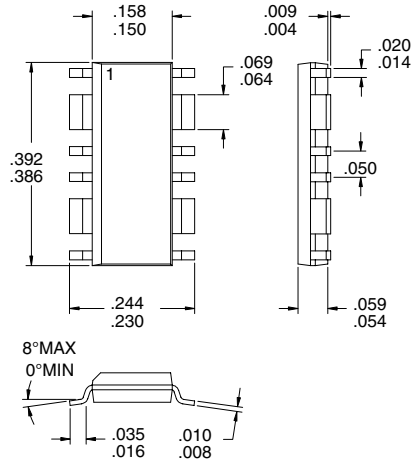
Typical Applications

- CATV Distribution Amplifiers
- Cable Modems
- Broadband Gain Blocks
- Laser Diode Driver
- Return Channel Amplifier
- Base Stations

Product Description

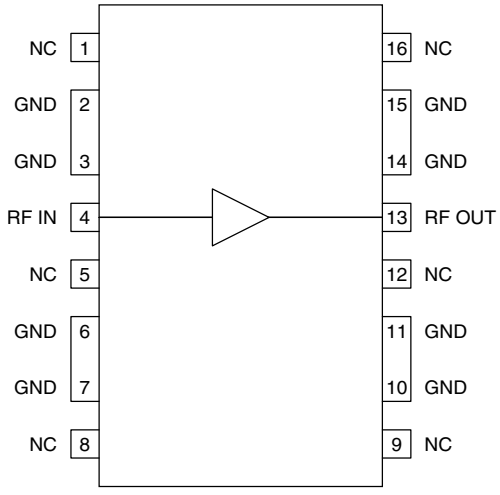
The RF2317 is a general purpose, low cost high linearity RF amplifier IC. The device is manufactured on an advanced Gallium Arsenide Heterojunction Bipolar Transistor (HBT) process, and has been designed for use as an easily cascadable 75Ω gain block. The gain flatness of better than ±0.4dB from 50MHz to 1000MHz, and the high linearity, make this part ideal for cable TV applications. Other applications include IF and RF amplification in wireless voice and data communication products operating in frequency bands up to 3GHz. The device is self-contained with 75Ω input and output impedances and requires only two external DC biasing elements to operate as specified.



Package Style: SOP-16 QBW1

Optimum Technology Matching® Applied

- ☐ Si BJT
- ☑ GaAs HBT
- ☐ GaAs MESFET
- ☐ Si Bi-CMOS
- ☐ SiGe HBT
- ☐ Si CMOS



Functional Block Diagram

Features

- DC to 3.0GHz Operation
- Internally Matched Input and Output
- 15dB Small Signal Gain
- 4.9dB Noise Figure
- +26dBm Output Power
- Single 9V to 12V Power Supply

Ordering Information

RF2317	Linear CATV Amplifier
RF2317 PCBA	Fully Assembled Evaluation Board

RF Micro Devices, Inc.
7625 Thorndike Road
Greensboro, NC 27409, USA
Tel (336) 664 1233
Fax (336) 664 0454
http://www.rfmd.com

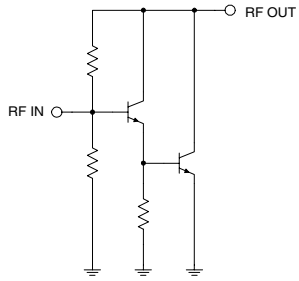
Absolute Maximum Ratings

Parameter	Rating	Unit
Device Current	250	mA
Input RF Power	+18	dBm
Output Load VSWR	20:1	
Ambient Operating Temperature	-40 to +85	°C
Storage Temperature	-40 to +150	°C

