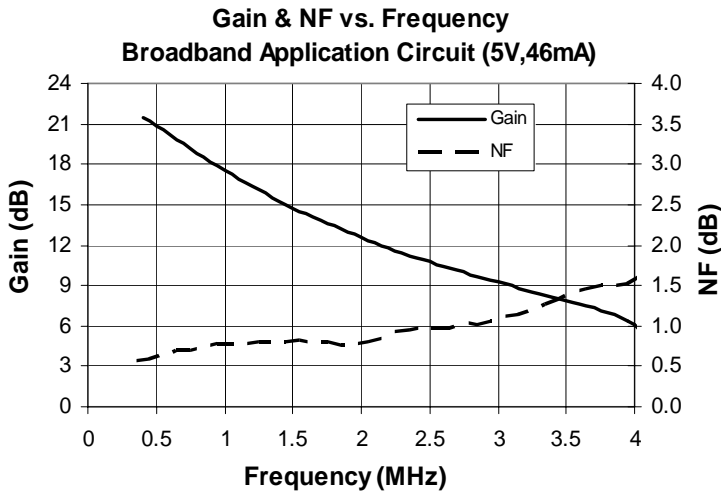




Product Description

The SPF-5043Z is a high performance pHEMT MMIC LNA designed for operation from 100-4000 MHz. The on-chip active bias network provides stable current over temperature and process threshold voltage variations. The SPF-5043Z offers ultra-low noise figure and high linearity performance in a gain block configuration. Its single-supply operation and integrated matching networks make implementation remarkably simple. A high maximum input power specification make it ideal for high dynamic range receivers.



Preliminary Information

SPF-5043Z

100-4000 MHz, GaAs pHEMT Low Noise MMIC Amplifier



Product Features

- Ultra-Low Noise Figure = 0.8 dB @ 900 MHz
- Gain = 18.2 dB @ 900 MHz
- High Linearity: OIP₃ = 35 dBm @ 1900 MHz
- P1dB = 21 dBm @ 1900 MHz
- Single-supply operation: 5V @ Idq=46mA
- Flexible Biasing Options: 3-5V, Adjustable Current
- Broadband Internal Matching

Applications

- Cellular, PCS, W-CDMA, ISM, WiMAX Receivers
- Low noise, high linearity gain block applications

Symbol	Parameters	Units	Frequency	Min.	Typ.	Max.
S ₂₁	Small Signal Power Gain	dB	0.9 GHz		18.2	
			1.9 GHz		12.9	
NF	Noise Figure	dB	0.9 GHz		0.80	
			1.9 GHz		0.80	
OIP ₃	Output Third Order Intercept Point	dBm	0.9 GHz		33.0	
			1.9 GHz		35.0	
P1dB	Output Power at 1dB Compression	dBm	0.9 GHz		20.0	
			1.9 GHz		21.0	
S ₁₁	Input Return Loss	dB	0.9 GHz		-16.0	
			1.9 GHz		-17.5	
S ₂₂	Output Return Loss	dB	0.9 GHz		-17.5	
			1.9 GHz		-16.5	
S ₁₂	Reverse Isolation	dB	0.9 GHz		-23.5	
			1.9 GHz		-19.0	
V _D	Device Operating Voltage	V			5.0	
I _{DQ}	Device Operating Current (Quiescent)	mA			46	
R _{th, j-l}	Thermal Resistance (junction-to-lead)	°C/W			125	

Test Conditions: V_D = 5.0V, I_{DQ} = 46mA, OIP₃ Tone Spacing = 1MHz, P_{out} per tone = 0 dBm
Z_s = Z_L = 50 Ohms, 25C, Broadband Application Circuit

The information provided herein is believed to be reliable at press time. Sirenza Microdevices assumes no responsibility for inaccuracies or omissions. Sirenza Microdevices assumes no responsibility for the use of this information, and all such information shall be entirely at the user's own risk. Prices and specifications are subject to change without notice. No patent rights or licenses to any of the circuits described herein are implied or granted to any third party. Sirenza Microdevices does not authorize or warrant any Sirenza Microdevices product for use in life-support devices and/or systems. Copyright 2007 Sirenza Microdevices, Inc.. All worldwide rights reserved.

Typical RF Performance - Broadband Application Circuit with $V_D = 5V$, $I_D = 46mA$

Symbol	Parameter	Unit	Frequency (GHz)								
			0.1*	0.4	0.9	1.5	1.9	2.2	2.5	3.5	3.8
S_{21}	Small Signal gain	dB	23.5	21.6	18.2	14.8	13.1	11.9	10.8	8.0	7.0
NF	Noise Figure	dB	0.65	0.61	0.74	0.82	0.78	0.84	0.96	1.34	1.49
OIP ₃	Output IP3	dBm	30.5	31.0	33.0	34.5	35.0	35.5	36.5	38.5	37.5
P1dB	Output P1dB	dBm	18.5	18.9	19.9	20.7	21.0	21.4	21.7	22.3	22.0
S_{11}	Input Return Loss	dB	-13.0	-12.5	-15.5	-18.0	-17.5	-17.0	-16.0	-11.5	-10.5
S_{22}	Output Return Loss	dB	-22.0	-17.5	-20.0	-18.0	-17.0	-17.0	-16.5	-16.0	-13.5
S_{12}	Reverse Isolation	dB	-27.0	-26.0	-23.5	-20.5	-19.0	-18.0	-17.5	-15.0	-15.0

Test Conditions: $V_D=5.0V$ $I_{DQ}=46mA$ OIP₃ Tone Spacing = 1MHz Pout per tone = 0dBm $T_L = 25^\circ C$ $Z_S = Z_L = 50\Omega$ * Bias Tee Data @ 100MHz

Typical RF Performance - Broadband Application Circuit with $V_D = 3V$, $I_D = 25mA$

