



RFMD Green, RoHS Compliant, Pb-Free
Package: SOT-86

Product Description

RFMD's SPF-2086TKZ is a high performance 0.25μm pHEMT Gallium Arsenide FET with Schottky barrier gates. This 300μm device is ideally biased at 3V, 20mA for lowest noise performance and battery powered requirements. At 5V, 40mA the device delivers excellent output TOI of 32dBm. It provides ideal performance as driver stages in many commercial, industrial, and military LNA applications.

Features

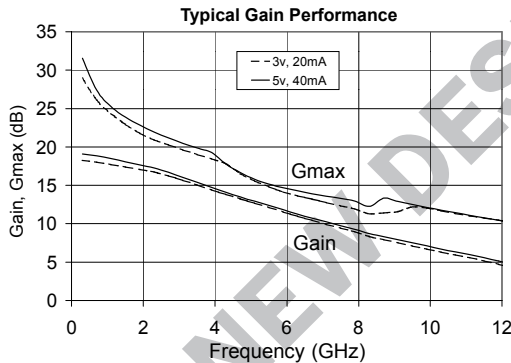
- 22dB G_{MAX} at 1.9GHz
- 0.4dB NF_{MIN} at 1.9GHz
- +32dBm Output IP_3
- +20dBm Output Power at 1dB Compression

Applications

- LNA for Analog and Digital Wireless Systems
- 3G, Cellular, PCS
- Fixed Wireless, Pager Systems
- Driver Stage for Low Power Applications

Optimum Technology Matching® Applied

- ☐ GaAs HBT
- ☐ GaAs MESFET
- ☐ InGaP HBT
- ☐ SiGe BiCMOS
- ☐ Si BiCMOS
- ☐ SiGe HBT
- ☒ GaAs pHEMT
- ☐ Si CMOS
- ☐ Si BJT
- ☐ GaN HEMT
- ☐ RF MEMS



Parameter	Specification			Unit	Condition
	Min.	Typ.	Max.		
Maximum Available Gain		25.2		dB	0.9GHz, $Z_S = Z_S^*$, $Z_L = Z_L^*$
		21.8		dB	1.9GHz
		18.7		dB	4.0GHz
		13.5		dB	6.0GHz
		9.3		dB	12.0GHz
Insertion Gain	16.0	17.7	19.4	dB	1.9GHz ^[1] , $Z_S = Z_L = 50\Omega$
Minimum Noise Figure		0.3		dB	1GHz, $Z_S = \Gamma_{OPT}^*$, $Z_L = Z_{LOPT}$
		0.4		dB	2GHz
		0.5		dB	4GHz
		0.7		dB	6GHz
Output Third Order Intercept Point		32		dBm	$V_{DS} = 5.0V$, $I_{DQ} = 40mA$, $Z_S = Z_{SOPT}$, $Z_L = Z_{LOPT}$
		28		dBm	$V_{DS} = 3.0V$, $I_{DQ} = 20mA$
Output 1dB Compression Point		20		dBm	$V_{DS} = 5.0V$, $I_{DQ} = 40mA$, $Z_S = Z_{SOPT}$, $Z_L = Z_{LOPT}$
		15		dBm	$V_{DS} = 3.0V$, $I_{DQ} = 20mA$
Saturated Drain Current	30	85	140	mA	$V_{DS} = V_{DSP}$, $V_{GS} = -0.25V$
Transconductance		112		mS	$V_{DS} = V_{DSP}$, $V_{GS} = -0.25V$
Pinch-Off Voltage	-1.5	-1.0	-0.5	V	[1], $V_{DS} = 2.0V$, $I_{DS} = 150\mu A$
Gate-to-Source Breakdown Voltage		-17	-8	V	[1], $I_{GS} = 0.3mA$, drain open
Gate-to-Source Breakdown Voltage		-17	-8	V	[1], $I_{GD} = 0.3mA$, $V_{GS} = -3.0V$
Thermal Resistance (junction-to-lead)		110		°C/W	

Test Conditions: $V_{DS} = 3V$, $I_{DQ} = 20mA$ (unless otherwise noted), [1]=100% Tested

Absolute Maximum Ratings

Parameter	Rating	Unit
Drain Current (I_{DS})	I_{DSS}	mA
Forward Gate Current (I_{GSF})	0.3	mA
Reverse Gate Current (I_{GSR})	0.3	mA
Drain-to-Source Voltage (V_{DS})	+7	V
Gate-to-Drain Voltage (V_{GD})	-8	V
Gate-to-Source Voltage (V_{GS})	<-5 or >0	V
RF Input Power (P_{IN})	100	mW
Operating Temperature (T_{OP})	-40 to +85	°C
Storage Temperature Range (T_{STOR})	-40 to +150	°C
Power Dissipation (P_{DISS})	600	mW
Channel Temperature (T_J)	+150	°C

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.



