

Package: Bare Die, 0.83mmx0.74mm

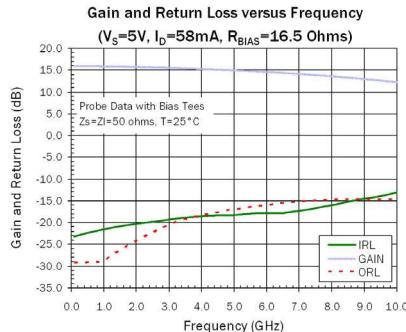
Product Description

RFMD's SUF-8500 is a monolithically matched high IP_3 broadband pHEMT MMIC amplifier. The self biased direct coupled topology provides exceptional cascadable performance from DC-10GHz. Its efficient operation from a single 5V supply and compact size (0.83mmx0.74mm) make it ideal for high density multi-chip module applications. It is well suited for RF, LO, and IF driver applications.

RFMD can provide 100% DC screening, visual inspection, and Hi-Rel wafer qualification. Die can be delivered at the wafer level or picked to gel or waffle paks.

Optimum Technology Matching® Applied

- GaAs HBT
- GaAs MESFET
- InGaP HBT
- SiGe BiCMOS
- Si BiCMOS
- SiGe HBT
- GaAs pHEMT
- Si CMOS
- Si BJT
- GaN HEMT
- InP HBT
- RF MEMS
- LDMOS



Features

- Broadband Performance
- Gain = 15.6dB @ 3GHz
- $P_{1dB} = 15.7$ dBm @ 3GHz
- Low-Noise, Efficient Gain Block
- 5V Single Supply Operation

Applications

- Broadband Communications
- Test Instrumentation
- Military and Space
- LO and IF Mixer Applications
- High IP_3 RF Driver Applications

| Parameter | Specification | | | Unit | Condition |
|------------------------------------|---------------|------|------|------|----------------------|
| | Min. | Typ. | Max. | | |
| Frequency of Operation | DC | | 10.0 | GHz | |
| Small Signal Power Gain, G_p | | 15.6 | | dB | Freq=3GHz |
| | | 14.1 | | dB | Freq=7GHz |
| | | 12.3 | | dB | Freq=10GHz |
| Output Power at 1dB Compression | | 15.7 | | dBm | Freq=3GHz |
| | | 14.5 | | dBm | Freq=7GHz |
| | | 12.9 | | dBm | Freq=10GHz |
| Output Third Order Intercept Point | | 31.2 | | dBm | Freq=3GHz |
| | | 29.0 | | dBm | Freq=7GHz |
| | | 27.9 | | dBm | Freq=10GHz |
| Input Return Loss | | 19.4 | | dB | Freq=3GHz |
| Output Return Loss | | 20.7 | | dB | Freq=3GHz |
| Device Operating Voltage | | 4.0 | | V | |
| Current | | 58 | | mA | |
| Noise Figure, NF | | 3.2 | | dB | Freq=3GHz |
| Thermal Resistance | | 159 | | °C/W | Junction to backside |

Test Conditions: $Z_0 = 50\Omega$, $V_S = 5V$, $I_D = 58mA$, $R_{BIAS} = 16.5\Omega$, $T = 25^\circ C$, $0IP_3$ Tone Spacing = 1MHz with $P_{OUT/TONE} = 0$ dBm.
Probe Data with Bias Tees.

Absolute Maximum Ratings

| Parameter | Rating | Unit |
|--|-------------|------|
| Total Current (I_D) | 90 | mA |
| Device Voltage (V_D) | 4.2 | V |
| Power Dissipation | 0.38 | W |
| RF Input Power | +20 | dBm |
| Storage Temperature Range | -65 to +150 | °C |
| Operating Temperature Range (T_L) | -55 to +150 | °C |
| Operating Junction Temperature (T_J) | +150 | °C |

Operation of this device beyond any one of these limits may cause permanent damage. For reliable continuous operation, the device voltage and current must not exceed the maximum operating values specified in the table on page one.

Bias Conditions should also satisfy the following expression:

$$I_D V_D < (T_J - T_L) / R_{TH}, \text{ J-1 and } T_L = \text{Backside of die}$$



Caution! ESD sensitive device.

Exceeding any one or a combination of the Absolute Maximum Rating conditions may cause permanent damage to the device. Extended application of Absolute Maximum Rating conditions to the device may reduce device reliability. Specified typical performance or functional operation of the device under Absolute Maximum Rating conditions is not implied.

RoHS status based on EU Directive 2002/95/EC (at time of this document revision).

