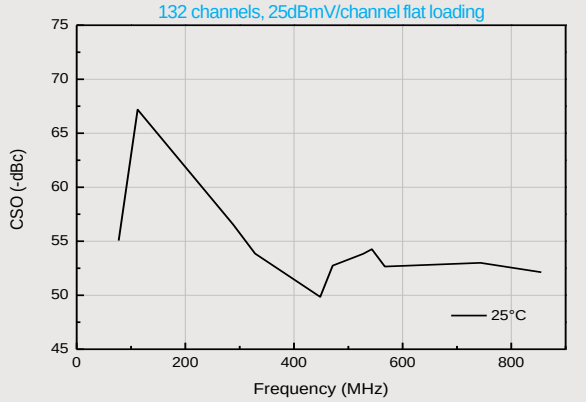



### P1dB vs. Frequency



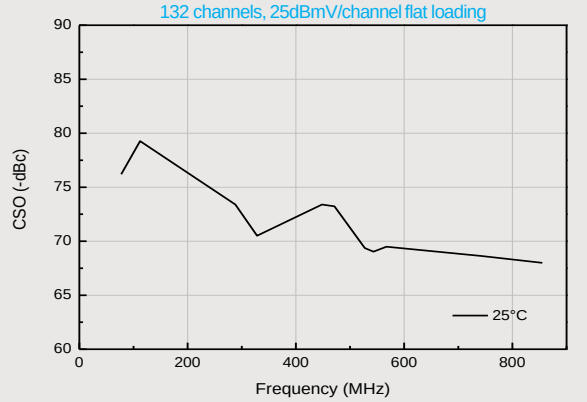

### CSO vs. Frequency

132 channels, 25dBmV/channel flat loading

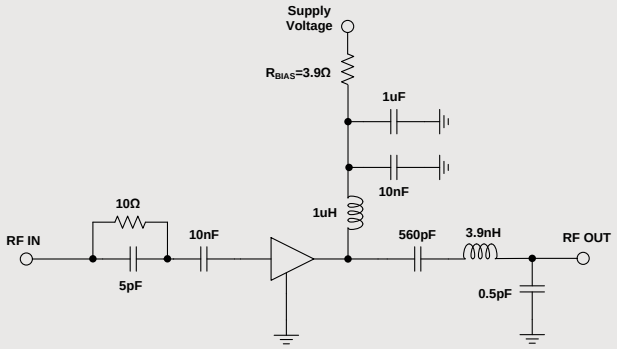



### CTB vs. Frequency

132 channels, 25dBmV/channel flat loading



## 45 -1500MHz CATV Application Circuit

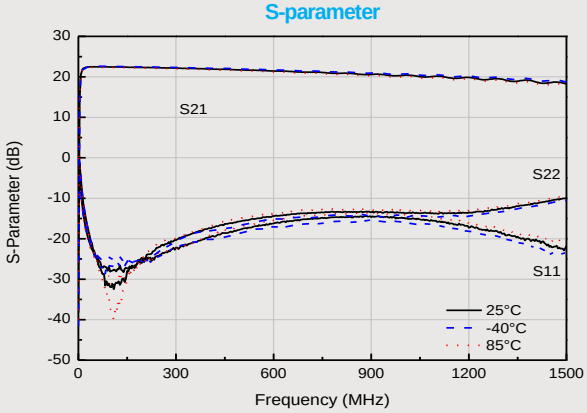



## Recommended Bias Values

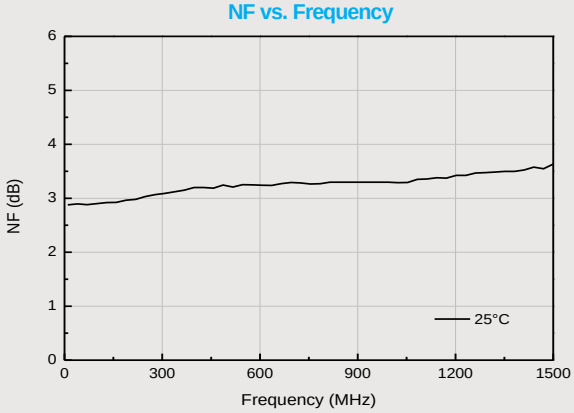
| Supply Voltage ( V ) | $R_{BIAS}$ Value (ohm) | Size |
|---|---|---|
| 5 | 3.9 | 0805 |
| 5.3 | 6.4 | 0805 |
| 6 | 12.3 | 0805 |
| 7 | 20.6 | 1210 |
| 8 | 28.9 | 1210 |
| 9 | 37.3 | 2010 |
| 10 | 45.6 | 2010 |
| 12 | 62.3 | 2512 |

1) Measurement for our datasheet was made on 1.6mm thick FR-4 Board and 75 ohm microstrip line.

