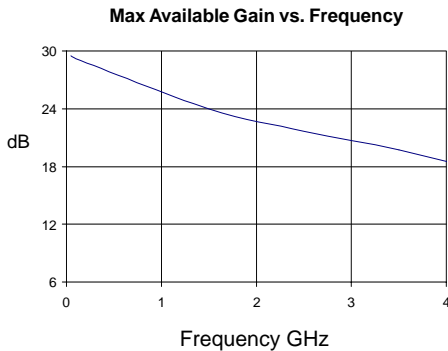


Product Description

Stanford Microdevices' SPF-2086TK is a high performance PHEMT Gallium Arsenide FET utilizing 0.25 micron long by 300 micron wide Schottky barrier gates.

This device is ideally biased at $V_{ds}=3V$ and $I_d=20mA$ for lowest noise performance and battery powered requirements. At 5V 40mA bias it delivers excellent linearity. The SPF-2086TK provides ideal performance as driver stages in many commercial, industrial and military LNA applications.



SPF-2086TK

0.1 GHz - 4 GHz Low Noise PHEMT GaAs FET



Product Features

- High Gain: 20 dB at 1900 MHz
- +20 dBm Output Power at P1dB
- Low Noise Figure: 0.4 dB NF at 1900 MHz
- Low Current Draw: 20 mA typ. at 3.0V

Applications

- LNA for Cellular, PCS, CDPD
- Wireless Data, SONET
- Driver Stage for low power applications

SYMBOL	PARAMETERS	TEST CONDITIONS: $Z_0 = 50 \text{ Ohms}, T = 25^\circ\text{C}$	UNITS	MIN.	TYP.	MAX.
Bandwidth	Note : Bandwidth determined by limited gain performance		GHz	0.1		4.0
P_{1dB}	Output Power at 1dB Compression $f = 1 \text{ GHz to } 4 \text{ GHz}$	$V_{DS} = 5V, I_b = 40 \text{ mA}$ $V_{DS} = 3V, I_b = 20 \text{ mA}$	dBm dBm		20.0 15.0	
OIP₃	Output Third Order Intercept Point $f = 1 \text{ GHz to } 4 \text{ GHz}$	$V_{DS} = 5V, I_b = 40 \text{ mA}$ $V_{DS} = 3V, I_b = 20 \text{ mA}$	dBm dBm		32 28	
NF_{OPT}	Optimum Noise Figure	$f = 1 \text{ GHz}$ $f = 2 \text{ GHz}$ $f = 4 \text{ GHz}$ $V_{DS} = 3V, I_b = 20 \text{ mA}$	dB dB dB		0.28 0.44 0.54	
GA	Associated Gain	$f = 1 \text{ GHz}$ $f = 2 \text{ GHz}$ $f = 4 \text{ GHz}$ $V_{DS} = 3V, I_b = 20 \text{ mA}$	dB dB dB		23.1 17.8 13.9	
I_{DSS}	Drain Saturation Current	$V_{DS} = 2V, V_{GS} = 0V$	mA	30	85	140
V_P	Pinch-off Voltage	$V_{DS} = 2V, I_b = 1mA$	V		-1.0	
G_M	Transconductance	$V_{DS} = 2V, I_b = 20mA$	mmho		100	
V_{BGS}	Gate to Source Breakdown Voltage		V		-17	-8
V_{BDS}	Drain to Source Breakdown Voltage		V		-17	-8

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Absolute Maximum Ratings

Operation of this device above any one of these parameters may cause permanent damage.

Bias Conditions should also satisfy the following expression: $I_D V_D (\text{max}) < (T_J - T_{OP})/T_L$

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V _{DS}	+7	V
Gate-Source Voltage	V _{GS}	-7	V
Drain Current	I _{DS}	I _{DSS}	mA
Forward Gate Current	I _{BSF}	10	mA
RF Input Power	P _{IN}	+20	dBm
Operating Temperature	T _{OP}	-40 to +85	°C
Storage Temperature Range	T _S	-65 to +150	°C
Channel Temperature	T _{CH}	+150	°C
Thermal Resistance (lead - junction)	T _L	110	°C/W
Power Dissipation	P _{BSS}	400	mW

Noise parameters, at typical operating frequencies:

