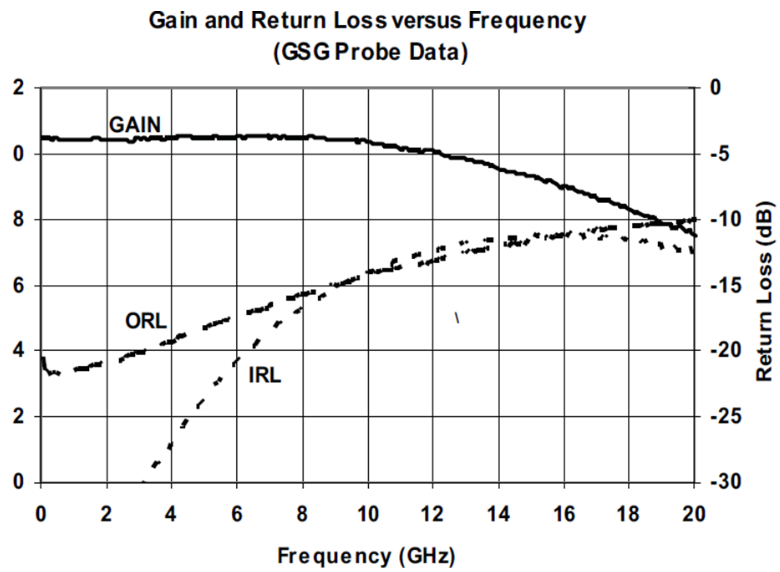
SUF-1000

Cascadable pHEMT MMIC Amplifier
DC to 20GHz

RFMD's SUF-1000 is a monolithically matched high IP_3 broadband pHemt MMIC amplifier. The self-biased direct-coupled topology provides exceptional cascadable performance from DC to 20GHz. Its efficient operation from a single 5V supply and its compact size (0.88mm x 0.75mm) make it ideal for high-density multi-chip module applications. It is well suited for wideband instrumentation and direct-conversion systems.



Package: Die, 0.88mm x 0.75mm

Features

- Broadband Flat Gain = 10dB
- P1dB = 14dBm
- Direct-Coupled Topology
- Efficient Single-Supply Operation: 5V, 45mA
- Low Gain Variation versus Temperature
- Compact Die Size (0.75mm x 0.88m)
- Patented Self-Bias Darlington

Applications

- Ultra-Broadband Communications
- Test Instrumentation
- Military and Space
- LO and IF Mixer Applications
- Replaces Traditional Dual-Supply Distributed Amplifiers

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Absolute Maximum Ratings

Parameter	Rating	Unit
Max Device Current (I_D)	70	mA
Max Device Voltage (V_D)	4	V
Max RF Input Power	20	dBm
Max Dissipated Power	280	mW
Max Junction Temperature (T_J)	150	°C
Operating Temperature Range (T_L)	-40 to +85	°C
Max Storage Temperature	-65 to +150	°C
Human Body Model	Class 1A	

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 below. 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.

RFMD Green: RoHS compliant per EU Directive 2011/65/EU, halogen free per IEC 61249-2-21, <1000ppm each of antimony trioxide in polymeric materials and red phosphorus as a flame retardant, and <2% antimony solder.

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.

Nominal Operating Parameters

Parameter	Specification			Unit	Condition
	Min	Typ	Max		
General Performance					**Test Conditions: V = 5.0V R_{BIAS} = 35Ω, I_D = 46mA, OIP_3 Tone Spacing = 1MHz, P_{OUT} per tone = 0dBmZ_S = Z_L = 50Ω, 25°C, GSG Probe Data with Bias Tees**
Small Signal Gain		10.5		dB	2GHz and 6GHz
		9.0		dB	16GHz
Output Power at 1dB Compression		14.0		dBm	2GHz, 6GHz, and 16GHz
Output Third Order Intercept Point		26.0		dBm	2GHz and 6GHz
		25.5		dBm	16GHz
Noise Figure		4.5		dB	2GHz and 6GHz
		5.0		dB	16GHz
Input Return Loss		-37.0		dB	2GHz
		-20.5		dB	6GHz
		-11.5		dB	16GHz
Output Return Loss		-21.5		dB	2GHz
		-17.5		dB	6GHz
		-11.0		dB	16GHz
Reverse Isolation		-21.0		dB	2GHz
		17.5		dB	6GHz
		-17.0		dB	16GHz
Device Operating Voltage		3.4		V	