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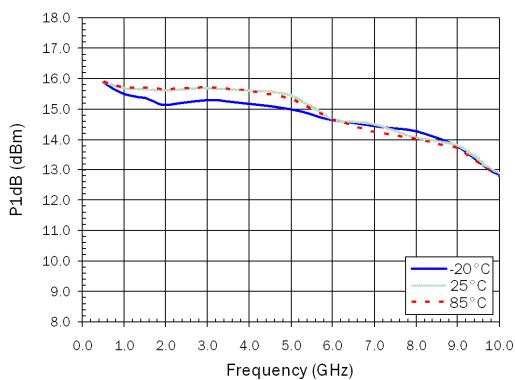
Typical Performance (Probe Data with Bias Tees) $V_S = 5V$, $I_D = 58mA$, $R_{BIAS} = 16.5\Omega$, $T = 25^\circ C$, $Z = 50\Omega$

| Small Signal Gain | dB | 16.0 | 15.9 | 15.6 | 15.0 | 14.1 | 12.3 |
|---|-----|------|------|------|------|------|------|
| Output 3rd Order Intercept Point (see note 1) | dBm | | 31.7 | 31.2 | 29.9 | 29.0 | 27.9 |
| Output Power at 1dB Compression | dBm | | 15.7 | 15.7 | 15.5 | 14.5 | 12.9 |
| Input Return Loss | dB | 23.0 | 21.7 | 19.4 | 18.2 | 16.9 | 12.8 |
| Output Return Loss | dB | 29.0 | 28.8 | 20.7 | 17.1 | 15.1 | 14.4 |
| Reverse Isolation | dB | 21.9 | 21.9 | 21.7 | 21.2 | 20.8 | 20.2 |
| Noise Figure | dB | | 3.3 | 3.2 | 3.2 | 3.1 | 3.5 |

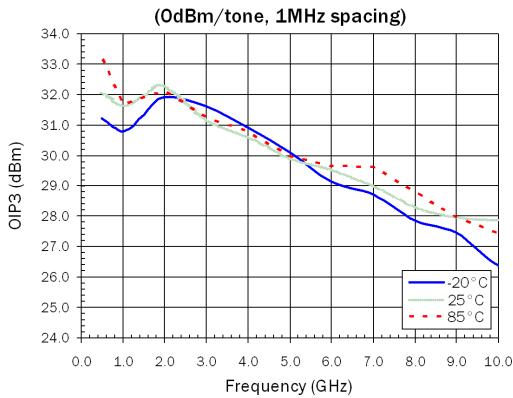
Note 1: 0dBm/tone, 1MHz tone spacing.

Typical Performance (Probe Data with Bias Tees) $V_S=5V$, $I_D=58mA$, $R_{BIAS}=16.5\Omega$

P1dB versus Frequency

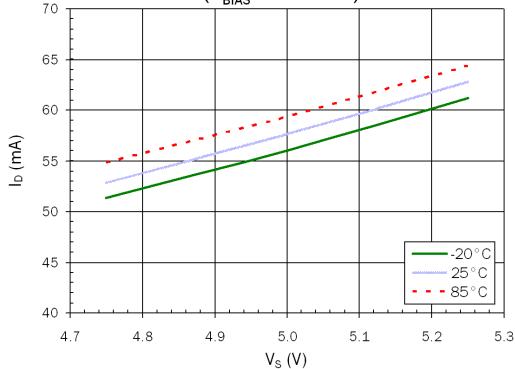


OIP3 versus Frequency

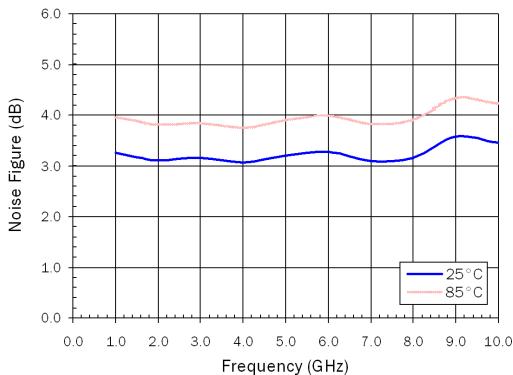


Device Current versus Supply Voltage

($R_{BIAS}=16.5$ Ohm)

