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RF2126

HIGH POWER LINEAR AMPLIFIER

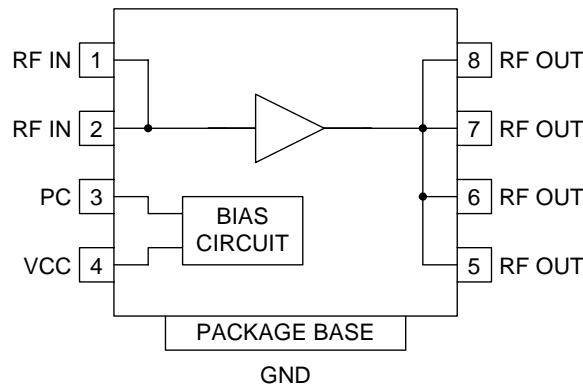
RoHS Compliant & Pb-Free Product
Package Style: SOIC-8 Slug


Features

- Single 3V to 6.0V Supply
- 1.3W Output Power
- 12dB Gain
- 45% Efficiency
- Power Down Mode
- 400MHz to 2700MHz Operation

Applications

- 2.5GHz ISM Band Applications
- Digital Communication Systems
- PCS Communication Systems
- Commercial and Consumer Systems
- Portable Battery-Powered Equipment


Functional Block Diagram

Product Description

The RF2126 is a high-power, high-efficiency, linear amplifier IC. The device is manufactured on an advanced Gallium Arsenide Heterojunction Bipolar Transistor (HBT) process and has been designed for use as the final RF amplifier in 2.45 GHz ISM applications such as WLAN and POS terminals. The part will also function as the final stage in transmitters requiring linear amplification operating between 400MHz and 2700MHz. The device is packaged in an 8-lead plastic package with a backside ground. The device is self-contained with the exception of the output matching network and power supply feed line. It produces a typical output power level of 1W.

Ordering Information

RF2126	High Power Linear Amplifier
RF2126PCK	Fully Assembled Evaluation Board

Optimum Technology Matching® Applied

<input checked="" type="checkbox"/> GaAs HBT	<input type="checkbox"/> SiGe BiCMOS	<input type="checkbox"/> GaAs pHEMT	<input type="checkbox"/> GaN HEMT
<input type="checkbox"/> GaAs MESFET	<input type="checkbox"/> Si BiCMOS	<input type="checkbox"/> Si CMOS	
<input type="checkbox"/> InGaP HBT	<input type="checkbox"/> SiGe HBT	<input type="checkbox"/> Si BJT	

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Absolute Maximum Ratings

Parameter	Rating	Unit
Supply Voltage (V_{CC})	-0.5 to +6.5	V_{DC}
Power Control Voltage (V_{PC})	-0.5 to +5V	V
DC Supply Current	450 (see Note)	mA
Input RF Power	+20	dBm
Output Load VSWR	20:1	
Operating Ambient Temperature	-40 to +85	$^{\circ}C$
Storage Temperature	-40 to +125	$^{\circ}C$


Caution! ESD sensitive device.

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RoHS status based on EU Directive 2002/95/EC (at time of this document revision).

Parameter	Specification			Unit	Condition
	Min.	Typ.	Max.		
Overall					$T=25^{\circ}C, V_{CC}=6.0V, V_{PC}=3.0V, Z_{LOAD}=12\Omega, P_{in}=0\text{dBm}, \text{Freq}=2450\text{MHz, Idle current}=180\text{mA}$
Frequency Range	1800		2500	MHz	
Maximum Output Power		+27.0		dBm	$V_{CC}=3.6V, P_{IN}=+19\text{dBm}$
Maximum Output Power		+29		dBm	$V_{CC}=4.8V, P_{IN}=+19\text{dBm}$
Maximum Output Power	+30.0	+31.0		dBm	$V_{CC}=6.0V, P_{IN}=+19\text{dBm}$
Total Power Added Efficiency		45		%	Maximum output, $V_{CC}=3.6V$
Total Power Added Efficiency		45		%	Maximum output, $V_{CC}=4.8V$
Total Power Added Efficiency		45		%	Maximum output, $V_{CC}=6.0V$
Small-signal Gain		12		dB	
Second Harmonic		-55		dBc	See Application Schematic, $P_{IN}=+17\text{dBm}$
Third Harmonic		-60		dBc	
Input VSWR		1.5:1			With external matching network; see application schematic
Two-tone Specification					
Average Two-Tone Power		+27		dBm	PEP-3dB
IM ₃	-24	-25		dBc	$P_{OUT}=+24\text{dBm}$ for each tone
IM ₅		-35		dBc	$P_{OUT}=+24\text{dBm}$ for each tone
IM ₇		-55		dBc	$P_{OUT}=+24\text{dBm}$ for each tone
Power Control					
V_{PC}	1.5	3.0	3.5	V	To obtain 180mA idle current
Power Control "OFF"	0.2	0.5		V	Threshold voltage at device input



