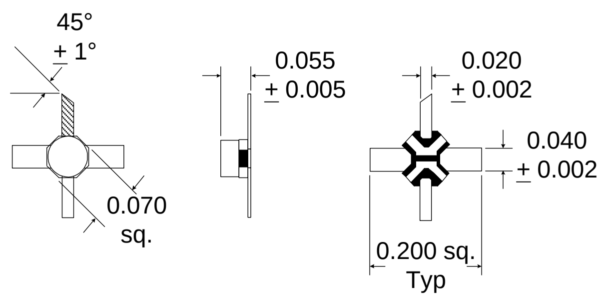
Typical Applications

- Broadband, Low Noise Gain Blocks
- IF or RF Buffer Amplifiers
- Driver Stage for Power Amplifiers
- Final PA for Low Power Applications
- High Reliability Applications
- Broadband Test Equipment

Product Description

The RF2043 is a general purpose, low cost RF amplifier IC. The device is manufactured on an advanced Gallium Arsenide Heterojunction Bipolar Transistor (HBT) process, and has been designed for use as an easily-cascadable 50Ω gain block. Applications include IF and RF amplification in wireless voice and data communication products operating in frequency bands up to 6000MHz. The device is self-contained with 50Ω input and output impedances and requires only two external DC biasing elements to operate as specified. With a goal of enhanced reliability, the extremely small Micro-X ceramic package offers significantly lower thermal resistance than similar size plastic packages.



NOTES:
1. Shaded lead is pin 1.
2. Darkened areas are metallization.

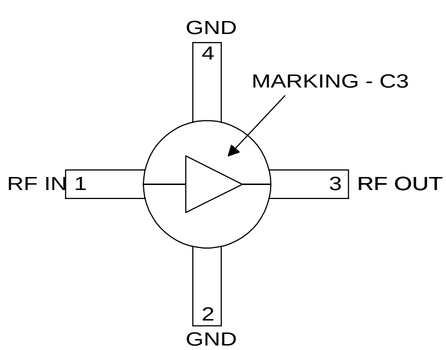
Optimum Technology Matching® Applied

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

Package Style: Micro-X Ceramic

Features

- DC to >6000MHz Operation
- Internally matched Input and Output
- 11dB Small Signal Gain
- +35dBm Output IP3
- +18.5dBm Output Power
- Extremely Flat Gain Response



Functional Block Diagram

Ordering Information

RF2043	General Purpose Amplifier
RF204X PCBA	Fully Assembled Evaluation Board

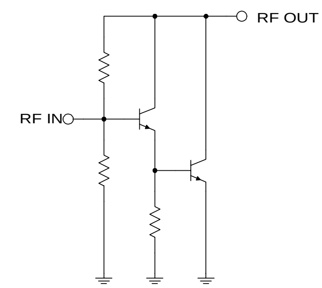
RF Micro Devices, Inc.
7625 Thorndike Road
Greensboro, NC 27409, USA
Tel (336) 664 1233
Fax (336) 664 0454
http://www.rfmd.com

Absolute Maximum Ratings

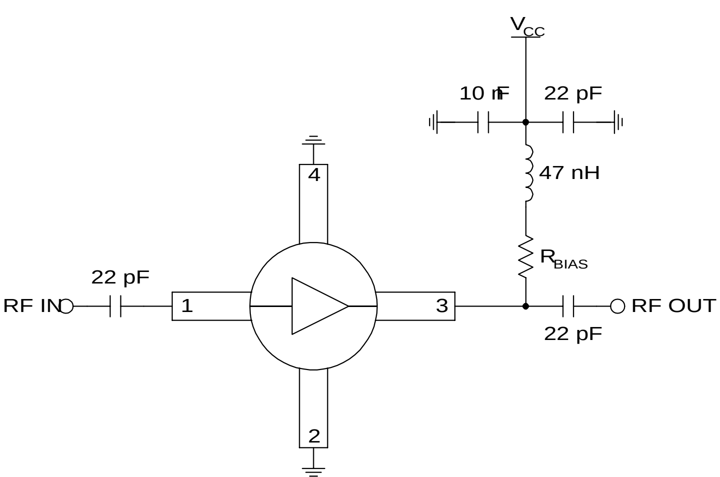
Parameter	Rating	Unit
Supply Current	120	mA
Input RF Power	+20	dBm
Operating Ambient Temperature	-40 to +85	°C
Storage Temperature	-60 to +150	°C

Caution! ESD sensitive device.