Symbol	Parameter	Unit	Frequency (GHz)								
			0.1*	0.4	0.9	1.5	1.9	2.2	2.5	3.5	3.8
S_{21}	Small Signal gain	dB	22.6	20.9	17.7	14.4	12.7	11.5	10.5	7.6	6.7
NF	Noise Figure	dB	0.60	0.61	0.73	0.82	0.78	0.85	0.93	1.28	1.48
OIP ₃	Output IP3	dBm	26.5	27.0	28.5	30.0	30.5	30.5	32.0	33.5	33.0
P1dB	Output P1dB	dBm	12.5	16.3	17.5	18.4	19.0	19.3	19.0	19.2	19.2
S_{11}	Input Return Loss	dB	-10.5	-11.0	-14.0	-16.5	-16.5	-16.0	-14.5	-10.5	-9.5
S_{22}	Output Return Loss	dB	-21.0	-21.5	-28.5	-24.5	-22.5	-22.5	-22.5	-20.0	-15.5
S_{12}	Reverse Isolation	dB	-26.0	-25.5	-22.5	-20.0	-18.0	-17.5	-16.5	-14.5	-14.0

Test Conditions: $V_D=3.0V$ $I_{DQ}=25mA$ OIP₃ Tone Spacing = 1MHz Pout per tone = 0dBm $T_L = 25^\circ C$ $Z_S = Z_L = 50\Omega$ * Bias Tee Data @ 100MHz