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Parameter	Specification			Unit	Condition
	Min.	Typ.	Max.		
Power Supply					
Power Supply Voltage	3.0		6.5	V	
Supply Current		350		mA	$P_{OUT}=+30\text{dBm}$, $V_{CC}=6.0\text{V}$
Power Down Current		0.5	10	μA	$V_{PC}=0.2\text{V}$

Note:

For infrastructure class operation, the maximum allowable current over all operating conditions is 260mA. This implies the need for an external active bias control network to control I_{CC} over temperature and normal process variation. The RF5187 datasheet provides an example of a recommended active bias control circuit.

For consumer systems with typical ambient operating temperature requirements below $+50^\circ\text{C}$, the customer may exceed this 260mA I_{CC} limit. However, for best reliability in all applications, the maximum continuous dissipated power ($I_{CC} \cdot V_{CC} - P_{RF}$) for this part is 1.3W.

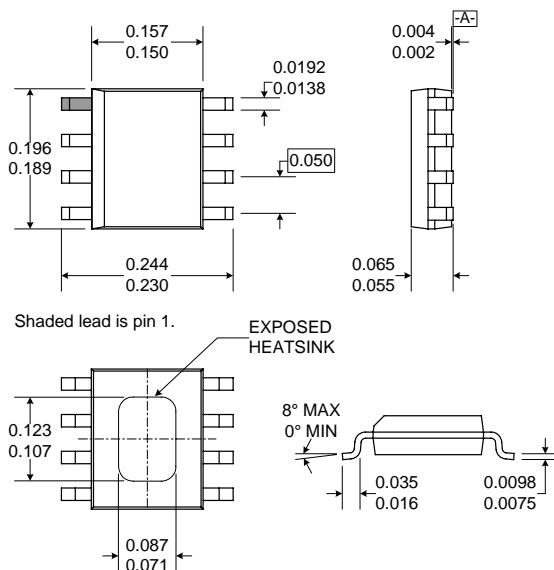
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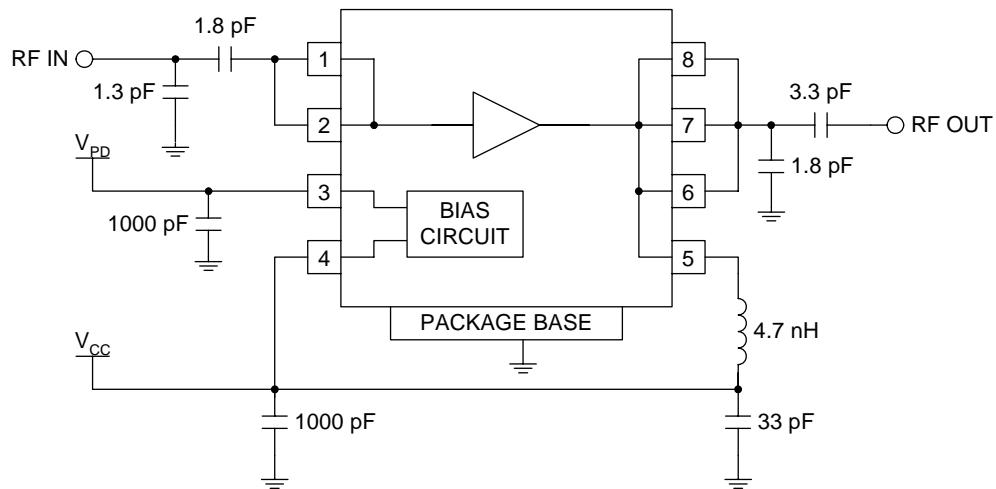
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Pin	Function	Description	Interface Schematic
1	RF IN	RF input. This input is DC coupled, so an external blocking capacitor is required if this pin is connected to a DC path. An optimum match to 50Ω is obtained by providing an external series capacitor of 1.8pF and then a shunt capacitor of 1.3pF ; see the Application Schematic. Those values are typical for 2450MHz; other values may be required for other frequencies.	
2	RF IN	Same as pin 1.	
3	PC	Power control pin. For obtaining maximum performance the voltage on this pin can be used to set correct bias level. In a typical application this is implemented by a feedback loop. The feedback can be based on the actual supply current of the device, i.e. maintaining a fixed current level, or it can be based on the RF output power level to maintain a fixed RF power level (Automatic Level Control loop). A voltage of 0.5V or lower brings the part into power down state.	
4	VCC	Power supply pin for the bias circuits. External low frequency bypass capacitors should be connected if no other low frequency decoupling is nearby.	
5	RF OUT	RF output and bias for the output stage. The power supply for the output transistor needs to be supplied to this pin. This can be done through a quarter-wavelength microstrip line that is RF grounded at the other end, or through an RF inductor that supports the required DC currents. Optimum load impedance is achieved by providing a shunt capacitor of 1.8pF and a series capacitor of 3.3pF ; see the Application Schematic. Those values are typical for 2450MHz; other values may be required for other frequencies. Since there are several output pins available, which are internally connected, one pin can be used for connecting the bias, another for connecting a (third) harmonic trap filter, and the other pins for the RF output.	
6	RF OUT	Same as pin 5.	
7	RF OUT	Same as pin 5.	
8	RF OUT	Same as pin 5.	
Pkg Base	GND	Ground connection. The backside of the package should be connected to the ground plane through a short path, i.e., vias under the device may be required.	

