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SPD-2226Z

40MHz to 1000MHz DUAL GaAs HFET AMPLIFIER

Package: SOF-26

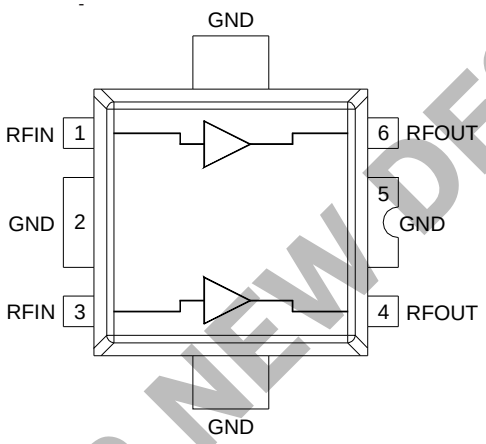
Product Description

RFMD's SPD-2226Z is a high performance AlGaAs/GaAs Heterostructure FET (HFET) housed in a low-cost surface-mount plastic package. The HFET technology improves breakdown voltage while minimizing Schottky leakage current resulting in higher PAE and improved linearity. The active bias network provides stable current over temperature and process Beta variations. The SPD-2226Z product contains two amplifiers for use in Push-Pull CATV amplifiers requiring excellent second order performance.

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

Simplified Device Schematic



Features

- Low Distortion: 83/85dBc CTB/CSO
- 5V, 6V, 7V Supply
- Robust 1000V ESD, Class 1C

Applications

- CATV Network Amplifiers
- CATV Drop Amplifiers
- Optical Rx/Tx
- FTTH Video Solutions

Parameter	Specification			Unit	Condition
	Min.	Typ.	Max.		
Small Signal Gain		15.5		dB	500MHz
Output Power at 1dB Compression		30.0		dBm	500MHz
Third Order Intercept Point		44.0		dBm	500MHz
CSO Lower		88.0		dBc	79CH., Flat Tilt, +34dBmV
CSO Upper		85.0		dBc	79CH., Flat Tilt, +34dBmV
CTB		83.0		dBc	79CH., Flat Tilt, +34dBmV
XMOD		74.0		dBc	79CH., Flat Tilt, +34dBmV
Input Return Loss		-12.0		dB	40MHz to 1000MHz
Output Return Loss		-18.0		dB	40MHz to 1000MHz
Reverse Isolation		23.5		dB	40MHz to 1000MHz
Noise Figure		2.5		dB	500MHz
Device Operating Voltage		6.0		V	
Device Operating Current		500.0		mA	
Thermal Resistance		21.0		°C/W	junction - lead

Test Conditions: V_{DD}=6V, I_D=500mA Typ., OIP_3 Spacing=1MHz, P_{OUT} per tone=13dBm, T_L=25°C, Z_S=Z_L=50Ω

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Absolute Maximum Ratings

Parameter	Rating	Unit
Drain Current (I_{DS})	800	mA
Forward Gate Current (I_{GSF})	4.2	mA
Reverse Gate Current (I_{GSR})	4.2	mA
Drain-to-Source Voltage (V_{DS})	+9.0	V
Gate-to-Source Voltage (V_{GS})	<-5 or >0	V
RF Input Power (P_{IN})	800	mW
Operating Lead Temperature	See P_{DC} Formula	°C
Storage Lead Temperature	-40 to +165	°C
Power Dissipation	See P_{DC} Formula	W
Channel Temperature (T_J)	+165	°C

Note: Absolute Max ratings are for the entire device operating in a balanced circuit configuration
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 EUDirective2002/95/EC (at time of this document revision).

Parameter	Specification			Unit	Condition
	Min.	Typ.	Max.		
Small Signal Gain		15.5		dB	500MHz
Output Power at 1dB Compression		27.0		dBm	500MHz
Third Order Intercept Point		42.0		dBm	500MHz
CSO Lower		88.0		dBc	79CH., Flat Tilt, +34dBmV
CSO Upper		84.0		dBc	79CH., Flat Tilt, +34dBmV
CTB		79.0		dBc	79CH., Flat Tilt, +34dBmV
XMOD		70.0		dBc	79CH., Flat Tilt, +34dBmV
Input Return Loss		-12.0		dB	40MHz to 1000MHz
Output Return Loss		-16.0		dB	40MHz to 1000MHz
Reverse Isolation		23.5		dB	40MHz to 1000MHz
Noise Figure		2.4		dB	500MHz
Device Operating Voltage		5.0		V	
Device Operating Current		500.0		mA	
Thermal Resistance		21.0		°C/W	junction - lead

