

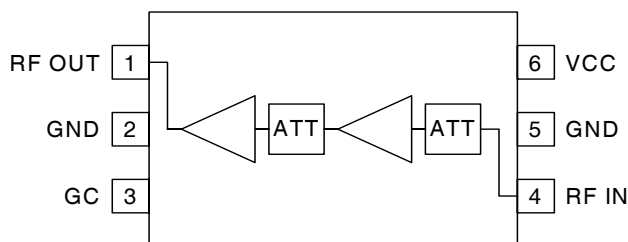


Features

- 50dB Linear Gain Control Range
- 22dB Maximum Gain
- Single 2.7V to 3.3V Supply
- 35mA Supply Current
- High Linearity

Applications

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



Functional Block Diagram

Product Description

The RF2381 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.

Ordering Information

RF2381	PCS/Cellular TDMA/CDMA/W-CDMA Linear Variable Gain Amplifier
RF2381PCBA-41X	Fully Assembled Evaluation Board

Optimum Technology Matching® Applied

- | | | | |
|--|--------------------------------------|-------------------------------------|-----------------------------------|
| ☒ GaAs HBT | ☐ SiGe BiCMOS | ☐ GaAs pHEMT | ☐ GaN HEMT |
| ☐ GaAs MESFET | ☐ Si BiCMOS | ☐ Si CMOS | |
| ☐ InGaP HBT | ☐ SiGe HBT | ☐ Si BJT | |

Absolute Maximum Ratings

Parameter	Rating	Unit
Supply Voltage	0 to +5.0	V _{DC}
DC Current	100	mA
Operating Ambient Temperature	-30 to +85	°C
Storage Temperature	-40 to +150	°C



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).

The information in this publication is believed to be accurate and reliable. However, no responsibility is assumed by RF Micro Devices, Inc. ("RFMD") for its use, nor for any infringement of patents, or other rights of third parties, resulting from its use. No license is granted by implication or otherwise under any patent or patent rights of RFMD. RFMD reserves the right to change component circuitry, recommended application circuitry and specifications at any time without prior notice.

Parameter	Specification			Unit	Condition
	Min.	Typ.	Max.		
Overall					V _{CC} = 2.8V, V _{GC} = 2.0V, T = 25 °C
Usable Frequency Range		800 to 2100		MHz	
Linear Gain Control Range	50			dB	
Gain Control Slope		70		dB/V	
Input VSWR		1.5:1	2.5:1		Over entire gain control range
Output VSWR		1.5:1	2.5:1		Over entire gain control range
Output IP3	+23	+26		dBm	
Noise Figure		9		dB	Maximum gain
TDMA					V _{CC} = 2.8V, V _{GC} = 2.0V, T = 25 °C
Operating Frequency		1880		MHz	
Maximum Small Signal Gain	18	20	22	dB	
Maximum Average Output Power		+8		dBm	TDMA modulation; ACP ≤ -32 dBc
Maximum Average Input Power		-9	-8	dBm	TDMA modulation; for any V _{GC} that gives P _{OUT} ≤ +8 dBm, ACP ≤ -32 dBc, ALT ≤ -52 dBc
Adjacent Channel Power		-33	-32	dBc	TDMA modulation; P _{OUT} ≤ +8 dBm and P _{IN} ≤ -11 dBm, at all V _{GC} .
		-61	-52	dBc	TDMA modulation; P _{OUT} ≤ +8 dBm and P _{IN} ≤ -11 dBm, at all V _{GC} .
CDMA					V _{CC} = 2.8V, V _{GC} = 2.0V, T = 25 °C
Operating Frequency		1880		MHz	
Maximum Small Signal Gain	18	20	22	dB	
Maximum Average Output Power		+6		dBm	CDMA modulation; V _{CC} = 3.0V, maximum gain setting, ACP ≤ -52 dBc.
Maximum Average Input Power		-13		dBm	CDMA modulation; for any V _{GC} that gives P _{OUT} ≤ +6 dBm, ACP ≤ -52 dBc
Adjacent Channel Power		-53		dBc	CDMA modulation; V _{CC} = 3.0V. P _{OUT} ≤ +6 dBm and P _{IN} ≤ -13 dBm, at all V _{GC} .
W-CDMA					V _{CC} = 2.8V, V _{GC} = 2.0V, T = 25 °C
Operating Frequency		1920 to 1980		MHz	
Small Signal Gain	17.5	19.5	22	dB	
Maximum Linear Output Power		+5		dBm	W-CDMA ACP < -46 dBc
Adjacent Channel Power			-46	dBc	W-CDMA modulation; P _{OUT} ≤ +5 dBm and P _{IN} < -12 dBm
			-43	dBc	W-CDMA modulation; Over entire gain control range, P _{IN} < -17 dBm