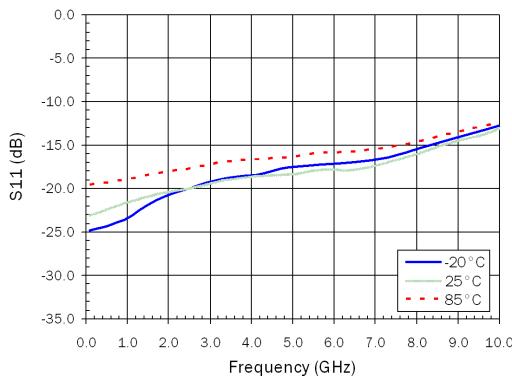


Noise Figure versus Frequency

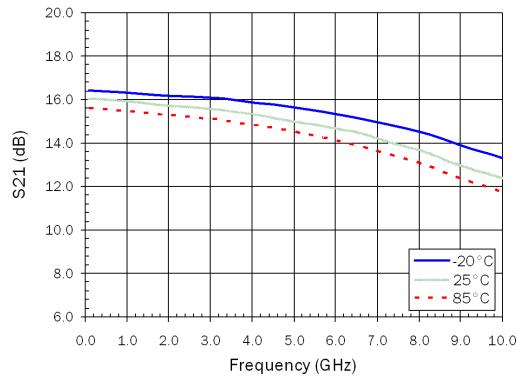


Typical Performance (Probe Data with Bias Tees) $V_S=5V$, $I_D=58mA$, $R_{BIAS}=16.5\Omega$

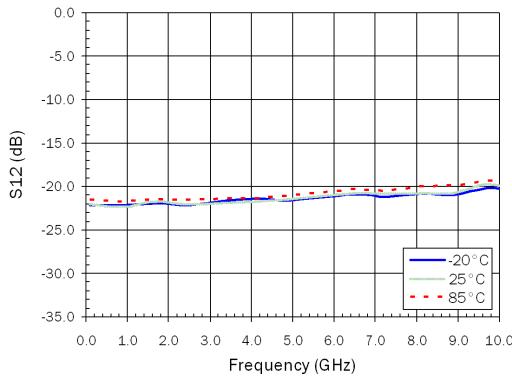
S11 versus Frequency



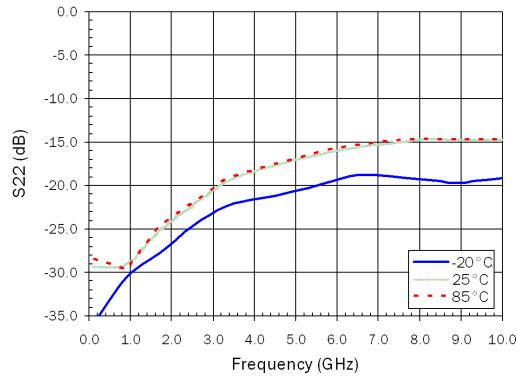
S21 versus Frequency



S12 versus Frequency



S22 versus Frequency



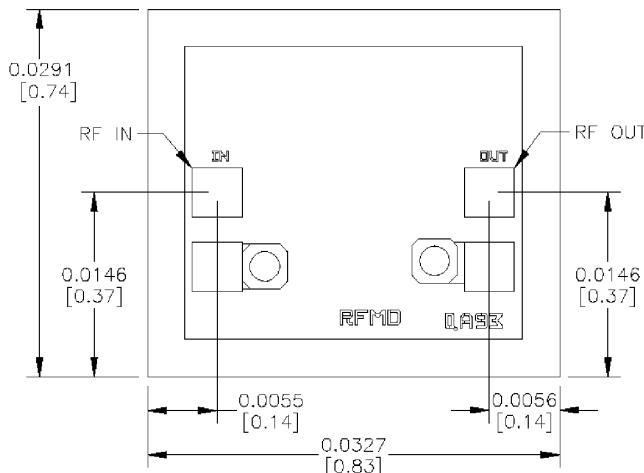
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| Pin | Function | Description |
|-------------------|--------------------|--|
| 1 | RF IN | This pad is DC coupled and matched to 50Ω. An external DC block is required. |
| 2 | RF OUT/BIAS | This pad is DC coupled and matched to 50Ω. DC bias is applied through this pad. |
| Die Bottom | GND | Die bottom must be connected to RF/DC ground using silver-filled conductive epoxy. |

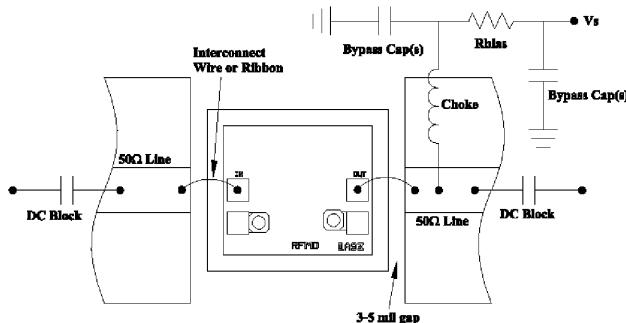
Notes:

1. All dimensions in inches (millimeters).
2. No connection required for unlabeled bond pads.
3. Die thickness is 0.004 (0.10).
4. Typical bond pad is 0.004 (0.10) square.
5. Backside and bond pad metalization is Gold.
6. Backside is ground.

Die Dimensions



Device Assembly



Ordering Information

| Part Number | Description | Devices/Reel |
|-------------|-------------|--------------|
| SUF-8500 | Bare Die | |