RF3223

HIGH LINEARITY/DRIVER AMPLIFIER

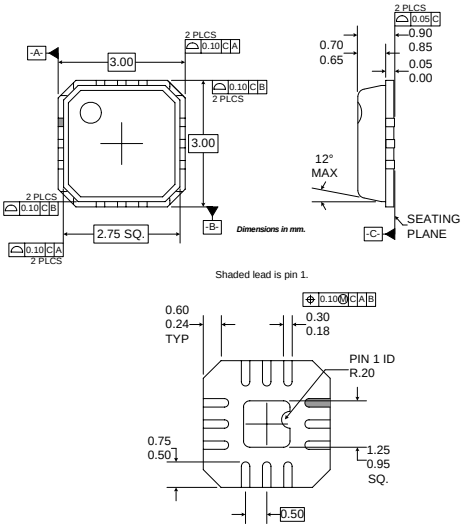
RoHS Compliant & Pb-Free Product

Typical Applications

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

Product Description

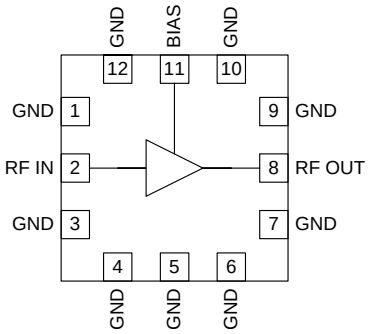
The RF3223 is a high-efficiency GaAs Heterojunction Bipolar Transistor (HBT) amplifier packaged in a low-cost surface-mount package. This amplifier is ideal for use in applications requiring high-linearity and low noise figure over the 500MHz to 3GHz frequency range. The RF3223 operates from a single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



Package Style: QFN, 12-Pin, 3x3

Optimum Technology Matching® Applied

- ☐ Si BJT
- ☑ GaAs HBT
- ☐ GaAs MESFET
- ☐ Si Bi-CMOS
- ☐ SiGe HBT
- ☐ Si CMOS
- ☐ InGaP/HBT
- ☐ GaN HEMT
- ☐ SiGe Bi-CMOS



Functional Block Diagram

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

Ordering Information

RF3223	High Linearity/Driver Amplifier
RF3223PCBA-41X	Fully Assembled Evaluation Board

RF Micro Devices, Inc.
7628 Thorndike Road
Greensboro, NC 27409, USA
Tel (336) 664 1233
Fax (336) 664 0454
http://www.rfmd.com

Absolute Maximum Ratings

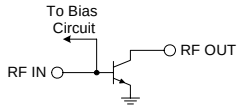
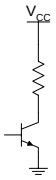
Parameter	Rating	Unit
RF Input Power	+20	dBm
Device Voltage	-0.5 to +6.0	V
Device Current	250	mA
Operating Temperature	-40 to +85	°C
Storage Temperature	-40 to +150	°C

Caution! ESD sensitive device.

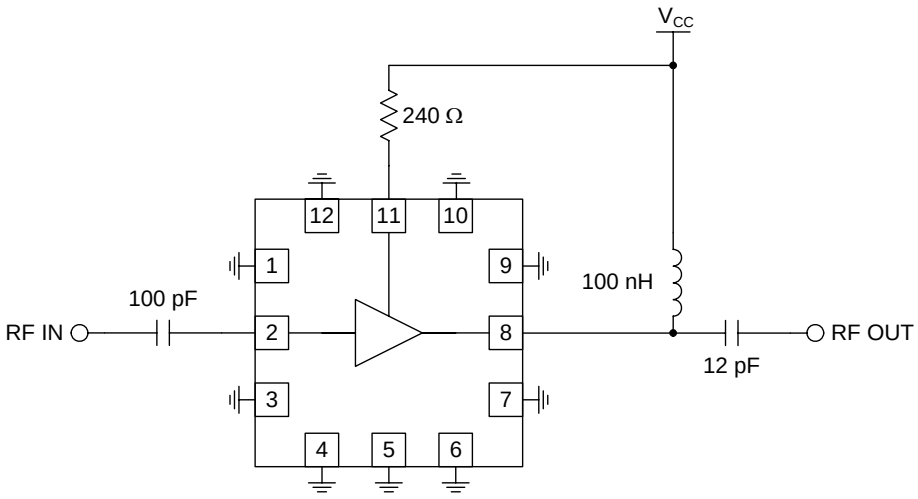
RF Micro Devices believes the furnished information is correct and accurate at the time of this printing. RoHS marking based on EU Directive 2002/95/EC (at time of this printing). However, RF Micro Devices reserves the right to make changes to its products without notice. RF Micro Devices does not assume responsibility for the use of the described product(s).

