RFMD
rfmd.com

SPF5189Z

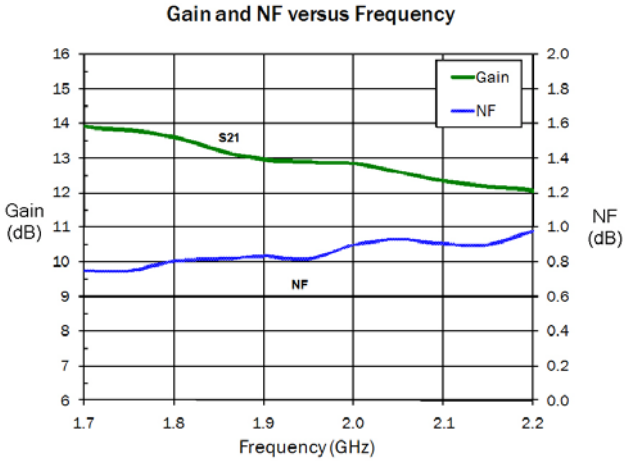
50MHz to 4000MHz, GaAs pHEMT LOW NOISE MMIC AMPLIFIER

Product Description

The SPF5189Z is a high performance pHEMT MMIC LNA designed for operation from 50MHz to 4000MHz. The on-chip active bias network provides stable current over temperature and process threshold voltage variations. The SPF5189Z offers ultra-low noise figure and high linearity performance in a gain block configuration. Its single-supply operation and integrated matching networks make implementation remarkably simple. A high maximum input power specification make it ideal for high dynamic range receivers.

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



Features

- Ultra-Low Noise Figure=0.60dB at 900MHz
- Gain=18.7dB at 900MHz
- High Linearity: OIP_3=39.5dBm at 1960MHz
- P_{1dB}=22.7dBm at 1960MHz
- Single-Supply Operation: 5V at I_{DQ}=90mA
- Flexible Biasing Options: 3V to 5V, Adjustable Current
- Broadband Internal Matching

Applications

- Cellular, PCS, W-CDMA, ISM, WiMAX Receivers
- PA Driver Amplifier
- Low Noise, High Linearity Gain Block Applications

Parameter	Specification			Unit	Condition
	Min.	Typ.	Max.		
Small Signal Gain		18.7		dB	0.9GHz
	11.3	12.8	14.3	dB	1.96GHz
Output Power at 1dB Compression		22.4		dBm	0.9GHz
	20.7	22.7		dBm	1.96GHz
Output Third Order Intercept Point		38.5		dBm	0.9GHz
	36.0	39.5		dBm	1.96GHz
Noise Figure		0.55		dB	0.9GHz
		0.8	1.1	dB	1.96GHz
Input Return Loss		17.5		dB	0.9 GHz
	14.5	18.5		dB	1.96GHz
Output Return Loss		16.0		dB	0.9GHz
	11.0	15.0		dB	1.96GHz
Reverse Isolation		24.0		dB	0.9GHz
		18.0		dB	1.96GHz
Device Operating Voltage		5	5.25	V	
Device Operating Current	75	90	105	mA	Quiescent
Thermal Resistance		65		°C/W	Junction to lead

Test Conditions: V_D=5V, I_{DQ}=90mA, TL=25°C, OIP_3 Tone Spacing=1MHz, P_{OUT} per tone=0dBm
Z_S=Z_L=50Ω, 25°C, Application Circuit Data

7628 Thorndike Road, Greensboro, NC 27409-9421 · For sales or technical support, contact RFMD at (+1) 336-678-5570 or sales-support@rfmd.com.

Absolute Maximum Ratings

Parameter	Rating	Unit
Max Device Current (I_D)	120	mA
Max Device Voltage (V_D)	5.5	V
Max RF Input Power	27	dBm
Max Dissipated Power	660	mW
Max Junction Temperature (T_J)	150	°C
Operating Temperature Range (T_L)	-40 to + 85	°C
Max Storage Temperature	-65 to +150	°C
ESD Rating - Human Body Model (HBM)	Class 1B	
Moisture Sensitivity Level (MSL)	MSL 2	

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.
Bias Conditions should also satisfy the following expression:
$I_D V_D < (T_J - T_L)/R_{TH}$, j-l and $T_L = T_{LEAD}$

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.

RFMD Green: RoHS compliant per EU Directive 2002/95/EC, halogen free per IEC 61249-2-21, < 1000 ppm each of antimony trioxide in polymeric materials and red phosphorus as a flame retardant, and <2% antimony in solder.

