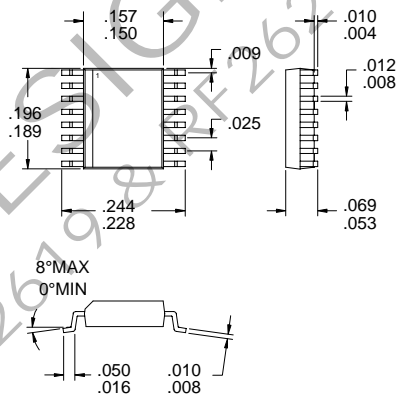


Typical Applications

- CDMA/FM Cellular Systems
- Supports Dual-Mode AMPS/CDMA
- Supports Dual-Mode TACS/CDMA
- General Purpose Linear IF Amplifier
- Portable Battery Powered Equipment
- Commercial and Consumer Systems

Product Description

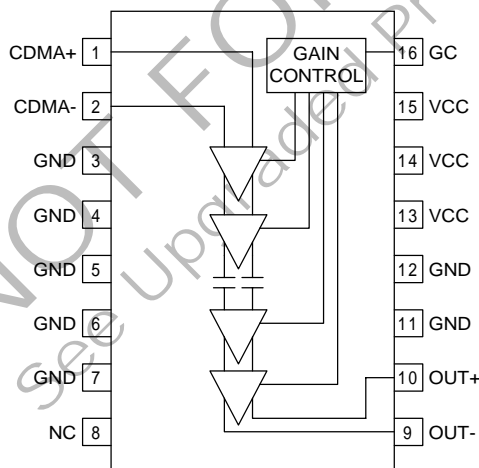
The RF2609 is a complete AGC amplifier designed for the transmit section of dual-mode CDMA/FM cellular applications. It is designed to amplify IF signals while providing more than 84dB of gain control range. Noise Figure, IP3, and other specifications are designed to be compatible with the IS-95 Interim Standard for CDMA cellular communications. This circuit is designed as part of the RFMD CDMA Chip Set, consisting of this Transmit IF AGC Amp, a Transmit Upconverter, a Receive LNA/Mixer, and a Receive IF AGC Amp. The IC is manufactured on an advanced high frequency Silicon Bipolar process and is packaged in a standard miniature 16-lead plastic SSOP package.



Package Style: SSOP-16

Optimum Technology Matching® Applied

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



Functional Block Diagram

Features

- Supports Dual Mode Operation
- -48dB to +42dB Gain Control Range
- IS-95 CDMA Compatible
- Monolithic Construction
- 12MHz to 175MHz Operation
- Miniature Surface Mount Package

Ordering Information

- RF2609      CDMA/FM Transmit AGC Amplifier  
 RF2609 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>

# RF2609

## Absolute Maximum Ratings

Parameter	Rating	Unit
Supply Voltage	-0.5 to +7.0	V <sub>DC</sub>
Control Voltage	-0.5 to +5.0	V
Input Power Levels	+10	dBm
Operating Ambient Temperature	-40 to +85	°C
Storage Temperature	-40 to +150	°C



**Caution!** ESD sensitive device.

RF Micro Devices believes the furnished information is correct and accurate at the time of this printing. However, RF Micro Devices reserves the right to make changes to its products without notice. RF Micro Devices does not assume responsibility for the use of the described product(s).

Parameter	Specification			Unit	Condition
	Min.	Typ.	Max.		
<b>Overall</b>					T=25°C, 130MHz, V <sub>CC</sub> =3.6V, Z <sub>S</sub> =1kΩ, Z <sub>L</sub> =1kΩ, 1kΩ External Output Terminating Resistor (Effective Z <sub>L</sub> =500Ω) (See Application Example)
Frequency Range		12 to 175		MHz	
Maximum Gain	+39	+42		dB	V <sub>GC</sub> =2.76V
Minimum Gain		-48	-45	dB	V <sub>GC</sub> =0.2V
Gain Slope		47		dB/V	Measured in 0.5V increments
Gain Control Voltage Range		0 to 3		V <sub>DC</sub>	
Gain Control Input Impedance		30		kΩ	
Noise Figure		10		dB	At maximum gain and 130MHz
Input IP3	-26	-25		dBm	At +10 gain and referenced to 1kΩ
Input Impedance		1		kΩ	Differential
Stability (Max VSWR)	10:1				Spurious < -70 dBm
<b>Power Supply</b>					
Voltage		3.3 to 3.6		V	
Current Consumption		23	25	mA	Maximum gain
Current Consumption		22		mA	Minimum gain

