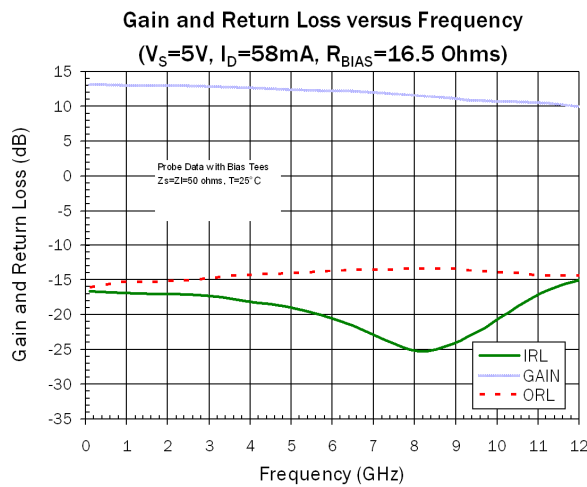


**Product Description**

RFMD’s SUF-8000 is a monolithically matched high IP<sub>3</sub> broadband pHEMT MMIC amplifier. The self biased direct coupled topology provides exceptional cascadable performance from DC to 12GHz. 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 wafer 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 = 12.8dB @ 3GHz
- P<sub>1dB</sub> = 15.5dBm @ 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<sub>3</sub> RF Driver Applications

Parameter	Specification			Unit	Condition
	Min.	Typ.	Max.		
Frequency of Operation	DC		12	GHz	
Small Signal Gain		12.8		dB	Freq=3GHz
		12.3		dB	Freq=6GHz
		10.1		dB	Freq=12GHz
Output Power at 1dB Compression		15.5		dBm	Freq=3GHz
		14.7		dBm	Freq=6GHz
		12.0		dBm	Freq=12GHz
Output Third Order Intercept Point		30.9		dBm	Freq=3GHz
		29.3		dBm	Freq=6GHz
		25.6		dBm	Freq=12GHz
Input Return Loss		17.3		dB	Freq=3GHz
Output Return Loss		14.7		dB	Freq=3GHz
Device Operating Voltage		4.0		V	
Current		58		mA	
Noise Figure		4.1		dB	Freq=3GHz
Thermal Resistance		146		°C/W	Junction to backside

Test Conditions: Z<sub>0</sub>=50Ω, V<sub>S</sub>=5V, I<sub>D</sub>=58mA, R<sub>BIAS</sub>=16.5Ω, T=25°C, OIP<sub>3</sub> Tone Spacing=1MHz with P<sub>OUT</sub> per tone=0dBm. Probe Data with Bias Tees.

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## 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



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 EUDirective2002/95/EC (at time of this document revision).

The information in this publication is believed to be accurate and reliable. However, no responsibility is assumed by RF Micro Devices, Inc. ("RFMD") for its use, nor for any infringement of patents, or other rights of third parties, resulting from its use. No license is granted by implication or otherwise under any patent or patent rights of RFMD. RFMD reserves the right to change component circuitry, recommended application circuitry and specifications at any time without prior notice.

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:

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

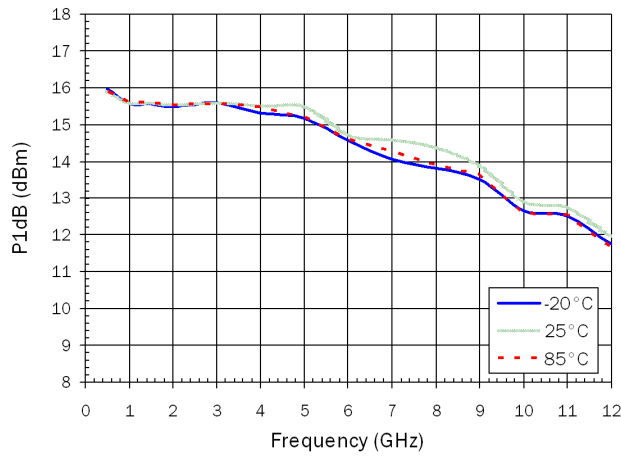
## Typical Performance (Probe Data with Bias Tees) $V_S = 5V$ , $I_D = 58mA$ , $R_{BIAS} = 16.5\Omega$ , $T = 25^\circ C$ , $Z = 50\Omega$

