SUF-8500

DC to 10GHz, CASCADABLE pHEMT MMIC AMPLIFIER

RFMD
rfmd.com

Package: Bare Die, 0.83mmx0.74mm

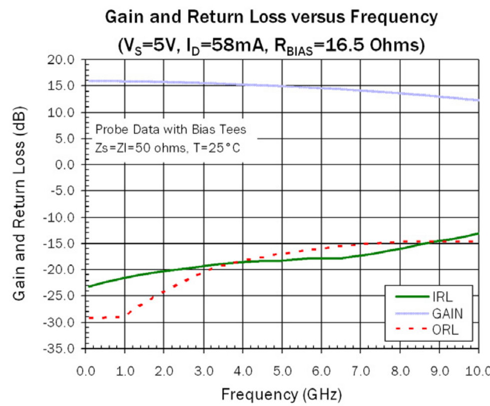
Product Description

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}=15.7dBm @ 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_O=50Ω, V_S=5V, I_D=58mA, R_{BIAS}=16.5Ω, T=25°C, OIP_3 Tone Spacing=1MHz with $P_{OUT/TONE}$=0dBm.
Probe Data with Bias Tees.

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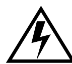
Absolute Maximum Ratings

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

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:
$I_D V_D < (T_J - T_L)/R_{TH}$, j-l and T_L=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}=16.5Ω, T=25°C, Z=50Ω

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.

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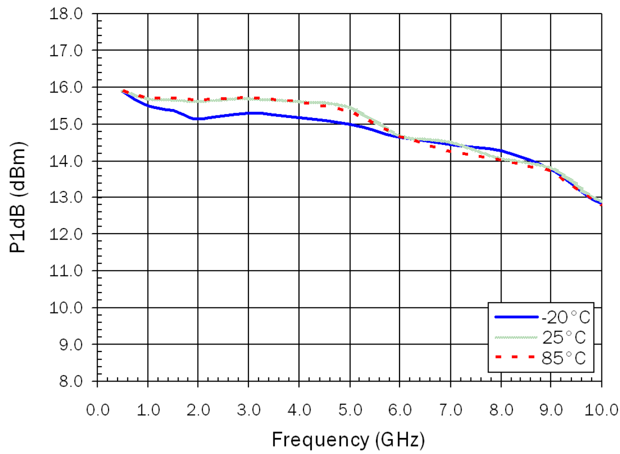
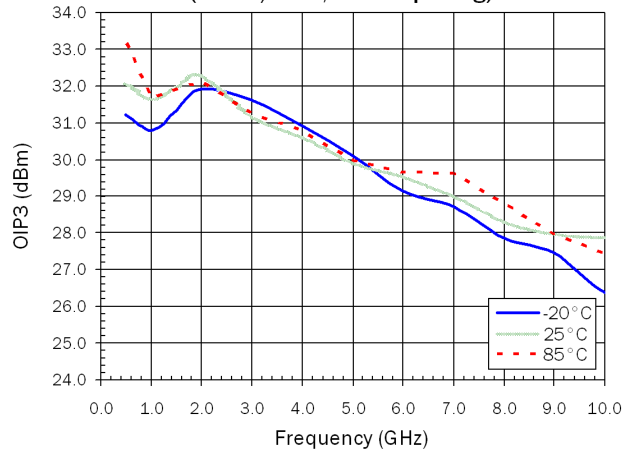
Typical Performance (Probe Data with Bias Tees) V_S=5V, I_D=58mA, R_{BIAS}=16.5Ω