Package Drawing



**Application Schematic
2450MHz Operation**



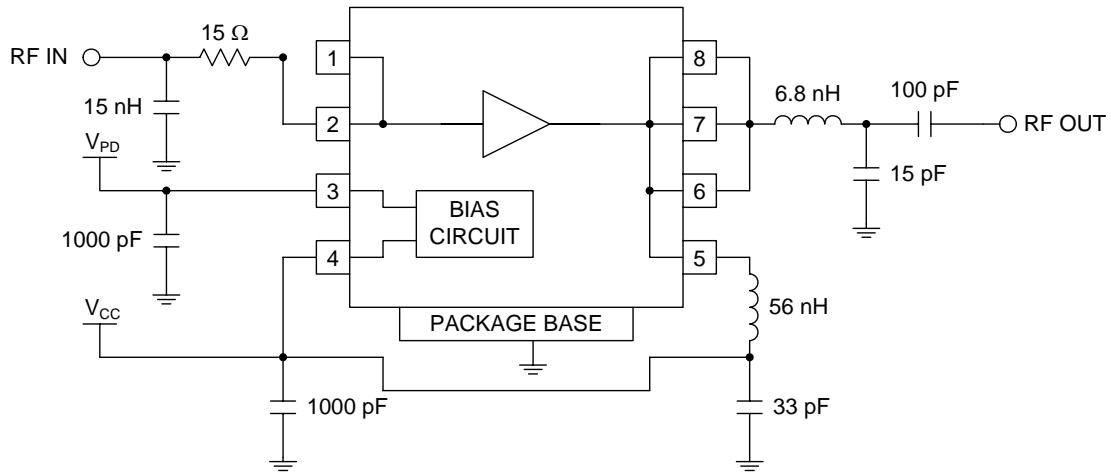
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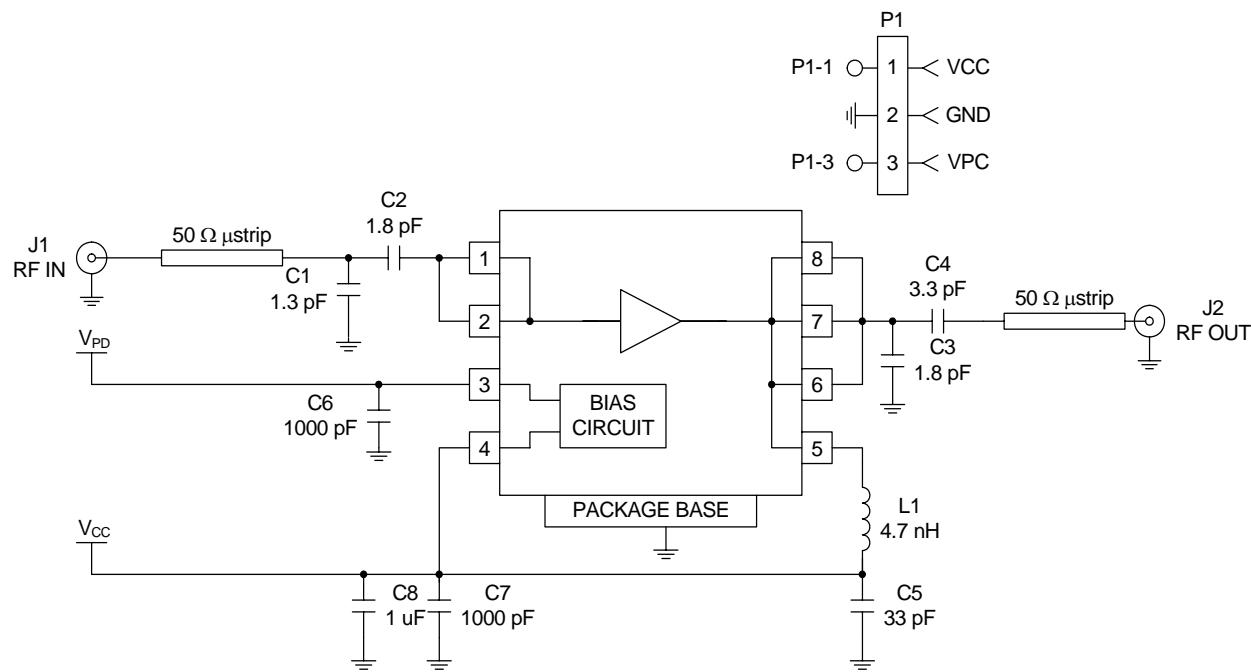
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POWER AMPLIFIERS