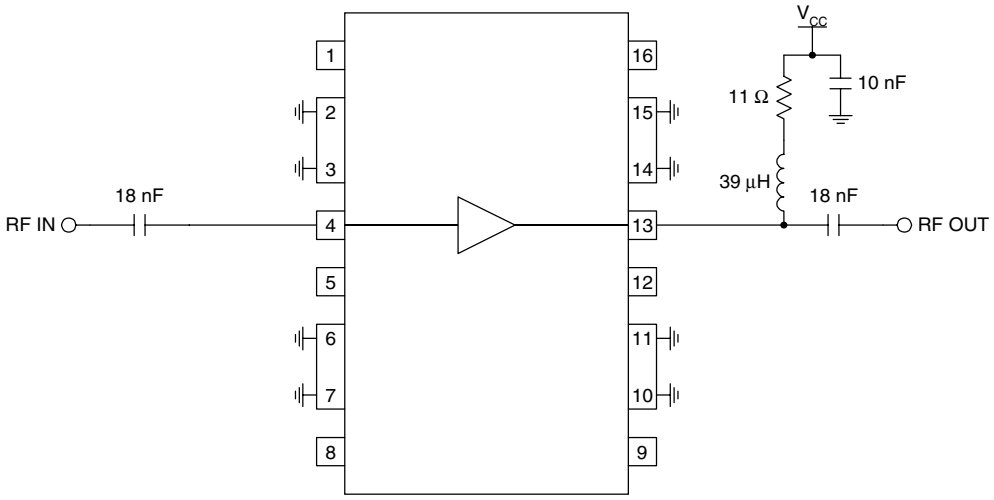
Caution! ESD sensitive device.

Parameter	Specification			Unit	Condition
	Min.	Typ.	Max.		
Overall (50Ω)					T=25 °C, I_{CC}=180mA, R_C=11Ω, 50Ω System
Frequency Range		DC to 3000		MHz	3dB Bandwidth
Gain	14.0	14.5		dB	
Noise Figure		4.9		dB	From 100MHz to 1000MHz
Input VSWR		1.7			Appropriate values for the DC blocking capacitors and bias inductor are required to maintain this VSWR at the intended operating frequency range.
Output VSWR		2.2			Appropriate values for the DC blocking capacitors and bias inductor are required to maintain this VSWR at the intended operating frequency range.
Output IP_3				dBm	At 100MHz
Output IP_3		+42		dBm	At 500MHz
Output IP_3				dBm	At 900MHz
Output IP_2		+63		dBm	F_1=400MHz, F_2=500MHz, F_{OUT}=100MHz
Output P_{1dB}				dBm	At 100MHz
Output P_{1dB}		+26		dBm	At 500MHz
Output P_{1dB}				dBm	At 900MHz
Saturated Output Power				dBm	At 100MHz
Saturated Output Power		+27		dBm	At 500MHz
Saturated Output Power				dBm	At 900MHz
Reverse Isolation		20		dB	
Thermal					
$Theta_{JC}$		47		°C/W	I_{CC}=150mA, P_{DISS}=1.3W, T_{AMB}=85°C
Maximum junction temperature		153		°C	
Mean Time Between Failures		$8.6x10^2$		years	T_{AMB}=+85°C
Mean Time Between Failures		$1.8x10^5$		years	T_{AMB}=+25°C
$Theta_{JC}$		54		°C/W	I_{CC}=180mA, P_{DISS}=1.7W, T_{AMB}=85°C
Maximum Junction Temperature		177		°C	
Mean Time Between Failures		99		years	T_{AMB}=+85°C
Mean Time Between Failures		$9.4x10^3$		years	T_{AMB}=+25°C
Power Supply					
Device Voltage		8.3		V	On pin 13, I_{CC}=150mA
Device Voltage		8.7		V	On pin 13, I_{CC}=180mA
Operating Current Range	100		200	mA	Actual current determined by V_{CC} and R_S

Parameter	Specification			Unit	Condition
	Min.	Typ.	Max.		
Overall (75Ω)					T=25°C, I_{CC}=180mA, R_C=11Ω, 75Ω System
Frequency Range		DC to 3000		MHz	3dB Bandwidth
Gain	14.5	15.0		dB	
Noise Figure		5.3		dB	From 100MHz to 1000MHz
Input VSWR		1.1:1			Appropriate values for the DC blocking capacitors and bias inductor are required to maintain this VSWR at the intended operating frequency range.
Output VSWR		1.5:1			Appropriate values for the DC blocking capacitors and bias inductor are required to maintain this VSWR at the intended operating frequency range.
Output IP_3				dBm	At 100MHz
Output IP_3		+42		dBm	At 500MHz
Output IP_3				dBm	At 900MHz
Output IP_2		+63		dBm	F_1=400MHz, F_2=500MHz, F_{OUT}=100MHz
Output P_{1dB}				dBm	At 100MHz
Output P_{1dB}		+26		dBm	At 500MHz
Output P_{1dB}				dBm	At 900MHz
Saturated Output Power				dBm	At 100MHz
Saturated Output Power		+27		dBm	At 500MHz
Saturated Output Power				dBm	At 900MHz
Reverse Isolation		20		dB	
79 Channels					10dBmV per channel, flat, at the input of the amplifier; I_{CC}=150mA, V_{CC}=10.6V
XMOD		-110		dBc	At 55.25MHz
		-78		dBc	At 331.25MHz
		-75		dBc	At 547.25MHz
CTB		-88		dBc	At 55.25MHz
		-88		dBc	At 331.25MHz
		-88		dBc	At 547.25MHz
CSO+1.25MHz		-93		dBc	At 55.25MHz
		-78		dBc	At 331.25MHz
		-70		dBc	At 547.25MHz
CSO-1.25MHz		-68		dBc	At 55.25MHz
		-78		dBc	At 331.25MHz
		-85		dBc	At 547.25MHz
110 Channels					10dBmV per channel, flat, at the input of the amplifier; I_{CC}=150mA, V_{CC}=10.6V
XMOD		-91		dBc	At 55.25MHz
		-77		dBc	At 331.25MHz
		-75		dBc	At 547.25MHz
CTB		-86		dBc	At 55.25MHz
		-85		dBc	At 331.25MHz
		-85		dBc	At 547.25MHz
CSO+1.25MHz		-92		dBc	At 55.25MHz
		-78		dBc	At 331.25MHz
		-71		dBc	At 547.25MHz
CSO-1.25MHz		-63		dBc	At 55.25MHz
		-68		dBc	At 331.25MHz
		-81		dBc	At 547.25MHz

