RF MICRO·DEVICES

Preliminary

RF2371

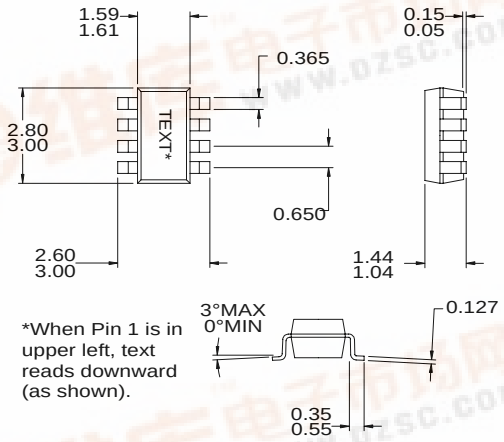
3V LOW NOISE AMPLIFIER

Typical Applications

- GSM Handsets
- CDMA Handsets
- TDMA Handsets
- IF or RF Buffer Amplifiers
- Driver Stage for Power Amplifiers
- Oscillator Loop Amplifiers

Product Description

The RF2371 is a general purpose, low-cost, high performance low noise amplifier designed for operation from a 2.7V to 4V supply with low current consumption. The attenuation of the device is controlled when in power down mode, providing a known gain step. The RF2371 is available in a small industry-standard SOT23-8 surface mount package, enabling compact designs which conserve board space. The design features a highly accurate PTAT (Proportional To Absolute Temperature) biasing scheme using bandgap cells.



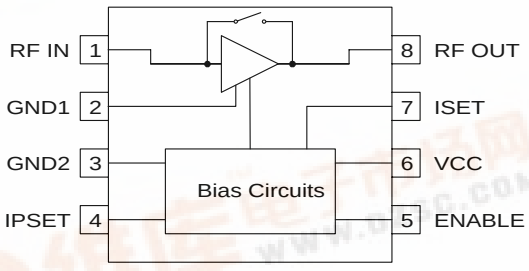
Package Style: SOT23-8

Optimum Technology Matching® Applied

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

Features

- 700MHz to 2000MHz Operation
- 2.7V to 3.6V Single Supply
- +5dBm Input IP_3 at 3.0mA
- 12dB Gain at 1950MHz
- 1.8dB Noise Figure at 1950MHz
- 17dB Gain Step



Functional Block Diagram

Ordering Information

RF2371	3V Low Noise Amplifier
RF2371 PCBA	Fully Assembled Evaluation Board

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Absolute Maximum Ratings

Parameter	Rating	Unit
Supply Voltage	4.0	V
Supply Current	20	mA
Operating Ambient Temperature	-40 to +85	°C
Storage Temperature	-40 to +150	°C

Caution! ESD sensitive device.

Parameter	Specification			Unit	Condition
	Min.	Typ.	Max.		
Overall					T=27°C, V_{CC}=2.7V, $V_{ISELECT}$=0V, V_{ENABLE}=2.7V
Frequency Range		700 to 2000		MHz	
LNA Performance					Freq=1.95GHz
Gain	10.5	12.5		dB	
Noise Figure		1.6		dB	
Input IP3	+4	+6		dBm	At 2.9mA
Input P1dB		-14		dBm	
Input VSWR		5:1		dB	(Noise match)
Output VSWR			1.5:1	dB	
Off Mode Gain		-5.0		dB	V_{ENABLE}=0V
Gain		17		dB	Freq=836MHz
Noise Figure		1.6		dB	
Input IP3		0		dBm	
Current Control					
Internal Current Setting “ON”		CMOS Low		V	Voltage on ISELECT
External Current Setting “ON”		CMOS High		V	Voltage on ISELECT
Current into ISELECT			1	µA	$V_{ISELECT}$=2.7V
Power Control					
Power “ON” Voltage		CMOS High		V	Voltage on ENABLE
Power “OFF” Voltage		CMOS Low		V	Voltage on ENABLE
Current into ENABLE			1	µA	V_{ENABLE}=2.7V
Power Supply					
Operating Voltage		2.7 to 3.6		V	
Operating Current		2.9	5	mA	V_{CC}=2.7V, Internal current setting
Leakage Current			1	µA	V_{ENABLE}=0V

Pin	Function	Description	Interface Schematic
1	RF IN	RF input pin. This pin is not internally DC blocked and requires an external blocking capacitor.	
2	GND1	Ground connection for the LNA. Keep traces physically short and connect immediately to ground plane for best performance.	
3	GND2	Ground connection for the bias circuits.	
4	IPSET	This pin selects the internal current setting when CMOS level “low”, and the external current setting when this pin is CMOS level “high”.	
5	ENABLE	Power down control. This is a CMOS input. When this pin is CMOS “high” the device is enabled. When the level is CMOS “low” the device is shut off and a controlled attenuator is turned on.	
6	VCC	Power supply for the bias circuits.	
7	ISET	This pin sets the current for the device.	
8	RF OUT	RF output pin. Bias for the LNA is provided through this pin, hence it should be connected to VCC through an inductor.	

Application Information

The RF2371 may be configured to use either the internal current setting or the external current setting. This choice is made by asserting IPSET, pin 4, to CMOS level “low” for the internal current setting or CMOS level “high” for the external current setting.

