

## Product Description

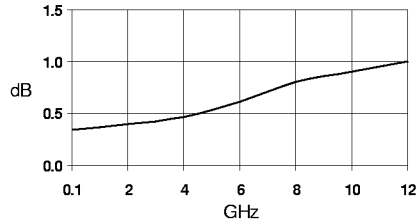
Stanford Microdevices' SPF-2086 is a high performance PHEMT gallium arsenide FET utilizing electron beam written 0.25 micron long by 200 micron wide Schottky barrier gates.

1dB output power is +21dBm at 5V and 50mA. This device may be biased at 3V and 25mA for battery powered requirements and are ideal as driver stages for commercial, industrial and military applications.

These devices are also suitable for use as output stages for 100mW transmitter applications or as drivers for VSAT, PCS/PCN, PHP, AMPS, GSM and DECT subscriber units.

The SPF series of ceramic PHEMT FET's are available in tape and reel form and in different package styles.

**Optimum Noise Figure vs. Frequency**  
V<sub>ds</sub>=5.0V, I<sub>ds</sub>=50mA



## Electrical Specifications at Ta = 25C

Symbol	Parameters: Test Conditions	Units	Min.	Typ.	Max.
N <sub>F OPT</sub>	Optimum Noise Figure: V <sub>ds</sub> = 5.0V, I <sub>ds</sub> = 40mA	f = 0.1 GHz		0.4	
		f = 12.0 GHz	dB	1.0	
P <sub>1dB</sub>	Output Power at 1dB Compression: V <sub>ds</sub> = 5.0V, I <sub>ds</sub> = 50mA	f = 0.1 GHz	20	21	
		f = 12.0 GHz	dBm	20	21
G <sub>a</sub>	Gain at 1dB Compression: V <sub>ds</sub> = 5.0V, I <sub>ds</sub> = 50mA	f = 6.0 GHz	11	13	
		f = 12.0 GHz	dB	8.5	10
TOIP	Third Order Intercept Point: V <sub>ds</sub> = 5.0V, I <sub>ds</sub> = 50mA	f = 0.1 GHz		36	
		f = 12.0 GHz	dBm	36	
I <sub>DSS</sub>	Saturated Drain Current: V <sub>ds</sub> = 2.0V, V <sub>gs</sub> = 0V	mA	30	75	120
G <sub>m</sub>	Transconductance: V <sub>ds</sub> = 2.0V, I <sub>ds</sub> = 15mA	mmho	45	75	
V <sub>p</sub>	Pinch-off Voltage: V <sub>ds</sub> = 2.0V, I <sub>ds</sub> = 1mA	V		-0.6	
V <sub>bgs</sub>	Gate-to-Source Breakdown Voltage	V		-3.0	
V <sub>bgd</sub>	Gate-to-Drain Breakdown Voltage	V		-3.0	

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## SPF-2086

### 0.1-12 GHz, Low Noise PHEMT GaAs FET



## Product Features

- High Gain: 17dB at 2 GHz, 10dB at 12 GHz
- +20dBm Output Power at P<sub>1dB</sub>
- High IP<sub>3</sub> : Up To +36dBm
- 50% Power Added Efficiency
- 1.0dB Noise Figure at 12 GHz

## Applications

- Driver Stage for VSAT, PCS, AMPS, GSM
- Output Stage for 100mW Transmitters

Low Noise FETs

## SPF-2086 0.1-12 GHz Low Noise PHEMT GaAs FET

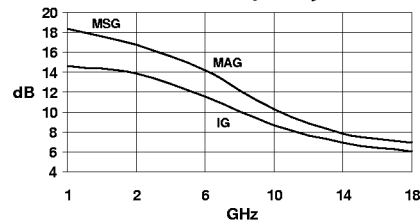
### Absolute Maximum Ratings at 25°C

Parameter	Absolute Maximum
Drain-Source Voltage (Vds)	+10V
Gate-Source Voltage (Vgs)	-6V
Drain Current (Ids)	Idss
Forward Gate Current (Igsf)	10mA
RF Input Power (Pin)	100mW
Channel Temperature (Tch)	+175°C
Operating Temperature	-45°C to +85°C
Storage Temperature	-65°C to +150°C
Power Dissipation	400mW

### Notes:

- Operation of this device above any one of these parameters may cause permanent damage.
- Mounting Surface Temperature = 25° C

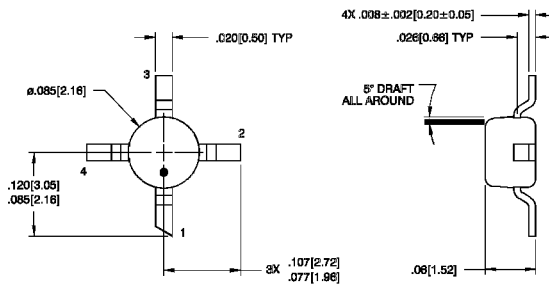
**Maximum Stable Gain, Maximum Available Gain and Insertion Gain vs. Frequency**



### Noise Parameters (Vds=5.0V, Ids=40mA)

Freq. GHz	NF <sub>OPT</sub> dB	Gamma Opt Mag	Gamma Opt Ang	R <sub>N</sub> /50
2.0	0.44	0.79	17	0.37
4.0	0.57	0.64	28	0.32
6.0	0.64	0.55	46	0.30
8.0	0.76	0.51	63	0.27
10.0	0.74	0.45	80	0.24
12.0	0.81	0.40	95	0.23
14.0	0.84	0.41	113	0.18
16.0	0.96	0.38	129	0.14
18.0	1.00	0.34	153	0.14

### 86 Plastic Package



Pin Designation	
1	Gate
2	Source
3	Drain
4	Source

### Typical S-Parameters Vds= 5.0V, Ids= 50mA

Freq GHz	S11	S11 Ang	S21	S21 Ang	S12	S12 Ang	S22	S22 Ang
.500	.871	-19	8.22	174	.009	74	.785	-11
1.00	.661	-39	8.13	160	.018	72	.785	-23
2.00	.385	-70	6.84	145	.028	70	.767	-44
4.00	.767	-125	6.31	105	.045	59	.700	-79
6.00	.668	-167	5.13	87	.053	51	.631	-110
8.00	.603	160	3.98	79	.053	72	.646	-136
10.00	.767	130	3.24	76	.141	115	.804	-166
12.00	.610	95	2.75	73	.124	141	.785	175
14.00	.638	53	2.46	71	.176	158	.861	148
16.00	.700	14	2.29	68	.184	154	.861	109
18.00	.543	-40	2.21	66	.221	161	.741	84

(S-Parameters include the effects of two 1.0 mil diameter bond wires, each 30 mils long, connected to the gate and drain pads on the die)

LOW NOISE FETs