Parameter	Specification			Unit	Condition
	Min.	Typ.	Max.		
Overall					T=25°C, V_D=5.5V, I_{CC}=70mA
Frequency Range		DC to >6000		MHz	
1dB Bandwidth		5.5		GHz	
Gain		11.3		dB	Freq=100MHz
		11.3		dB	Freq=1000MHz
	10.2	11.4		dB	Freq=2000MHz
		11.5		dB	Freq=3000MHz
		11.5			Freq=4000MHz
		9.9			Freq=6000MHz
Gain Flatness		±0.05		dB	100MHz to 2000MHz
Noise Figure		7.6		dB	Freq=1000MHz
Input VSWR		<1.8:1			In a 50Ω system, DC to 3000MHz
		<2.5:1			In a 50Ω system, 3000MHz to 6000MHz
Output VSWR		<1.8:1			In a 50Ω system, DC to 3000MHz
		<2.6:1			In a 50Ω system, 3000MHz to 6000MHz
Output IP_3		+34.5		dBm	Freq=1000MHz
Output P_{1dB}		+18.5		dBm	Freq=1000MHz
Reverse Isolation		16.5		dB	Freq=1000MHz
Thermal					I_{CC}=70mA, P_{DISS}=370mW
$Theta_{JC}$		149		°C/W	
Maximum Measured Junction Temperature at DC Bias Conditions		142		°C	T_{AMB}=+85°C
Mean Time Between Failures		1.4×10^3		years	T_{AMB}=+85°C
		3.4×10^5		years	T_{AMB}=+25°C
		1.8×10^9		years	T_{AMB}=-40°C
Power Supply					With 22Ω bias resistor
Device Operating Voltage	5.0	5.5	6.0	V	At pin 3 with I_{CC}=70mA
Operating Current		70		mA	

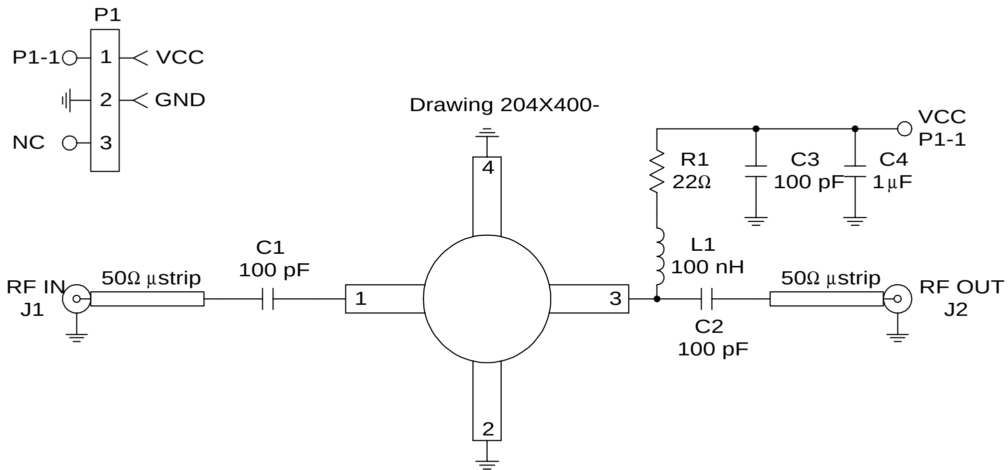
Pin	Function	Description	Interface Schematic
1	RF IN	RF input pin. This pin is NOT internally DC blocked. A DC blocking capacitor, suitable for the frequency of operation, should be used in most applications. DC coupling of the input is not allowed, because this will override the internal feedback loop and cause temperature instability.	
2	GND	Ground connection. Keep traces physically short and connect immediately to ground plane for best performance.	
3	RF OUT	RF output and bias pin. Biasing is accomplished with an external series resistor and choke inductor to V_{CC}. The resistor is selected to set the DC current into this pin to a desired level. The resistor value is determined by the following equation: $$R = \frac{(V_{SUPPLY} - V_{DEVICE})}{I_{CC}}$$ Care should also be taken in the resistor selection to **ensure that the current into the part never exceeds 120 mA over the planned operating temperature**. This means that a resistor between the supply and this pin is always required, even if a supply near 5.5V is available, to provide DC feedback to prevent thermal runaway. Because DC is present on this pin, a DC blocking capacitor, suitable for the frequency of operation, should be used in most applications. The supply side of the bias network should also be well bypassed.	
4	GND	Same as pin 2.	

