RF2301

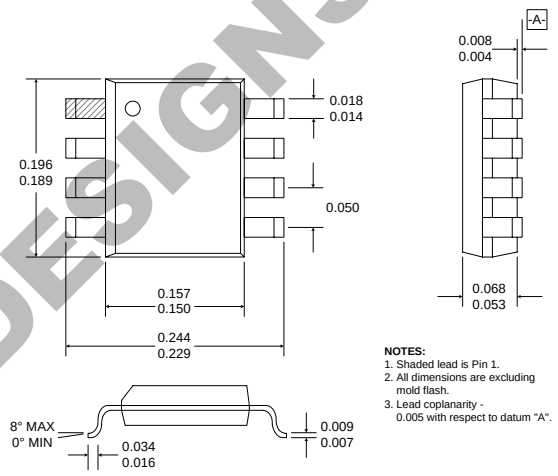
HIGH ISOLATION BUFFER AMPLIFIER

Typical Applications

- Local Oscillator Buffer Amplifiers
- FDD and TDD Communication Systems
- Commercial and Consumer Systems
- Portable Battery-Powered Equipment
- Wireless LAN
- ISM Band Applications

Product Description

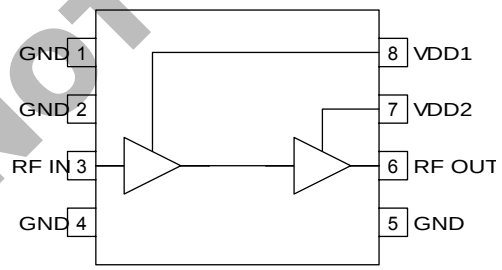
The RF2301 is a high reverse isolation buffer amplifier. The device is manufactured on a low-cost Gallium Arsenide MESFET process, and has been designed for use as a general purpose buffer in high-end communication systems operating at frequencies from less than 300MHz to higher than 2500MHz. With +5dBm output power, it may also be used as a driver in transmitter applications. The device is packaged in an 8-lead plastic package. The product is self-contained, requiring just a resistor and blocking capacitors to operate. The output power, combined with 50dB reverse isolation at 900MHz allows excellent buffering of LO sources to impedance changes. The device can be used in 3V battery applications. The unit has a total gain of 17dB from a 3V supply.



Package Style: SOIC-8

Optimum Technology Matching® Applied

- ☐ Si BJT
- ☐ Si Bi-CMOS
- ☐ InGaP/HBT
- ☐ GaAs HBT
- ☐ SiGe HBT
- ☐ GaN HEMT
- ☑ GaAs MESFET
- ☐ Si CMOS
- ☐ SiGe Bi-CMOS



Functional Block Diagram

Features

- Single 2.7V to 4.0V Supply
- +0dBm Output Power
- 20dB Small Signal Gain
- 50dB Reverse Isolation at 900MHz
- 300MHz to 2500MHz Operation

Ordering Information

RF2301	High Isolation Buffer Amplifier
RF2301PCBA-41X	Fully Assembled Evaluation Board

RF Micro Devices, Inc.
7628 Thorndike Road
Greensboro, NC 27409, USA
Tel (336) 664 1233
Fax (336) 664 0454
http://www.rfmd.com

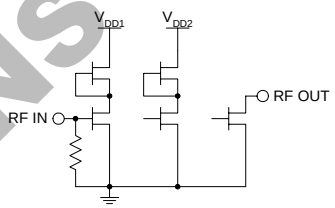
Absolute Maximum Ratings

Parameter	Rating	Unit
Supply Voltage (V_{DD})	-0.5 to +5.0	V_{DC}
DC Supply Current	40	mA
Input RF Power	+10	dBm
Operating Ambient Temperature	-40 to +85	°C
Storage Temperature	-40 to +150	°C

