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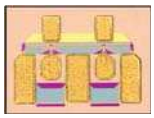
SPF-2000

LOW NOISE, HIGH GAIN LINEARITY pHEMT GaAs FET



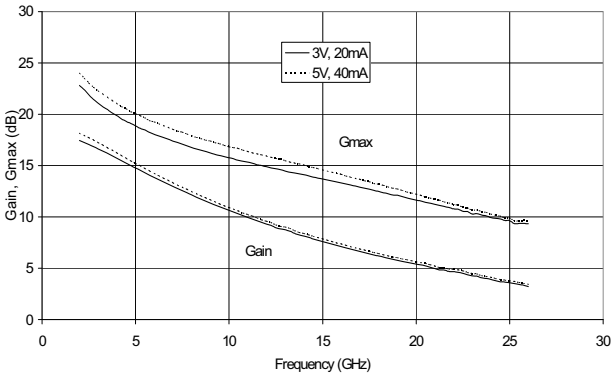
Product Description

RFMD's SPF-2000 is a high linearity. low noise 0.25µm pHEMT. This 300µm device is ideally biased at 3V, 20mA for lowest noise performance. 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.

Optimum Technology Matching® Applied

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

Typical Gain Performance



Features

- 15dB G_{MAX} at 12GHz
- 1.25dB F_{MIN} at 12GHz
- +32dBm Output IP3 at 12GHz
- +20dBm Output Power at 1dB Compression

Applications

- High IP3 LNA for VSAT, LMDS, Cellular Systems, and Instrumentation
- Broadband Amplifiers

Parameter	Specification			Unit	Condition
	Min.	Typ.	Max.		
Maximum Available Gain [2], $Z_S=Z_S^*$, $Z_L=Z_L^*$		23		dB	Freq=1.9GHz
	18	20	25	dB	Freq=4.0GHz
	13	15	17	dB	Freq=12.0GHz
Insertion Gain[2]	16	18	20	dB	Freq=1.9GHz, $Z_S=Z_L=50\Omega$
Minimum Noise Figure, Z_S=Gamma-opt, $Z_L=Z_L^*$		0.5		dB	Freq=2.0GHz
		0.6		dB	Freq=4.0GHz
		1.2		dB	Freq=12.0GHz
Output 1dB Compression Point		20.0		dBm	Freq=2.0GHz, V_{DS}=5V, I_{DS}=40mA
		15.0		dBm	Freq=2.0GHz, V_{DS}=3V, I_{DS}=20mA
		21		dBm	Freq=12.0GHz, V_{DS}=5V, I_{DS}=40mA
		18		dBm	Freq=12.0GHz, V_{DS}=3V, I_{DS}=40mA
Gain at 1dB Compression Point		17.7		dBm	Freq=2.0GHz, V_{DS}=5V, I_{DS}=40mA
		17.0		dBm	Freq=2.0GHz, V_{DS}=3V, I_{DS}=20mA
		13.0		dBm	Freq=12.0GHz, V_{DS}=5V, I_{DS}=40mA
		11.0		dBm	Freq=12.0GHz, V_{DS}=3V, I_{DS}=40mA

[1] 100% tested- DC parameters tested on wafer.
[2] Sample tested - Samples pulled from each wafer lot. Sample test specifications are based on statistical data from sample test measurements.
[3] $V_{DS}*I_{DQ} < P_{DISS}$ is recommended for continuous reliable operation.
[4] Test conditions: V_{DS}=3.0V, I_{DS}=20mA, T=25°C (unless otherwise noted).

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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	100	mW
Operating Temp Range (T_{OP})	-40 to +85	°C
Storage Temp Range	-40 to +150	°C
Power Dissipation (P_{DISS})	600	mW
Channel Temp	+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.

MTTF is inversely proportional to the device junction temperature. For junction temperature and MTTF considerations should also satisfy 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 (°C), R_{TH} = Thermal Resistance (°C/W)

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 EUDirective2002/95/EC (at time of this document revision).