Typical RF Performance - Application Circuit Data with $V_D = 5V$, $I_D = 90mA$

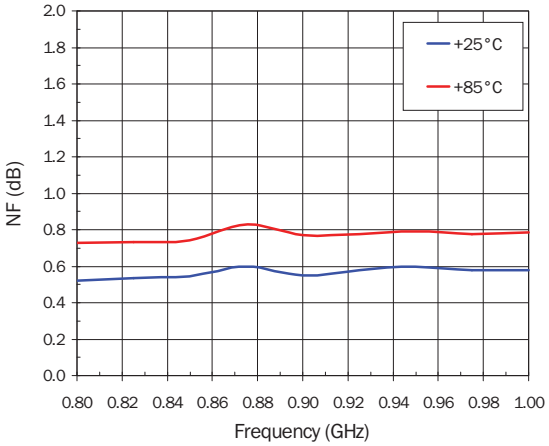
Parameter	Unit	0.8 GHz	0.9 GHz	1.0 GHz	1.7 GHz	1.8 GHz	1.9 GHz	2.0 GHz	2.1 GHz	2.2 GHz
Small Signal Gain	dB	19.6	18.7	17.9	13.8	13.5	12.9	12.7	12.2	11.9
Noise Figure	dB	0.52	0.55	0.79	0.75	0.81	0.83	0.90	0.91	0.98
Output IP3	dBm	38.4	38.5	39.0	39.2	39.5	39.5	39.8	39.8	39.9
Output P1dB	dBm	22.3	22.4	22.5	22.6	22.6	22.7	22.7	22.7	22.7
Input Return Loss	dB	17.1	17.5	17.5	17.5	17.5	18.5	18.5	18.5	18.0
Output Return Loss	dB	16.0	16.0	15.5	14.0	14.0	14.5	15.0	15.5	16.0
Reverse Isolation	dB	24.5	24.0	23.0	18.5	18.5	18.0	18.0	17.5	17.0

Test Conditions: $V_D = 5V$, $I_{DQ} = 90mA$, OIP_3 Tone Spacing = 1MHz, P_{OUT} per tone = 0dBm, $T_L = 25°C$, $Z_S = Z_L = 50\Omega$

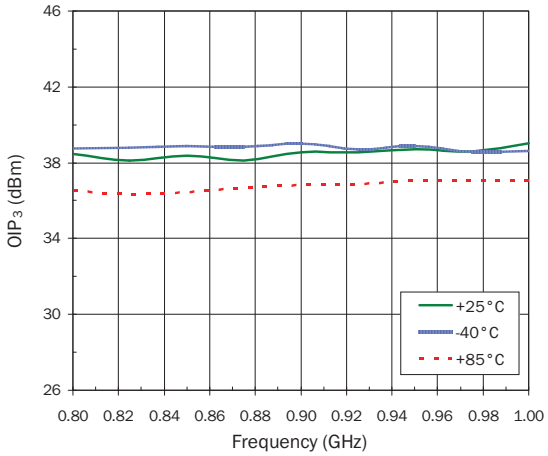
7628 Thorndike Road, Greensboro, NC 27409-9421 · For sales or technical support, contact RFMD at (+1) 336-678-5570 or sales-support@rfmd.com.

Typical RF Performance - 900MHz Application Circuit with V_D=5V, I_D=90mA

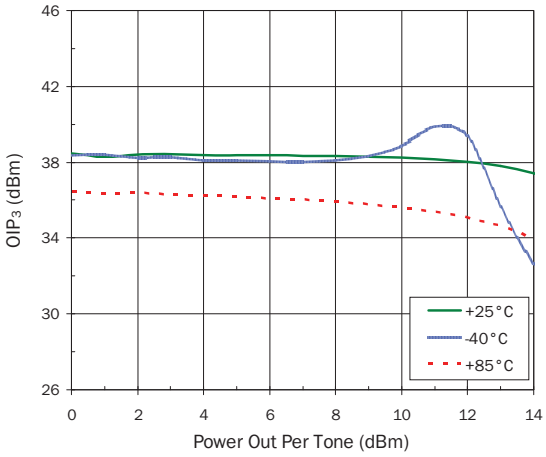
Noise Figure versus Frequency



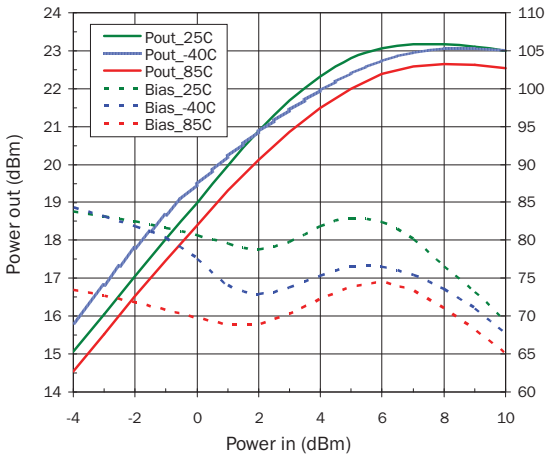
OIP_3 versus Frequency (0dBm tones)



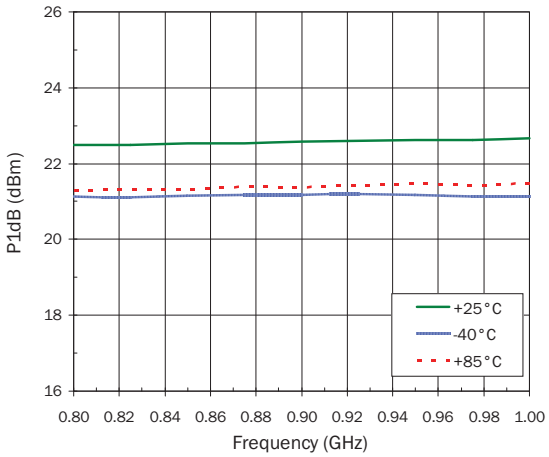
OIP_3 versus Power (850MHz, 1MHz spacing)