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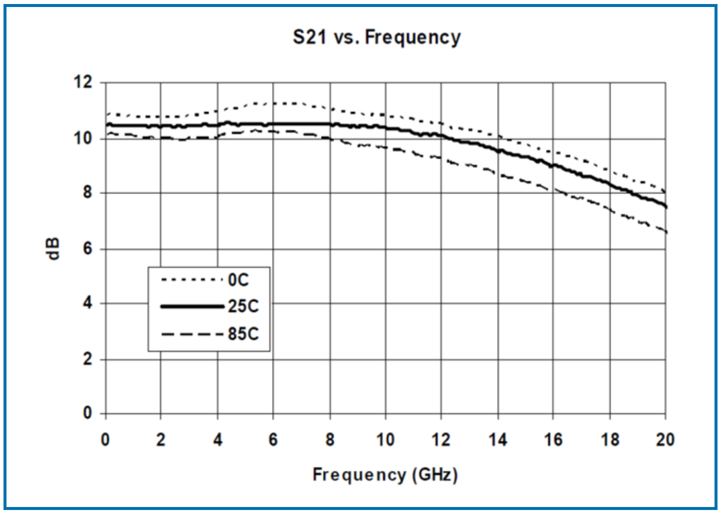
General Performance					**Test Conditions: V = 5.0V R_{BIAS} = 35Ω, I_D = 46mA, OIP3 Tone Spacing = 1MHz, P_{OUT} per tone = 0dBmZ_S = Z_L = 50Ω, 25°C, GSG Probe Data with Bias Tees**
Device Operating Current		46		mA	
Gain Variation vs. Temperature		-0.01		dB/°C	
Thermal Resistance (junction to backside)		262		°C/W	

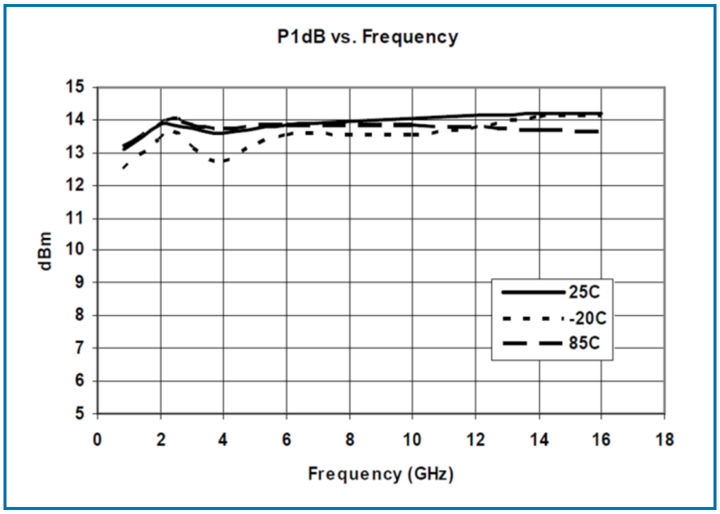
Typical Performance (GSG Probe Data)

Frequency (GHz)	VD (V)	Current (mA)	Gain (dB)	P1dB (dBm)	OIP3 (dBm)	S11 (dB)	S22 (dB)	NF (dB)
0.10	3.4	46.0	10.4			-34.0	-21.0	
0.50	3.4	46.0	10.4			-36.0	-22.0	
0.85	3.4	46.0	10.4	13.0	24.5	-37.0	-22.0	4.4
2.00	3.4	46.0	10.4	14.0	26.0	-34.0	-21.0	4.4
4.00	3.4	46.0	10.5	13.5	26.0	-26.0	-19.0	4.4
6.00	3.4	46.0	10.5	14.0	26.0	-20.0	-17.0	4.6
10.00	3.4	46.0	10.3	14.0	25.0	-14.0	-14.0	4.7
16.00	3.4	46.0	9.0	14.0	25.5	-12.0	-11.0	5.1
20.00	3.4	46.0	7.6			-13.0	-10.0	5.1

