RF2377

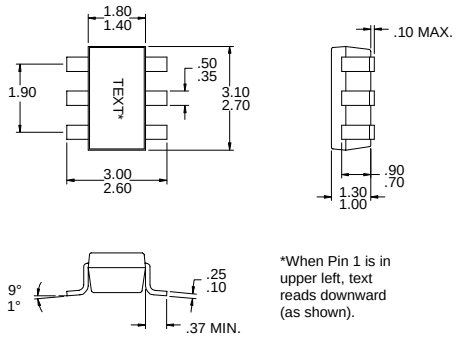
PCS/CELLULAR TDMA/CDMA/W-CDMA
LINEAR VARIABLE GAIN AMPLIFIER

Typical Applications

- CDMA PCS/Cellular Handsets
- TDMA PCS/Cellular Handsets
- W-CDMA Handsets

Product Description

The RF2377 is a linear variable gain amplifier suitable for use in TDMA and CDMA systems in the cellular or PCS band and for W-CDMA systems. The features of this device include linear gain control, high gain, and high linearity. The IC is manufactured on an advanced Gallium Arsenide Heterojunction Bipolar Transistor (GaAs HBT) process and is featured in an industry-standard miniature 6-lead plastic SOT package.



*When Pin 1 is in upper left, text reads downward (as shown).

All dimensions in mm.

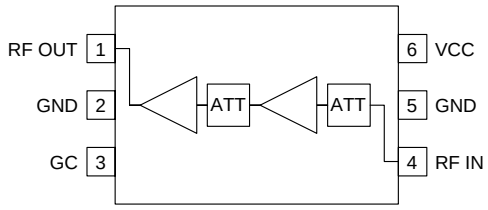
Optimum Technology Matching® Applied

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

Package Style: SOT23-6

Features

- 50dB Linear Gain Control Range
- 24dB Maximum Gain
- Single 2.7V to 3.3V Supply
- 45mA Supply Current
- High Linearity



Functional Block Diagram

Ordering Information

RF2377	PCS/Cellular TDMA/CDMA/W-CDMA Linear Variable Gain Amplifier
RF2377-410 PCBA	Fully Assembled Evaluation Board, PCS
RF2377-411 PCBA	Fully Assembled Evaluation Board, W-CDMA

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

Absolute Maximum Ratings

Parameter	Rating	Unit
Supply Voltage	0 to +5.0	V_{DC}
DC Current	100	mA
Operating Ambient Temperature	-20 to +85	°C
Storage Temperature	-40 to +150	°C

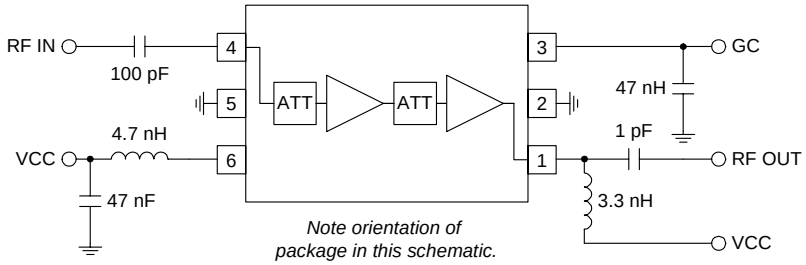
Caution! ESD sensitive device.