Test Conditions: V_{DD}=5V, I_D=500mA Typ., OIP_3 Spacing=1MHz, P_{OUT} per tone=13dBm, T_L=25°C, Z_S=Z_L=50Ω

Parameter	Specification			Unit	Condition
	Min.	Typ.	Max.		
Small Signal Gain		15.5		dB	500MHz
Output Power at 1dB Compression		31.0		dBm	500MHz
Third Order Intercept Point		44.0		dBm	500MHz
CSO Lower		89.0		dBc	79CH., Flat Tilt, +34dBmV
CSO Upper		85.0		dBc	79CH., Flat Tilt, +34dBmV
CTB		84.0		dBc	79CH., Flat Tilt, +34dBmV
XMOD		79.0		dBc	79CH., Flat Tilt, +34dBmV
Input Return Loss		-12.0		dB	40MHz to 1000MHz
Output Return Loss		-20.0		dB	40MHz to 1000MHz
Reverse Isolation		23.5		dB	40MHz to 1000MHz
Noise Figure		2.7		dB	500MHz
Device Operating Voltage		7.0		V	
Device Operating Current		500.0		mA	
Thermal Resistance		21.0		°C/W	junction - lead

Test Conditions: V_{DD}=7V, I_D=500mA Typ., OIP_3 Spacing=1MHz, P_{OUT} per tone=13dBm, T_L=25°C, Z_S=Z_L=50Ω

Typical Unit Performance

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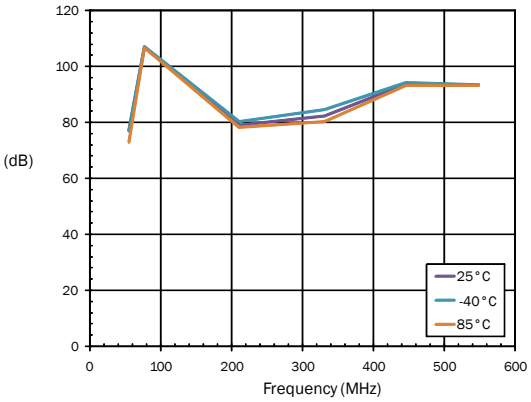
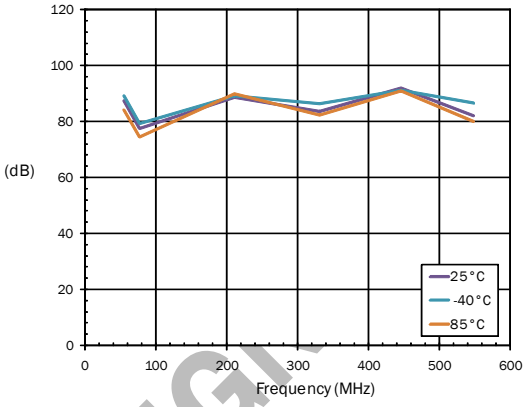
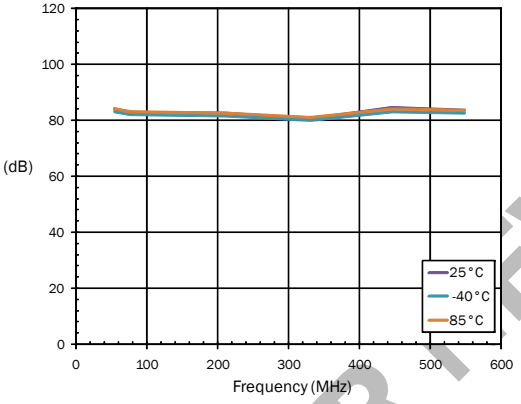
CSO Lower 6V 500mA