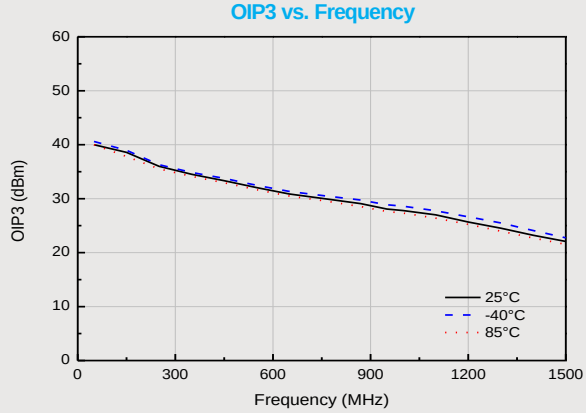
### S-parameter



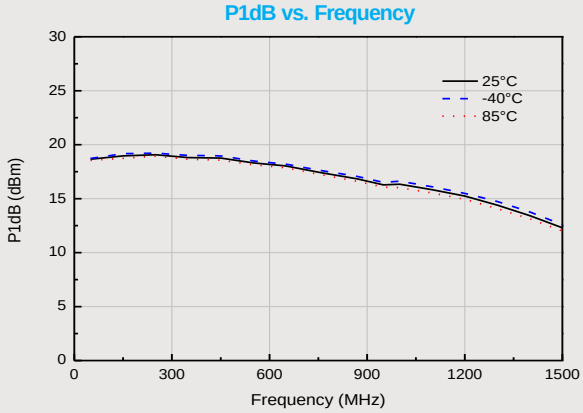

### NF vs. Frequency




### OIP3 vs. Frequency

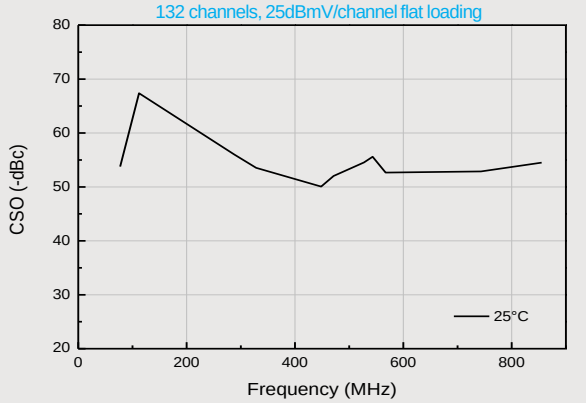



### P1dB vs. Frequency



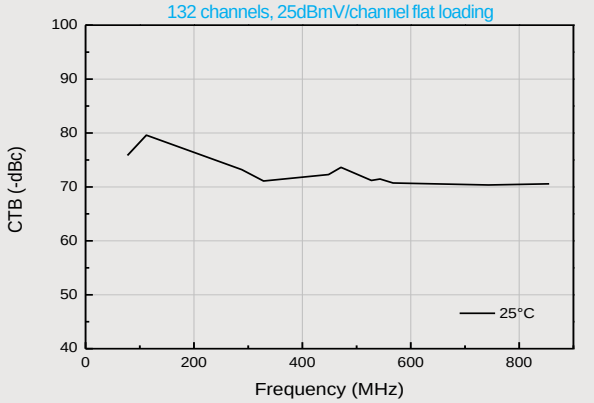

### CSO vs. Frequency

132 channels, 25dBmV/channel flat loading

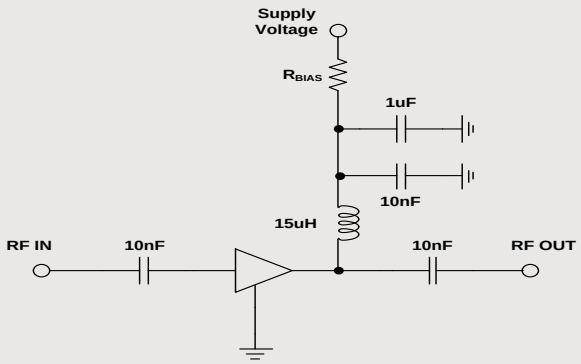



### CTB vs. Frequency

132 channels, 25dBmV/channel flat loading



