

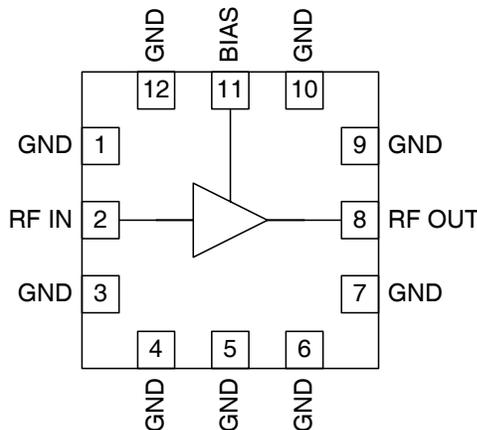


**Features**

- 500MHz to 2000MHz
- +44.0dBm Output IP3
- +14.0dB Gain at 850MHz
- +11.4dBm Input P1dB at 850MHz
- 3.4dB Noise Figure at 850MHz
- Single 5V Power Supply

**Applications**

- Basestation Applications
- Cellular and PCS Systems
- CDMA, W-CDMA Systems
- GSM/EDGE Systems
- Final PA for Low-Power Applications



Functional Block Diagram

**Product Description**

The RF3223 is a high-efficiency GaAs Heterojunction Bipolar Transistor (HBT) amplifier packaged in a low-cost surface-mount package. This amplifier is ideal for use in applications requiring high-linearity and low noise figure over the 500MHz to 3GHz frequency range. The RF3223 operates from a single 5V power supply, and is assembled in an economical 3mmx3mm QFN package.

**Ordering Information**

RF3223 High Linearity/Driver Amplifier  
RF3223PCBA-41X 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
RF Input Power	+20	dBm
Device Voltage	-0.5 to +6.0	V
Device Current	250	mA
Operating Temperature	-40 to +85	°C
Storage Temperature	-40 to +150	°C



**Caution!** ESD sensitive device.

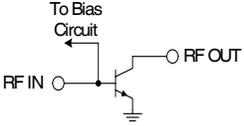
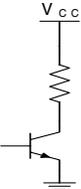
Exceeding any one or a combination of the Absolute Maximum Rating conditions may cause permanent damage to the device. Extended application of Absolute Maximum Rating conditions to the device may reduce device reliability. Specified typical performance or functional operation of the device under Absolute Maximum Rating conditions is not implied.

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

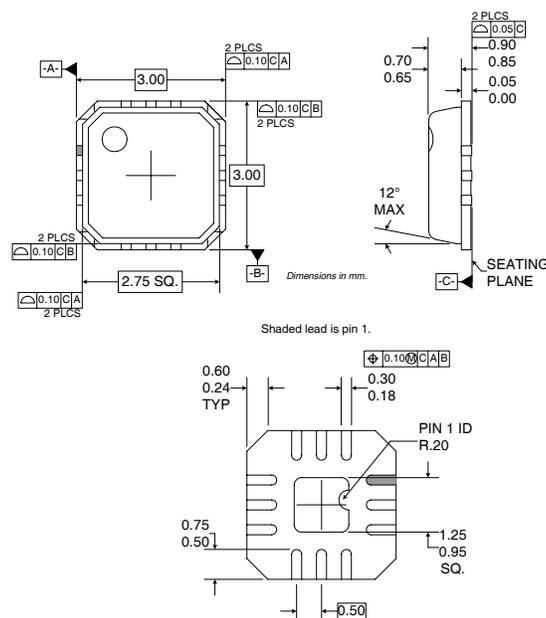
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Parameter	Specification			Unit	Condition
	Min.	Typ.	Max.		
<b>Overall</b>					$V_{CC}=5V$ , $RF_{IN}=-10dBm$ , Freq=850MHz, with Temp=25 °C unless otherwise noted.
<b>AC Specifications</b>					
Frequency	500		2000	MHz	
Gain (Small Signal)	12	14	15	dB	
Input VSWR		1.4	1.7	SWR	
Output VSWR		1.3		SWR	
Reverse Isolation	19	21			
Output IP3	41	45		dBm	$F_1 = 850MHz$ , $F_2 = 851MHz$
Output P1dB	23	+24.5		dBm	
Noise Figure		3.4	4.0	dB	
<b>Thermal</b>					$I_{CC}=160mA$ , $P_{DISS}=0.913W$ . (See Note)
Theta <sub>JC</sub>		75		°C/W	
Maximum Measured Junction Temperature at DC Bias Conditions		154		°C	$T_{CASE}=+85 °C$
Mean Time To Failures		5500		years	$T_{CASE}=+85 °C$
<b>DC Specifications</b>					
Device Voltage	4.5	5.0	5.5	V	$I_{CC}=160mA$
Operating Current Range	110	150	170	mA	$V_{CC}=5V$

