

RF2381 PCS/CELLULAR TDMA/CDMA/W-CDMA LINEAR VARIABLE GAIN AMPLIFIER

RoHS Compliant & Pb-Free Product Package Style: SOT23-6

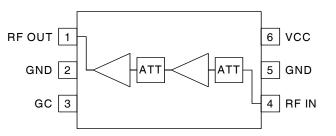


Features

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

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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



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 perfor-mance or functional operation of the device under Absolute Maximum Rating condi-tions is not implied.

RoHS status based on EUDirective2002/95/EC (at time of this document revision).

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Paramatar	Specification			Unit	Condition	
Parameter	Min.	Тур.	Max.	Unit	Condition	
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≤-32dBc	
Maximum Average Input Power		-9	-8	dBm	TDMA modulation; for any V_{GC} that gives $P_{OUT} \le +8$ dBm, ACP ≤ -32 dBc, ALT ≤ -52 dBc	
Adjacent Channel Power		-33	-32	dBc	TDMA modulation; $P_{OUT} \le +8$ dBm and $P_{IN} \le -11$ dBm, at all V_{GC} .	
		-61	-52	dBc	TDMA modulation; $P_{OUT} \le +8$ dBm and $P_{IN} \le -11$ 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 <u><</u> -52dBc.	
Maximum Average Input Power		-13		dBm	CDMA modulation; for any V_{GC} that gives $P_{OUT} \leq +6$ dBm, ACP ≤ -52 dBc	
Adjacent Channel Power		-53		dBc	CDMA modulation; V_{CC} =3.0V. P_{OUT} ≤+6dBm and P_{IN} ≤-13dBm, 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<-46dBc	
Adjacent Channel Power			-46	dBc	W-CDMA modulation; $P_{OUT} \le +5 dBm$ and $P_{IN} < -12 dBm$	
			-43	dBc	W-CDMA modulation; Over entire gain control range, $\text{P}_{\text{IN}}\text{<-}17\text{dBm}$	





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

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Parameter	Specification			Unit	Condition	
Farameter	Min.	Тур.	Max.	Unit	Condition	
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	



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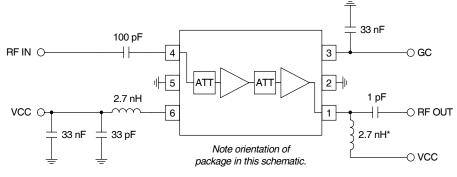
Pin	Function	Description	Interface Schematic
1	RF OUT	RF output pin. This pin is DC-coupled and requires V _{CC} through a bias inductor sized accordingly to provide a high pass transformation with a series capacitor.	
2	GND	Ground connection. For best performance, keep traces physically short and connect 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



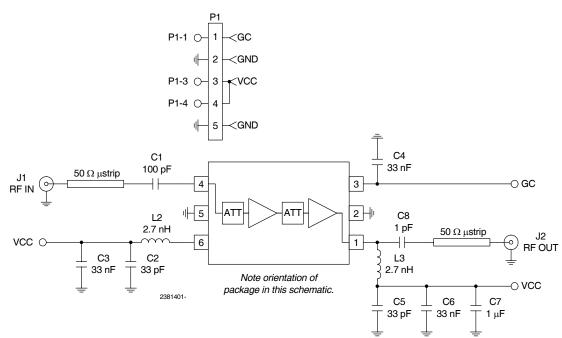


Application Schematic 1850 MHz to 1910 MHz



*For W-CDMA, use 2.2 nH

Evaluation Board Schematic



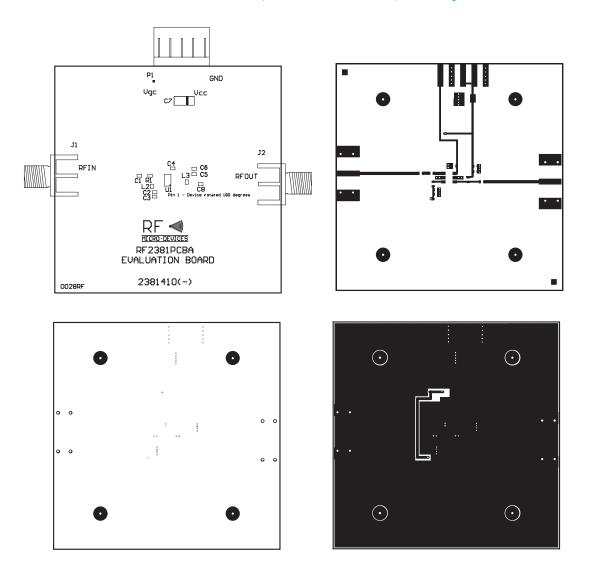




Evaluation Board Layout

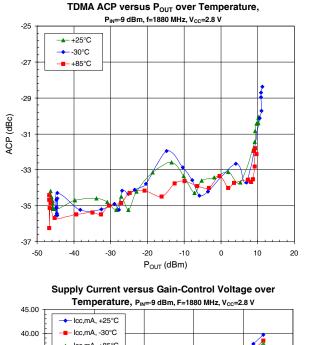
Board Size 2.0" x 2.0"

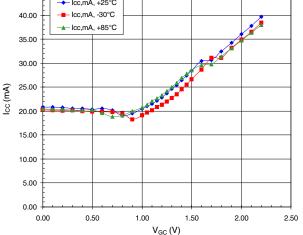
Board Thickness 0.028", Board Material FR-4, Multi-Layer

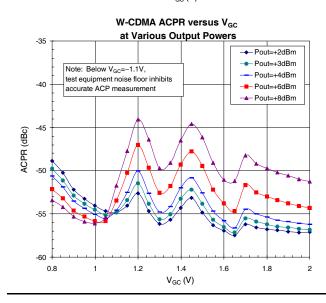


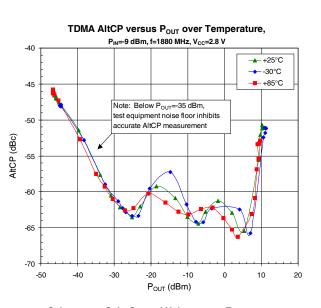


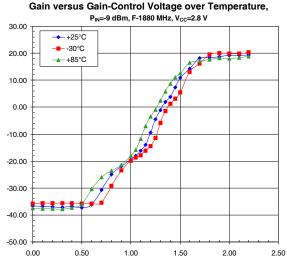


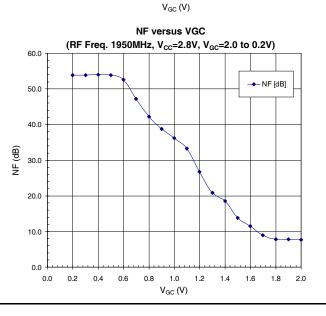










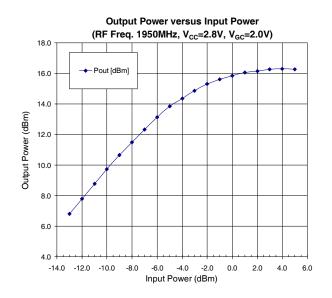


Gain (dB)



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