10

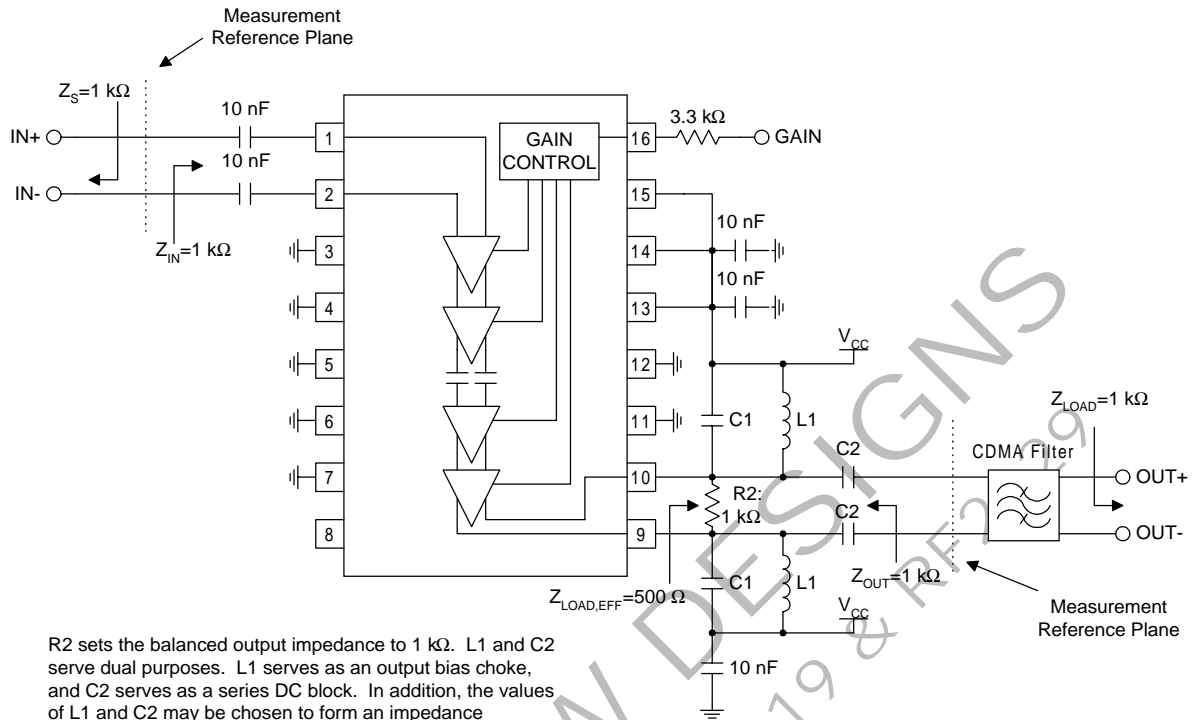
IF AMPLIFIERS

NOT FOR NEW DESIGN

See Upgraded Products RF2619, RF2629

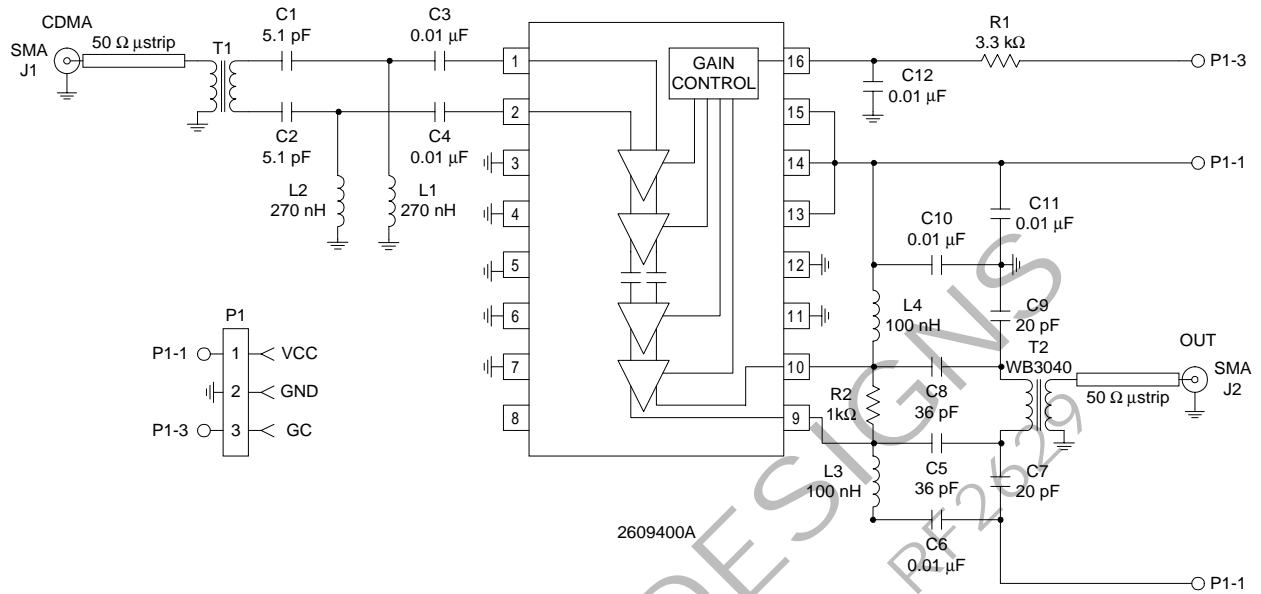
Pin	Function	Description	Interface Schematic
1	CDMA+	CDMA Balanced Input Pin. This pin is internally DC biased and should be DC blocked if connected to a device with a DC level, other than $V_{CC}$ , present. A DC to connection to $V_{CC}$ is acceptable. For single-ended input operation, one pin is used as an input and the other CDMA input is AC coupled to ground. The balanced input impedance is $1\text{ k}\Omega$ , while the single-ended input impedance is $500\Omega$ .	
2	CDMA-	Same as pin 2, except complementary input.	See pin 1 schematic.
3	GND	Ground connection. Keep traces physically short and connect immediately to ground plane for best performance.	
4	GND	Same as pin 3.	
5	GND	Same as pin 3.	
6	GND	Same as pin 3.	
7	GND	Same as pin 3.	
8	NC	No Connection pin. This pin is internally biased and should not be connected to any external circuitry, including ground or $V_{CC}$ .	