Test Conditions: GSG Probe Data With Bias Tees, R_{BIAS} = 35Ω OIP3 Tone Spacing = 1MHz, P_{OUT} per tone = 0dBm, 25°C

Typical Performance





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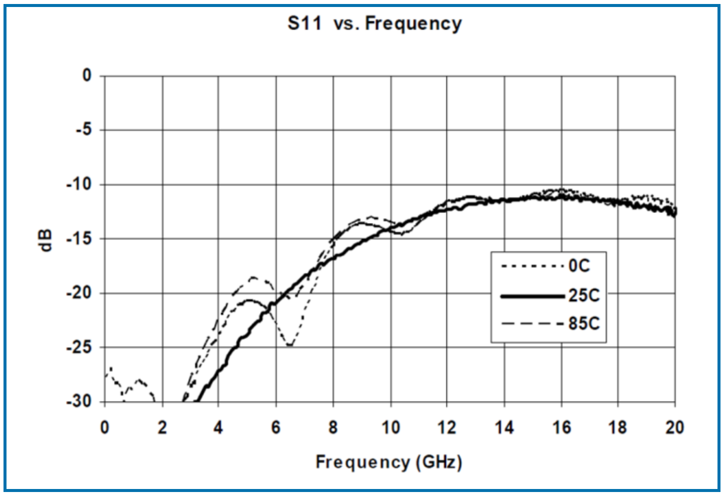
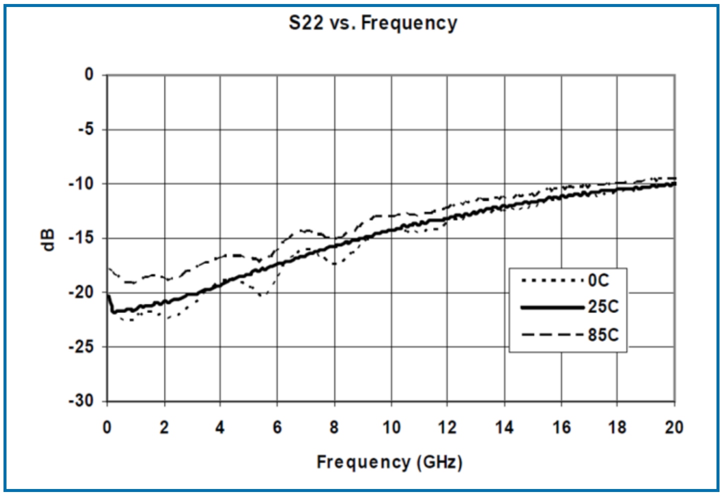
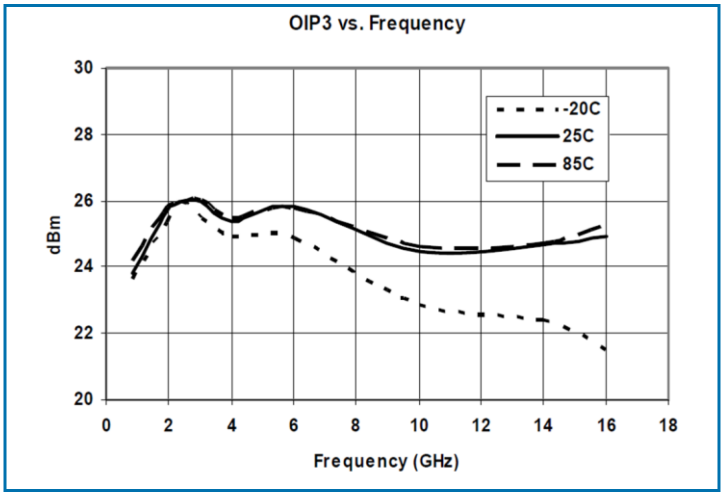
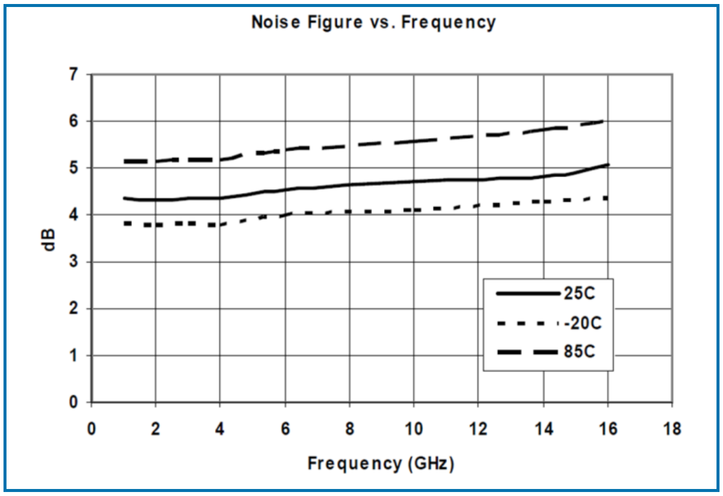
Typical Performance (Continued)

