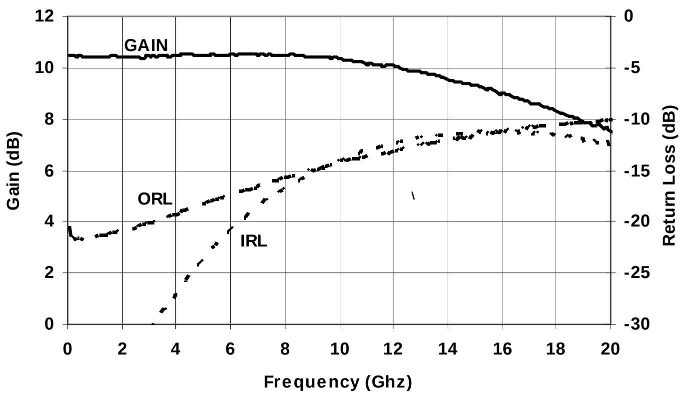
Preliminary

SUF-1000

DC-20 GHz, Cascadable pHEMT MMIC Amplifier

Product Description

Sirenza Microdevices' SUF-1000 is a monolithically matched high IP3 broadband pHEMT MMIC amplifier. The self-biased direct-coupled topology provides exceptional cascadable performance from DC-20 GHz. Its efficient operation from a single 5V supply and its compact size (0.88 x 0.75 mm^2) make it ideal for high-density multi-chip module applications. It is well-suited for wideband instrumentation and direct-conversion systems.



Product Features

- Broadband Flat Gain = 10 dB
- P1dB = 14 dBm
- Direct-coupled topology
- Efficient single-supply operation: 5V, 45mA
- Low Gain Variation vs. Temperature
- Compact die size (0.75 x 0.88 mm^2)
- Patented Self-Bias Darlington

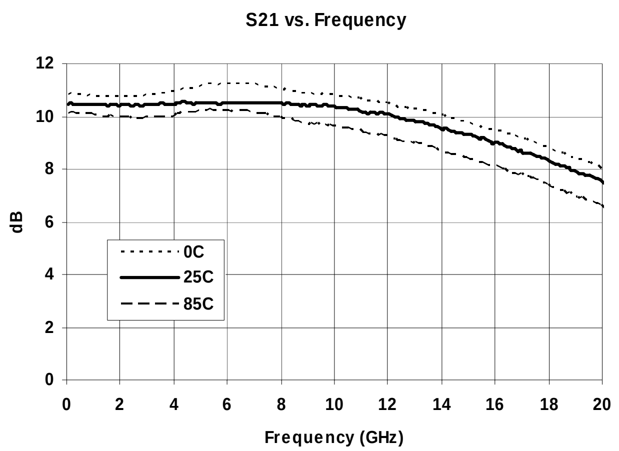
Applications

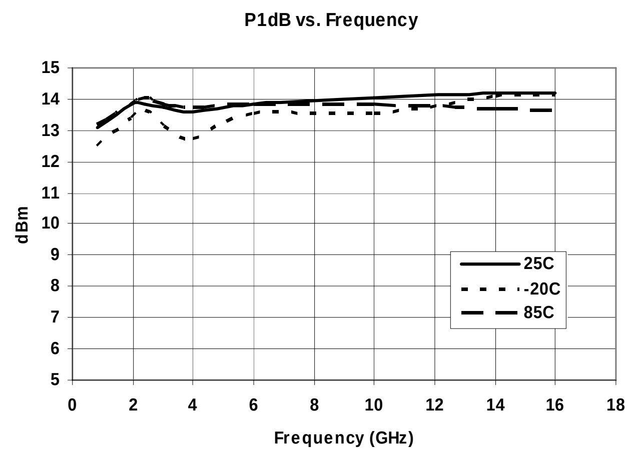
- Ultra-Broadband Communications
- Test Instrumentation
- Military & Space
- LO and IF Mixer Applications
- Replaces traditional dual-supply distributed amplifers