Parameter	Specification			Unit	Condition
	Min.	Typ.	Max.		
Overall					V_{CC}=2.8V, V_{GC}=2.0V, T=25°C
Usable Frequency Range		800 to 2200		MHz	
Linear Gain Control Range	50			dB	
Gain Control Slope		70		dB/V	
TDMA					V_{CC}=2.8V, V_{GC}=2.0V, T=25°C
Operating Frequency		1880		MHz	
Maximum Small Signal Gain	22	24	27	dB	
Input VSWR		1.5:1	2.5:1		Over entire gain control range
Output IP3	+23	+26		dBm	
Noise Figure		7		dB	Maximum gain
Maximum Average Output Power		+8		dBm	TDMA modulation
Adjacent Channel Power Rejection		-33	-32	dBc	TDMA modulation; P_{OUT}=+8dBm
Alternate Channel Power Rejection		-61	-57	dBc	TDMA modulation; P_{OUT}=+8dBm
CDMA					V_{CC}=2.8V, V_{GC}=2.0V, T=25°C
Operating Frequency		1880		MHz	
Maximum Small Signal Gain	22	24	27	dB	
Input VSWR		1.5:1	2.5:1		Over entire gain control range
Output IP3	+23	+26		dBm	
Noise Figure		7		dB	Maximum gain
Maximum Average Output Power		+11		dBm	CDMA modulation; V_{CC}=3.0V, maximum gain setting, ACPR≤-52dBc.
Adjacent Channel Power Rejection		-53		dBc	CDMA modulation; V_{CC}=3.0V. For P_{IN}>-16dBm, adjustment of P_{IN} is required to maintain ACPR performance over gain control range. For P_{IN}≤-16dBm, ACPR performance is maintained over entire gain control range.
W-CDMA					V_{CC}=2.8V, T=25°C
Operating Frequency		1920 to 1980		MHz	
Small Signal Gain	20	22	24	dB	V_{GC}=2.0V
	-33	-32	-31	dB	V_{GC}=0.3V
Input VSWR		1.5:1	2.5:1		Over entire gain control range
Output IP3	+22	+24		dBm	
Noise Figure	4	5	6	dB	Maximum gain
	32	32.5	34	dB	Minimum gain
Maximum Linear Output Power	+8	+9		dBm	W-CDMA ACPR<-46dBc, V_{GC}=2.0V
Adjacent Channel Power Rejection		-48	-46	dBc	W-CDMA modulation; V_{GC}=2.0V, P_{IN}<-12dBm
			-43	dBc	W-CDMA modulation; Over entire gain control range, P_{IN}<-17dBm
			-43	dBc	W-CDMA modulation; V_{GC}=1.0V, P_{IN}<-14dBm

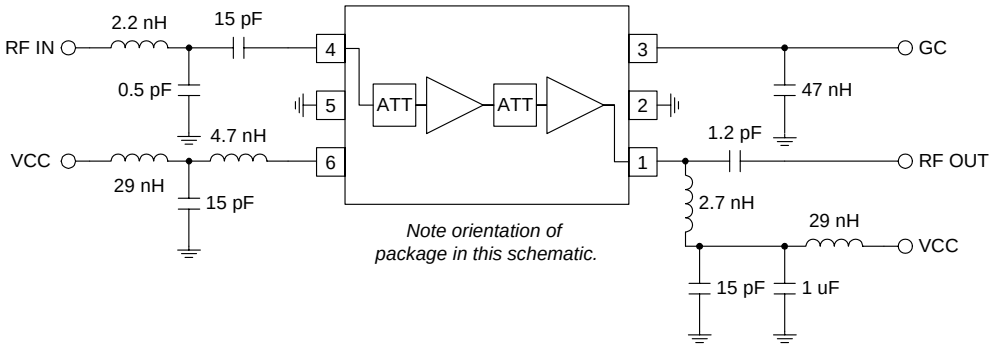
Parameter	Specification			Unit	Condition
	Min.	Typ.	Max.		
Power Supply					T = 25°C
Supply Voltage		2.8		V	Specifications
		2.7 to 3.3		V	Operating range
Gain Control Voltage		0 to 2.0		V	
Supply Current	40	45	60	mA	V_{CC}=2.8V, V_{GC}=2.0V
		56		mA	V_{CC}=3.0V, V_{GC}=2.0V
			20	mA	V_{CC}=2.8V, V_{GC}=0.4V
V_{GC} Current			1.5	mA	