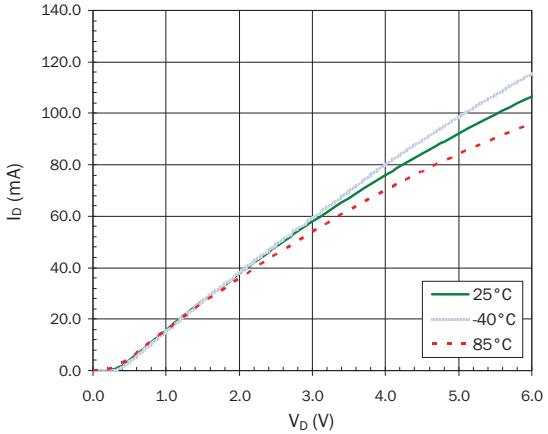
P_{OUT} versus Pin at 850MHz



P1dB versus Frequency

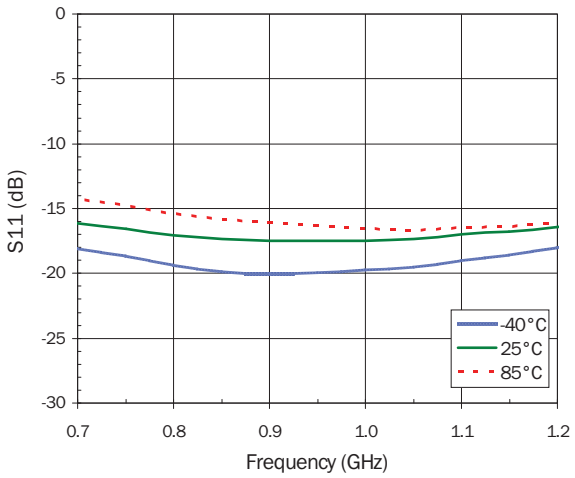


Device Current versus Voltage

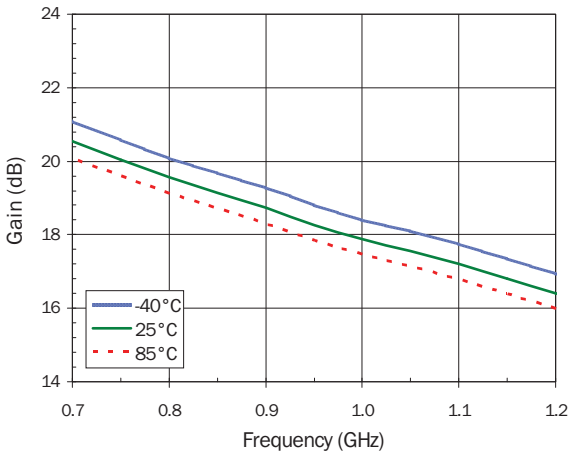


Typical RF Performance - 900MHz Application Circuit with V_D=5V, I_D=90mA

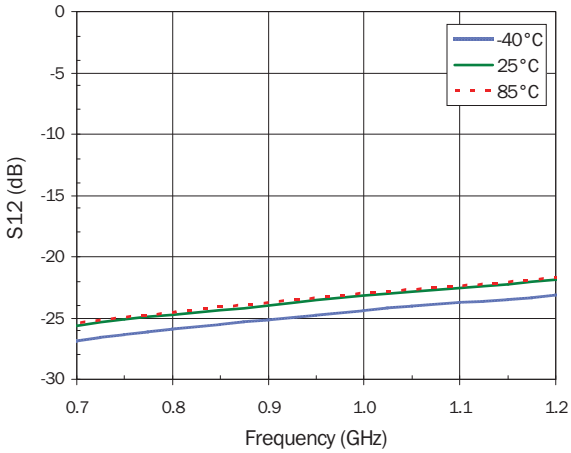
S11 versus Frequency



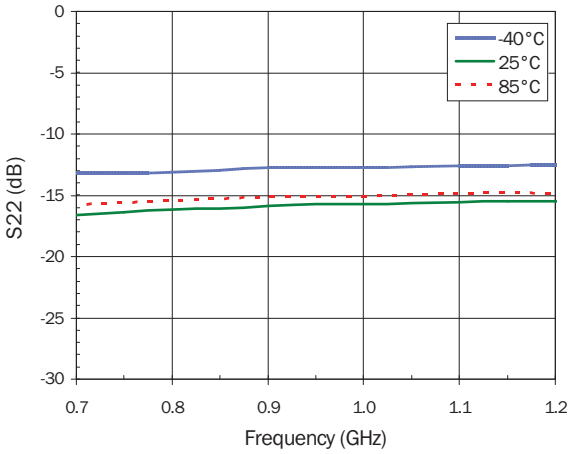
S21 versus Frequency



S12 versus Frequency



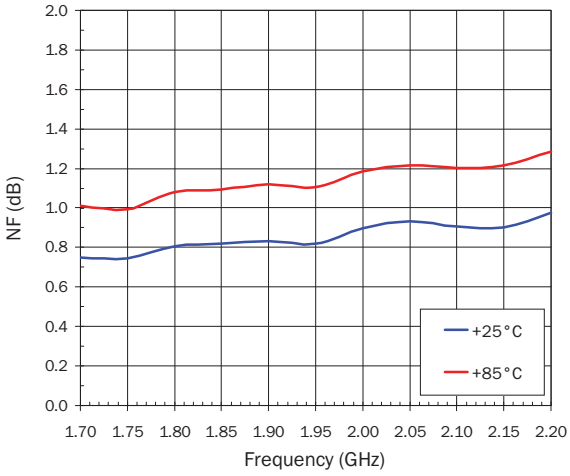
S22 versus Frequency