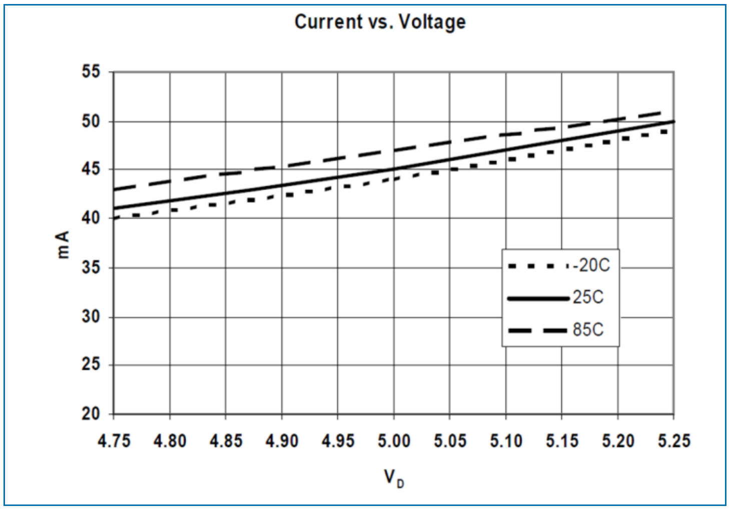








Current Variation Versus Temperature



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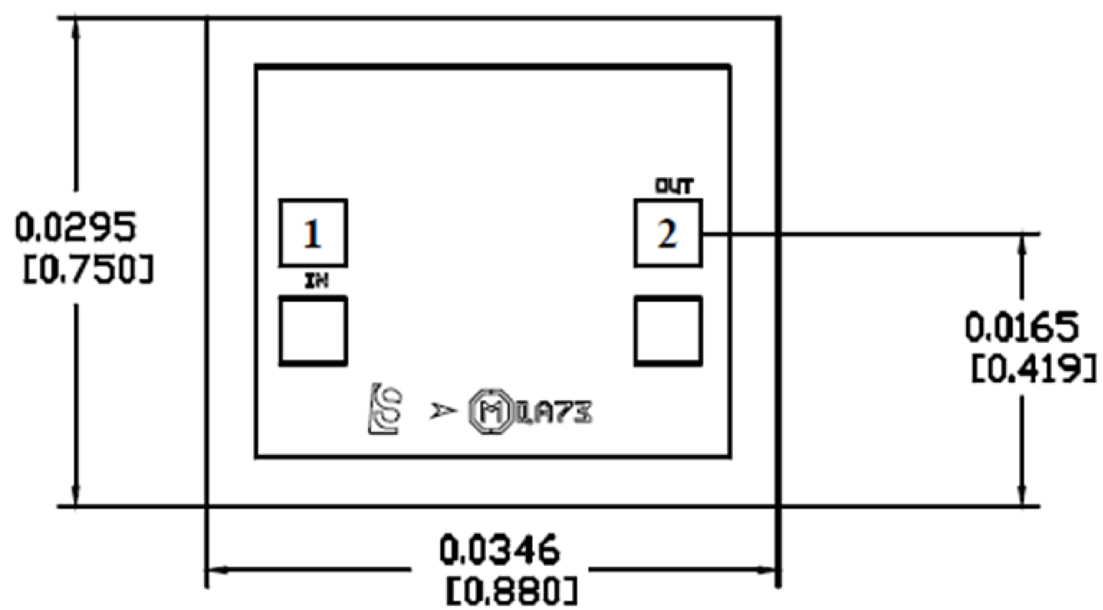
Pad Description (Dimensions in inches [millimeters])