Pin	Function	Description	Interface Schematic
1	RF OUT	RF output pin. This pin is DC coupled and requires V_{CC} through a bias inductor sized accordingly to provide a high pass transformation with a series capacitor.	
2	GND	Ground connection. Keep traces physically short and connect immediately to ground plane for best performance.	
3	GC	Analog gain control pin. This pin controls the gain of the IC. Minimum gain occurs at V_{GC}<0.4V and maximum gain is achieved with V_{GC}=2.0V. 50dB of linear gain control with little variation of input P_{1dB} is available.	
4	RF IN	RF input pin. This pin is DC coupled.	
5	GND	Ground connection. Keep traces physically short and connect immediately to ground plane for best performance.	
6	VCC	Power supply. This pin should be connected to a regulated supply and requires a bypass capacitor. Voltage is supplied through this pin to the first stage collector; this voltage also controls the bias. Gain may be tuned by adjusting the value of the feed inductor.	

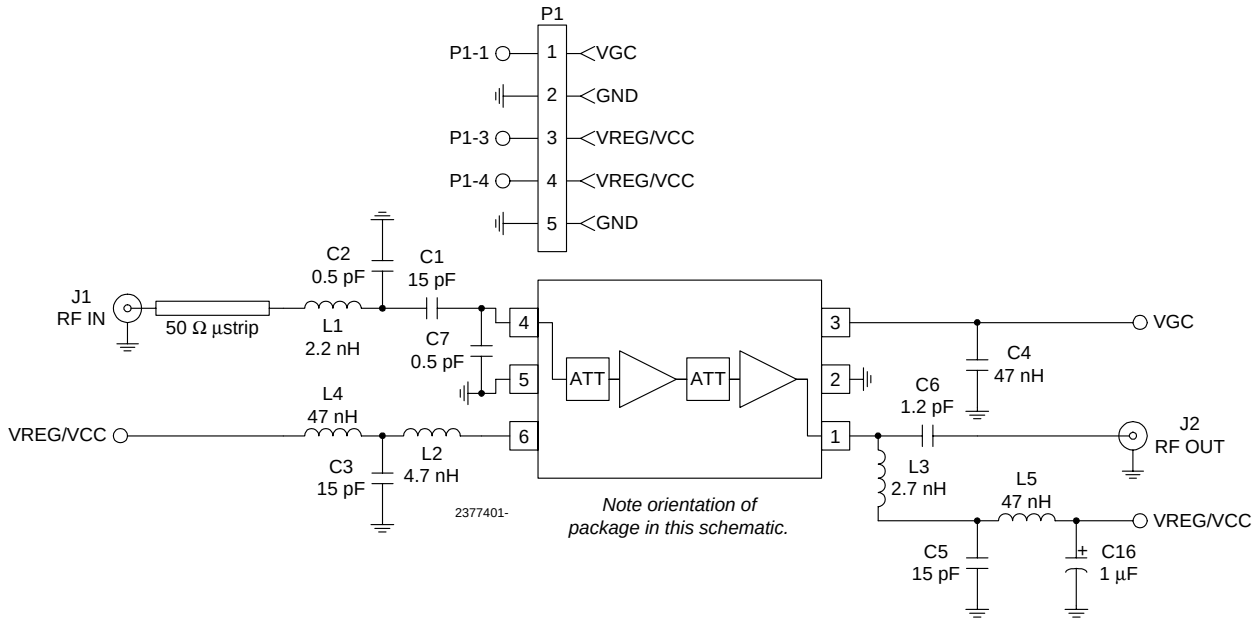
Application Schematic



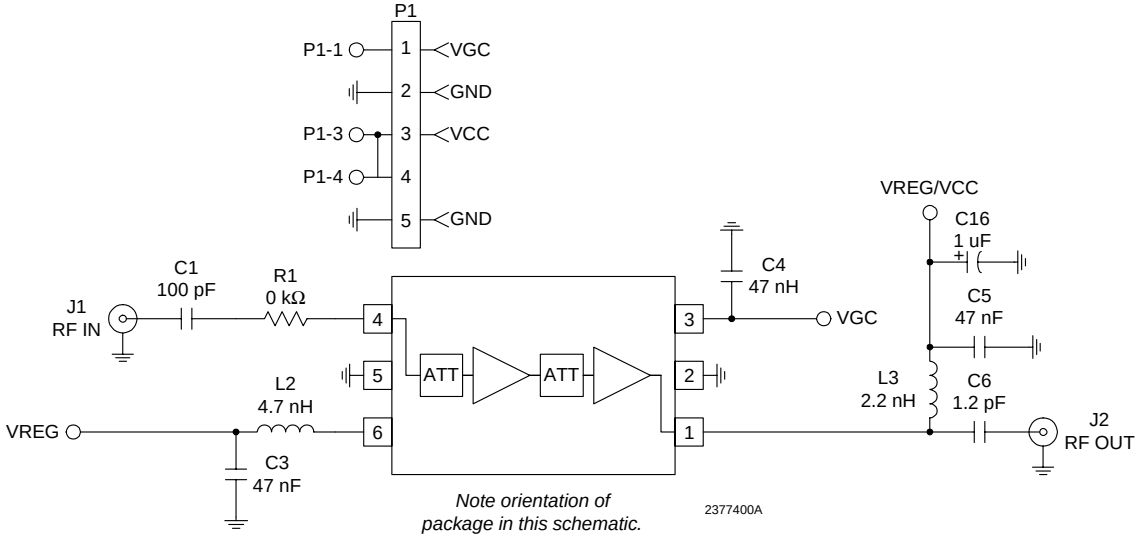
W-CDMA Application Schematic



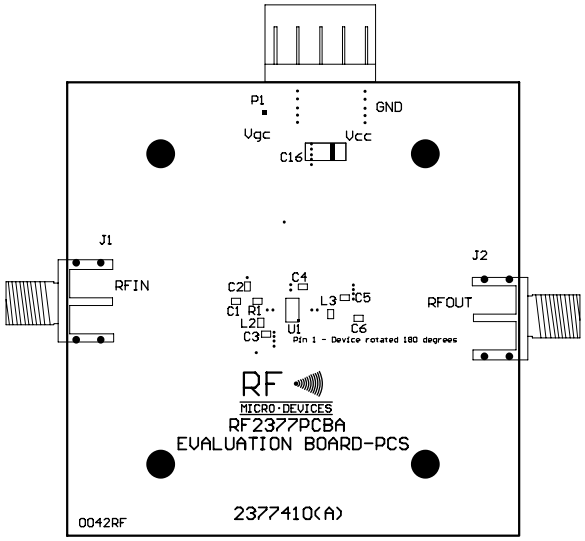
Evaluation Board Schematic (W-CDMA)

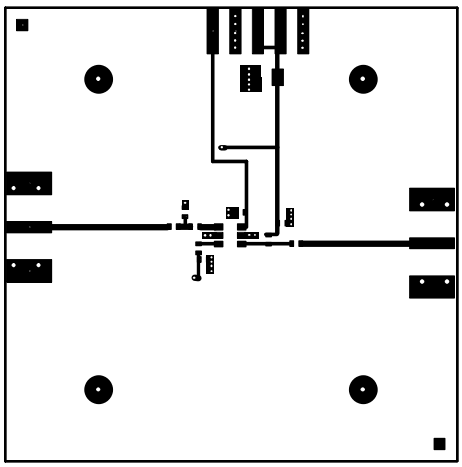


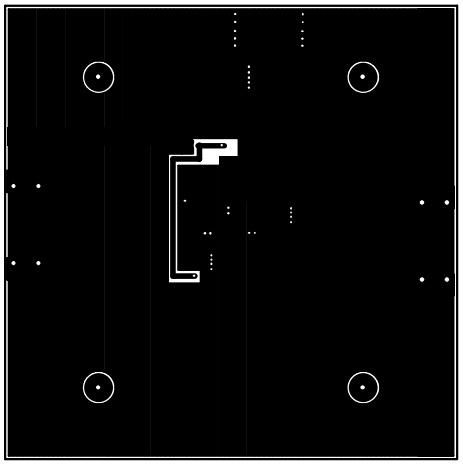
Evaluation Board Schematic (PCS)