Caution! ESD sensitive device.

Exceeding any one or a combination of the Absolute Maximum Rating conditions may cause permanent damage to the device. Extended application of Absolute Maximum Rating conditions to the device may reduce device reliability. Specified typical performance or functional operation of the device under Absolute Maximum Rating conditions is not implied.

RoHS status based on EU Directive 2002/95/EC (at time of this document revision).

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MTTF is inversely proportional to the device junction temperature. For junction temperature and MTTF considerations the operating conditions should also follow the following expressions:

$$P_{DC} - P_{OUT} < (T_J - T_L) / R_{TH}$$

Where:

$P_{DC} = I_{DS} * V_{DS}(W)$, P_{OUT} = RF output Power (W), T_J = Junction Temperature (°C), T_L = Lead Temperature (pin 4) (°C), R_{TH} = Thermal Resistance (°C/W)

Noise Parameters at typical operating frequencies, Bias $V_{DS} = 3.0V$, $I_{DS} = 20mA$

Freq (GHz)	FMIN dB	$ \Gamma_{OPT} $	Γ_{OPT} ANG	rN Ω	GA dB
1.0	0.28	0.74	17	0.22	23.1
2.0	0.44	0.69	31	0.18	17.8
4.0	0.54	0.54	84	0.09	13.9
6.0	0.70	0.28	179	0.05	12.2

Noise Parameters at typical operating frequencies, Bias $V_{DS} = 5.0V$, $I_{DS} = 40mA$

Freq (GHz)	FMIN dB	$ \Gamma_{OPT} $	Γ_{OPT} ANG	rN Ω	GA dB
1.0	0.34	0.76	19	0.27	23.9
2.0	0.55	0.67	36	0.23	19.1
4.0	0.75	0.47	93	0.11	15.0
6.0	1.04	0.31	-170	0.06	12.9

Scattering Parameters: Typical S-Parameters $V_{DS}=3.0V$, $I_{DS}=20mA$

Freq (GHz)	S11	S11 Ang	S21	S21 Ang	S12	S12 Ang	S22	S22 Ang
0.5	0.97	-17.5	8.07	162.9	0.01	55.5	0.66	-10.0
1.0	0.92	-34.2	7.76	146.1	0.03	72.8	0.64	-18.9
1.5	0.85	-50.9	7.40	130.4	0.04	62.9	0.61	-27.5
2.0	0.76	-69.2	7.06	114.9	0.05	52.7	0.57	-36.6
2.5	0.67	-89.6	6.67	99.4	0.06	45.3	0.51	-46.7
3.0	0.58	-109.6	6.16	85.3	0.06	39.6	0.47	-55.4
3.5	0.51	-128.5	5.64	72.4	0.07	33.2	0.44	-62.2
4.0	0.46	-146.4	5.16	60.5	0.08	27.3	0.42	-68.0
4.5	0.42	-165.0	4.74	49.3	0.08	23.0	0.39	-73.9
5.0	0.40	175.1	4.37	38.2	0.09	18.9	0.36	-81.1
5.5	0.41	155.0	4.04	27.3	0.09	14.6	0.32	-90.9
6.0	0.44	137.1	3.71	16.7	0.10	9.5	0.29	-102.9
6.5	0.48	123.1	3.43	6.6	0.10	5.3	0.26	-115.7
7.0	0.51	111.6	3.18	-2.9	0.10	1.2	0.23	-128.5
7.5	0.54	101.5	2.96	-11.9	0.11	-2.1	0.21	-141.7
8.0	0.57	91.8	2.75	-21.0	0.11	-5.6	0.20	-156.2
8.5	0.60	83.7	2.55	-29.5	0.12	-9.3	0.19	-170.9
9.0	0.63	77.5	2.40	-37.4	0.12	-13.0	0.20	172.1
9.5	0.66	71.4	2.26	-45.8	0.13	-17.5	0.22	154.7
10.0	0.69	66.3	2.13	-54.0	0.14	-22.1	0.24	140.5
10.5	0.70	61.1	2.02	-62.0	0.14	-26.8	0.27	128.5
11.0	0.71	55.7	1.92	-69.9	0.15	-30.9	0.29	119.0
11.5	0.72	50.1	1.81	-77.4	0.15	-35.0	0.31	109.5
12.0	0.75	45.0	1.70	-84.6	0.16	-39.7	0.33	99.8
12.5	0.76	40.3	1.60	-91.7	0.16	-44.1	0.35	90.3
13.0	0.77	36.4	1.51	-98.6	0.16	-47.5	0.39	81.2
13.5	0.77	32.9	1.47	-106.0	0.17	-51.7	0.43	75.0