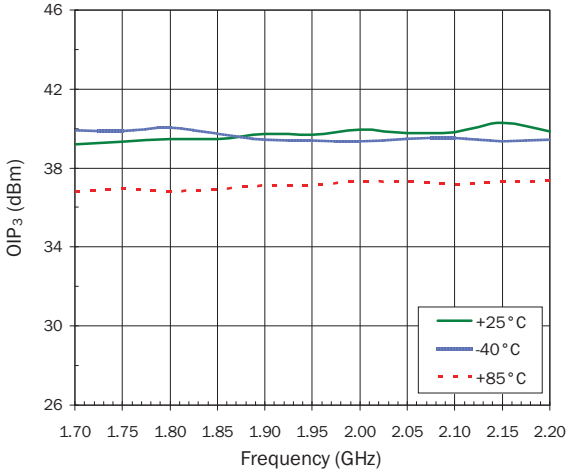
7628 Thorndike Road, Greensboro, NC 27409-9421 · For sales or technical support, contact RFMD at (+1) 336-678-5570 or sales-support@rfmd.com.

Typical RF Performance - 1900MHz Application Circuit with V_D=5V, I_D=90mA

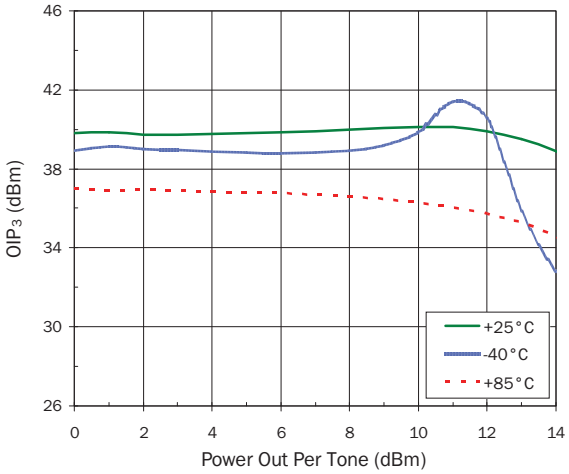
Noise Figure versus Frequency



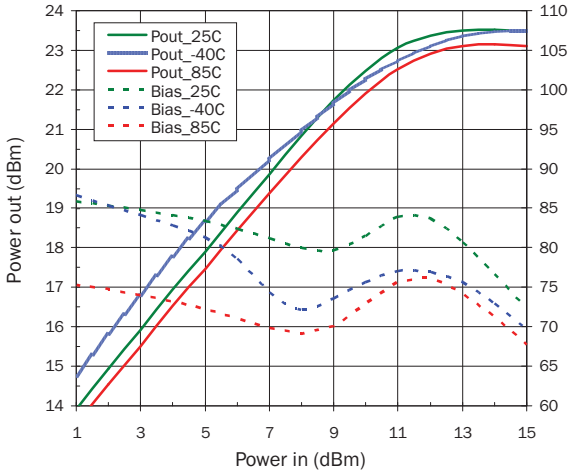
OIP_3 versus Frequency (0dBm tones)



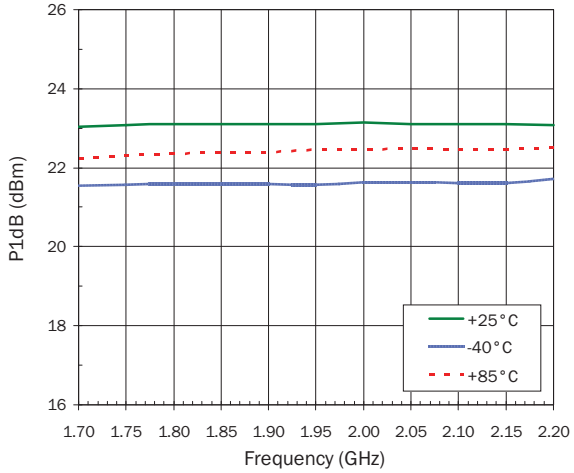
OIP_3 versus Power (1900MHz, 1MHz spacing)