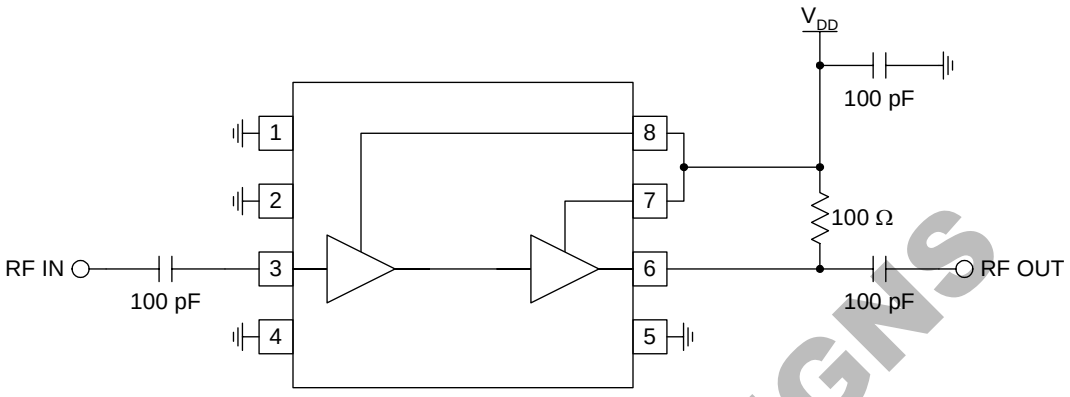
Caution! ESD sensitive device.

Parameter	Specification			Unit	Condition
	Min.	Typ.	Max.		
Overall					T=25°C, V_{DD}=4V_{DC}
Noise Figure	9.5	11.5	13.5	dB	
Input VSWR		<2:1			In a 50Ω system
Output VSWR		<2:1			In a 50Ω system
Power Supply Voltage		2.7 to 4.0		V	
Broadband 100MHz-1900MHz					
Nominal 4V Configuration					V_{DD}=4V_{DC}, T=25°C
Gain	16	20	24	dB	
P_{1dB} Output Power	0	+3	+6	dBm	
Input IP3	-10	-5	0		
Supply Current	25	30	35	mA	
Reverse Isolation		50		dB	900MHz, without RF input
		50		dB	900MHz, with RF input, saturated
Nominal 3V Configuration					V_{DD}=3V_{DC}, T=25°C
Gain	15	18	21	dB	
P_{1dB} Output Power	-2	+1	+4	dBm	
Input IP3	-10	-5	0		
Supply Current	25	29	35	mA	
Reverse Isolation		50		dB	900MHz, without RF input
		50		dB	900MHz, with RF input, saturated
High Band 2500MHz					
Nominal 4V Configuration					V_{DD}=4V_{DC}, T=25°C
Gain	17	21	25	dB	
P_{1dB} Output Power	-5	0	+5	dBm	
Input IP3	-12	-8	-4		
Supply Current	27	31	35	mA	
Reverse Isolation		40		dB	2500MHz, without RF input
		40		dB	2500MHz, with RF input, saturated
Nominal 3V Configuration					V_{DD}=3V_{DC}, T=25°C
Gain	14	18	23	dB	
P_{1dB} Output Power	-6	-2	+4	dBm	
Input IP3	-12	-8	-4		
Supply Current	27	30	33	mA	
Reverse Isolation		40		dB	2500MHz, without RF input
		40		dB	2500MHz, with RF input, saturated

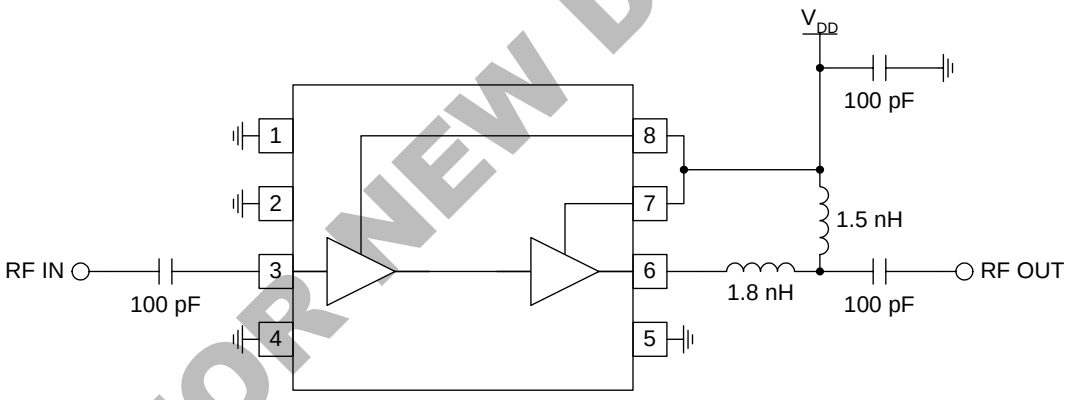
Note: Performance of the RF2301 over temperature cannot be guaranteed for a V_{DD} greater than 4V.