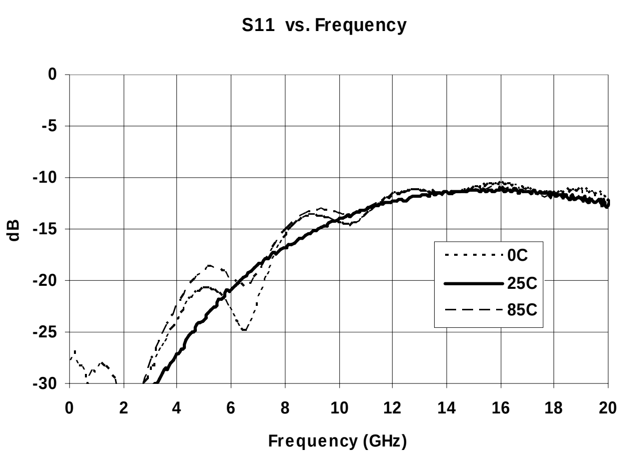
Symbol	Parameters	Units	Frequency	Min.	Typ.	Max.
G_p	Small Signal Power Gain	dB	2 GHz 6 GHz 16 GHz		10.5 10.5 9.0	
P1dB	Output Power at 1dB Compression	dBm	2 GHz 6 GHz 16 GHz		14.0 14.0 14.0	
OIP_3	Output Third Order Intercept Point	dBm	2 GHz 6 GHz 16 GHz		26.0 26.0 25.5	
NF	Noise Figure	dB	2 GHz 6 GHz 16 GHz		4.5 4.5 5.0	
IRL	Input Return Loss	dB	2 GHz 6 GHz 16 GHz		-37.0 -20.5 -11.5	
ORL	Output Return Loss	dB	2 GHz 6 GHz 16 GHz		-21.5 -17.5 -11.0	
Isol	Reverse Isolation	dB	2 GHz 6 GHz 16 GHz		-21.0 -17.5 -17.0	
V_D	Device Operating Voltage	V			3.4	
I_D	Device Operating Current	mA			46	
$\Delta G/\Delta T$	Gain Variation vs.Temperature	dB/°C			-0.01	
Rth, j-l	Thermal Resistance (junction to backside)	°C/W			262	

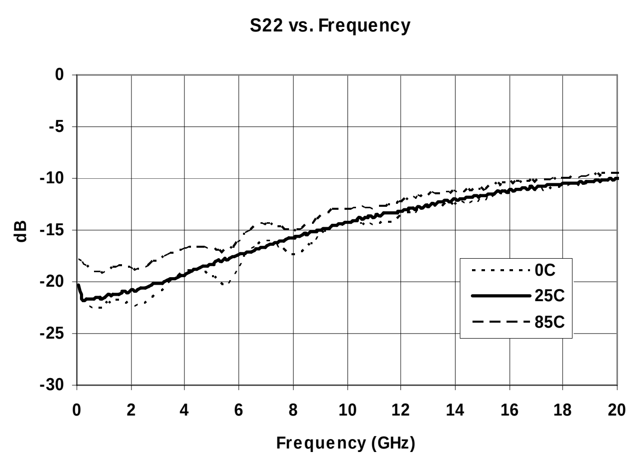
Test Conditions: V = 5.0V, R_{bias}=35 Ohms, I_D = 46mA, OIP3 Tone Spacing = 1MHz, Pout per tone = 0 dBm
$Z_S = Z_L$ = 50 Ohms, 25C, GSG Probe Data With Bias Tees

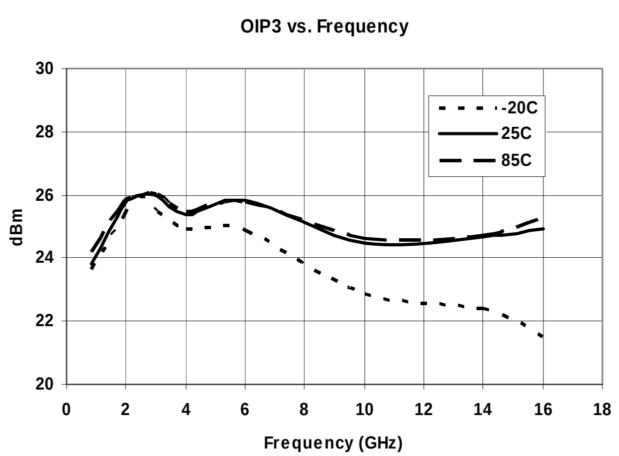
Typical Performance (GSG Probe Data)

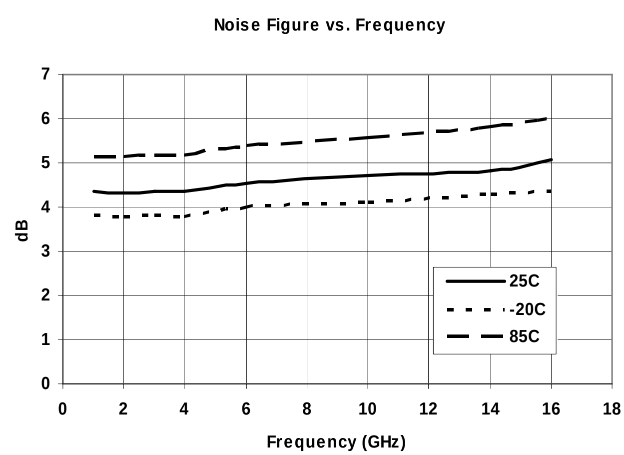












Typical Performance (GSG Probe Data)