Notes:

1. No connection required for unlabeled bond pads
2. Die thickness is 0.004 [0.10]
3. Typical bond pad is 0.004 [0.10] square
4. Backside metallization: Gold
5. Backside is ground
6. Bond pad metallization: Gold

Pin Names and Descriptions

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

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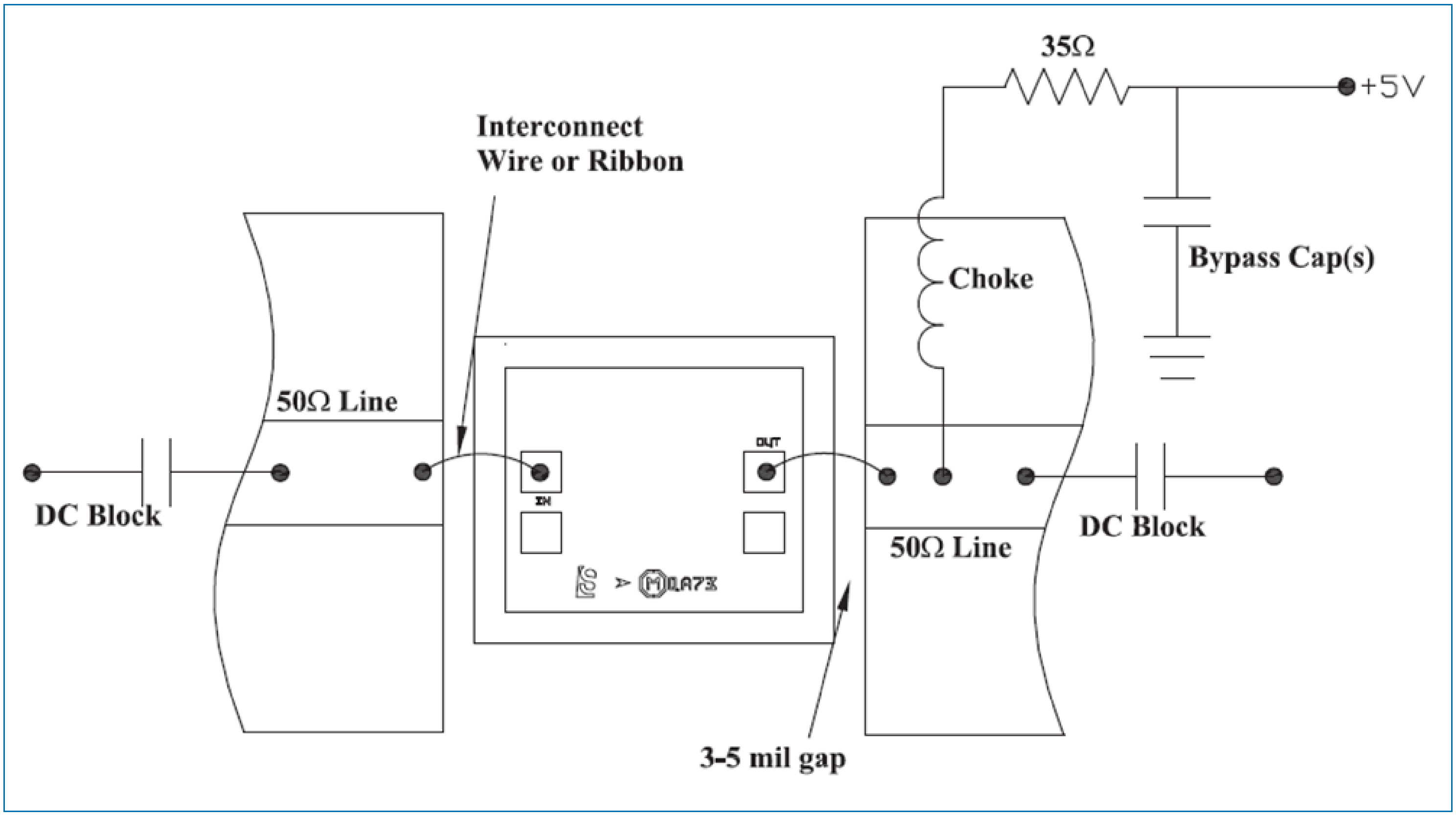
Device Assembly



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