Pin	Function	Description	Interface Schematic
1	GND	Low inductance ground connections. Use individual vias to backside ground plane, placed within 0.030" of pin landing for optimum performance.	
2	GND	Same as pin 1.	
3	RF IN	DC-coupled RF input. A broadband impedance match is produced by internal shunt resistive feedback. The DC level is 0V. If a DC voltage is present from connected circuitry, an external DC-blocking capacitor is required for the proper DC operating point.	
4	GND	Same as pin 1.	
5	GND	Same as pin 1.	
6	RF OUT	Open drain RF output. A broadband impedance match is produced by an external 100Ω resistor to power supply as shown in Application Schematic 1. Approximately 3dB improvement in gain and output power can be obtained over at least a 20% bandwidth by replacing the resistor to power supply with an external chip inductor network as shown in Application Schematic 2. An external DC-blocking capacitor is required if the following circuitry is not DC-blocked.	
7	VDD2	Power supply connections. Bypass with external chip capacitor and individual via to backside ground plane.	
8	VDD1	Power supply connections. Bypass with external chip capacitor and individual via to backside ground plane.	

Application Schematic 1
Broadband Match

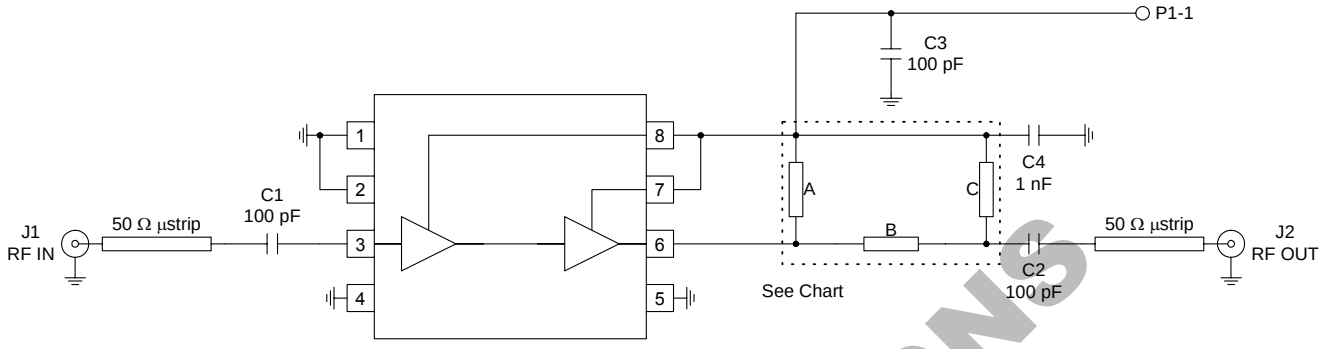


Application Schematic 2
2450MHz Optimum Match

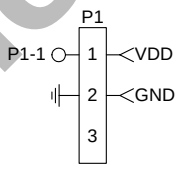


Evaluation Board Schematic

(Download Bill of Materials from www.rfmd.com.)