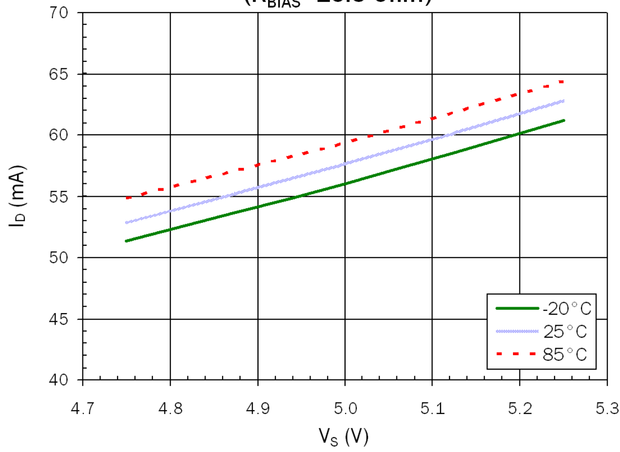
P1dB versus Frequency



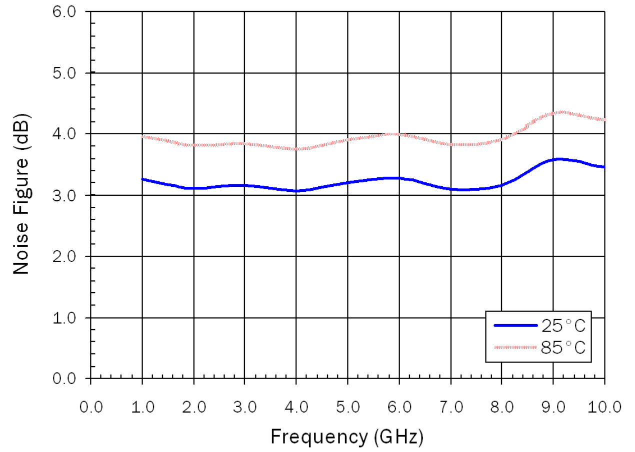
OIP3 versus Frequency
(0dBm/tone, 1MHz spacing)



Device Current versus Supply Voltage
(R_{BIAS}=16.5 Ohm)



Noise Figure versus Frequency



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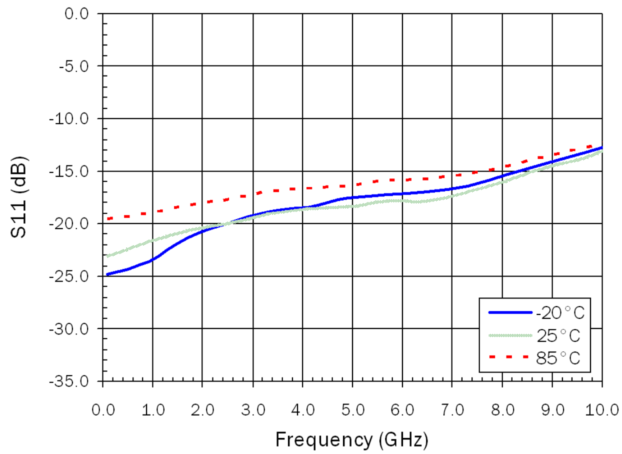
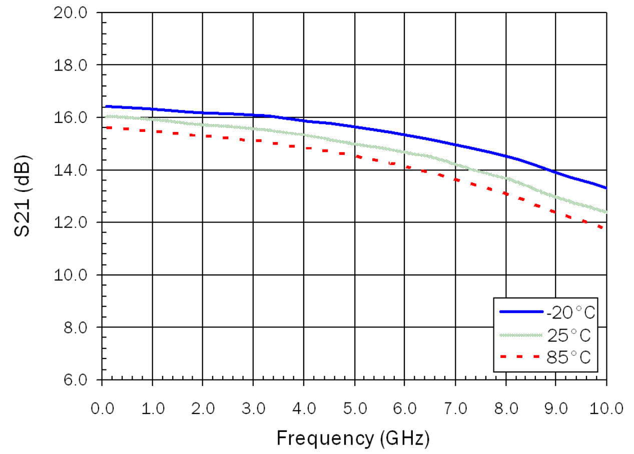
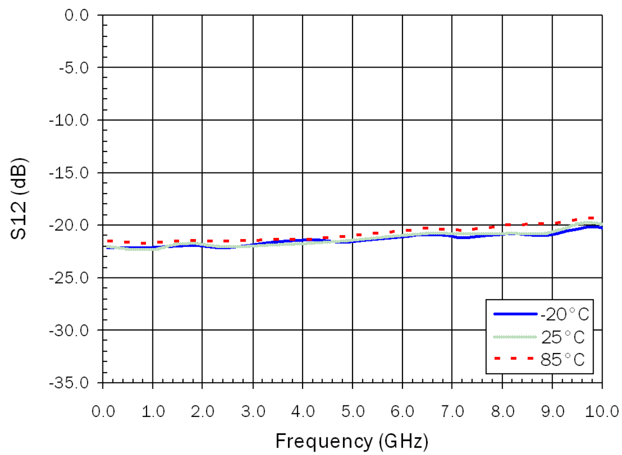
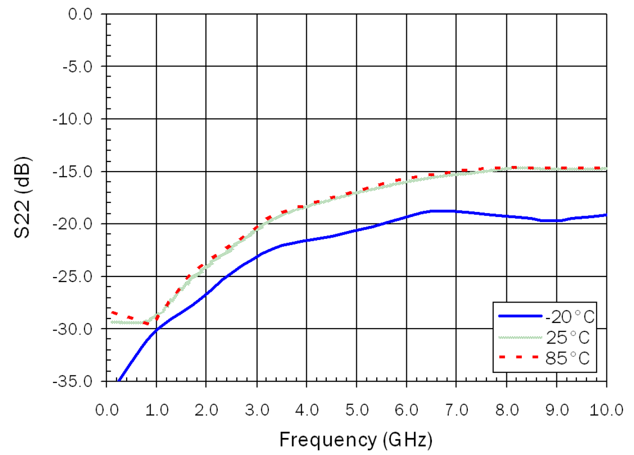
Typical Performance (Probe Data with Bias Tees) V_S=5V, I_D=58mA, R_{BIAS}=16.5Ω