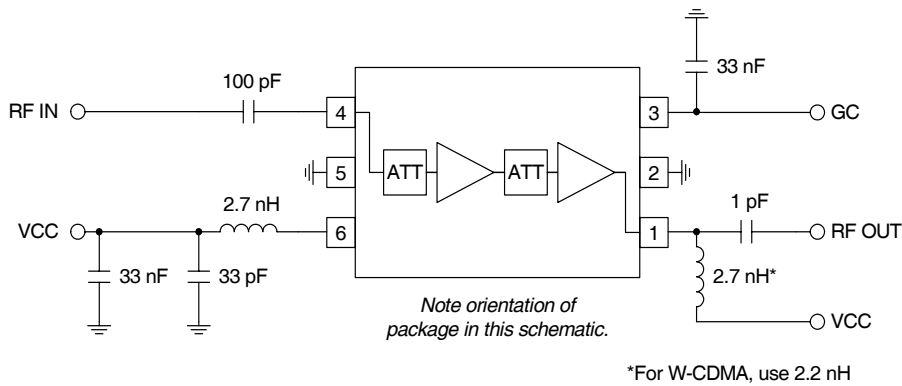
			-43	dBc	W-CDMA modulation; V _{GC} =1.0V, P _{IN} <-14dBm
--	--	--	-----	-----	---

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 (V_{GC})		0 to 2.2		V	
Supply Current		35		mA	$V_{CC}=2.8V$, $V_{GC}=2.2V$
		50		mA	$V_{CC}=3.3V$, $V_{GC}=2.2V$
		21		mA	$V_{CC}=2.8V$, $V_{GC}=0.4V$
V_{GC} Current	-2.0		+2.4	mA	$V_{GC}=0.4V$ to 2.2V

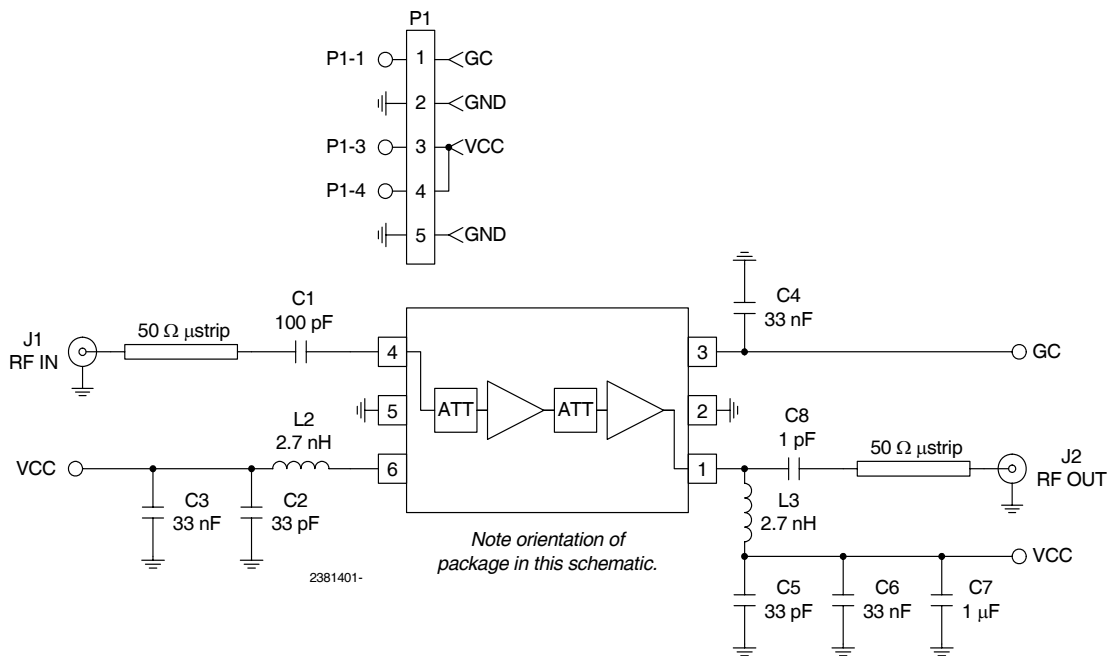
Pin	Function	Description	Interface Schematic
1	RF OUT	RF output pin. This pin is DC-coupled and requires V_{CC} through a bias inductor sized accordingly to provide a high pass transformation with a series capacitor.	
2	GND	Ground connection. For best performance, keep traces physically short and connect immediately to ground plane.	
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. For best performance, keep traces physically short and connect immediately to ground plane.	
6	VCC	Power supply. This pin should be connected to a regulated supply and requires a series inductor and 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.	

Package Drawing

Application Schematic
1850MHz to 1910MHz



Evaluation Board Schematic



Evaluation Board Layout
Board Size 2.0" x 2.0"
Board Thickness 0.028", Board Material FR-4, Multi-Layer