Parameter	Specification			Unit	Condition
	Min.	Typ.	Max.		
Overall					V_{CC}=5V, RF_{IN}=-10dBm, Freq=850MHz, with Temp=25°C unless otherwise noted.
AC Specifications					
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	
Thermal					I_{CC}=160mA, P_{DISS}=0.913W. (See Note)
$Theta_{JC}$		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
DC Specifications					
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 175mA in order to achieve the thermal performance listed above. While the RF3223 may be operated at higher bias currents, 175mA is the recommended bias to ensure the highest possible reliability and electrical performance.

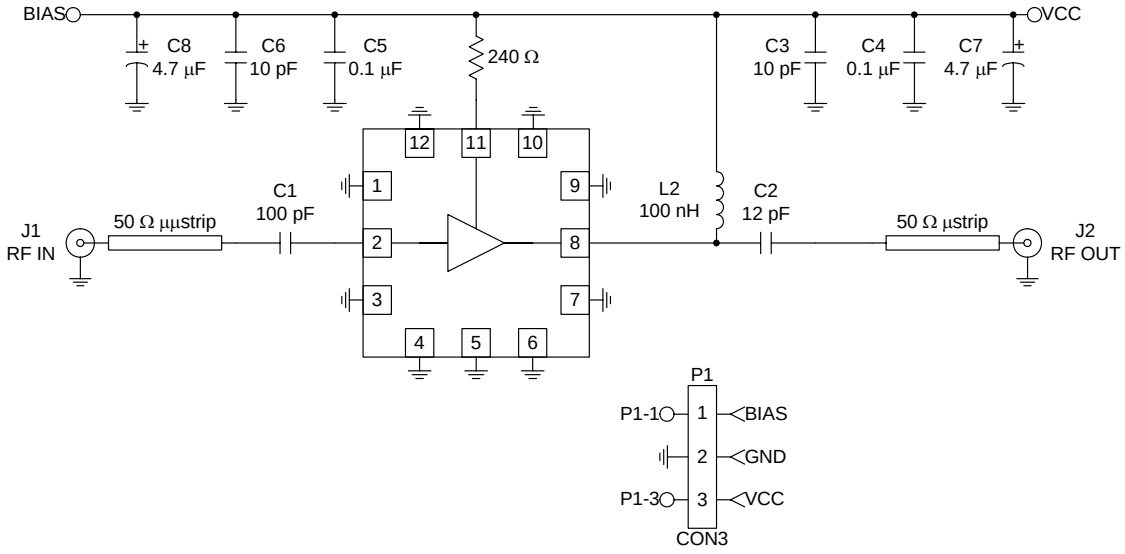
Pin	Function	Description	Interface Schematic
1	GND	Ground connection.	
2	RF IN	RF input pin. This pin is not internally DC-blocked. A DC blocking capacitor suitable for the frequency of operation should be used.	
3	GND	Ground connection.	
4	GND	Ground connection.	
5	GND	Ground connection.	
6	GND	Ground 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 50Ω 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.	