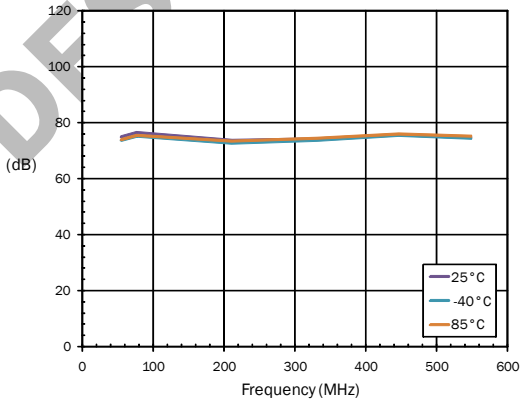
CSO Upper 6V 500mA



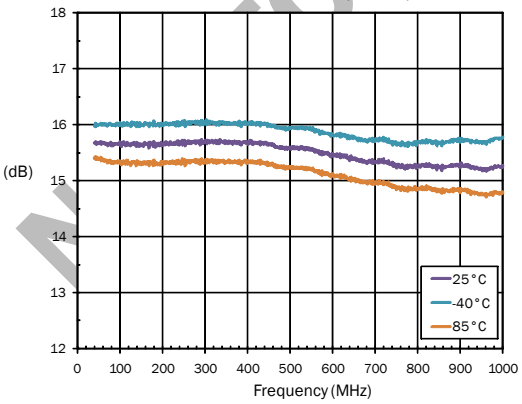
CTB 6V 500mA



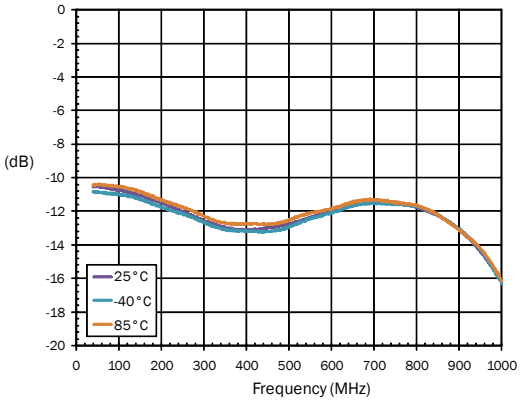
XMOD 6V 500mA



Gain 6V 500mA (+25°C)



Input Return Loss 6V 500mA



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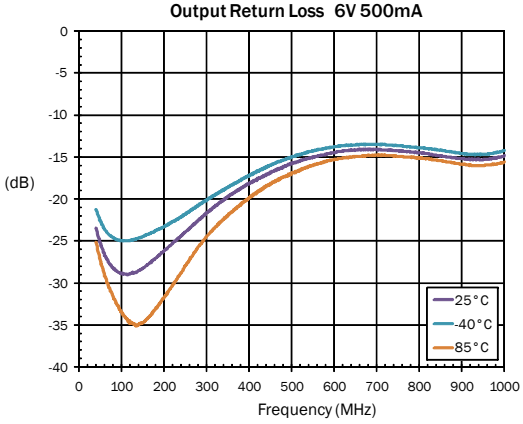
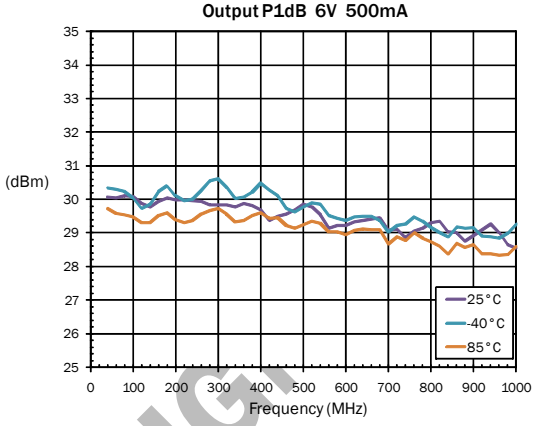
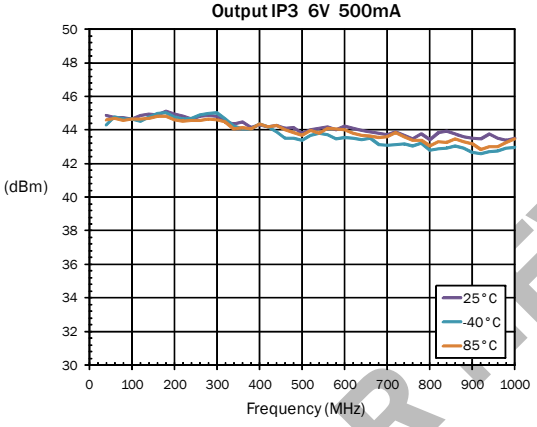
Output Return Loss 6V 500mA