## 5 -300MHz CATV Application Circuit

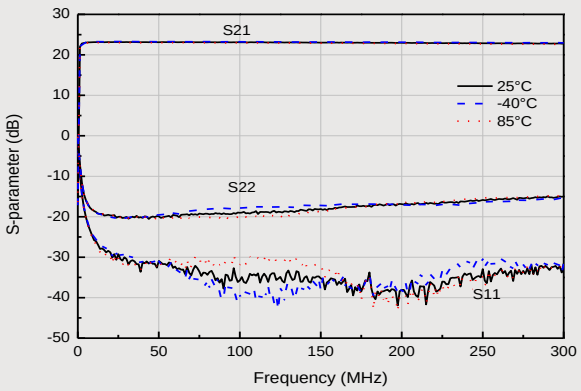



## Recommended Bias Values

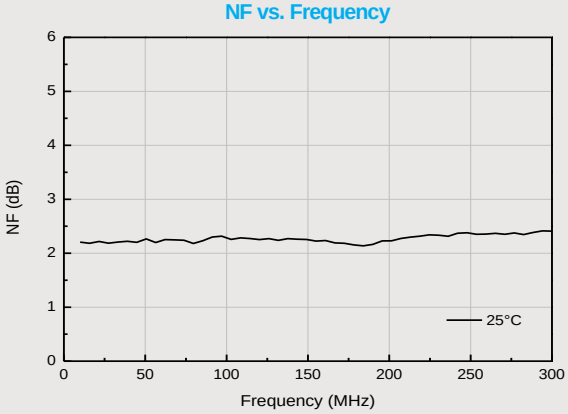
| Supply Voltage ( V ) | $R_{BIAS}$ Value (ohm) | Size |
|---|---|---|
| 5 | 3.9 | 0805 |
| 5.3 | 6.4 | 0805 |
| 6 | 12.3 | 0805 |
| 7 | 20.6 | 1210 |
| 8 | 28.9 | 1210 |
| 9 | 37.3 | 2010 |
| 10 | 45.6 | 2010 |
| 12 | 62.3 | 2512 |

1) Measurement for our datasheet was made on 1.6mm thick FR-4 Board and 75 ohm microstrip line.