Reliability & Qualification Information	
Parameter	Rating
ESD Rating - Human Body Model (HBM)	Class 1A
Moisture Sensitivity (MSL)	MSL 1

This product qualification report can be downloaded at: www.sirenza.com

Absolute Maximum Ratings	
Parameter	Absolute Limit
Max Device Current (I_D)	60mA
Max Device Voltage (V_D)	5.5V
Max RF Input Power	25dBm
Max Dissipated Power	330mW
Max Junction Temperature (T_J)	150C
Operating Temperature Range (T_L)	-40 to +85C
Max Storage Temp.	-65 to +150C

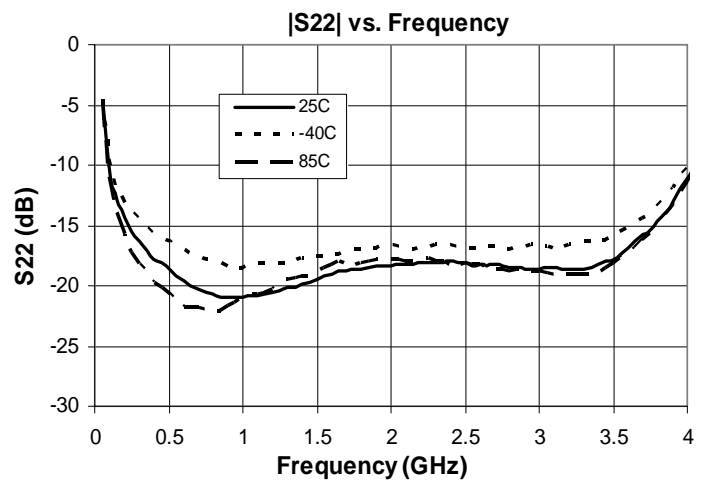
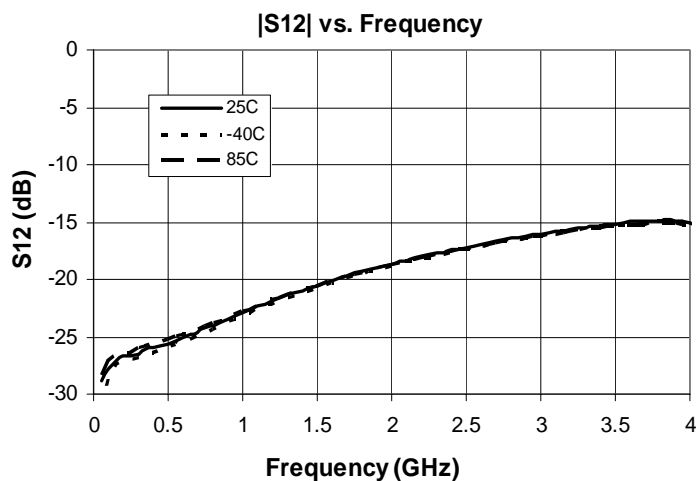
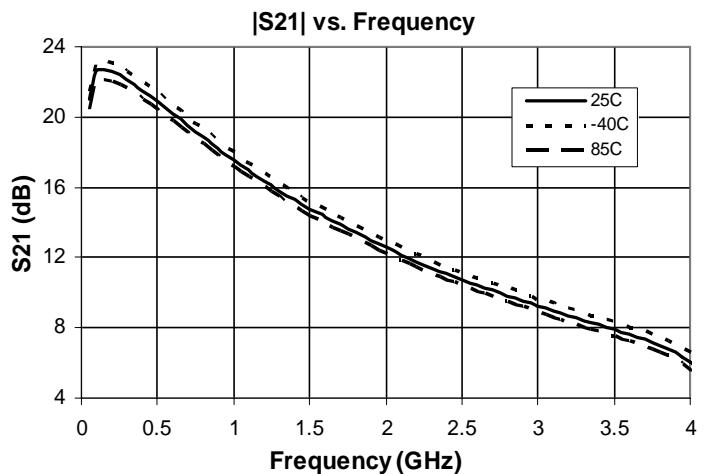
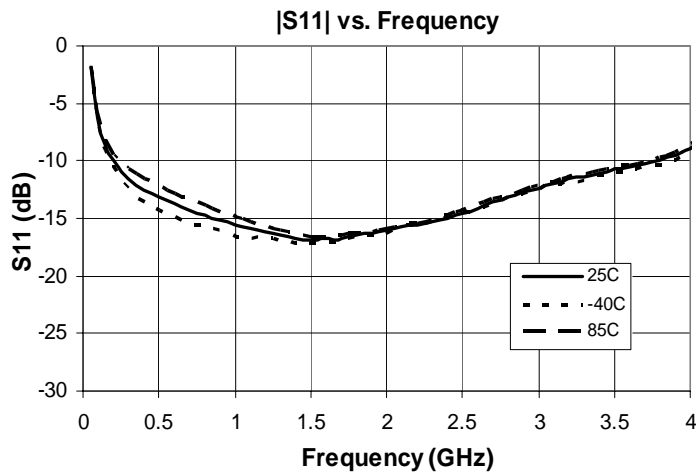
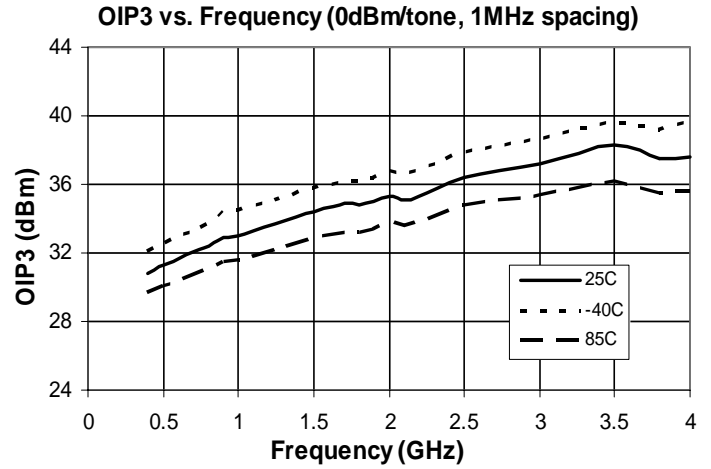
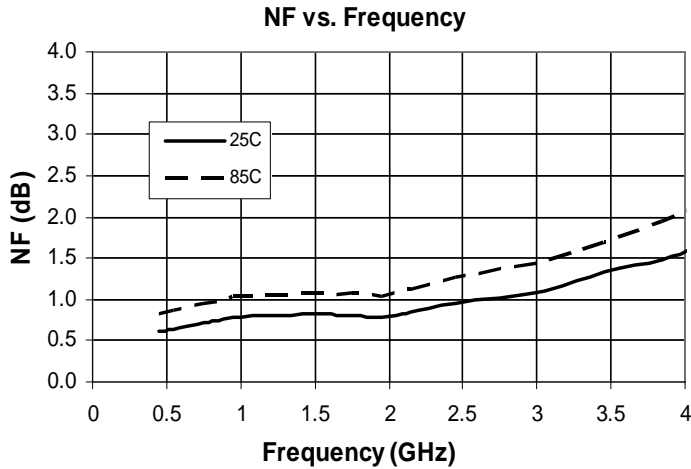