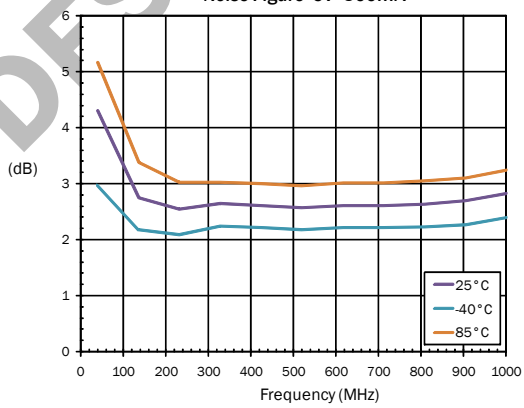
Output P1dB 6V 500mA



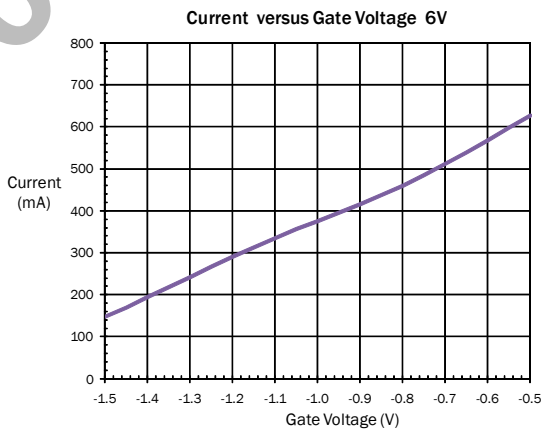
Output IP3 6V 500mA



Noise Figure 6V 500mA



Current versus Gate Voltage 6V



Pin	Function	Description
1, 3	RF IN	RF input pin. This pin requires the use of an external DC blocking capacitor chosen for the frequency of operation.
2, 5	GND	Connection to ground. Use via holes for best performance to reduce lead inductance as close to ground leads as possible.
4, 6	RF OUT/BIAS	RF output and bias pin. DC voltage is present on this pin, therefore a DC blocking capacitor is necessary for proper operation.