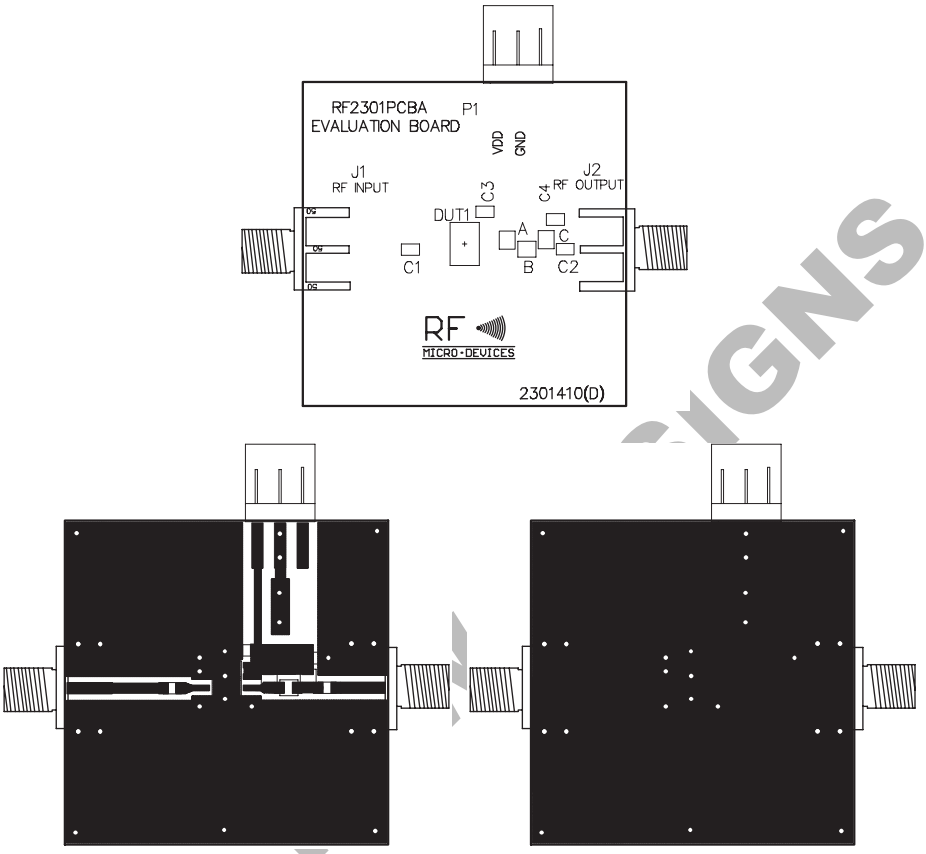


FREQUENCY BAND	COMPONENT		
	A	B	C
BROADBAND (default config.)	100 Ω	N/A	N/A
2450 MHz	N/A	1.8 nH	1.5 nH

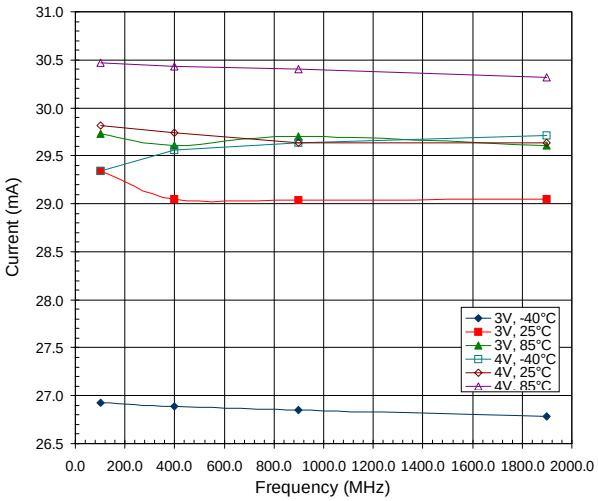


Evaluation Board Layout
1.43” x 1.43”

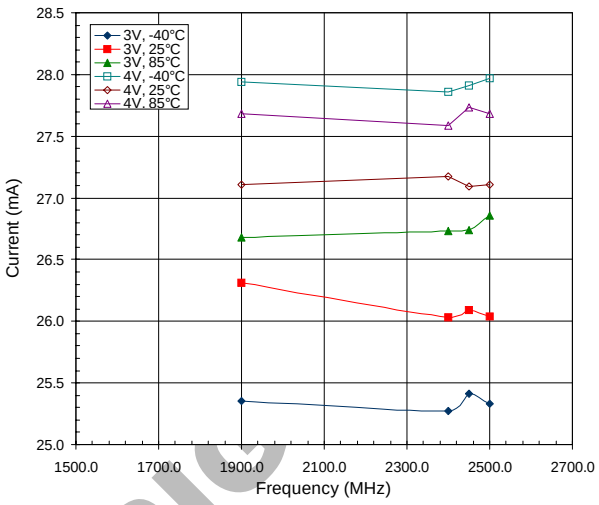
Board Thickness 0.031”; Board Material FR-4