Caution: ESD sensitive
Appropriate precautions in handling, packaging and testing devices must be observed.

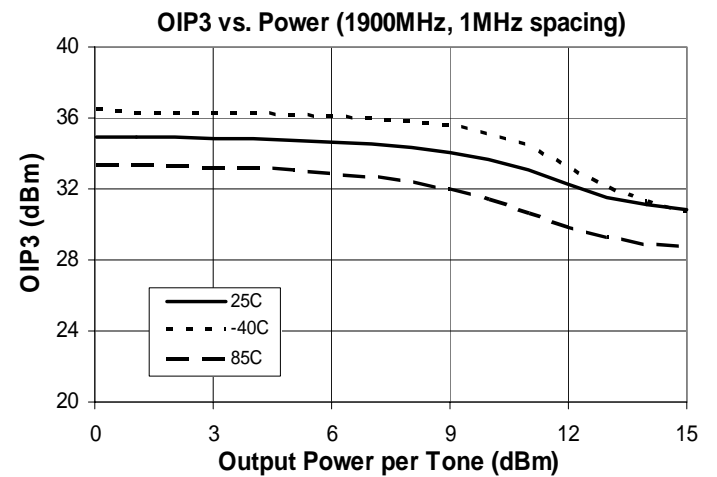
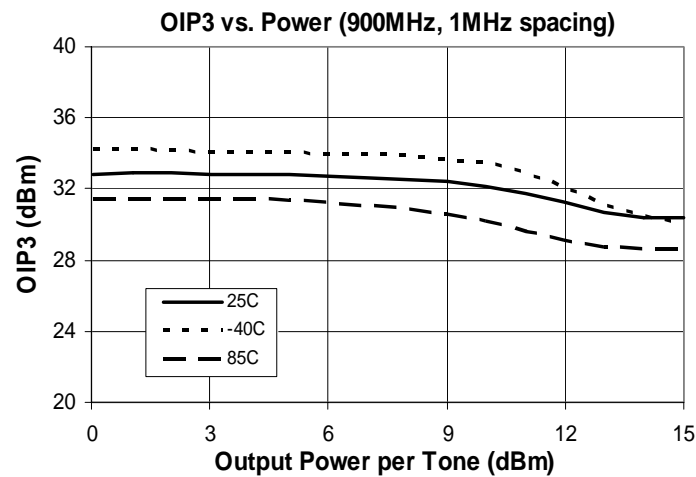
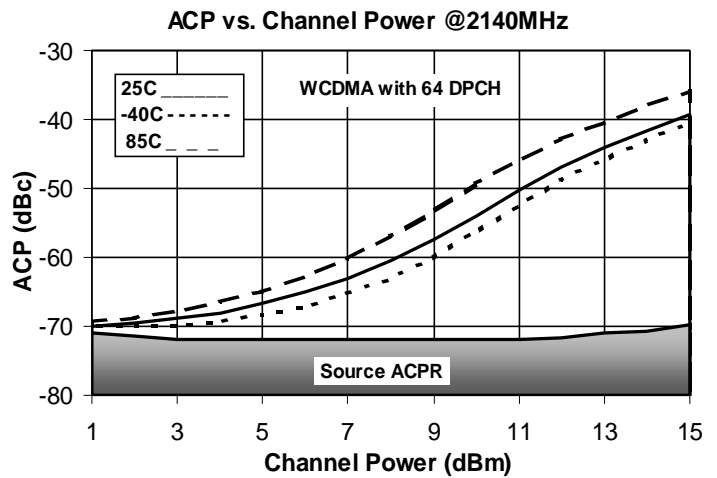
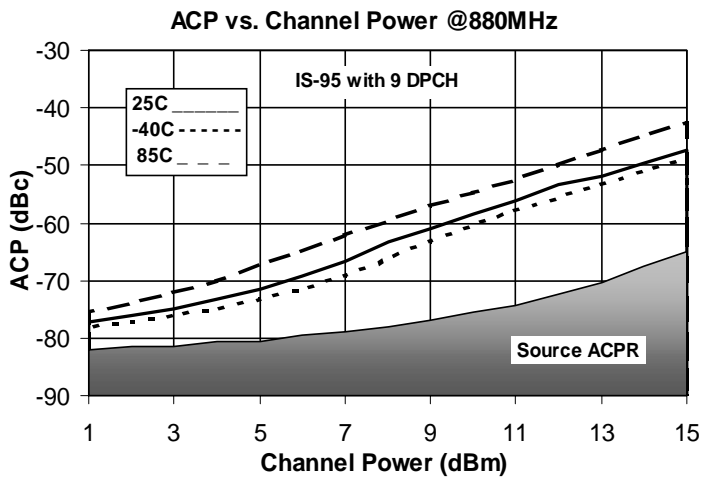
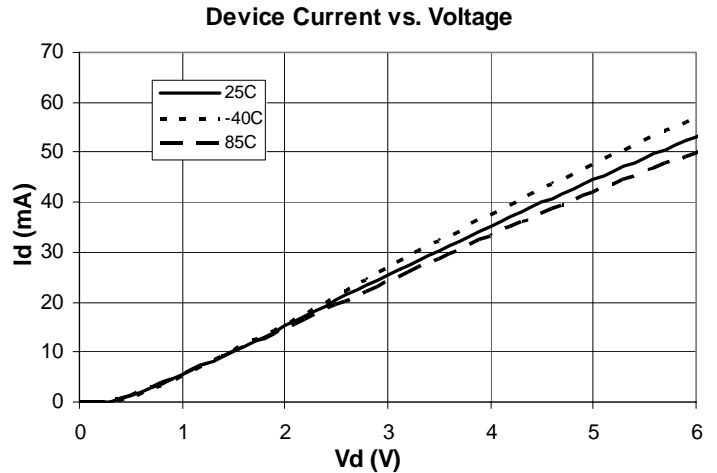
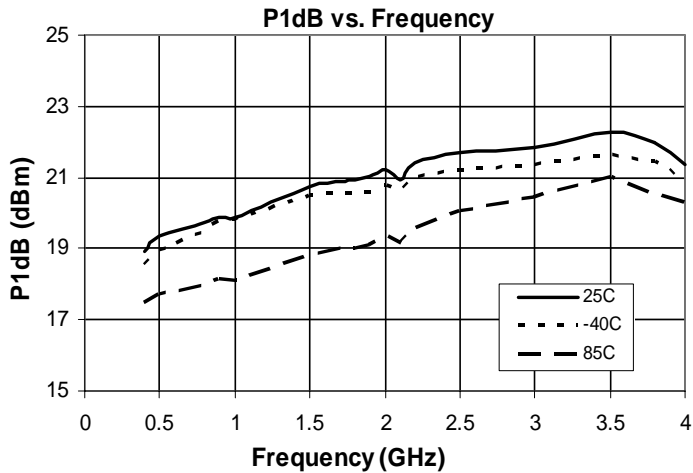
Operation of this device beyond any one of these limits may cause permanent damage. For reliable continuous operation, the device voltage and current must not exceed the maximum operating values specified in the table on page one.

Bias Conditions should also satisfy the following expression:
 $I_D V_D < (T_J - T_L) / R_{TH, j-l}$ $T_L = \text{Source lead Temperature}$