P_{OUT} versus Pin at 1900MHz

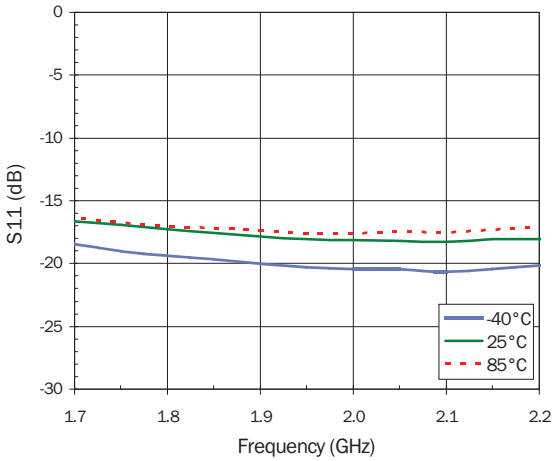


P1dB versus Frequency

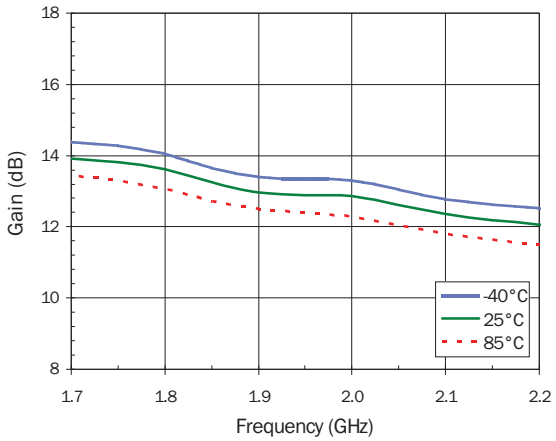


Typical RF Performance - 1900MHz Application Circuit with V_D=3V, I_D=90mA

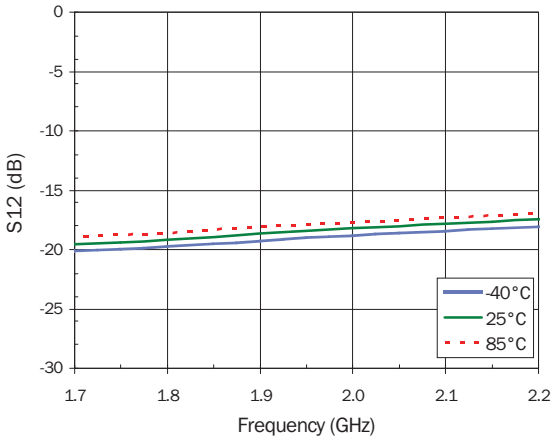
S11 versus Frequency



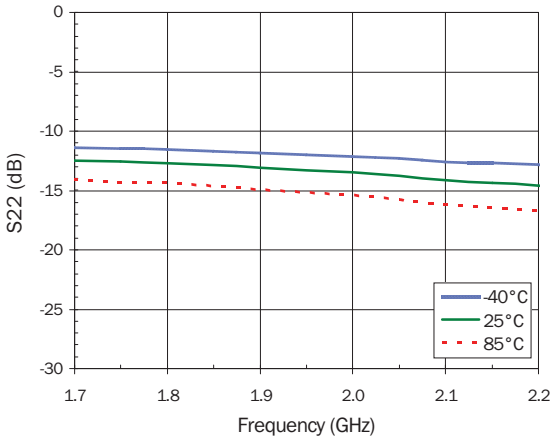
S21 versus Frequency



S12 versus Frequency

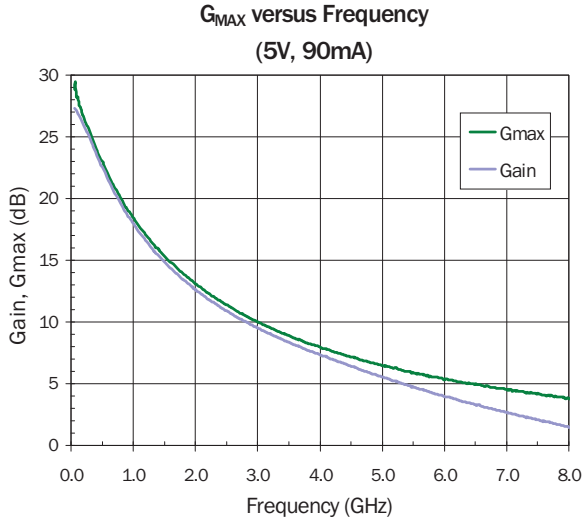


S22 versus Frequency

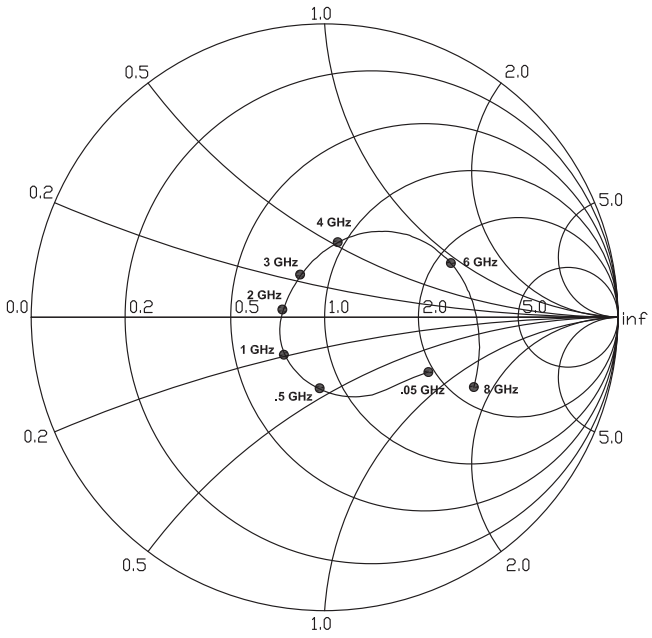


7628 Thorndike Road, Greensboro, NC 27409-9421 · For sales or technical support, contact RFMD at (+1) 336-678-5570 or sales-support@rfmd.com.