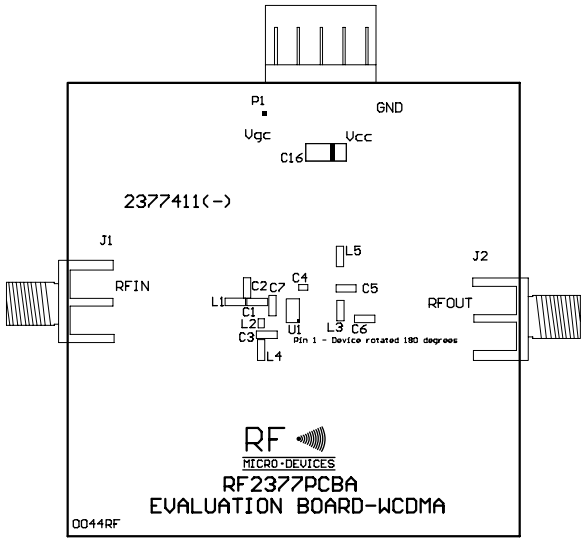
Evaluation Board Layout (PCS)
Board Size 2.0” x 2.0”
Board Thickness 0.028”, Board Material FR-4

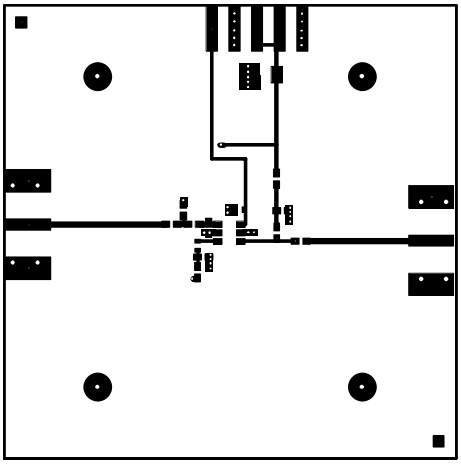


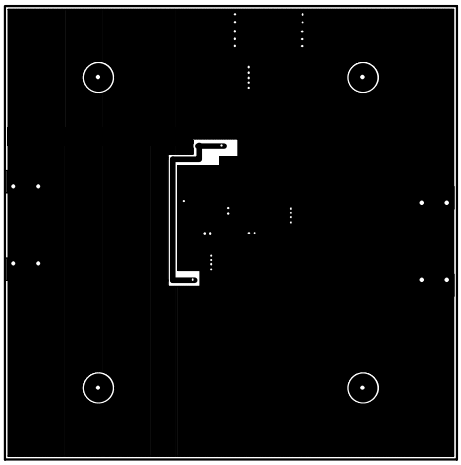




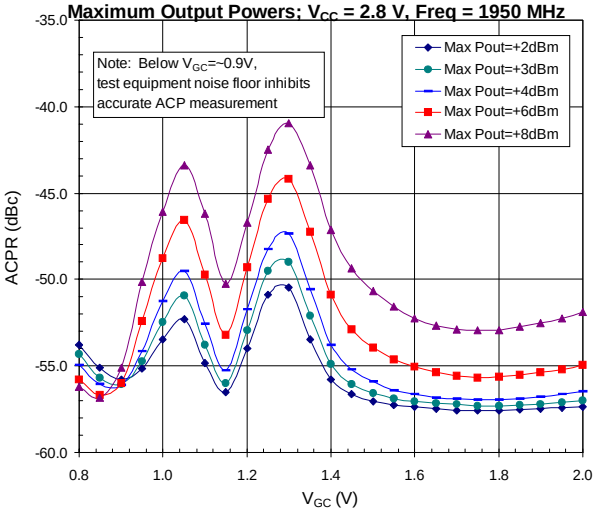
Evaluation Board Layout (W-CDMA)
Board Size 2.0” x 2.0”
Board Thickness 0.028”, Board Material FR-4