Application Schematic - 850MHz



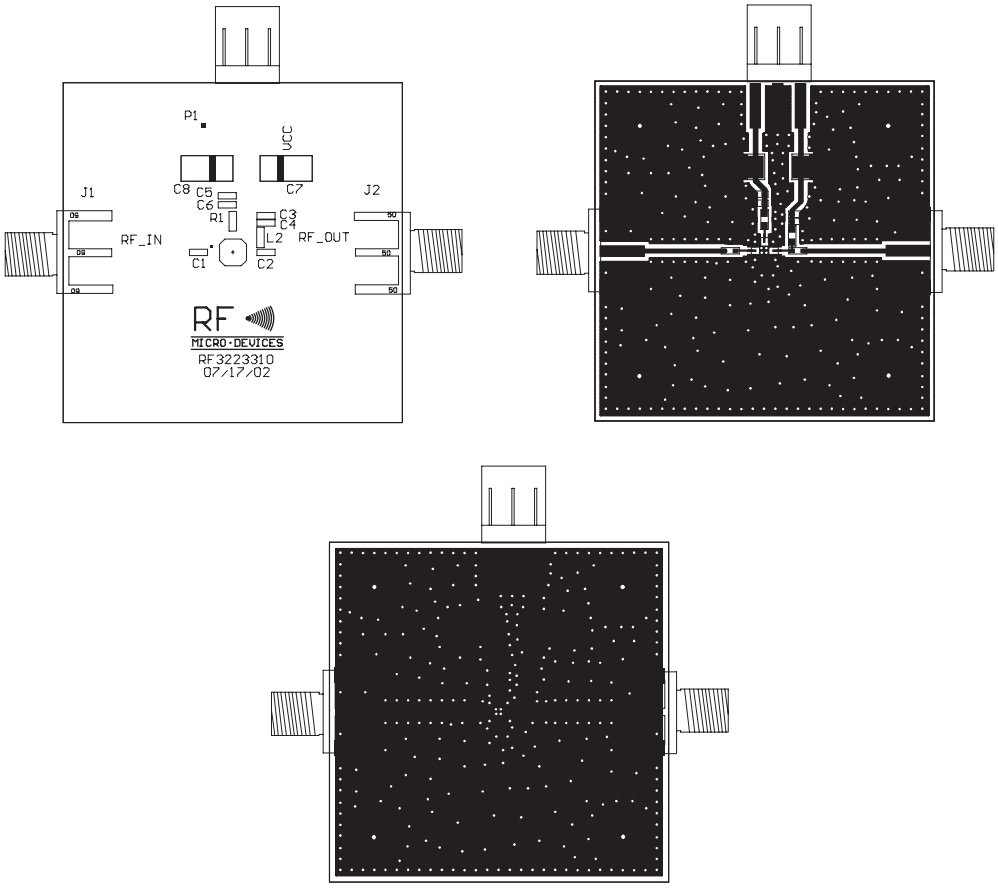
Evaluation Board Schematic

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

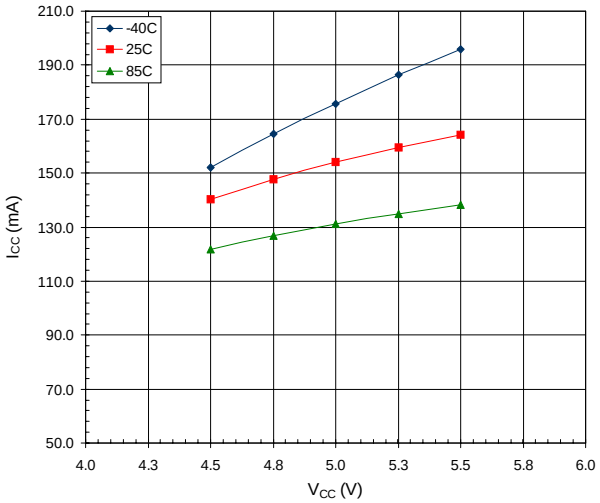


Evaluation Board Layout
Board Size 1.5” x 1.5”

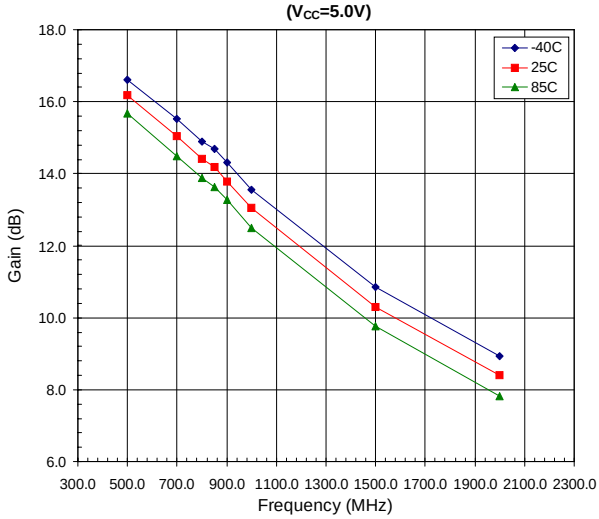
Board Thickness 0.032”, Board Material FR-4



