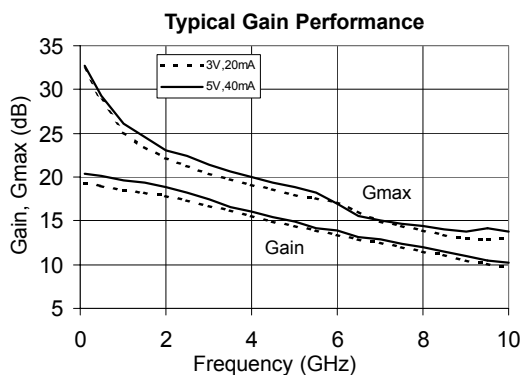


## Product Description

Stanford Microdevices' SPF-3043 is a high performance 0.25 $\mu$ m pHEMT Gallium Arsenide FET. This 300 $\mu$ m device is ideally biased at 3V,20mA for lowest noise performance and battery powered requirements. At 5V,40mA the device delivers excellent OIP3 of 32dBm. It provides ideal performance as a driver stage in many commercial and industrial LNA applications.



# SPF-3043

## Low Noise pHEMT GaAs FET

Qualification Pending April 2001



### Product Features

- DC-10 GHz Operation
- Ultra Low NF:
  - 0.25 dB @ 1 GHz
  - 0.50 dB @ 2 GHz
- High Assoc. Gain:
  - 25 dB @ 1 GHz
  - 22 dB @ 2 GHz
- Low Current Draw for NFopt (3V,20mA)
- +32 dBm OIP3, +20 dBm P1dB (5V,40mA)
- Low Cost High Performance pHEMT

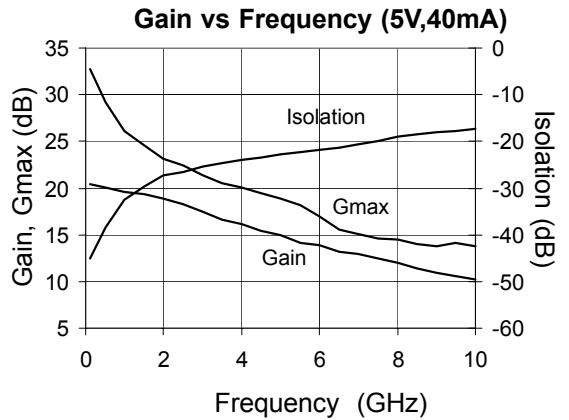
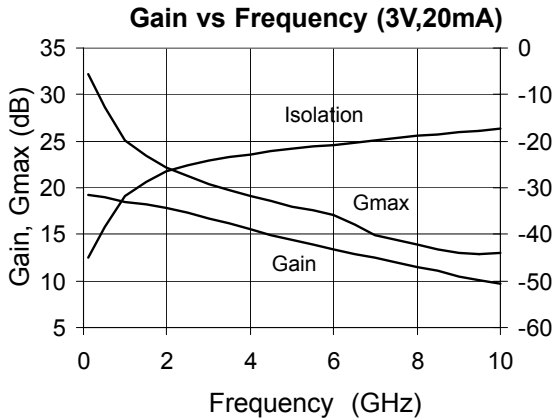
### Applications

- LNA for Wireless Infrastructure
- Fixed Wireless Infrastructure
- Wireless Data
- Driver Stage for Low Power Applications

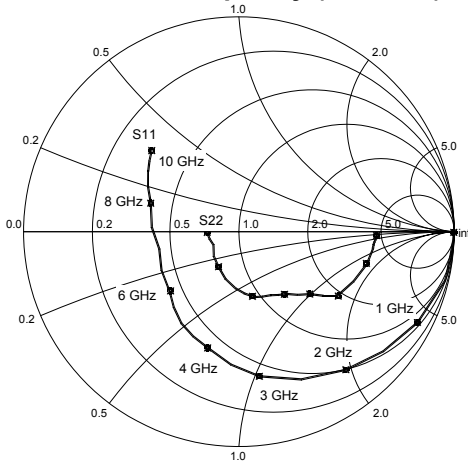
Symbol	Device Characteristics, T = 25°C V <sub>DS</sub> =3V, I <sub>DS</sub> =20mA (unless otherwise noted)	Units	Min.	Typ.	Max.
G <sub>MAX</sub>	Maximum Available Gain Z <sub>S</sub> =Z <sub>S</sub> <sup>*</sup> , Z <sub>L</sub> =Z <sub>L</sub> <sup>*</sup>	f = 0.9 GHz f = 1.9 GHz	dB	25.5 22.4	
S <sub>21</sub>	Insertion Gain Z <sub>S</sub> =Z <sub>L</sub> =50Ω	f = 0.9 GHz f = 1.9 GHz	dB	18.5 18.0	
NF <sub>min</sub>	Minimum Noise Figure Z <sub>S</sub> =Γ <sub>OPT</sub> <sup>*</sup> , Z <sub>L</sub> =Z <sub>L</sub> <sup>*</sup>	f = 0.9 GHz f = 1.9 GHz	dB	0.25 0.50	
P1dB	Output 1 dB compression point Z <sub>S</sub> =Z <sub>SOPT</sub> <sup>*</sup> , Z <sub>L</sub> =Z <sub>LOPT</sub>	V <sub>DS</sub> =3V, I <sub>DS</sub> =20 mA V <sub>DS</sub> =5V, I <sub>DS</sub> =40 mA	dBm	15.5 20	
OIP <sub>3</sub>	Output Third Order Intercept Point Z <sub>S</sub> =Z <sub>SOPT</sub> <sup>*</sup> , Z <sub>L</sub> =Z <sub>LOPT</sub>	V <sub>DS</sub> =3V, I <sub>DS</sub> =20 mA V <sub>DS</sub> =5V, I <sub>DS</sub> =40 mA	dBm	29 32	
V <sub>P</sub>	Pinchoff Voltage	V <sub>DS</sub> = 2V, I <sub>DS</sub> = 0.1 mA	V	-1.1	-0.5
I <sub>BSS</sub>	Saturated Drain Current	V <sub>DS</sub> = 2V, V <sub>GS</sub> = 0V	mA	45	100
g <sub>mp</sub>	Peak Transconductance	V <sub>DS</sub> = 2V, V <sub>GS</sub> @ g <sub>mp</sub>	mS	100	150
BV <sub>GSO</sub>	Gate-to-Source Breakdown Voltage	I <sub>G</sub> = 0.03 mA Drain Open, Source Grounded	V	-10	-8
BV <sub>GDO</sub>	Gate-to-Drain Breakdown Voltage	I <sub>G</sub> = 0.03 mA Source Open, Drain Grounded	V	-10	-8
R <sub>th</sub>	Thermal Resistance (junction to lead)		°C/W	150	