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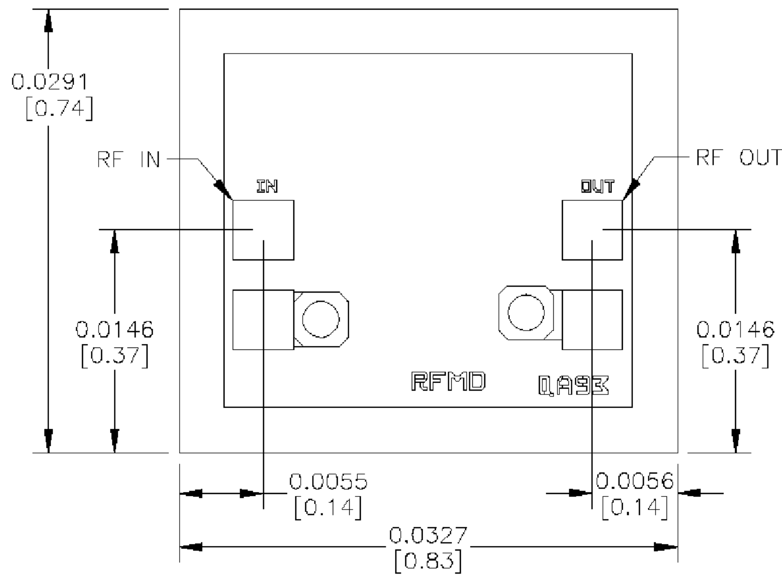
Pin	Function	Description
1	RF IN	This pad is DC coupled and matched to 50Ω. An external DC block is required.
2	RF OUT/BIAS	This pad is DC coupled and matched to 50Ω. DC bias is applied through this pad.
Die Bottom	GND	Die bottom must be connected to RF/DC ground using silver-filled conductive epoxy.

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



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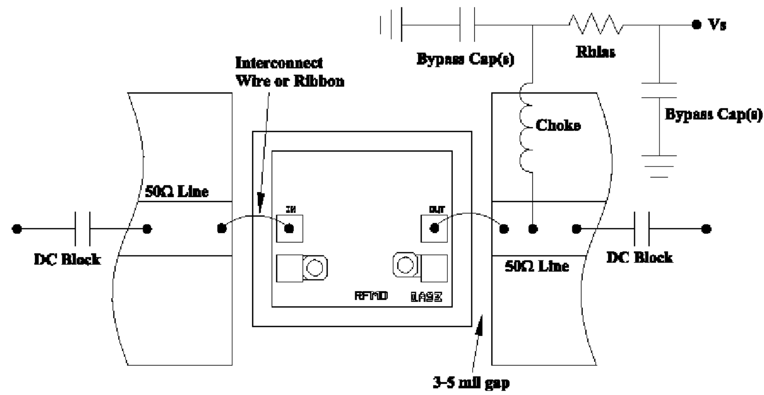
Device Assembly



Ordering Information

Part Number	Description	Devices/Reel
SUF-8500	Bare Die	

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