9	OUT-	Balanced Output pin. This is an open-collector output, designed to operate into a $500\Omega$ balanced load. The load sets the operating impedance, but an external choke or matching inductor to $V_{CC}$ must also be supplied in order to correctly bias this output. This bias inductor is typically incorporated in the matching network between the output and next stage. Because this pin is biased to $V_{CC}$ , a DC blocking capacitor must be used if the next stage's input has a DC path to ground.	
10	OUT+	Same as pin 9, except complementary output.	See pin 9 schematic.
11	GND	Same as pin 3.	
12	GND	Same as pin 3.	
13	VCC	Supply Voltage pin. External bypassing is required. The trace length between the pin and the bypass capacitors should be minimized. The ground side of the bypass capacitors should connect immediately to ground plane. Pins 13, 14, and 15 may share one bypass capacitor if trace lengths are kept minimal.	
14	VCC	Same as pin 13.	
15	VCC	Same as pin 13.	
16	GC	Analog gain adjustment for all amplifiers. Valid control ranges are from $0\text{ V}$ to $3.0\text{ V}$ . Maximum gain is selected with $3.0\text{ V}$ . Minimum gain is selected with $0\text{ V}$ . These voltages are valid only for a $3.3\text{ k}\Omega$ DC source impedance.	

## Application Schematic

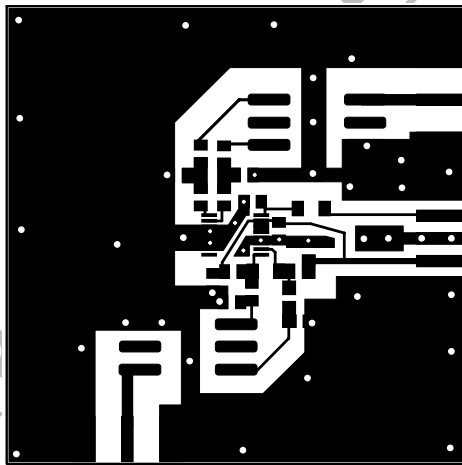
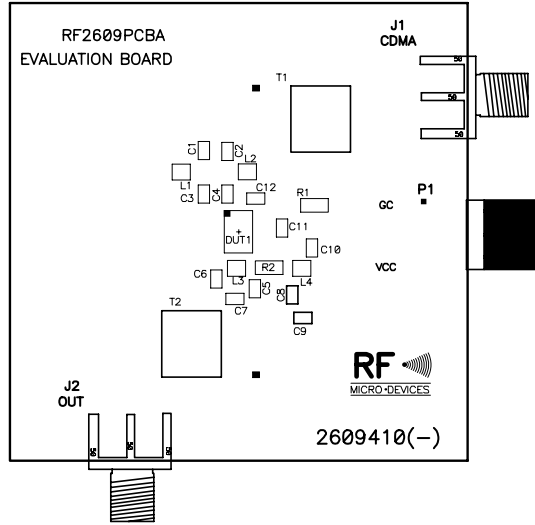