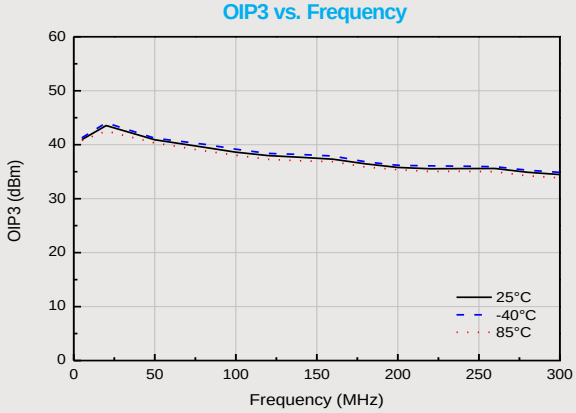
### S-Parameter



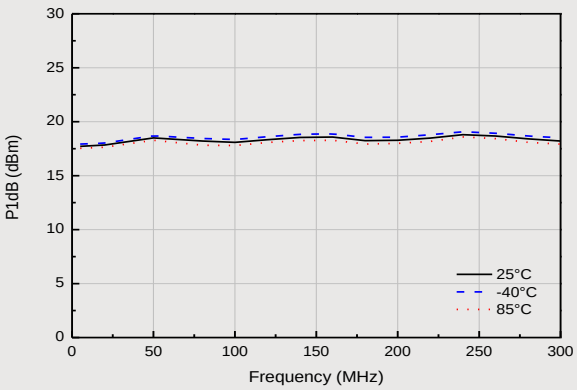

### NF vs. Frequency



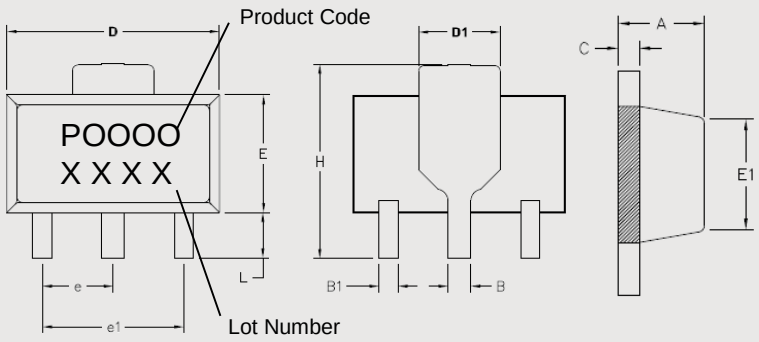

### OIP3 vs. Frequency




### P1dB vs. Frequency

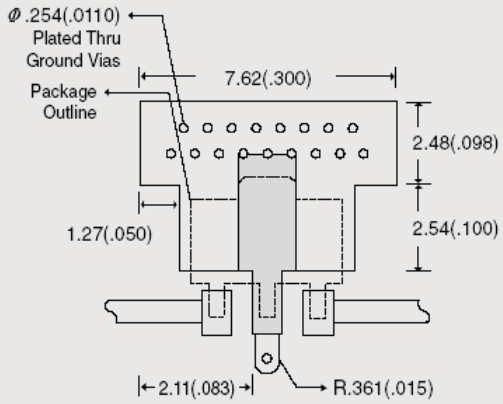


## Lead-free /RoHS Compliant / Green SOT-89 Package Outline

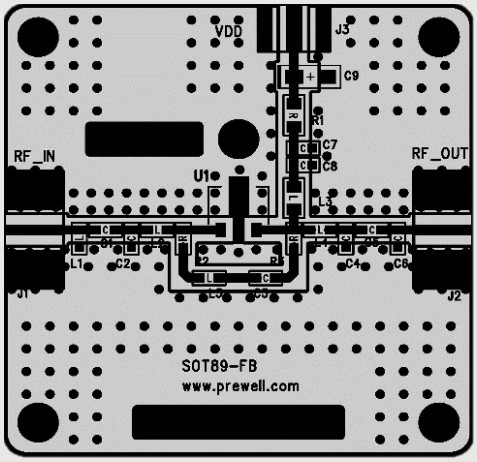



| REF. | DIMENSIONS (mm) | |
|---|---|---|
| | Min. | Max. |
| A | 1.40 | 1.60 |
| B | 0.43 | 0.58 |
| B1 | 0.36 | 0.54 |
| C | 0.35 | 0.46 |
| D | 4.30 | 4.70 |
| D1 | 1.50 | 1.87 |
| E | 2.29 | 2.70 |
| E1 | 2.13 | 2.18 |
| e | 1.5 | |
| e1 | 3.0 | |
| H | 3.43 | 5.10 |
| L | 0.74 | 1.20 |

## 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 1.6mm 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.