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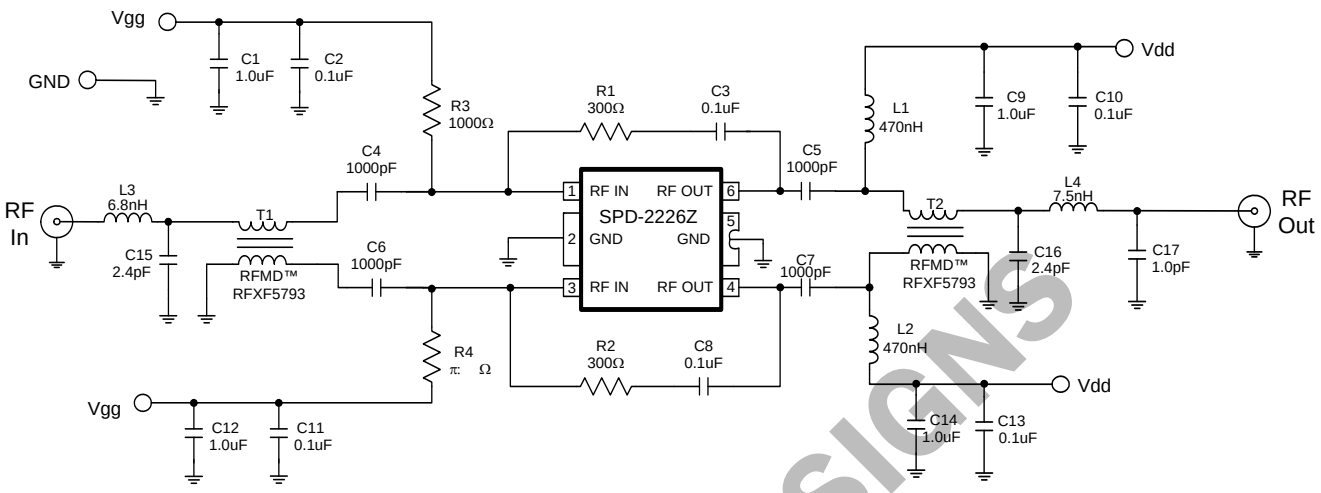
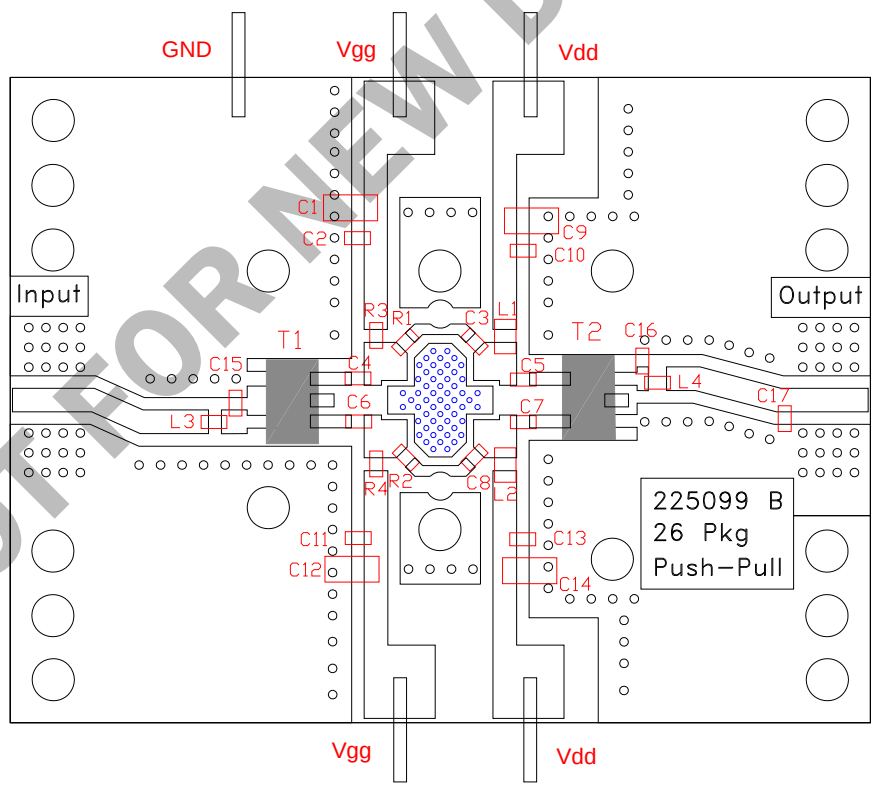
Evaluation Board Schematic



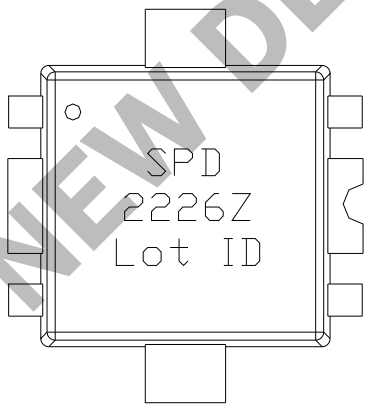
Evaluation Board Layout



Evaluation Board Circuit Values

Designator	Value	Size	Notes
R1, R2	300Ω	0603	ROHM
R3, R4	1000Ω	0603	ROHM
L1, L2	470nH	0805	CoilCraft
C1, C9, C12, C14	1uF	1206	Murata
C4, C5, C6, C7	1000pF	0603	AVX NPO
C2, C3, C8, C10, C11, C13	0.1uF	0603	AVX NPO
T1, T2	Transformer		RFMD™ RFXF5793
C15, C16	2.4pF	0603	AVX NPO
C17	1.0pF	0603	AVX NPO
L3	6.8nH	0603	CoilCraft
L4	7.5nH	0603	CoilCraft