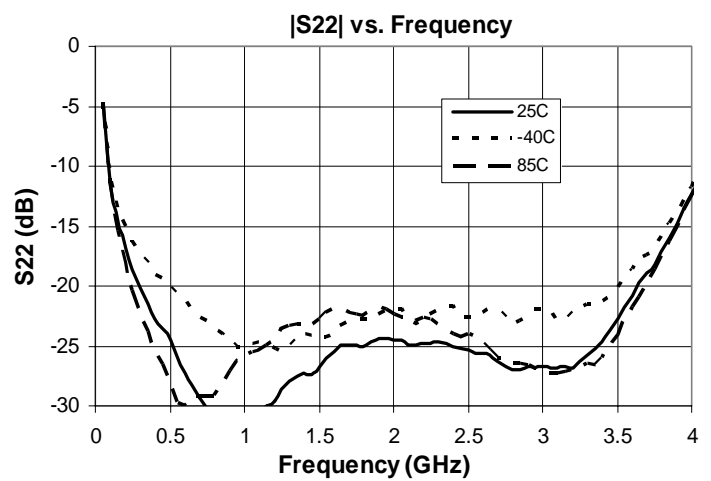
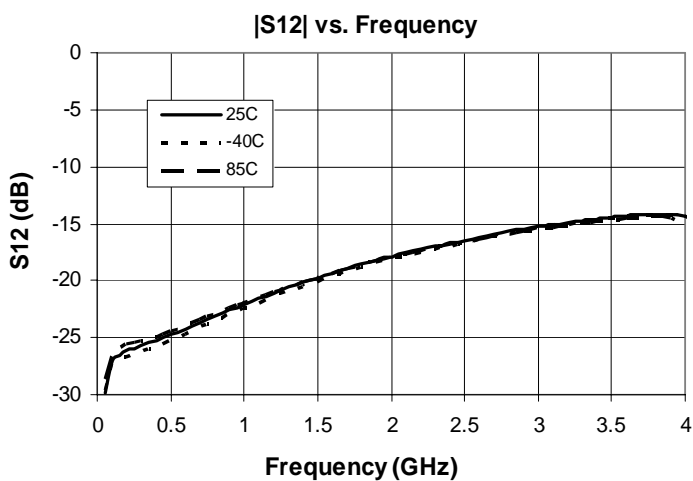
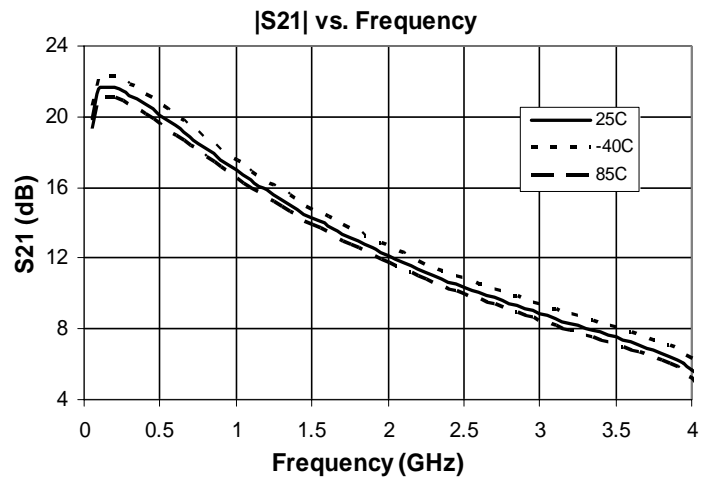
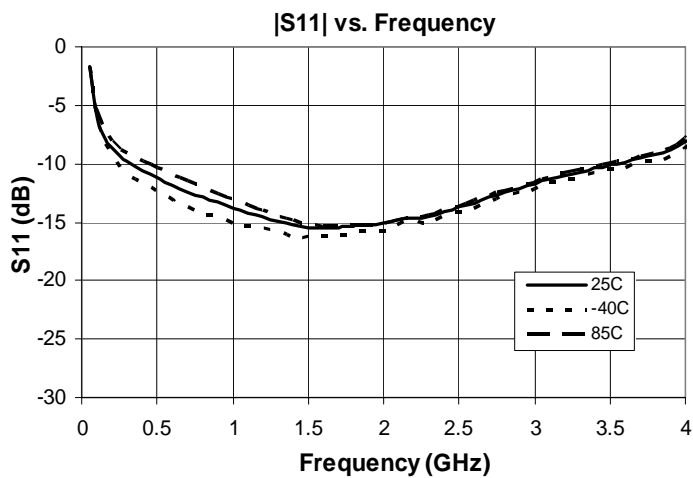
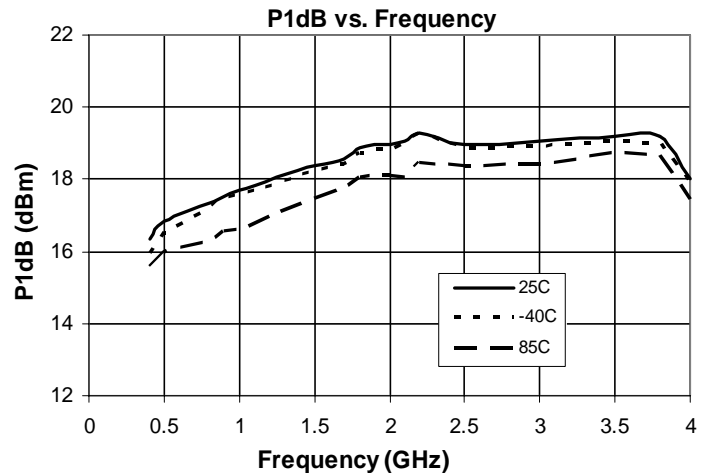
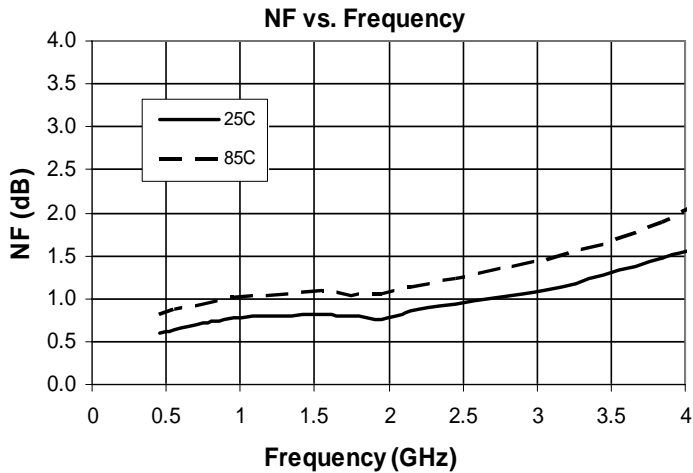
Typical RF Performance - Broadband Application Circuit with $V_D = 5V$, $I_D = 46mA$