Bias V_{DS}=3.0V, I_{DS}=20mA

FREQ GHz	G _{OPT}	G _{OPT} ANG	NF _{MIN} dB	r _N W	G _A dB
1.0	0.74	17	0.28	0.22	23.1
2.0	0.69	31	0.44	0.18	17.8
4.0	0.54	84	0.54	0.09	13.9

Bias V_{DS}=5.0V, I_{DS}=40mA

FREQ GHz	G _{OPT}	G _{OPT} ANG	NF _{MIN} dB	r _N W	G _A dB
1.0	0.76	19	0.34	0.27	23.9
2.0	0.67	36	0.55	0.23	19.1
4.0	0.47	93	0.75	0.11	15.0

Scattering Parameters:
Typical S-parameters $V_{ds}=3.0V$, $I_{ds}=20\text{ mA}$

Freq GHz	S11	S11 Ang	S21 dB	S21	S21 Ang	S12 dB	S12	S12 Ang	S22	S22 Ang
0.05	0.98	-0.63	18.1	8.0	179.6	-36.6	0.01	128.4	0.65	-1.7
0.1	0.98	-2.8	17.5	7.5	177.6	-49.5	0.00	100.7	0.63	-1.9
0.5	0.97	-15.3	17.5	7.5	165.5	-38.5	0.01	85.6	0.62	-9.5
1.0	0.96	-29.8	17.3	7.3	152.0	-32.9	0.02	69.1	0.61	-18.9
1.5	0.93	-44.5	17.1	7.2	138.8	-29.7	0.03	62.1	0.59	-27.4
2.0	0.88	-60.8	17.0	7.0	124.7	-27.4	0.04	53.3	0.55	-37.3
2.5	0.82	-78.5	16.8	6.9	110.6	-25.6	0.05	43.0	0.51	-48.4
3.0	0.76	-95.9	16.3	6.6	97.1	-24.3	0.06	33.5	0.47	-58.4
3.5	0.71	-112.1	15.8	6.2	84.5	-23.6	0.07	26.0	0.45	-67.0
4.0	0.66	-125.6	15.3	5.8	73.4	-23.1	0.07	18.7	0.43	-73.6

Note : De-embedded to device pins
Typical S-parameters $V_{ds}=5.0V$, $I_{ds}=40\text{ mA}$

Freq GHz	S11	S11 Ang	S21 dB	S21	S21 Ang	S12 dB	S12	S12 Ang	S22	S22 Ang
0.05	0.98	-1.86	19.65	9.60	179.14	-40.82	0.01	142.41	0.71	-1.49
0.1	0.98	-4.00	19.10	9.02	176.80	-36.44	0.02	61.47	0.69	-2.62
0.5	0.97	-18.55	18.96	8.87	161.63	-37.38	0.01	79.13	0.68	-9.34
1.0	0.91	-36.03	18.56	8.47	144.43	-32.60	0.02	71.00	0.67	-18.30
1.5	0.83	-53.20	18.07	8.00	128.44	-29.87	0.03	63.42	0.64	-26.15
2.0	0.73	-71.95	17.55	7.54	112.38	-27.40	0.04	54.26	0.59	-34.49
2.5	0.64	-92.56	16.96	7.05	97.04	-26.34	0.05	47.80	0.55	-43.18
3.0	0.55	-112.96	16.17	6.44	83.23	-25.06	0.06	41.17	0.50	-50.95
3.5	0.48	-132.70	15.36	5.86	70.22	-24.16	0.06	37.08	0.48	-57.59
4.0	0.43	-149.99	14.56	5.34	58.99	-23.47	0.07	32.76	0.46	-62.62