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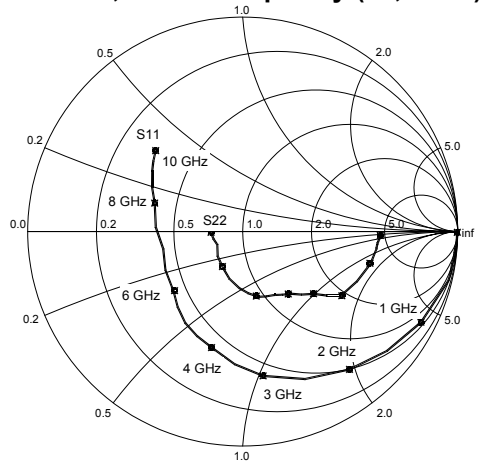
Typical Performance



S11,S22 vs Frequency (3V,20mA)



S11,S22 vs Frequency (5V,40mA)



Note: S-parameters are de-embedded to the device leads with  $Z_s = Z_L = 50\Omega$ . The data represents typical performance of the device. De-embedded s-parameters can be downloaded from our website ([www.stanfordmicro.com](http://www.stanfordmicro.com)).

Typical Performance

Freq (MHz)	$V_{DS}$ (V)	$I_{DS}$ (mA)	Fmin (dB)	$\Gamma_{OPT}$ Mag $\angle$ Ang	$r_N$	Gmax (dB)	P1dB (dBm)	OIP3 (dBm)
900	3	20	0.25	0.79 $\angle$ 12	0.22	25.5	15.5	29
	5	40	0.32	0.75 $\angle$ 12	0.25	26.5	20.0	32
1900	3	20	0.50	0.62 $\angle$ 34	0.19	22.4	15.5	29
	5	40	0.54	0.62 $\angle$ 33	0.20	23.3	20.0	32

### Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Drain Current	$I_{DS}$	150	mA
Forward Gate Current	$I_{GS}$	2	mA
Drain-to-Source Voltage	$V_{DS}$	7	V
Gate-to-Source Voltage	$V_{GS}$	-3	V
RF Input Power	$P_{IN}$	15	dBm
Operating Temperature	$T_{OP}$	-40 to +85	C
Storage Temperature Range	$T_{stor}$	-40 to +150	C
Power Dissipation	$P_{DISS}$	430	mW
Operating Junction Temperature	$T_J$	+150	C

### Part Number Ordering Information

Part Number	Reel Size	Devices/Reel
SPF-3043	7"	3000

### Part Symbolization

The part will be symbolized with an "F3" and a Pin 1 indicator on the top surface of the package.

### Pin Description

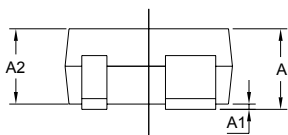
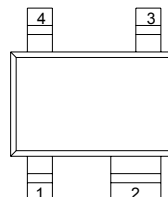
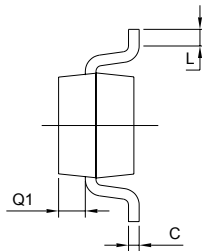
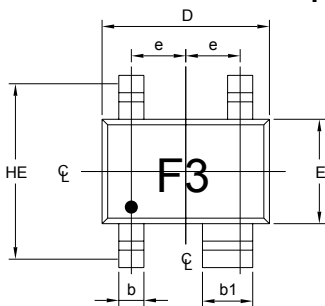
Pin #	Function	Description
1	Gate	RF Input
2	GND & Source	Connection to ground. Use via holes to reduce lead inductance. Place vias as close to ground leads as possible.
3	Drain	RF Output
4	GND & Source	Same as Pin 2



### Caution: ESD sensitive

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

### Package Dimensions



**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.

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

Use multiple plated-through vias holes located close to the package pins to ensure a good RF ground connection to a continuous groundplane on the backside of the board.