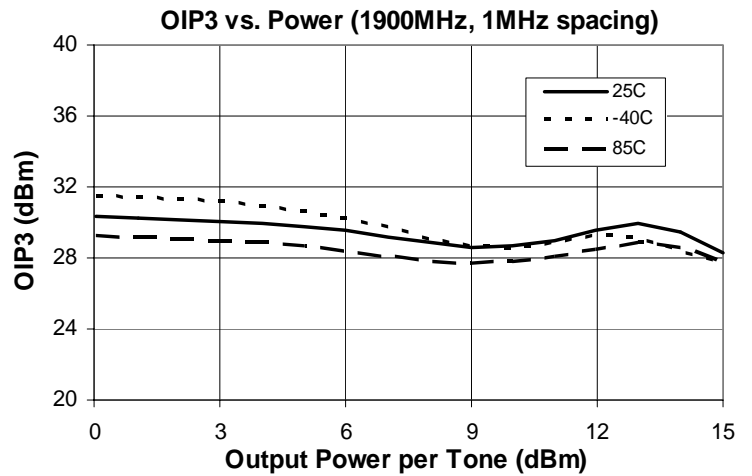
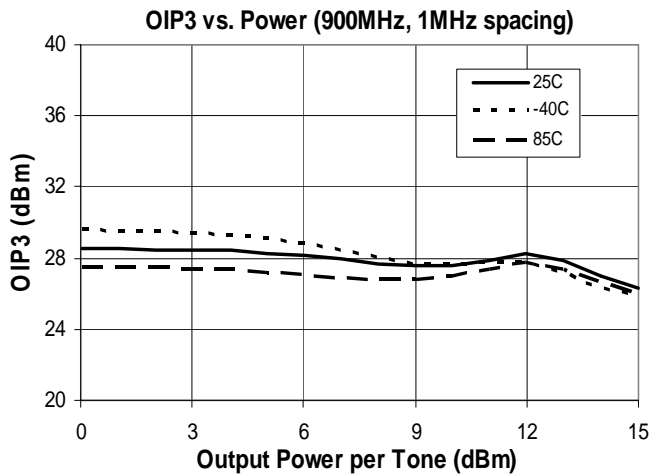
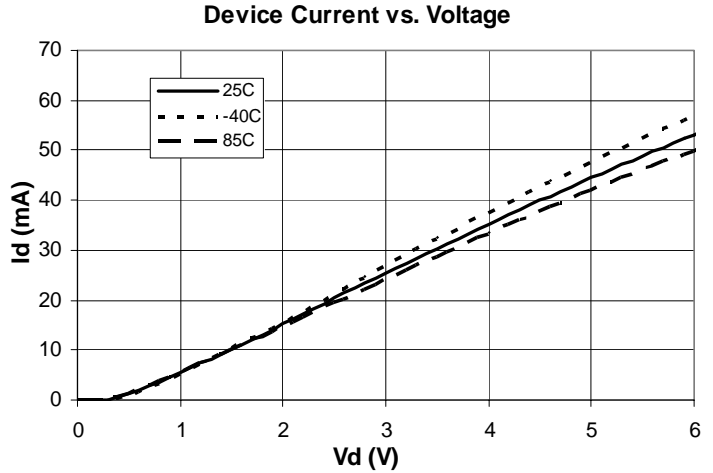
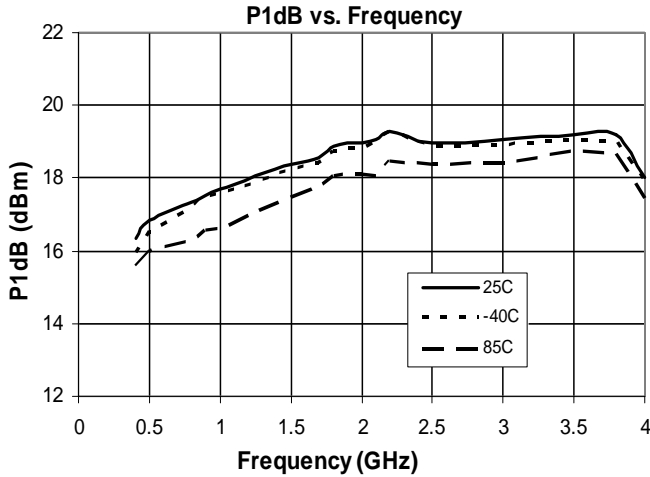
Typical RF Performance - Broadband Application Circuit with $V_D = 5V$, $I_D = 46mA$



Typical RF Performance - Broadband Application Circuit with $V_D = 3V$, $I_D = 25mA$

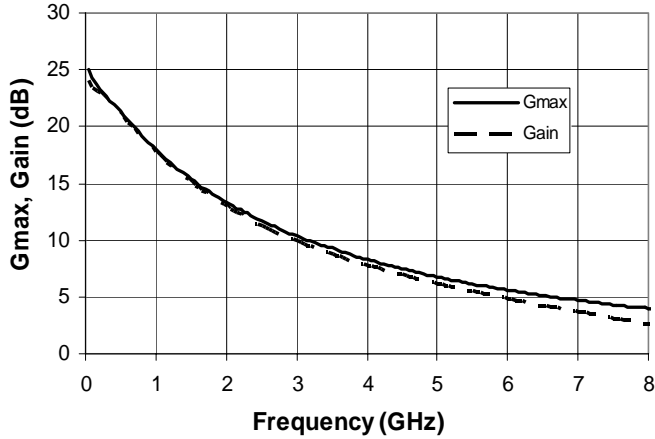


Typical RF Performance - Broadband Application Circuit with $V_D = 3V$, $I_D = 25mA$

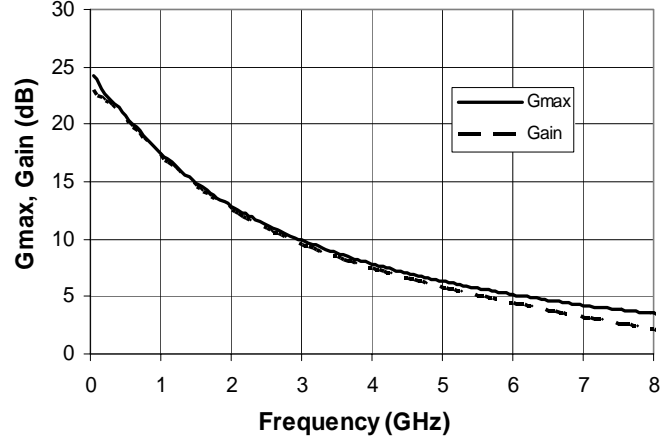


De-embedded Device S-parameters (Bias Tee Data)