Note : De-embedded to device pins



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

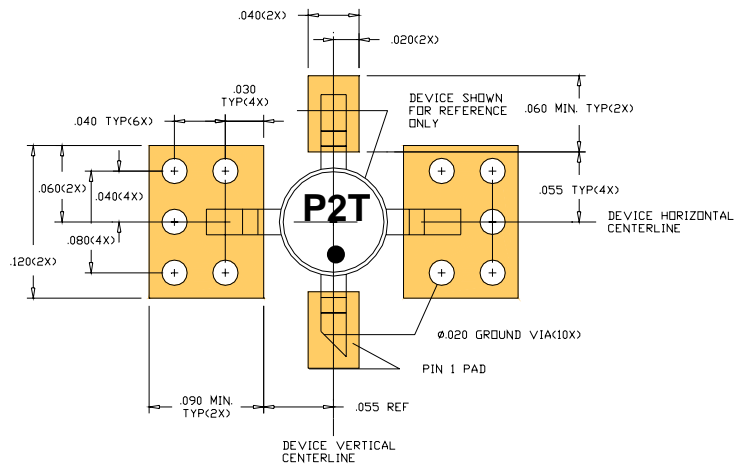
Part Number Ordering Information

Part Number	Reel Size	Devices/Reel
SPF-2086TK	7"	1000

Part Symbolization

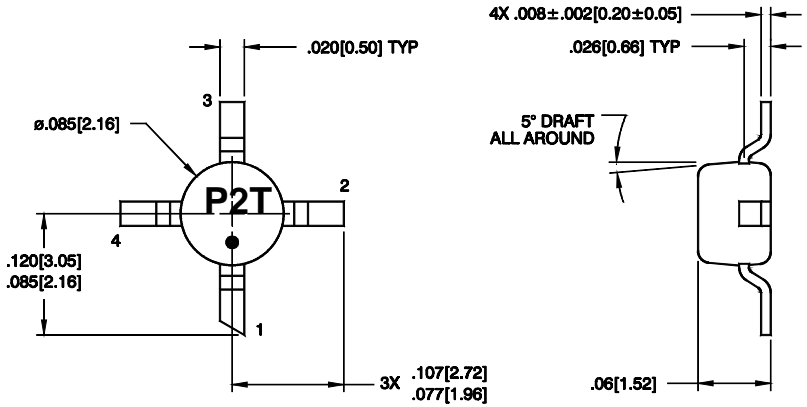
The part will be symbolized with a "P2T" designator on the top surface of the package.

PCB Pad Layout



Pin Designation	
1	Gate
2	Source
3	Drain
4	Source

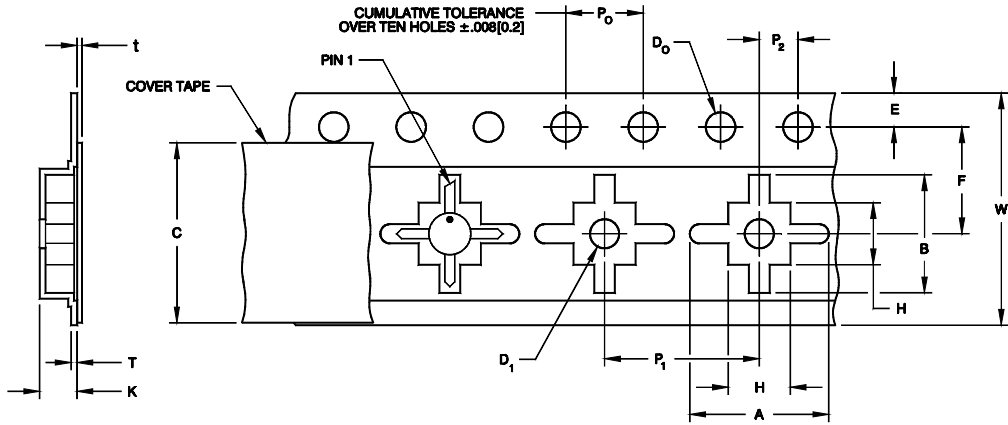
Package Dimensions



Component Tape and Reel Packaging

Tape Dimensions

For 86 Outline



DESCRIPTION		SYMBOL	SIZE (MM)
Cavity	Length	A	6.10 ± 0.10
	Width	B	6.20 ± 0.10
	Socket	H	3.10 ± 0.10
	Depth	K	2.00 ± 0.10
	Pitch	P	8.00 ± 0.10
	Bottom Hole diameter	D ₁	1.50 min.
Perforation	Diameter	D ₀	1.50 ± 0.10
	Pitch	P ₀	4.00 ± 0.10
	Position	E	1.75 ± 0.10
Cover Tape	Width	C	9.10 ± 0.25
	Tape Thickness	t	0.05 ± 0.01
Carrier Tape	Width	W	12.00 ± 0.30
	Tape Thickness	T	0.30 ± 0.05
Distance	Cavity to Perforation (Width Direction)	F	5.50 ± 0.05
	Cavity to Perforation (Length Direction)	P ₂	2.00 ± 0.05

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