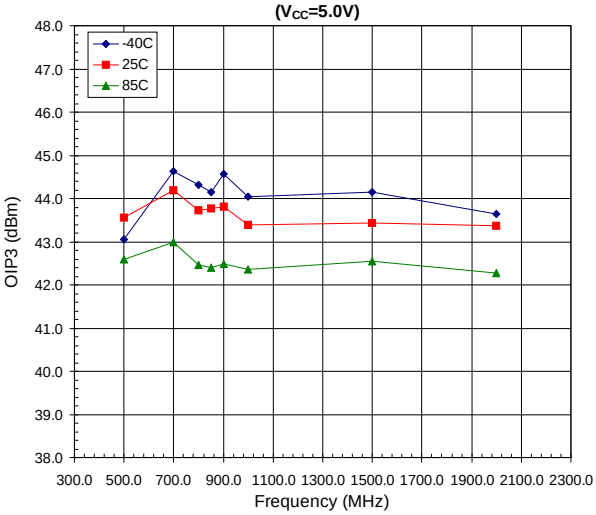
I_{CC} versus V_{CC} Across Temperature



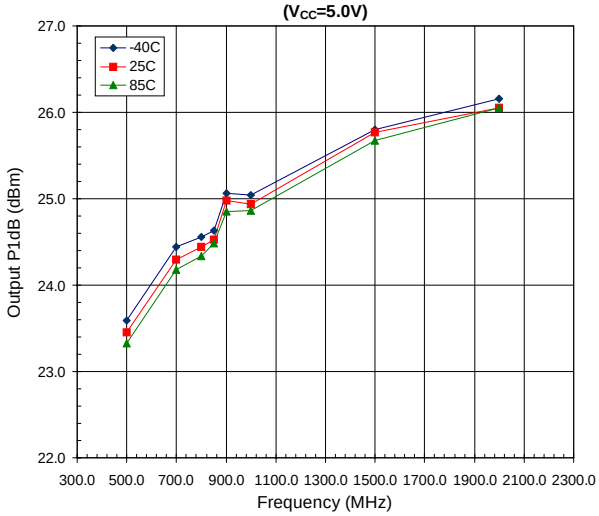
Gain versus Frequency Across Temperature
(V_{CC}=5.0V)



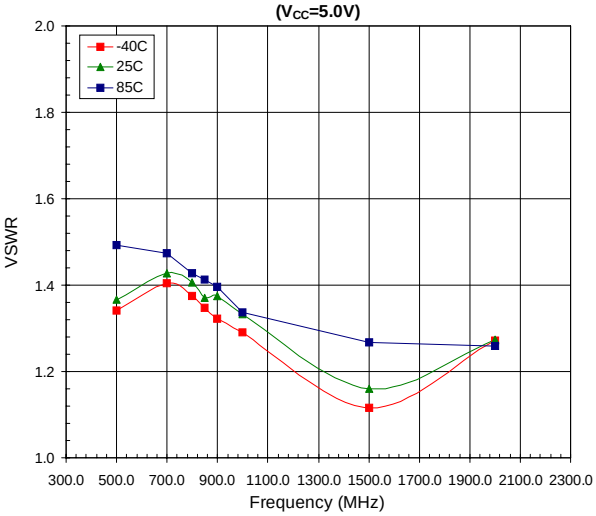
OIP3 versus Frequency Across Temperature
(V_{CC}=5.0V)



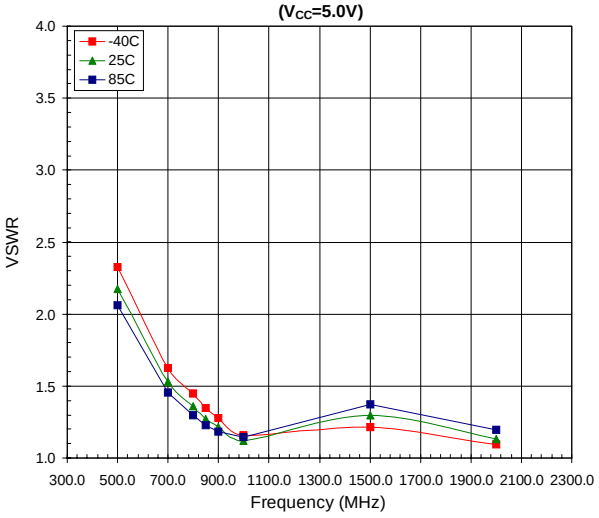
Output P1dB versus Frequency Across Temperature
(V_{CC}=5.0V)

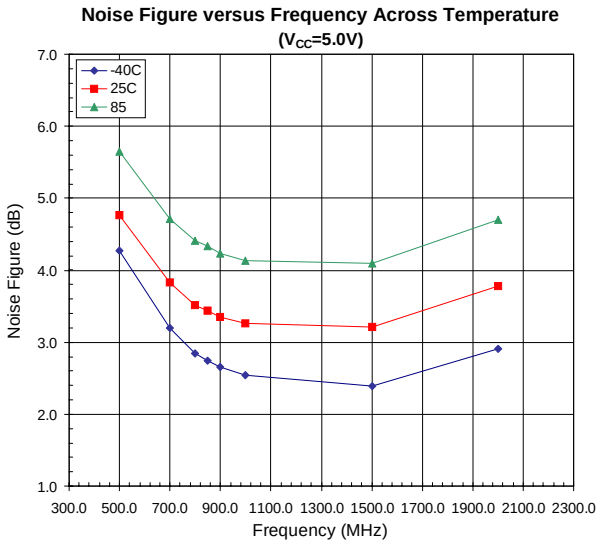


Input VSWR versus Frequency Across Temperature
(V_{CC}=5.0V)



Output VSWR versus Frequency Across Temperature
(V_{CC}=5.0V)




Noise Figure versus Frequency Across Temperature
(VCC=5.0V)
-40C
25C
85
Noise Figure (dB)
7.0
6.0
5.0
4.0
3.0
2.0
1.0
300.0 500.0 700.0 900.0 1100.0 1300.0 1500.0 1700.0 1900.0 2100.0 2300.0
Frequency (MHz)