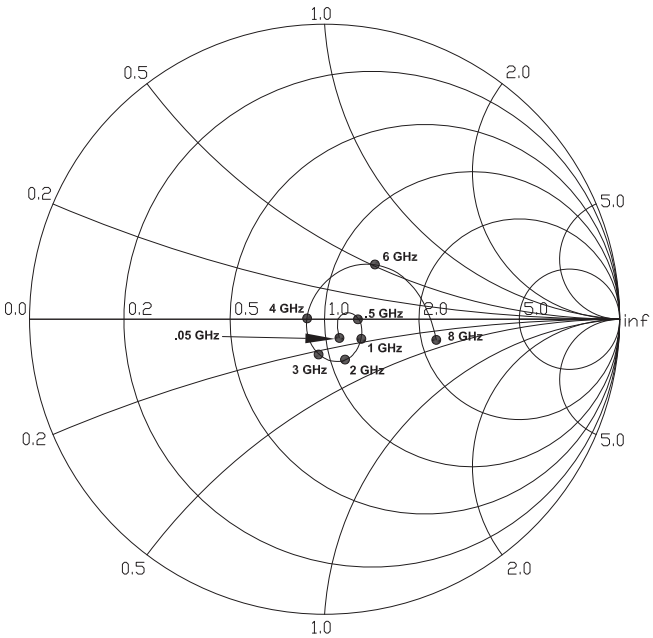
De-embedded Device S-parameters (Bias Tee Data)



S11 versus Frequency (5V, 90mA)

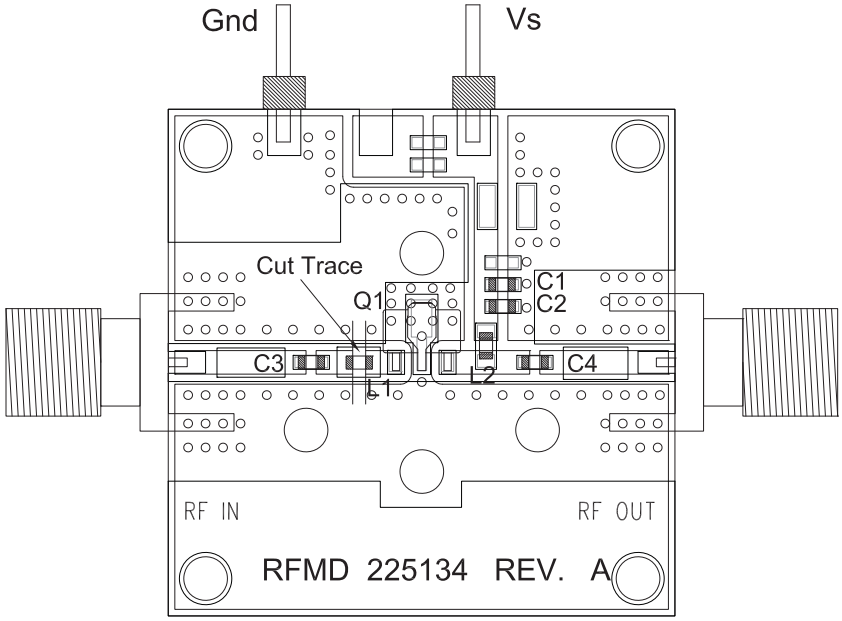


S22 versus Frequency (5V, 90mA)



7628 Thorndike Road, Greensboro, NC 27409-9421 · For sales or technical support, contact RFMD at (+1) 336-678-5570 or sales-support@rfmd.com.

900MHz Evaluation Board Layout

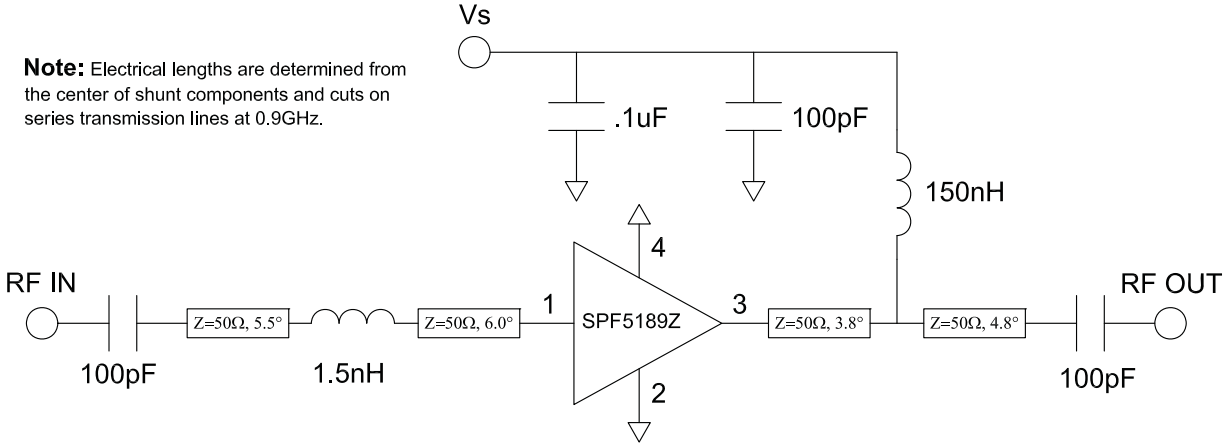


Bill of Materials (SPF5189Z, 900MHz)

C1	ECJ-1VB1C104, Panasonic, 0.1uF
C2, C3, C4	ECJ-1VC1H101J, Panasonic, 100pF
L1	LL1608-FSL1N5, Toko, 1.5nH
L2	LL1608-FSR15J, Toko, 150nH