Internal Current Setting

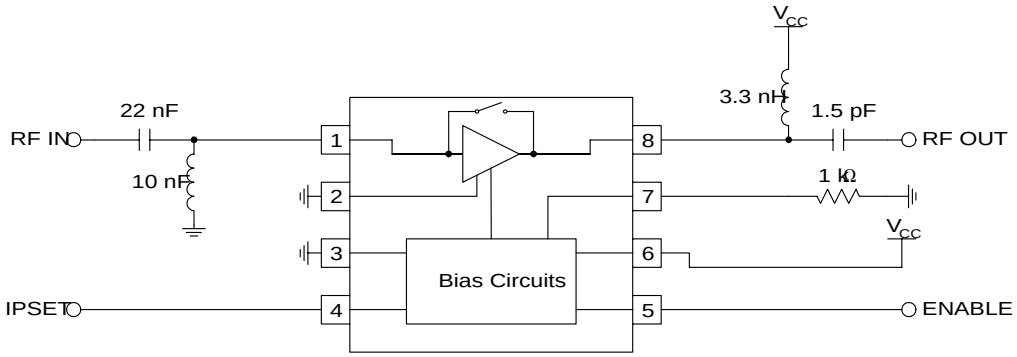
When IPSET is set to CMOS “low”, the internal current settings are chosen. This current draw is typically 2.9mA. In this mode, the resistorR1 may be removed from the evaluation board schematic and ISET left floating. The condition for optimal IP3 is to use the internal current setting option and leave the ISET pin open (no connect).

External Current Setting

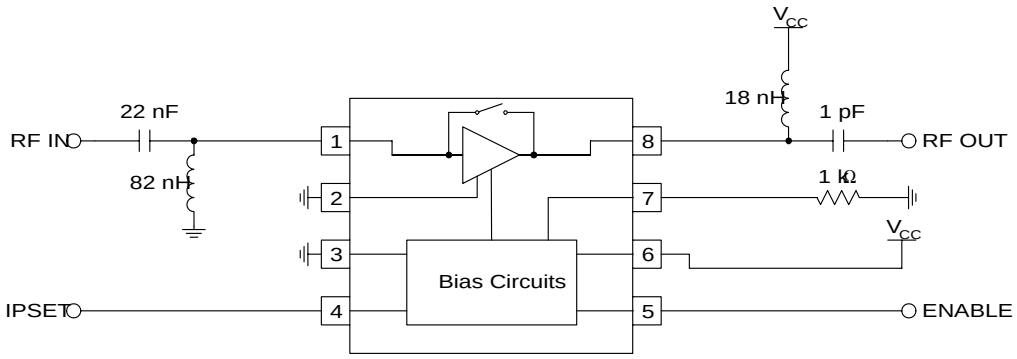
The external current setting is configured by using the series resistor between ISET, pin7, and ground (refer to resistor R1 in evaluation board schematic). The value of the resistor may be changed to permit various operating currents up to a maximum allowable current of 20mA. The table below gives approximate minimum R1 values to allow the 20mA maximum current draw at various operating voltages.

Note: When the internal current setting was selected, the part tested drew 4.4mA, which is higher than typical (2.9mA). Thus values of R1 given vary from part to part.		
V_{CC} (V)	Resistor R1 (Ω)	Current Draw (mA)
2.7	2.4k	20.1
3.0	2.7k	20.1
3.3	3.0k	20.0
3.6	3.3k	19.8

Application Schematic
1.95GHz

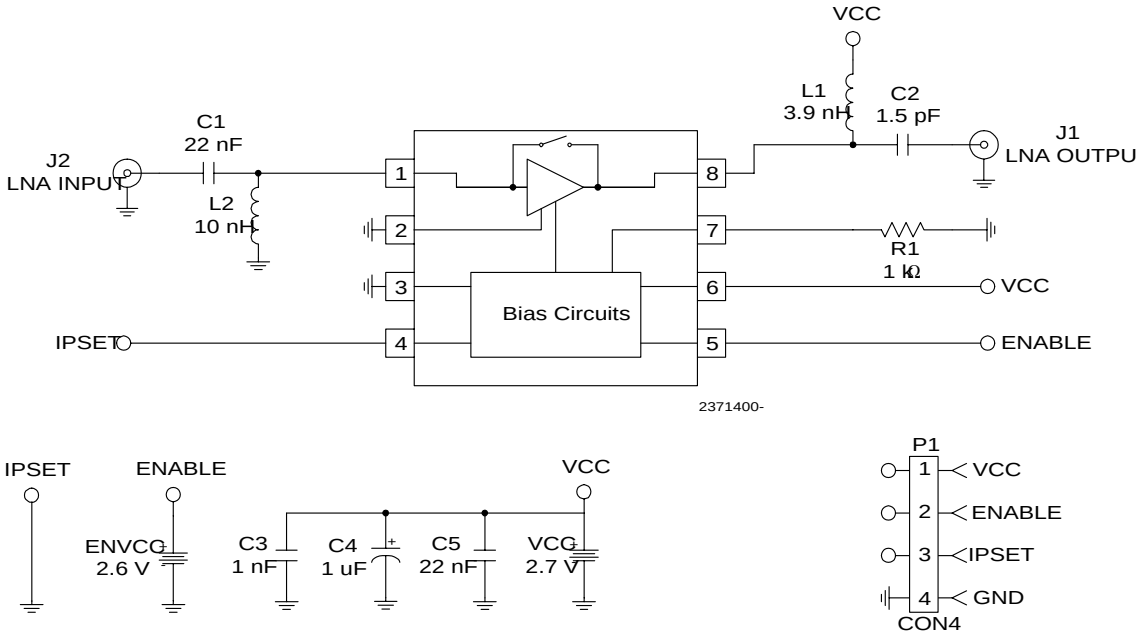


Application Schematic
836MHz



Evaluation Board Schematic

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



Evaluation Board Layout
Board Size 0.833” x 1.009”
Board Thickness 0.031”, Board Material FR-4