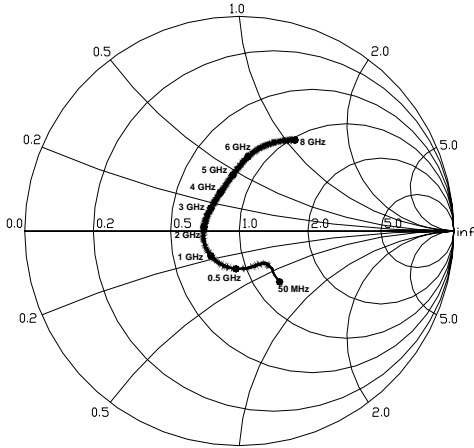
Gmax vs. Frequency (5V,46mA)



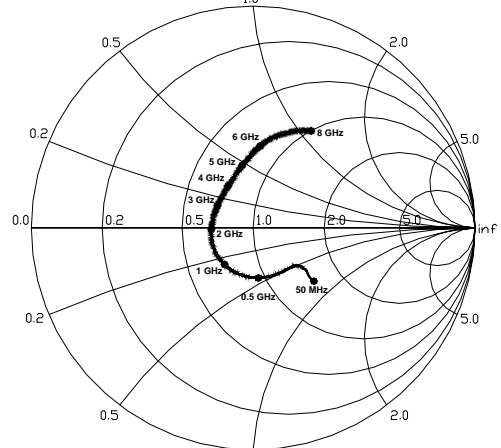
Gmax vs. Frequency (3V,25mA)



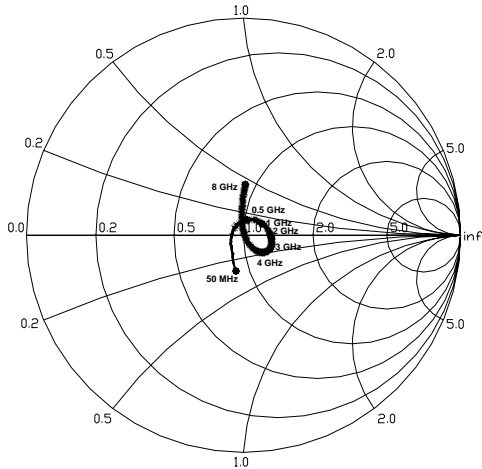
S11 vs. Frequency (5V 46mA)



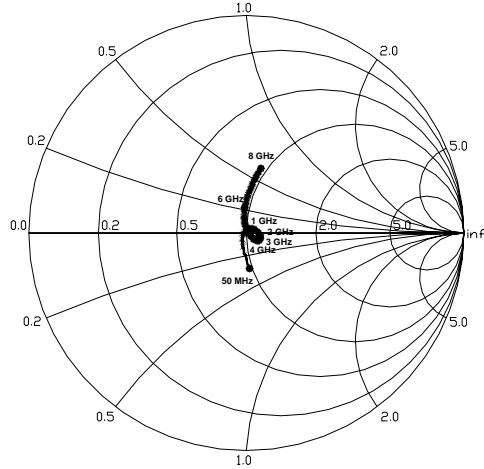
S11 vs. Frequency (3V 25mA)



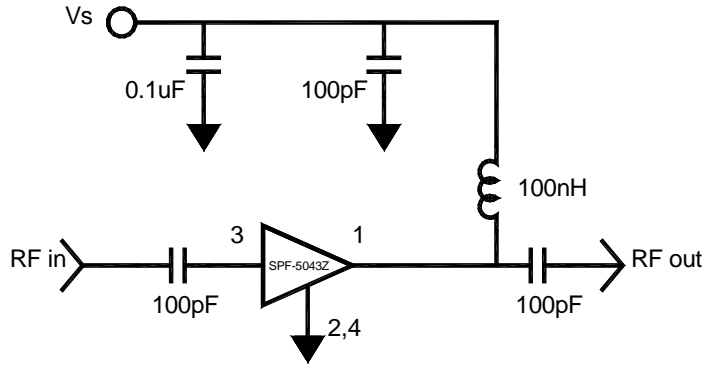
S22 vs. Frequency (5V 46mA)



S22 vs. Frequency (3V 25mA)



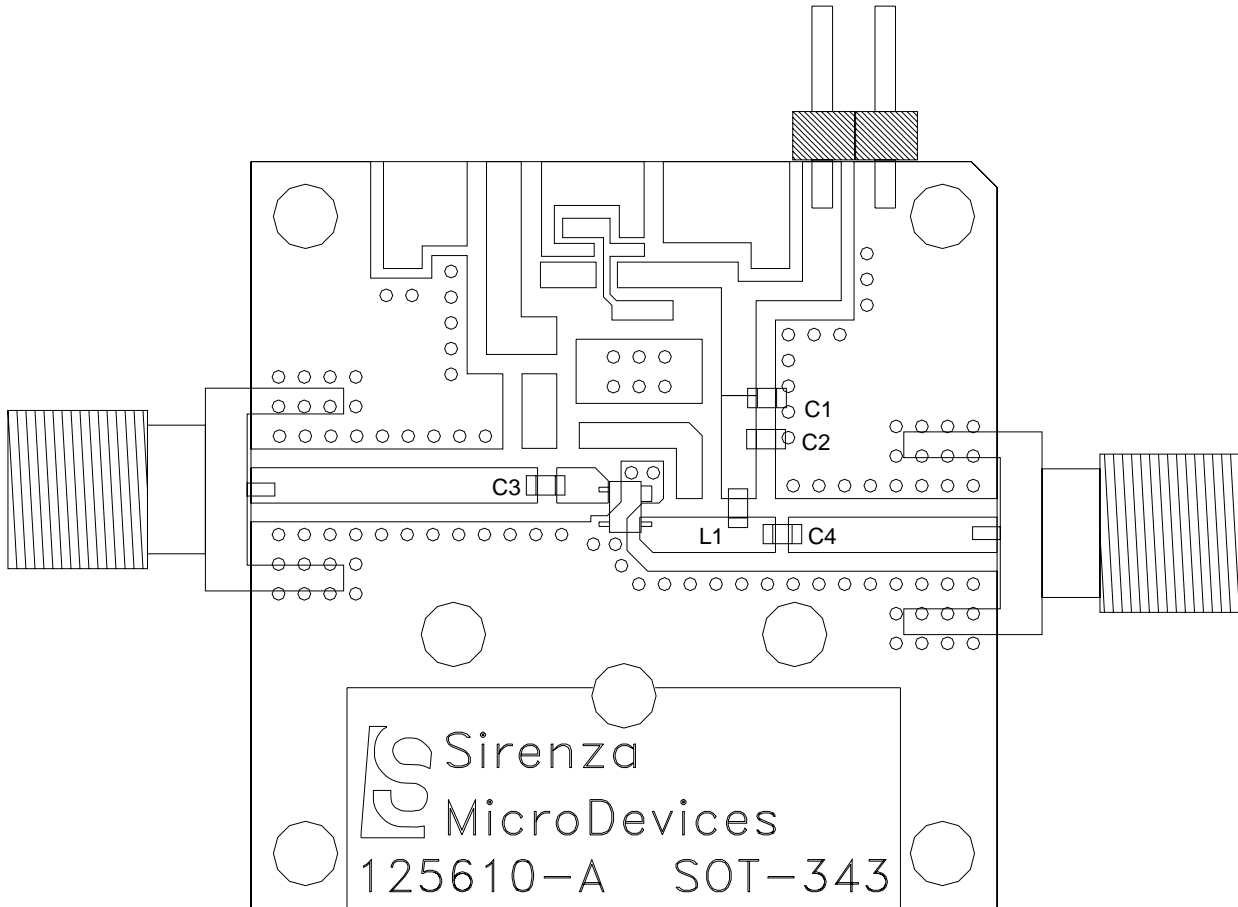
Broadband Application Circuit Schematic (400 - 3000MHz)