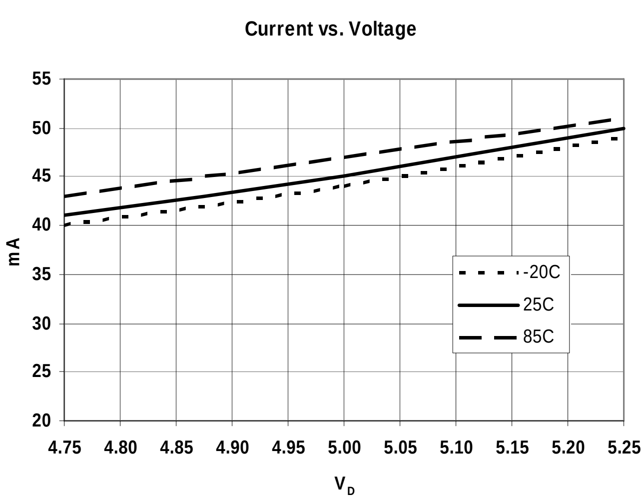
Freq (GHz)	V_D (V)	Current (mA)	Gain (dB)	P_{1dB} (dBm)	OIP_3 (dBm)	S11 (dB)	S22 (dB)	NF (dB)
0.1	3.4	46	10.4			-34.0	-21.0	
0.5	3.4	46	10.4			-36.0	-22.0	
0.85	3.4	46	10.4	13.0	24.5	-37.0	-22.0	4.4
2	3.4	46	10.4	14.0	26.0	-34.0	-21.0	4.4
4	3.4	46	10.5	13.5	26.0	-26.0	-19.0	4.4
6	3.4	46	10.5	14.0	26.0	-20.0	-17.0	4.6
10	3.4	46	10.3	14.0	25.0	-14.0	-14.0	4.7
16	3.4	46	9.0	14.0	25.5	-12.0	-11.0	5.1
20	3.4	46	7.6			-13.0	-10.0	5.1

Test Conditions: GSG Probe Data With Bias Tees, R_{bias} = 35 Ohms OIP_3 Tone Spacing = 1MHz, Pout per tone = 0 dBm, 25°C

Parameter	Absolute Limit
Max Device Current (I_D)	70mA
Max Device Voltage (V_D)	4V
Max RF Input Power	10dBm
Max Dissipated Power	280mW
Max Junction Temperature (T_J)	150C
Operating Temperature Range (T_L)	-40 to +85C
Max Storage Temp.	-65 to +150C

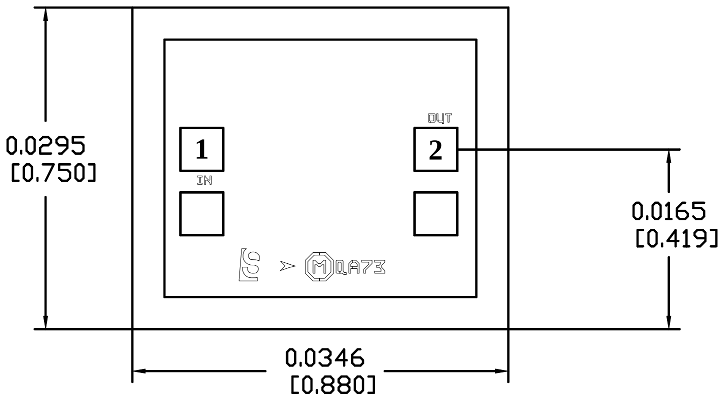
Operation of this device beyond any one of these limits may cause permanent damage. For reliable continuous operation, the device voltage and current must not exceed the maximum operating values specified in the table on page one.
Bias Conditions should also satisfy the following expression:
$I_D V_D < (T_J - T_L) / R_{TH}$, j-l T_L=Backside of die

Current Variation vs. Temperature



ELECTROSTATIC SENSITIVE DEVICE
Appropriate precautions in handling, packaging and testing devices must be observed.

Pad Description



Pad #	Function	Description
1	RF_{IN}	This pad is DC coupled and matched to 50 Ohms. An external DC block is required.
2	RF_{OUT} / Bias	This pad is DC coupled and matched to 50 Ohms. 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 (0.100).
4. Typical bond pad is 0.004 (0.100) square.
5. Backside metalization: Gold.
6. Backside is Ground.
7. Bond pad metalization: Gold.

Device Assembly