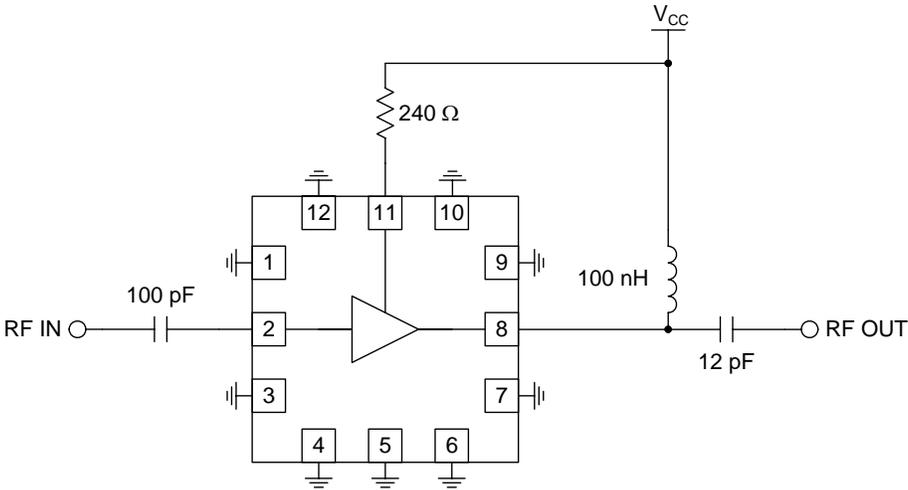
Note: The RF3223 must be operated at or below 175 mA in order to achieve the thermal performance listed above. While the RF3223 may be operated at higher bias currents, 175 mA is the recommended bias to ensure the highest possible reliability and electrical performance.

Pin	Function	Description	Interface Schematic
1	GND	Ground connection.	
2	RF IN	RF input pin. This pin is not internally DC-blocked. A DC blocking capacitor suitable for the frequency of operation should be used.	
3	GND	Ground connection.	
4	GND	Ground connection.	
5	GND	Ground connection.	
6	GND	Ground connection.	
7	GND	Ground connection.	
8	RF OUT	Amplifier output pin. This pin is an open-collector output. It must be biased to $V_{CC}$ through a choke or matching inductor. This pin is typically matched to $50\Omega$ with a shunt bias/matching inductor and series blocking/matching capacitor. Refer to application schematics.	See pin 2.
9	GND	Ground connection.	
10	GND	Ground connection.	
11	BIAS	This pin is used to control the bias current. An external resistor may be used to set the bias current for any $V_{PD}$ voltage. Allows for trade-offs between IP3 versus noise figure and $T_{MAX}$ .	
12	GND	Ground connection.	
Pkg Base	GND	Ground connection. Vias to ground required under the package base.	