Package Marking



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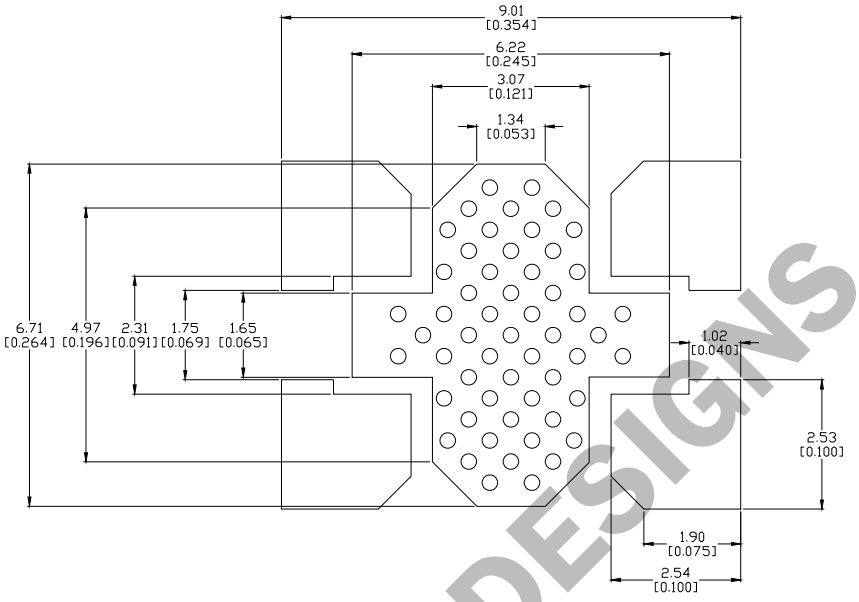
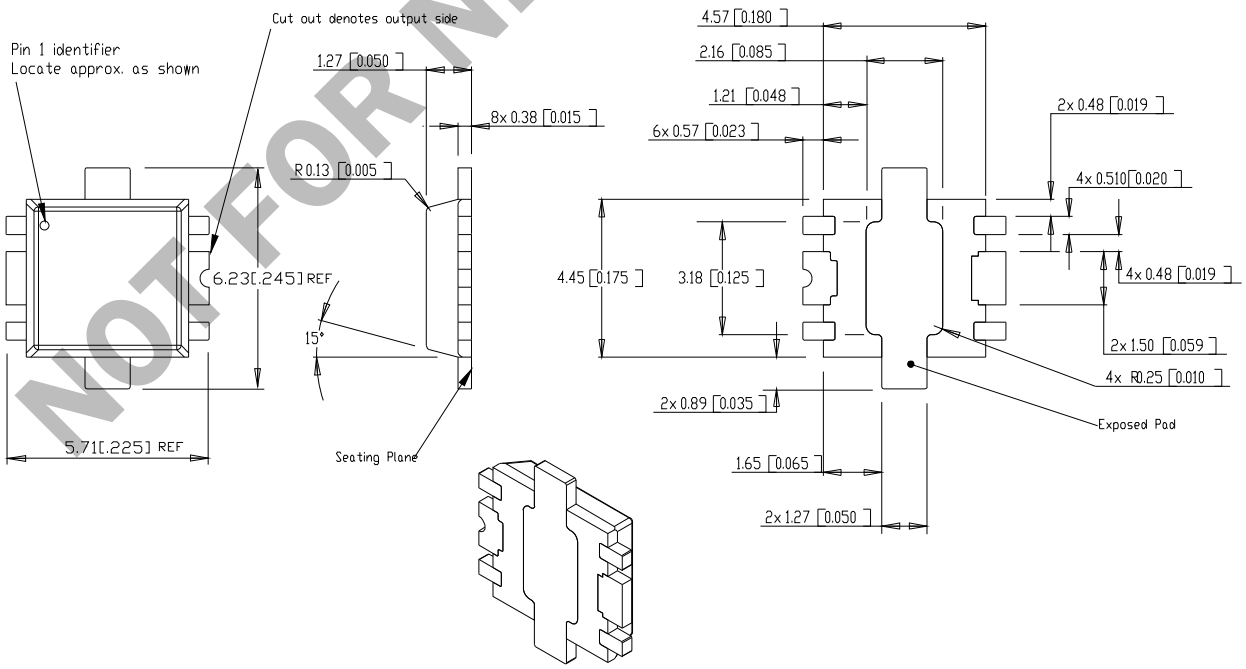
Suggested PCB Pad Layout



Package Drawing

Dimensions in millimeters (inches)

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



Ordering Information

Part Number	Description	Reel Size (in.)	Devices/Reel
SPD2226ZSB	5pcs Sample Bag	NA	NA
SPD2226ZSQ	25pcs Sample Bag	NA	NA
SPD2226ZSR	Lead Free, RoHS Compliant	7	100
SPD2226Z	Lead Free, RoHS Compliant	13	1000
SPD2226Z-EVB1	40MHz to 1000MHz Evaluation Board	NA	NA

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