R2 sets the balanced output impedance to 1 k $\Omega$ . L1 and C2 serve dual purposes. L1 serves as an output bias choke, and C2 serves as a series DC block. In addition, the values of L1 and C2 may be chosen to form an impedance matching network if the load impedance is not 1 k $\Omega$ . Otherwise, the values of L1 and C1 are chosen to form a parallel-resonant tank circuit at the IF when the IF filter's input impedance is 1 k $\Omega$ .

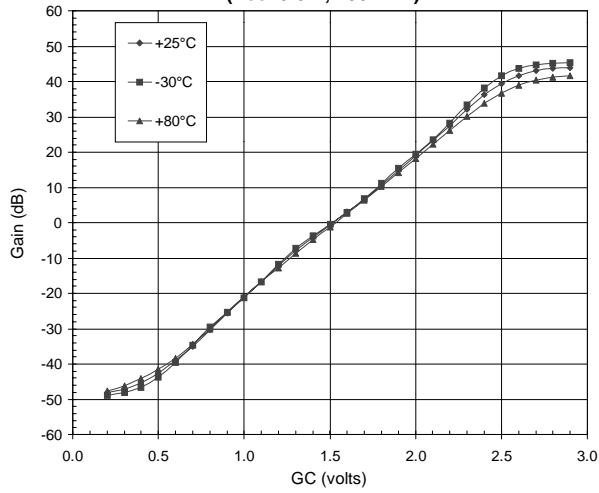
## Evaluation Board Schematic (Download [Bill of Materials](http://www.rfmd.com) from www.rfmd.com.)



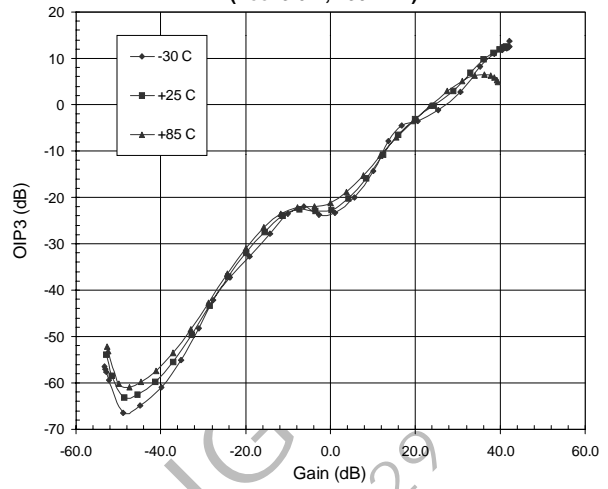
Evaluation Board Layout



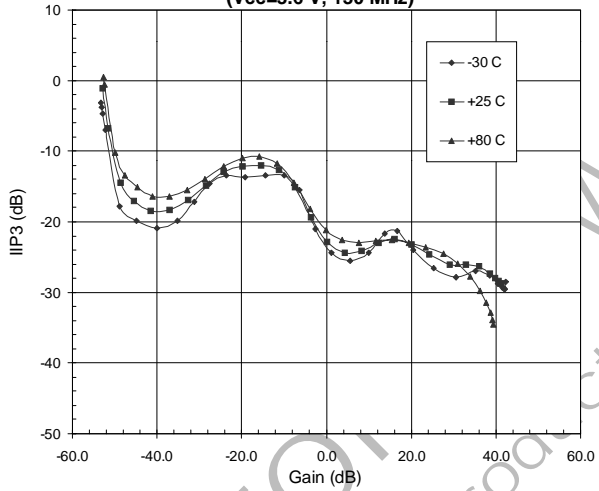
**RF2609 Gain vs. Gain Control Voltage**  
(V<sub>cc</sub>=3.6 V, 130 MHz)