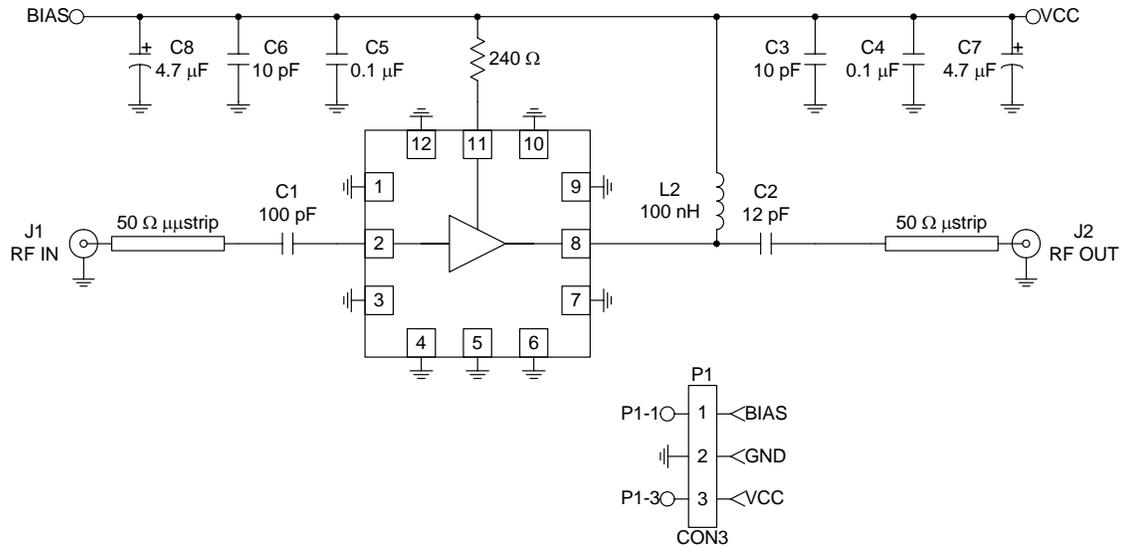
**Package Drawing**



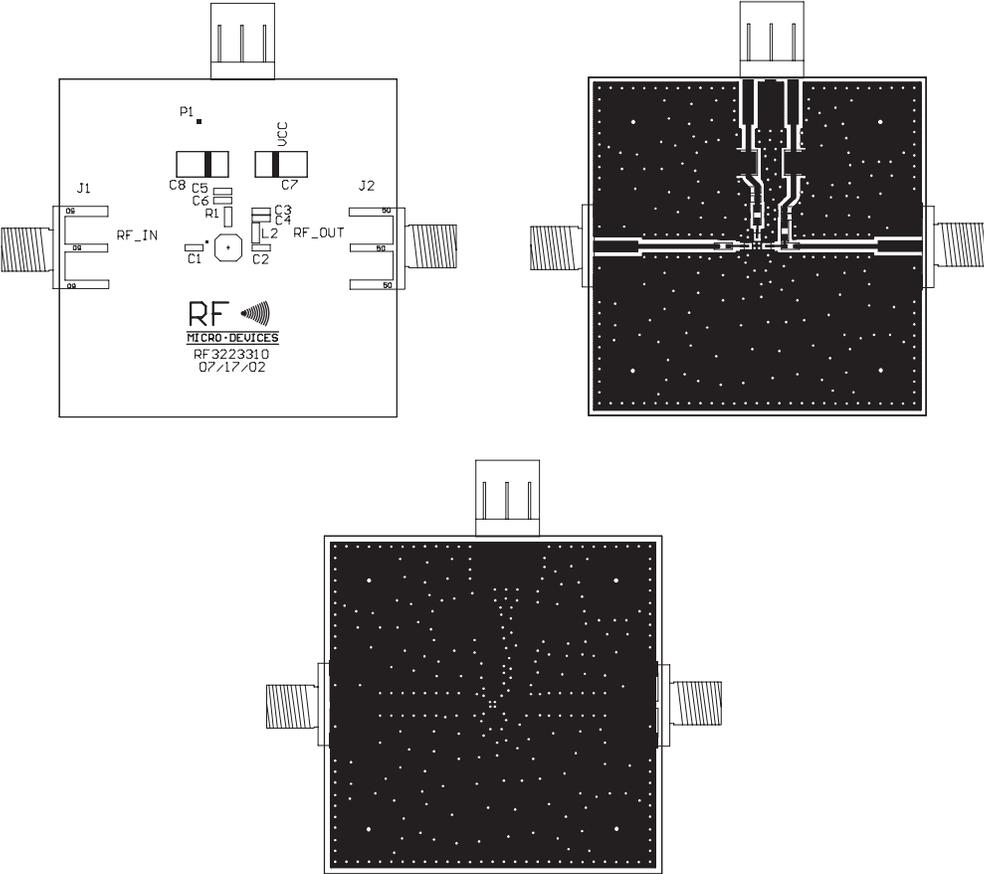
## Application Schematic - 850 MHz



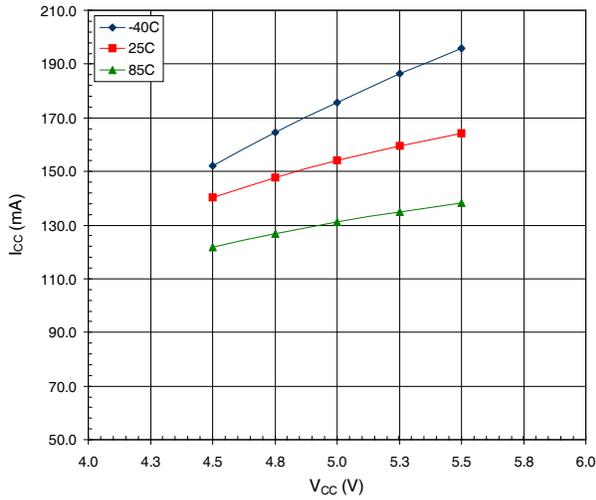
**Evaluation Board Schematic**  
 (Download [Bill of Materials](http://www.rfmd.com) from [www.rfmd.com](http://www.rfmd.com).)