Small Signal Gain	dB	13.2	13.1	12.8	12.3	11.2	10.1
Output 3rd Order Intercept Point (see note 1)	dBm		31.1	30.9	29.3	27.8	25.6
Output Power at 1dB Compression	dBm		15.6	15.5	14.7	13.9	12.0
Input Return Loss	dB	16.5	16.9	17.3	21.0	23.4	14.5
Output Return Loss	dB	16.0	15.4	14.7	13.8	13.6	14.7
Reverse Isolation	dB	20.8	20.1	20.1	19.6	19.4	19.3
Noise Figure	dB		4.3	4.1	4.2	4.5	5.2

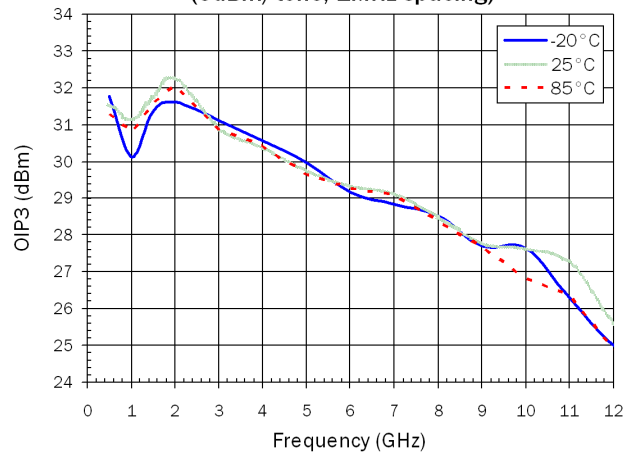
Note 1: 0dBm/tone, 1MHz tone spacing

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

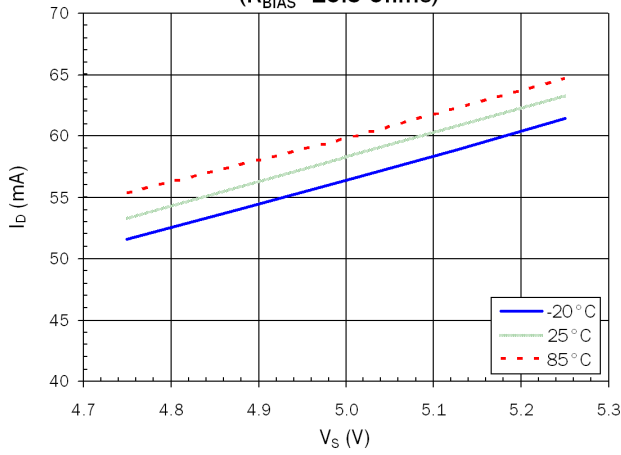
**P1dB versus Frequency**



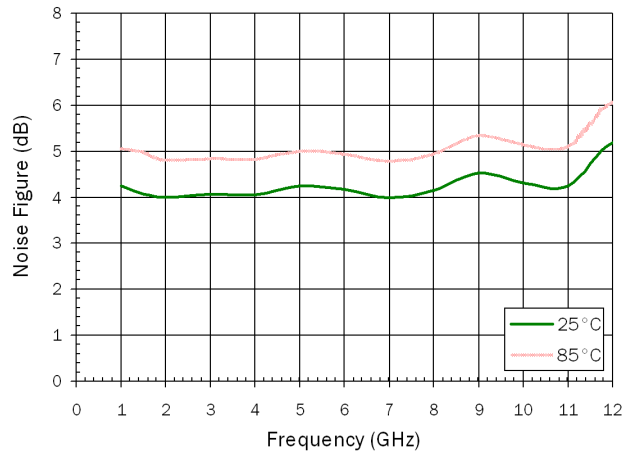
**OIP3 versus Frequency  
(0dBm/tone, 1MHz spacing)**