Evaluation Board Layout

Bill of Materials

C1	1x TAJB104KLRH Rohm 0.1uF
C2	1x MCH185A101JK Rohm 100pF
C3	1x MCH185A101JK Rohm 100pF
C4	1x MCH185A101JK Rohm 100pF
L1	1x LL1608-FSR10J Toko 100nH

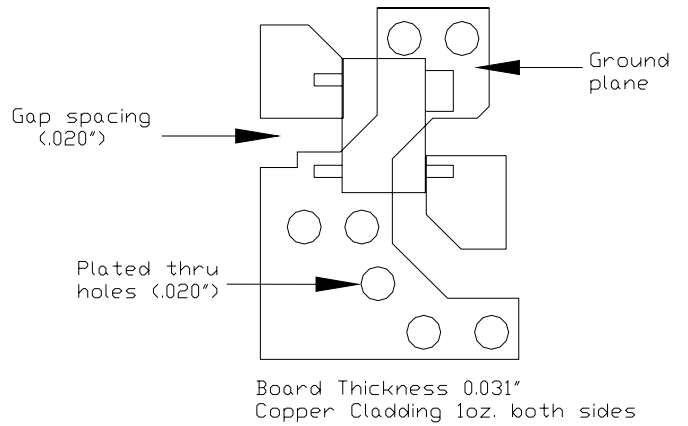


Pad #	Function	Description
1	RF _{OUT} / Bias	RF output and Bias pin. This pin is DC coupled and matched to 50 Ohms. Bias is applied through this pin.
2,4	GND	Connection to ground
3	RF _{IN}	RF input pin. This pin is DC coupled and matched to 50 Ohms. An external DC block is required.

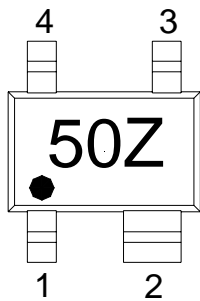
Part Number Ordering Information

Part Number	Description	Reel Size	Devices/Reel
SPF-5043Z	Lead Free, RoHS Compliant	7"	3000
SPF-5043Z-EVB1	400-2500 MHz Evaluation Board	N/A	N/A

Suggested Pad Layout



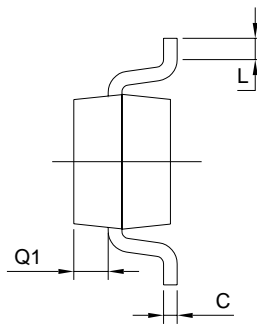
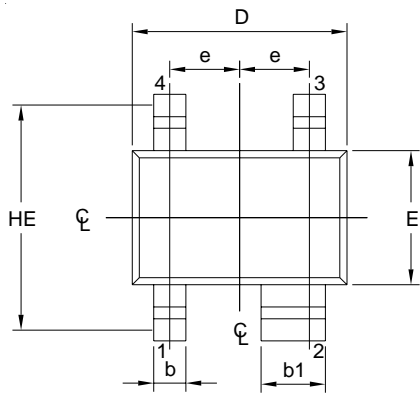
Part Identification



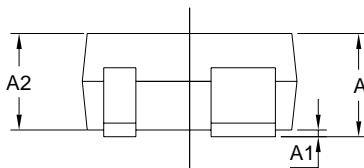
Nominal Package Dimensions

Dimensions in inches [millimeters]

Refer to drawing posted at www.sirenza.com for tolerances.



SYMBOL	MIN	MAX
E	1.15	1.35
D	1.85	2.25
HE	1.80	2.40
A	0.80	1.10
A2	0.80	1.00
A1	0.00	0.10
Q1	0.10	0.40
e	0.65 BSC	
b	0.25	0.40
b1	0.55	0.70
c	0.10	0.18
L	0.10	0.30



NOTE:

1. ALL DIMENSIONS ARE IN MILLIMETERS.
2. DIMENSIONS ARE INCLUSIVE OF PLATING.
3. DIMENSIONS ARE EXCLUSIVE OF MOLD FLASH & METAL BURR.
4. ALL SPECIFICATIONS COMPLY TO EIAJ SC70.
5. DIE IS FACING UP FOR MOLD AND FACING DOWN FOR TRIM/FORM. ie :REVERSE TRIM/FORM.
6. PACKAGE SURFACE TO BE MIRROR FINISH.