Pin	Function	Description	Interface Schematic
1	NC	This pin is internally not connected.	
2	GND	Ground connection. Keep traces physically short and connect immediately to ground plane for best performance. Each ground pin should have a via to the ground plane.	
3	GND	Same as pin 2.	
4	RF IN	RF input pin. This pin is NOT internally DC blocked. A DC blocking capacitor, suitable for the frequency of operation, should be used in most applications. DC coupling of the input is not allowed, because this will override the internal feedback loop and cause temperature instability.	
5	NC	This pin is internally not connected.	
6	GND	Same as pin 2.	
7	GND	Same as pin 2.	
8	NC	This pin is internally not connected.	
9	NC	This pin is internally not connected.	
10	GND	Same as pin 2.	
11	GND	Same as pin 2.	
12	NC	This pin is internally not connected.	
13	RF OUT	RF output and bias pin. Because DC is present on this pin, a DC blocking capacitor, suitable for the frequency of operation, should be used in most applications. For biasing, an RF choke in series with a resistor is needed. The DC voltage on this pin is typically 8.3V with a current of 150mA. See device voltage versus device current plot. In lower power applications the value of R_C can be increased to lower the current and V_D on this pin.	
14	GND	Same as pin 2.	
15	GND	Same as pin 2.	
16	NC	This pin is internally not connected.	

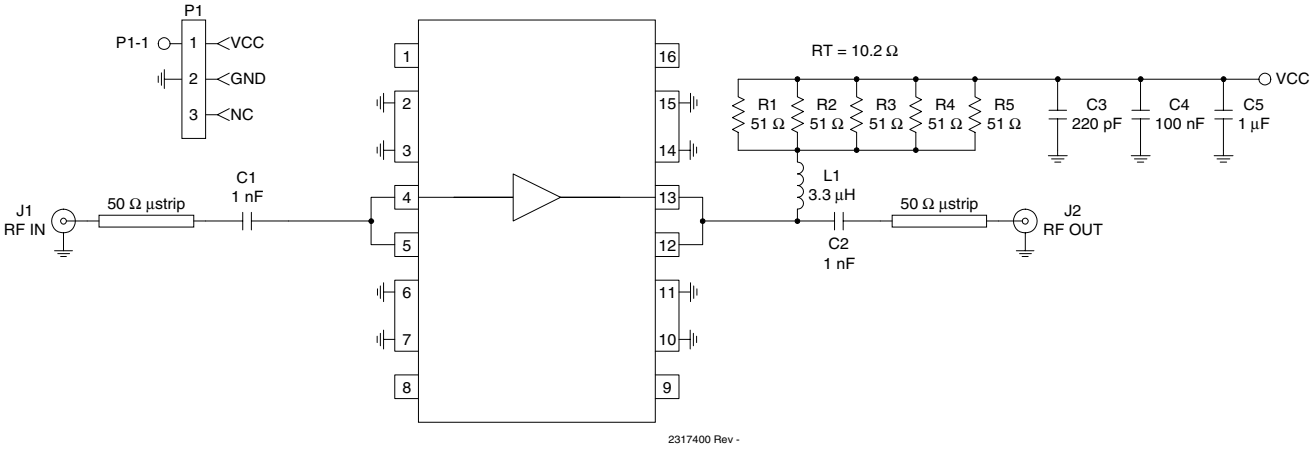
Application Schematic
5MHz to 50MHz Reverse Path