Application Schematic 433MHz Operation



**Evaluation Board Schematic
2450 MHz Operation**



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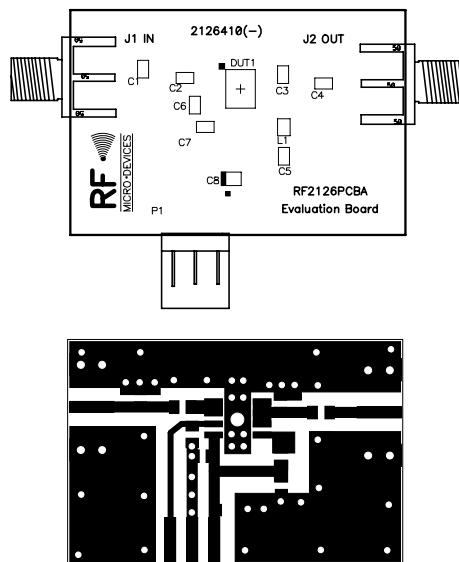


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POWER AMPLIFIERS

Evaluation Board Layout 1.5" x 1.0"

Board Thickness 0.031", Board Material FR-4



RoHS* Banned Material Content

RoHS Compliant:	Yes
Package total weight in grams (g):	0.091
Compliance Date Code:	0506
Bill of Materials Revision:	-
Pb Free Category:	e3

Bill of Materials	Parts Per Million (PPM)					
	Pb	Cd	Hg	Cr VI	PBB	PBDE
Die	0	0	0	0	0	0
Molding Compound	0	0	0	0	0	0
Lead Frame	0	0	0	0	0	0
Die Attach Epoxy	0	0	0	0	0	0
Wire	0	0	0	0	0	0
Solder Plating	0	0	0	0	0	0

This RoHS banned material content declaration was prepared solely on information, including analytical data, provided to RFMD by its suppliers, and applies to the Bill of Materials (BOM) revision noted

* DIRECTIVE 2002/95/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 27 January 2003 on the restriction of the use of certain hazardous substances in electrical and electronic equipment

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