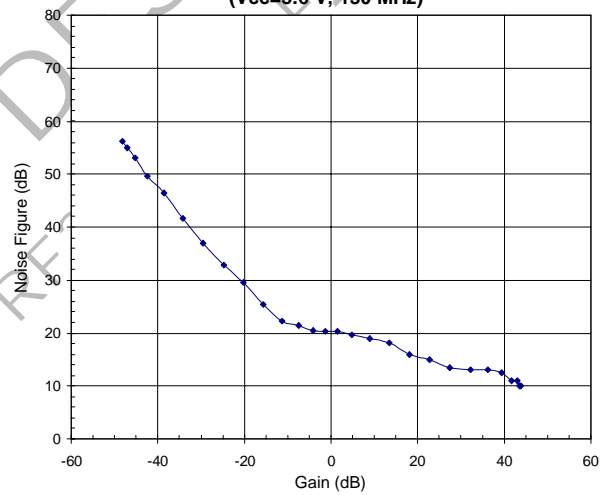
**RF2609 OIP3 vs. Gain**  
(V<sub>cc</sub>=3.6 V, 130 MHz)



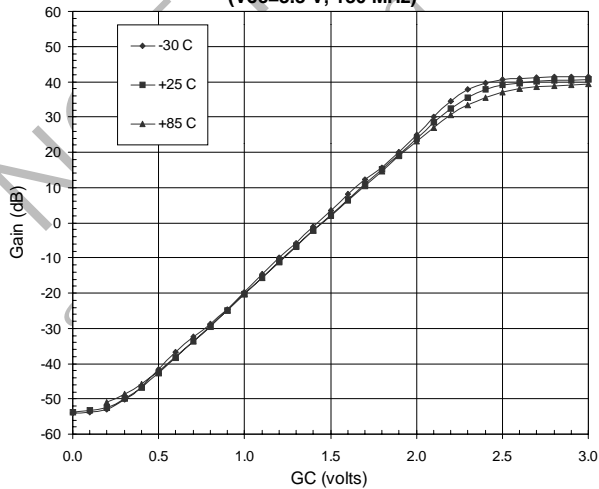
**RF2609 IIP3 vs. Gain**  
(V<sub>cc</sub>=3.6 V, 130 MHz)



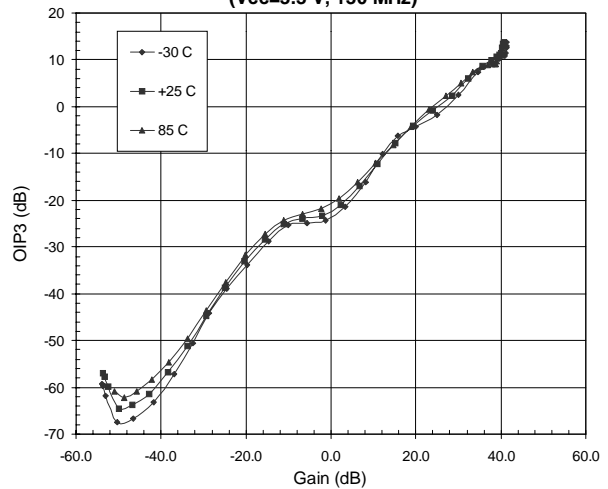
**RF2609 Noise Figure vs. Gain**  
(V<sub>cc</sub>=3.6 V, 130 MHz)



**RF2609 Gain vs. Gain Control Voltage**  
(V<sub>cc</sub>=3.3 V, 130 MHz)

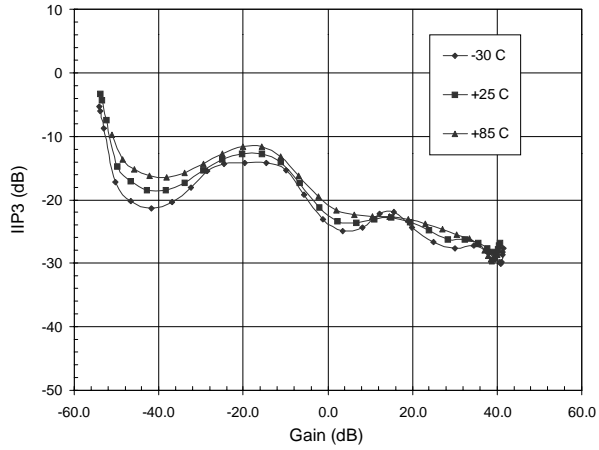


**RF2609 OIP3 vs. Gain**  
(V<sub>cc</sub>=3.3 V, 130 MHz)



# RF2609

RF2609 IIP3 vs. Gain  
(Vcc=3.3 V, 130 MHz)



NOT FOR NEW DESIGNS  
See Upgraded Products RF2619 & RF2629