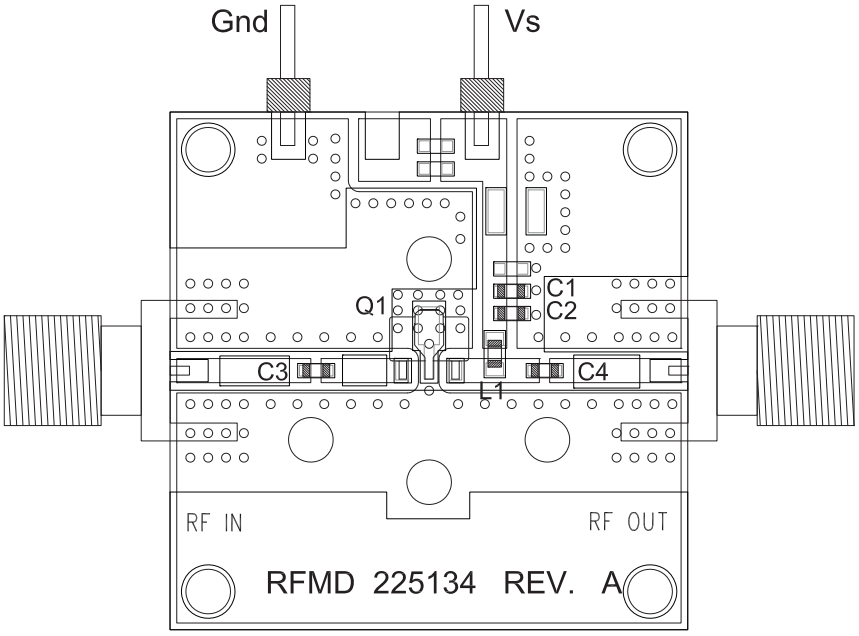
900MHz Application Schematic

Note: Electrical lengths are determined from the center of shunt components and cuts on series transmission lines at 0.9GHz.



7628 Thorndike Road, Greensboro, NC 27409-9421 · For sales or technical support, contact RFMD at (+1) 336-678-5570 or sales-support@rfmd.com.

1900MHz Evaluation Board Layout

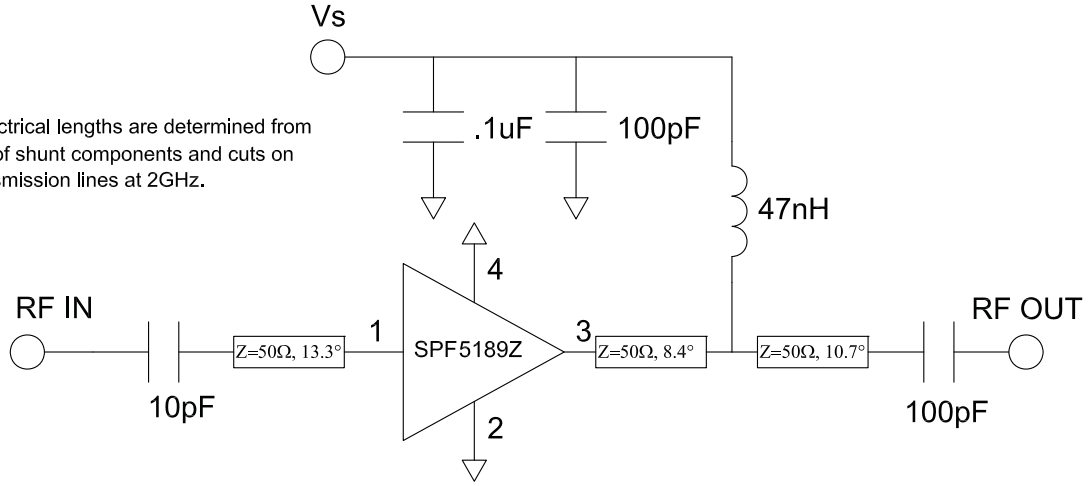


Bill of Materials (SPF5189Z, 1900MHz)

C1	ECJ-1VB1C104, Panasonic, 0.1uF
C2, C4	ECJ-1VC1H101J, Panasonic, 100pF
C3	ECJ-1VC1H100, Panasonic, 10pF
L1	LL1608-FSL47N, Toko, 47nH

1900MHz Application Schematic

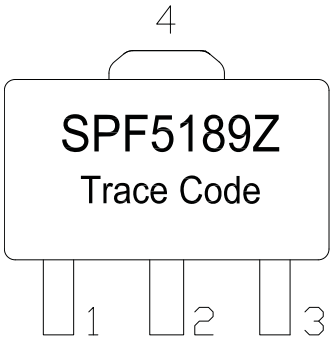
Note: Electrical lengths are determined from the center of shunt components and cuts on series transmission lines at 2GHz.



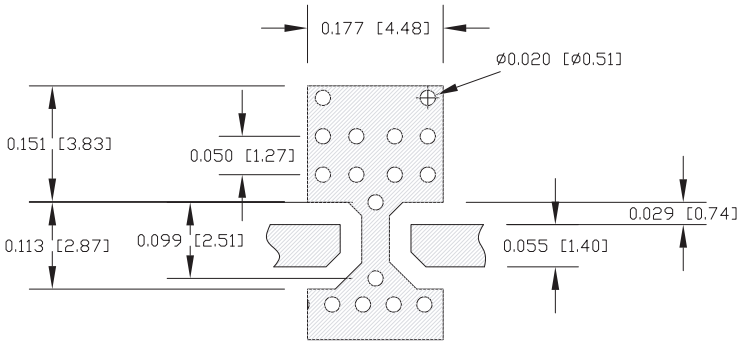
Pin Names and Description

Pin	Function	Description
1	RF IN	RF input pin. This pin requires the use of an external DC-blocking capacitor chosen for the frequency of operation.
2	GND	Connection to ground. Use via holes as close to the device ground leads as possible to reduce ground inductance and achieve optimum RF performance.
3	RF OUT/DC BIAS	RF output and bias pin. This pin requires the use of an external DC-blocking capacitor chosen for the frequency of operation.
4	GND	Connection to ground. Use via holes as close to the device ground leads as possible to reduce ground inductance and achieve optimum RF performance.