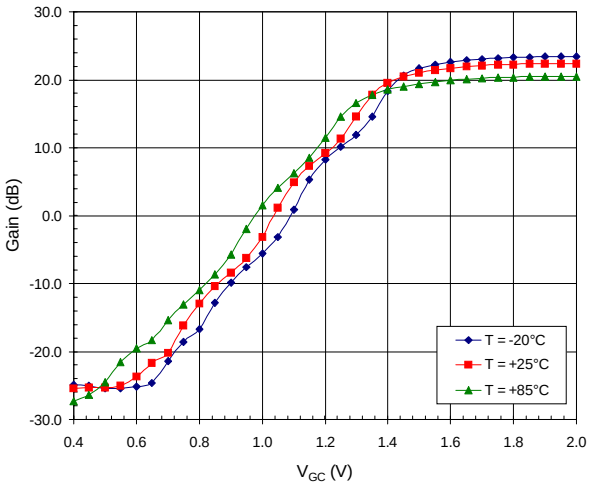




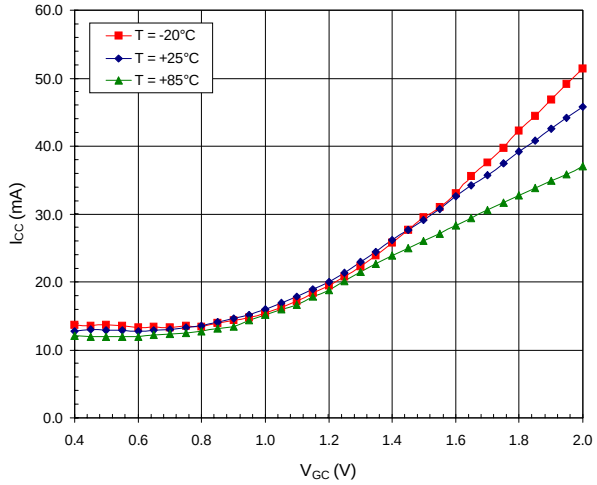
W-CDMA ACPR versus V_{GC} at Various Maximum Output Powers; V_{CC} = 2.8 V, Freq = 1950 MHz



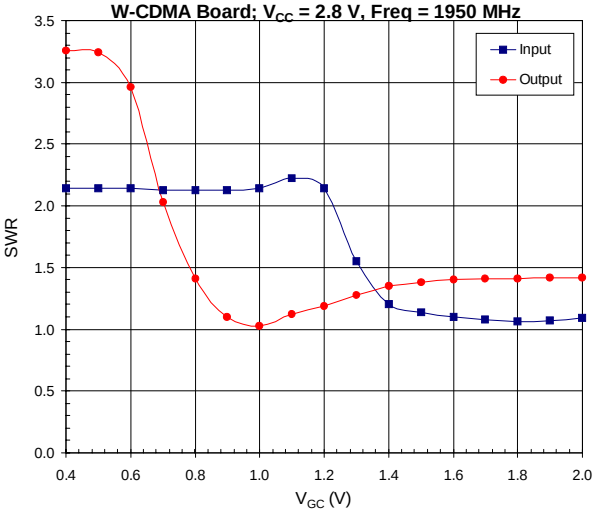
Gain versus V_{GC} over Temperature W-CDMA Board; V_{CC} = 2.8V, Freq = 1950 MHz



I_{CC} versus V_{GC} over Temperature W-CDMA Board; V_{CC} = 2.8V, Freq = 1950 MHz



SWR versus V_{GC} W-CDMA Board; V_{CC} = 2.8 V, Freq = 1950 MHz



Noise Figure versus V_{GC} W-CDMA Board; V_{CC} = 2.8 V, Freq = 1950 MHz