**Device Current versus Supply Voltage  
( $R_{BIAS}=16.5\text{ Ohms}$ )**

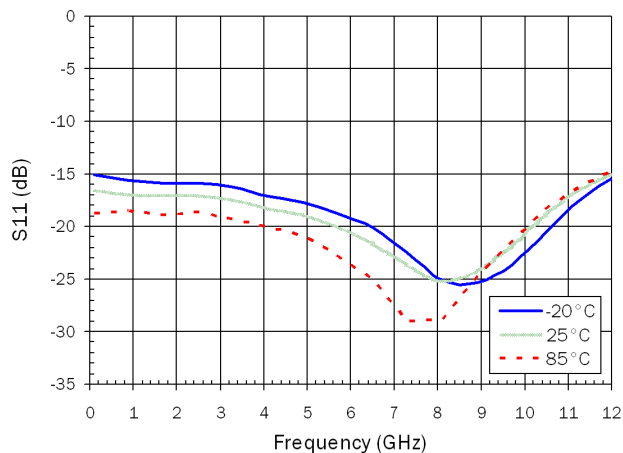


**Noise Figure versus Frequency**

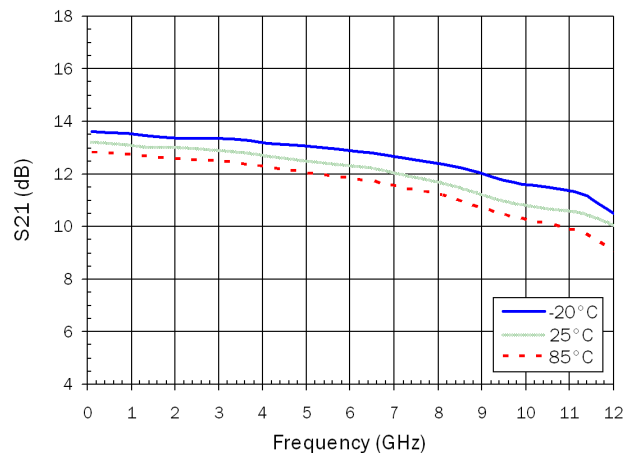


Typical Performance (Probe Data with Bias Tees)  $V_S=5V$ ,  $I_D=58mA$ ,  $R_{BIAS}=16.5\Omega$