Part Identification

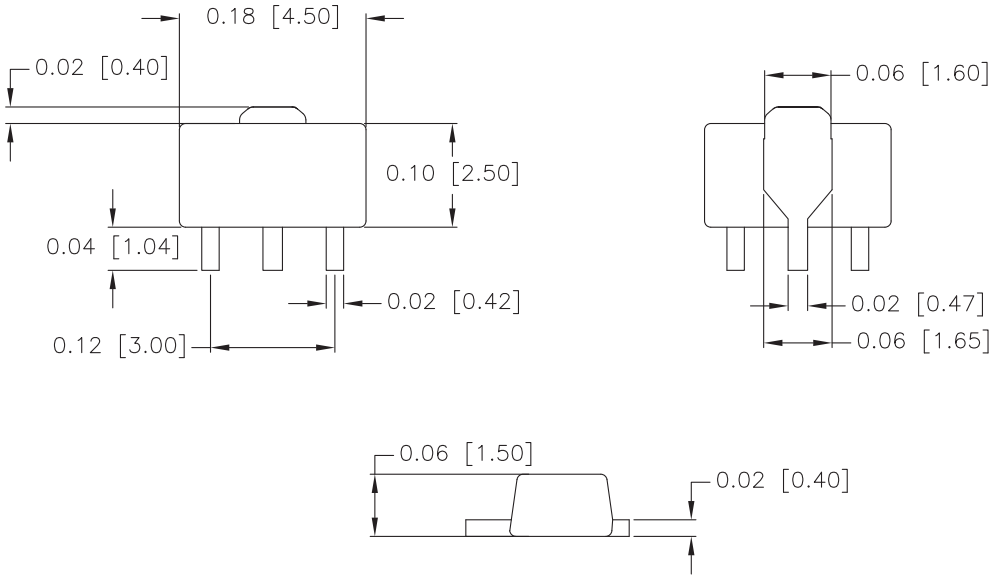


Suggested Pad Layout



Package Drawing

Dimensions in inches (millimeters)
Refer to drawing posted at www.rfmd.com for tolerances.



7628 Thorndike Road, Greensboro, NC 27409-9421 · For sales or technical support, contact RFMD at (+1) 336-678-5570 or sales-support@rfmd.com.

Ordering Information

Part Number	Description
SPF5189Z	7" Reel with 1000 pieces
SPF5189ZSQ	Sample Bag with 25 pieces
SPF5189ZSR	7" Reel with 100 pieces
SPF5189ZPCK1	800MHz to 1000MHz PCBA with 5-piece Sample Bag
SPF5189ZPCK2	1700MHz to 2200MHz PCBA with 5-piece Sample Bag

7628 Thorndike Road, Greensboro, NC 27409-9421 · For sales or technical support, contact RFMD at (+1) 336-678-5570 or sales-support@rfmd.com.

LifeElectronics
Живое партнерство

ООО «ЛайфЭлектроникс» **“LifeElectronics” LLC**

ИНН 7805602321 КПП 780501001 Р/С 40702810122510004610 ФАКБ "АБСОЛЮТ БАНК" (ЗАО) в г.Санкт-Петербурге К/С 30101810900000000703 БИК 044030703

Компания «Life Electronics» занимается поставками электронных компонентов импортного и отечественного производства от производителей и со складов крупных дистрибьюторов Европы, Америки и Азии.

С конца 2013 года компания активно расширяет линейку поставок компонентов по направлению коаксиальный кабель, кварцевые генераторы и конденсаторы (керамические, пленочные, электролитические), за счёт заключения дистрибьюторских договоров

Мы предлагаем:

- *Конкурентоспособные цены и скидки постоянным клиентам.*
- *Специальные условия для постоянных клиентов.*
- *Подбор аналогов.*
- *Поставку компонентов в любых объемах, удовлетворяющих вашим потребностям.*

- *Приемлемые сроки поставки, возможна ускоренная поставка.*
- *Доставку товара в любую точку России и стран СНГ.*
- *Комплексную поставку.*
- *Работу по проектам и поставку образцов.*
- *Формирование склада под заказчика.*

- *Сертификаты соответствия на поставляемую продукцию (по желанию клиента).*
- *Тестирование поставляемой продукции.*
- *Поставку компонентов, требующих военную и космическую приемку.*
- *Входной контроль качества.*
- *Наличие сертификата ISO.*

В составе нашей компании организован Конструкторский отдел, призванный помогать разработчикам, и инженерам.

Конструкторский отдел помогает осуществить:

- *Регистрацию проекта у производителя компонентов.*
- *Техническую поддержку проекта.*
- *Защиту от снятия компонента с производства.*
- *Оценку стоимости проекта по компонентам.*
- *Изготовление тестовой платы монтаж и пусконаладочные работы.*

Тел: +7 (812) 336 43 04 (многоканальный)
Email: org@lifeelectronics.ru

www.lifeelectronics.ru