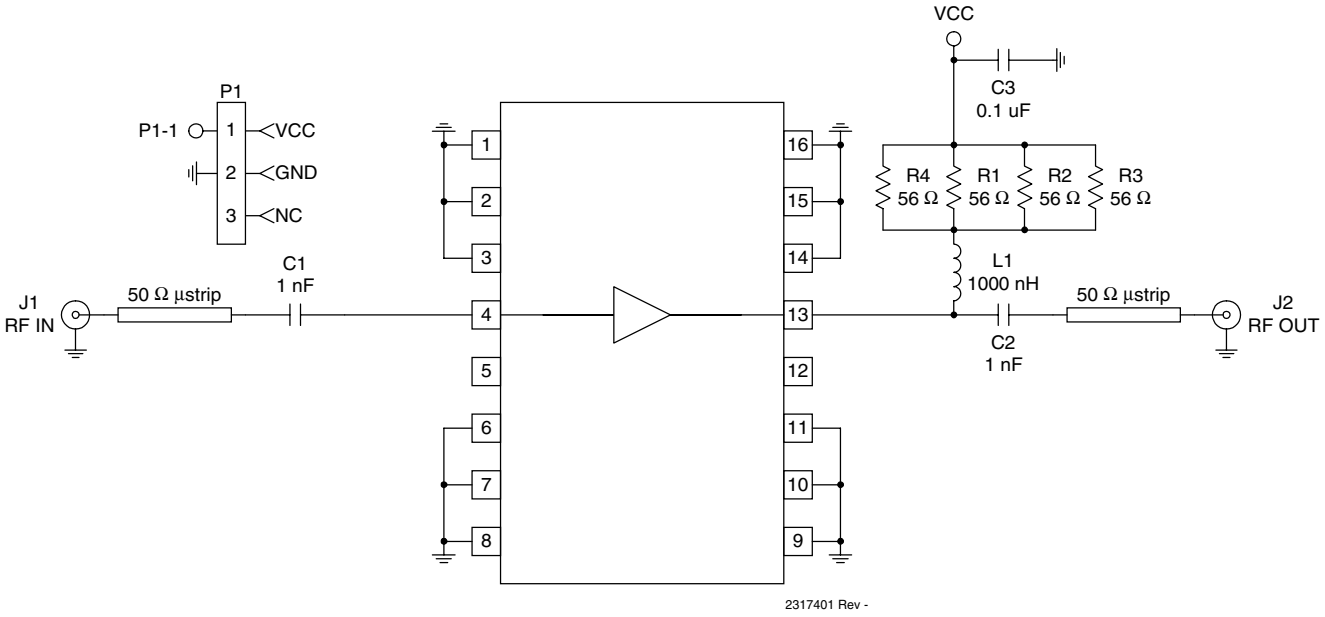
NOTES:
Gain Flatness <0.5 dB
Input and Output Return Loss >20 dB in 75 Ω system