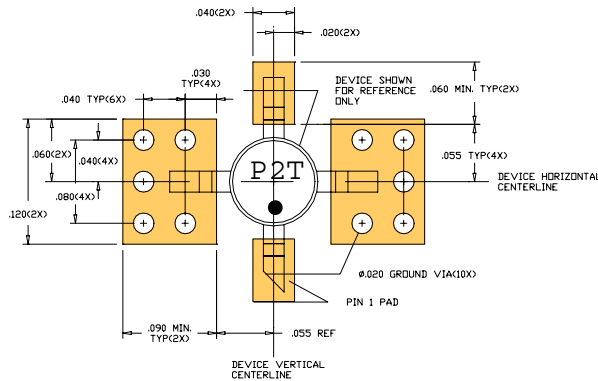
Scattering Parameters: Typical S-Parameters $V_{DS}=5.0V$, $I_{DS}=40mA$

Freq (GHz)	S11	S11 Ang	S21	S21 Ang	S12	S12 Ang	S22	S22 Ang
0.5	0.97	-18.2	8.87	162.0	0.01	92.8	0.68	-9.5
1.0	0.91	-35.9	8.47	144.6	0.02	66.4	0.67	-18.1
1.5	0.83	-53.3	8.00	128.4	0.03	60.3	0.64	-26.2
2.0	0.74	-72.2	7.54	112.6	0.04	54.0	0.60	-34.5
2.5	0.64	-92.9	7.06	97.1	0.05	46.6	0.55	-43.3
3.0	0.55	-113.4	6.46	83.2	0.06	40.7	0.51	-50.9
3.5	0.48	-132.3	5.87	70.5	0.06	35.9	0.48	-57.2
4.0	0.43	-150.3	5.35	58.8	0.07	31.9	0.46	-62.6
4.5	0.39	-169.1	4.89	47.9	0.07	27.9	0.44	-68.1
5.0	0.37	170.9	4.50	37.0	0.08	25.5	0.42	-75.1
5.5	0.39	151.2	4.16	26.3	0.08	22.1	0.38	-84.3
6.0	0.43	121.0	3.54	6.0	0.09	13.3	0.32	-106.2
6.5	0.47	121.0	3.54	6.0	0.09	13.3	0.32	-106.2
7.0	0.50	110.1	3.29	-3.6	0.10	9.6	0.30	-117.6
7.5	0.53	100.4	3.07	-12.7	0.10	5.7	0.28	-129.3
8.0	0.56	91.3	2.86	-21.8	0.11	2.4	0.26	-141.5
8.5	0.59	83.3	2.66	-30.2	0.12	-0.8	0.25	-154.6
9.0	0.63	77.2	2.52	-38.3	0.13	-4.6	0.26	-170.3
9.5	0.66	71.5	2.38	-46.8	0.13	-9.5	0.27	172.9
10.0	0.69	66.6	2.24	-55.1	0.14	-14.2	0.29	157.4
10.5	0.70	61.3	2.12	-63.3	0.15	-19.5	0.31	144.0
11.0	0.71	55.7	2.01	-71.4	0.15	-24.4	0.33	133.5
11.5	0.73	50.2	1.90	-79.0	0.16	-29.2	0.35	123.1
12.0	0.75	45.0	1.78	-86.4	0.16	-33.8	0.36	112.6
12.5	0.77	40.3	1.67	-93.7	0.17	-37.9	0.38	102.0
13.0	0.77	36.3	1.58	-100.9	0.17	-42.2	0.42	91.7
13.5	0.78	32.7	1.53	-108.4	0.18	-46.7	0.46	83.7

Note: De-embedded to device pins

Pin	Function
1	Gate
2	Source
3	Drain
4	Source

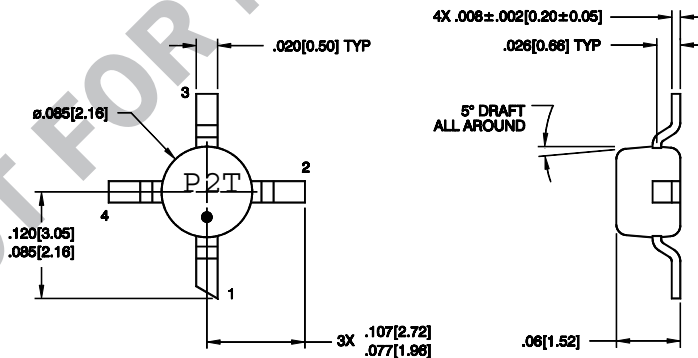
Suggested Pad Layout



Package Drawing

Dimensions in inches (millimeters)

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



Part Symbolization

The part will be symbolized with the “P2TZ” designator and a dot signifying pin 1 on the top surface of the package.

Ordering Information

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