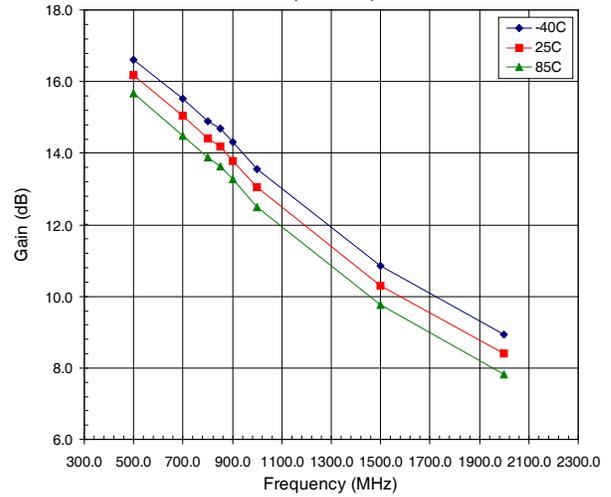
**Evaluation Board Layout**  
**Board Size 1.5" x 1.5"**  
**Board Thickness 0.032", Board Material FR-4**



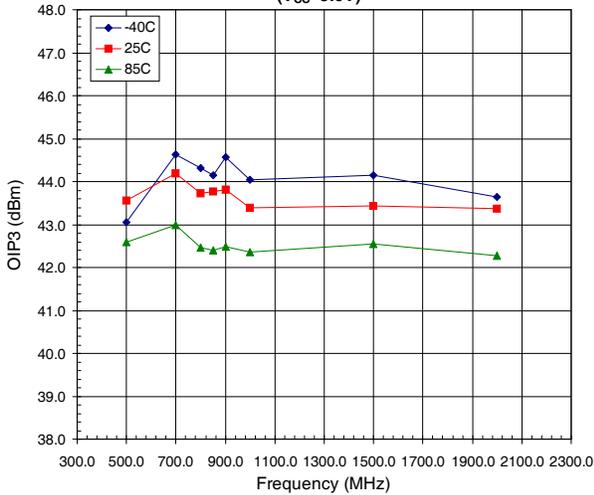
**I<sub>CC</sub> versus V<sub>CC</sub> Across Temperature**