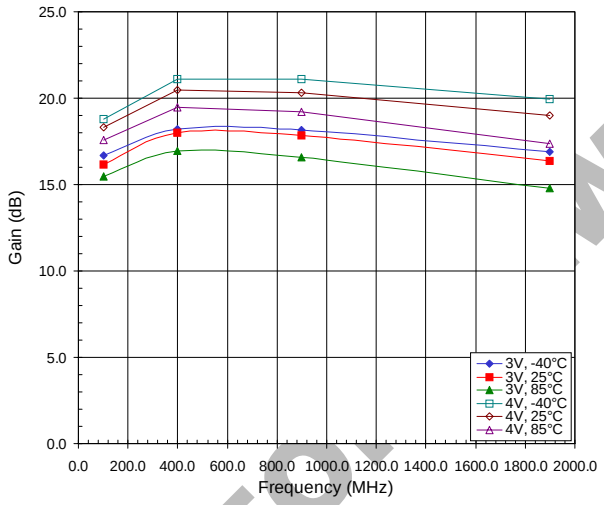
Current verusus Frequency (Wide Band)



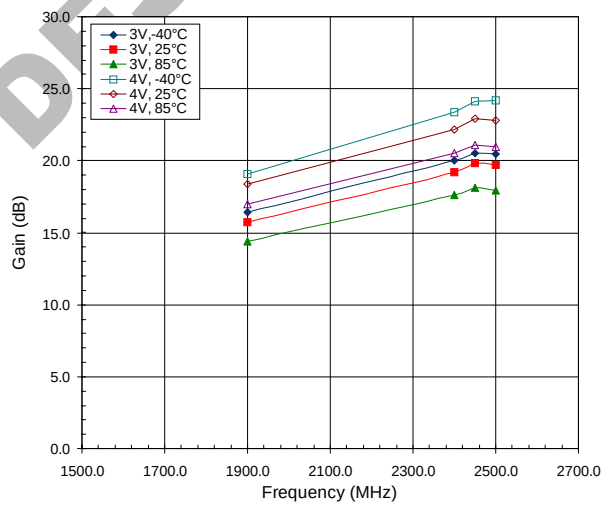
Current versus Frequency (High Band)



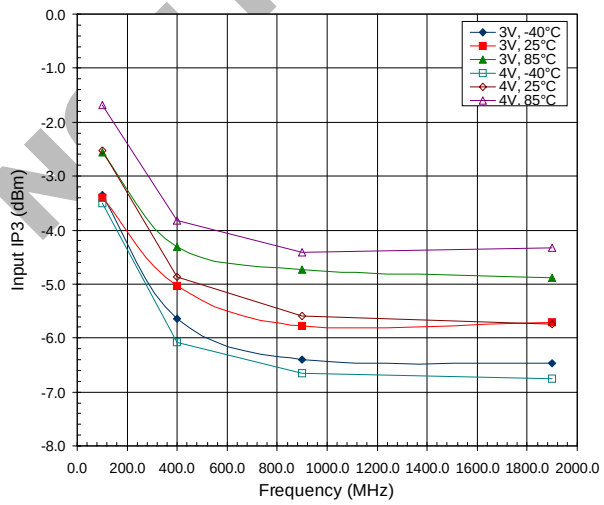
Gain versus Frequency (Wide Band)