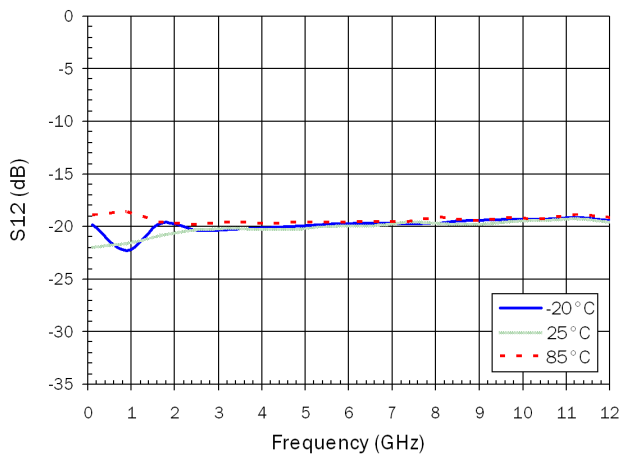
S11 versus Frequency



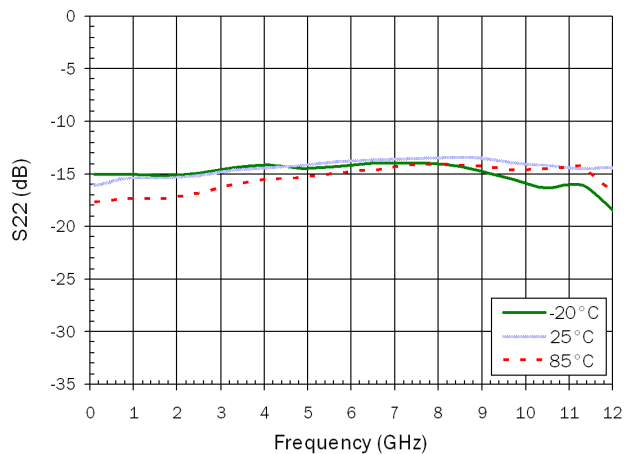
S21 versus Frequency



S12 versus Frequency



S22 versus Frequency

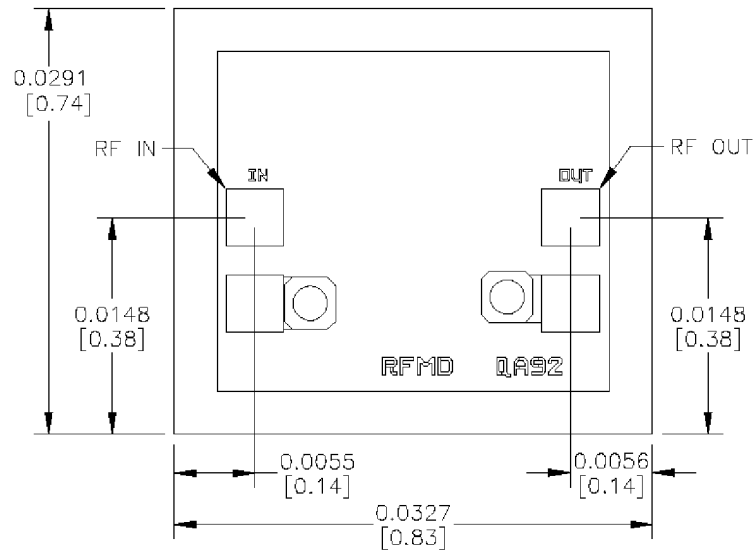


Pin	Function	Description
<b>1</b>	<b>RFIN</b>	This pad is DC coupled and matched to 50Ω. An external DC block is required.
<b>2</b>	<b>RFOUT/BIAS</b>	This pad is DC coupled and matched to 50Ω. Bias is applied through this pad.
<b>Die Bottom</b>	<b>GND</b>	Die bottom must be connected to RF/DC ground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

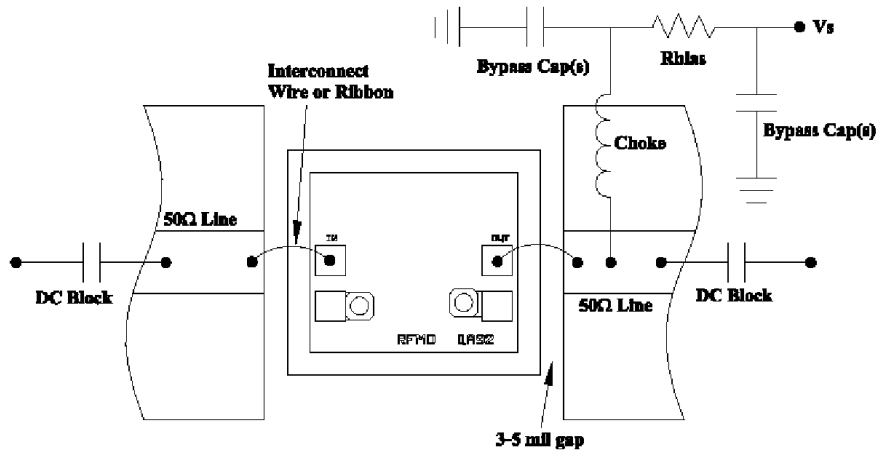
Notes:

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/Container
SUF-8000	Bare Die	