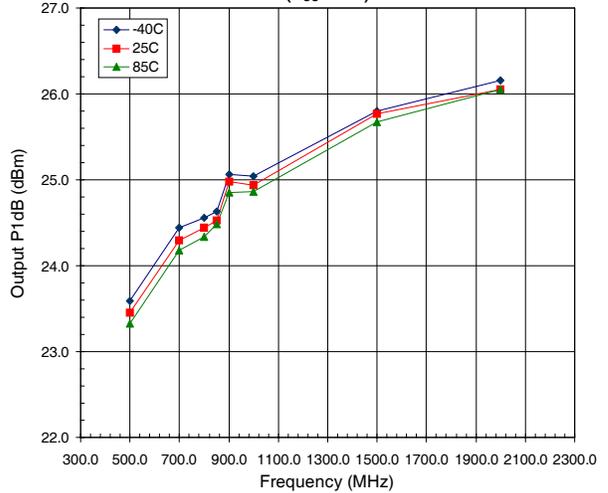
**Gain versus Frequency Across Temperature (V<sub>CC</sub>=5.0V)**



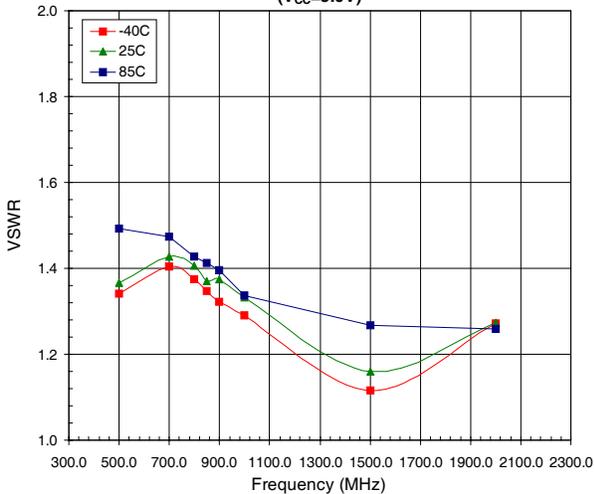
**OIP3 versus Frequency Across Temperature (V<sub>CC</sub>=5.0V)**



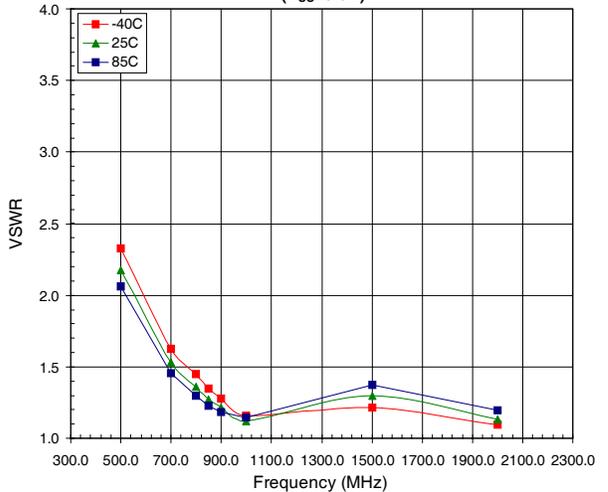
**Output P1dB versus Frequency Across Temperature (V<sub>CC</sub>=5.0V)**



**Input VSWR versus Frequency Across Temperature (V<sub>CC</sub>=5.0V)**



**Output VSWR versus Frequency Across Temperature (V<sub>CC</sub>=5.0V)**



Noise Figure versus Frequency Across Temperature  
(V<sub>CC</sub>=5.0V)