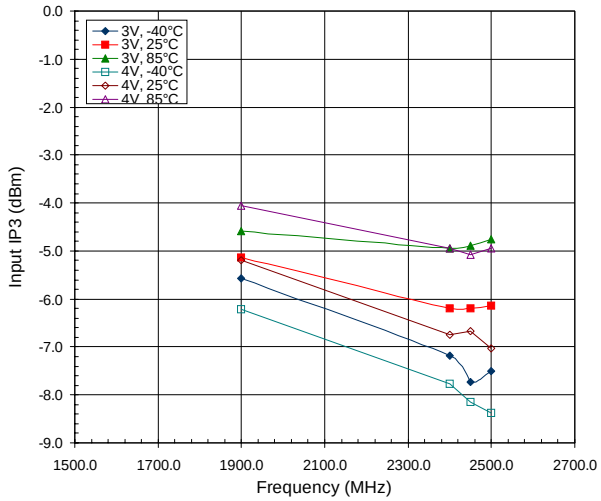
Gain versus Frequency (High Band)



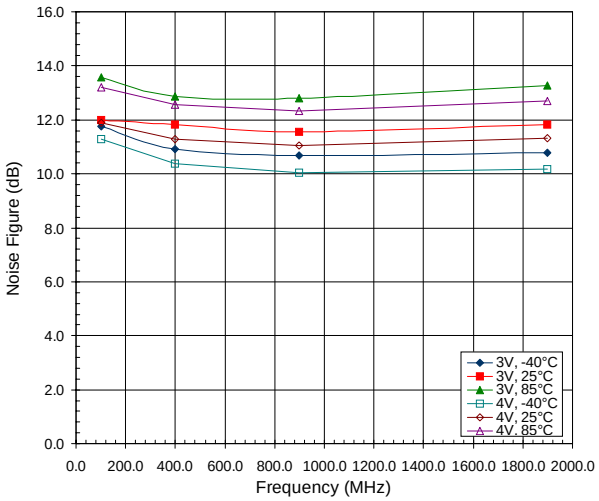
Input IP3 versus Frequency (Wide Band)



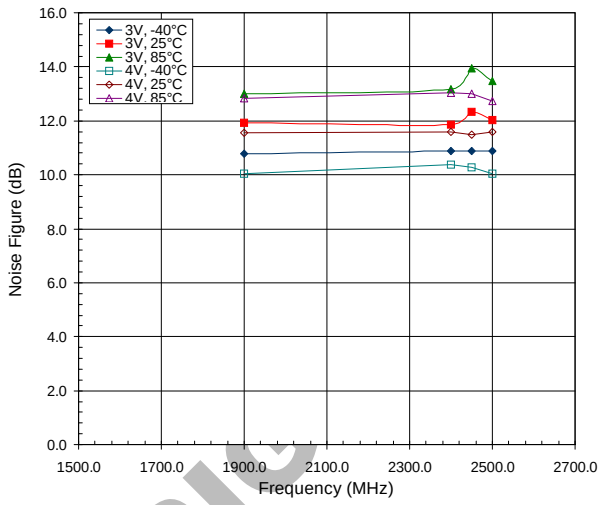
Input IP3 versus Frequency (High Band)



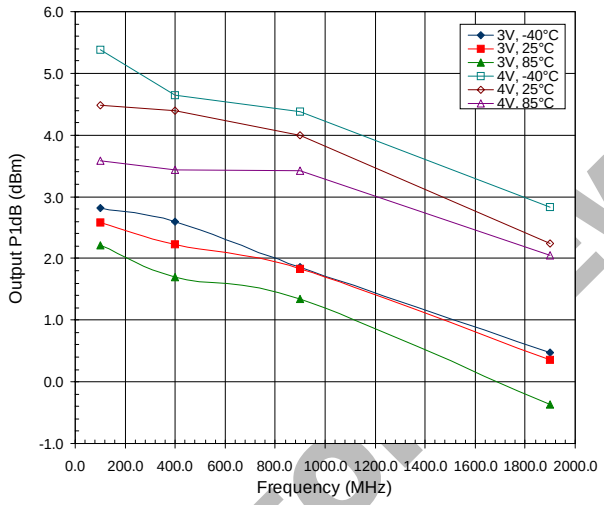
Noise Figure versus Frequency (Wide Band)



Noise Figure versus Frequency (High Band)



Output P1dB versus Frequency (Wide Band)



Output P1dB versus Frequency (High Band)