Parameter	Specification			Unit	Condition
	Min.	Typ.	Max.		
Output Third Order Intercept Point		32		dBm	Freq=2.0GHz, V_{DS}=5V, I_{DS}=40mA
		28		dBm	Freq=2.0GHz, V_{DS}=3V, I_{DS}=20mA
		32		dBm	Freq=12.0GHz, V_{DS}=5V, I_{DS}=40mA
		30		dBm	Freq=12.0GHz, V_{DS}=3V, I_{DS}=20mA
Saturated Drain Current[2] (I_{DSS})	30	85	140	mA	
Pinch-off Voltage[1]	-1.5	-1.0	-0.5	V	V_{DS}=2V, I_{DS}=0.150mA
Transconductance		112		mS	V_{GS}=-0.25V
Gate to Source Breakdown Voltage[1]		-17	-8	V	I_{GS}=0.3mA, drain open
Gate to Drain Breakdown Voltage[1]		-17	-8	V	I_{GS}=0.3mA, V_{GS}=-3.0V
Thermal Resistance		110		C/W	
Operating Voltage[3]			5.5	V	Drain-source
Operating Current[3]			55	mA	Drain-source, quiescent
Power Dissipation[3]			0.2	W	

[1] 100% tested- DC parameters tested on wafer.
[2] Sample tested - Samples pulled from each wafer lot. Sample test specifications are based on statistical data from sample test measurements.
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[4] Test conditions: V_{DS}=3.0V, I_{DS}=20mA, T=25°C (unless otherwise noted).

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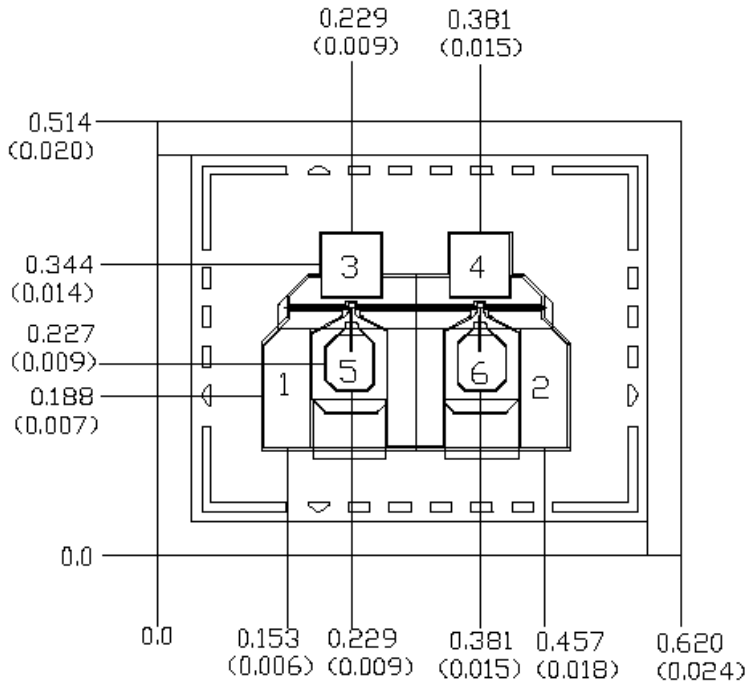
Assembly Instructions

The recommended die attach is conductive epoxy or AuSn (80/20) solder with limited exposure to temperatures at or above 300°C. The preferred wirebond method is thermo-compression wedge bond using 0.7 mil gold wire with a maximum stage temperature of 200°C. Aluminum wire should not be used.

Design Data

Complete design data including S-parameters, noise parameters, and large signal model are available upon request by contacting applications support at RFMD.com.

Mechanical Drawing



Units: millimeters (inches)
Thickness: 0.1016 (0.004)
Chip edge to bond pad dimensions are shown to center of bond pad
Chip size tolerance: +/- 0.051 (0.002)

Bond Pad #1,#2 (Source) 0.056 x 0.123 (0.002 x 0.005)
Bond Pad #3,#4 (Drain) 0.070 x 0.074 (0.003 x 0.003)
Bond Pad #5,#6 (Gate) 0.056 x 0.065 (0.002 x 0.003)

Ordering Information

Part Number	Reel Size	Devices/Reel
SPF-2000	Gel Pak	100

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