Evaluation Board Schematic - 50 Ω

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

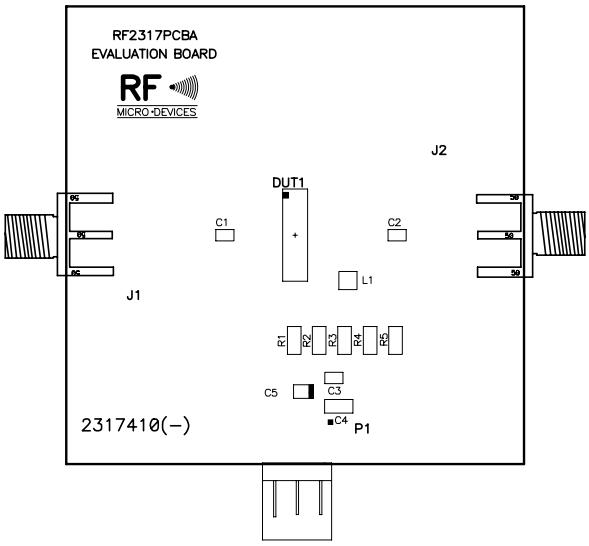


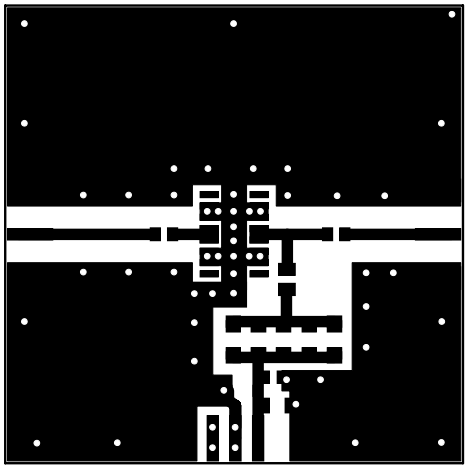
Evaluation Board Schematic - 75 Ω



Evaluation Board Layout - 50 Ω
2” x 2”

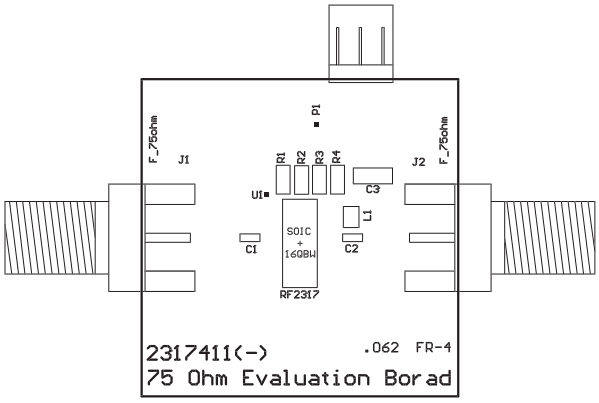
Board Thickness 0.031”, Board Material FR-4

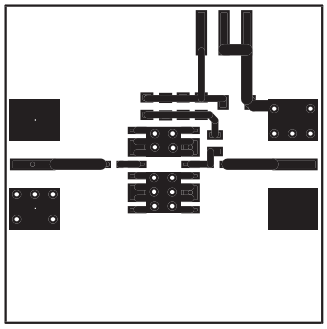




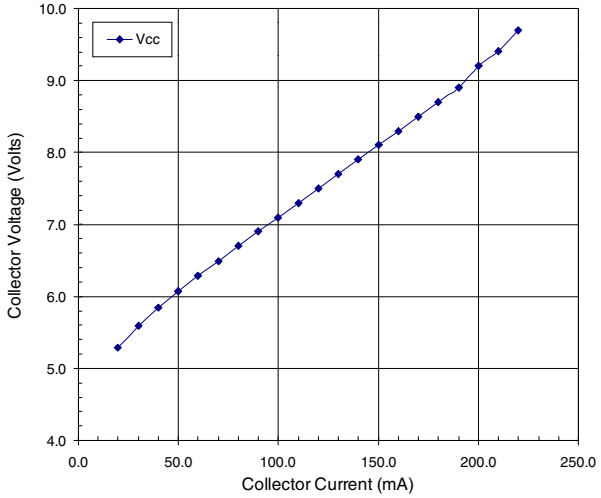
Evaluation Board Layout - 75 Ω
1.40” x 1.40”

Board Thickness 0.062”, Board Material FR-4

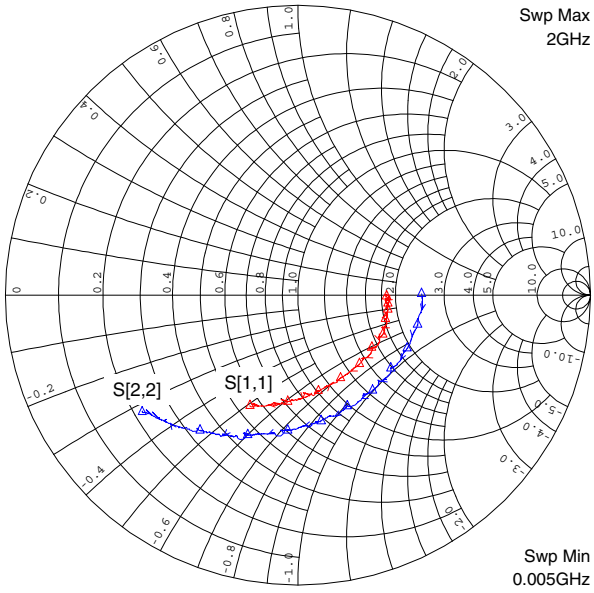




Collector Voltage versus Current



75 Ohms, ICC = 150 mA, Temp = 25°C



75 Ohms, ICC = 180 mA, Temp = 25°C