Application Schematic

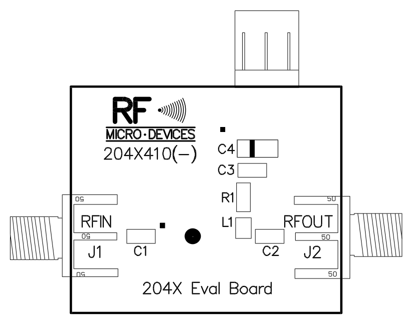


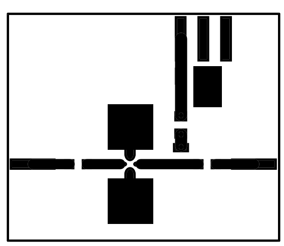
Evaluation Board Schematic

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

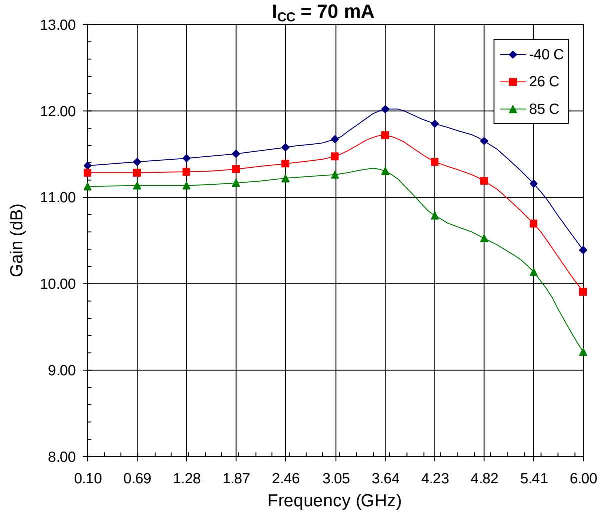


Evaluation Board Layout
Board Size 1.195" x 1.000"

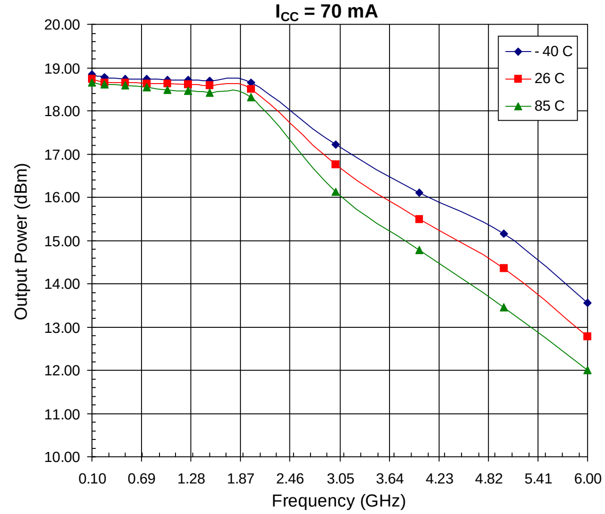




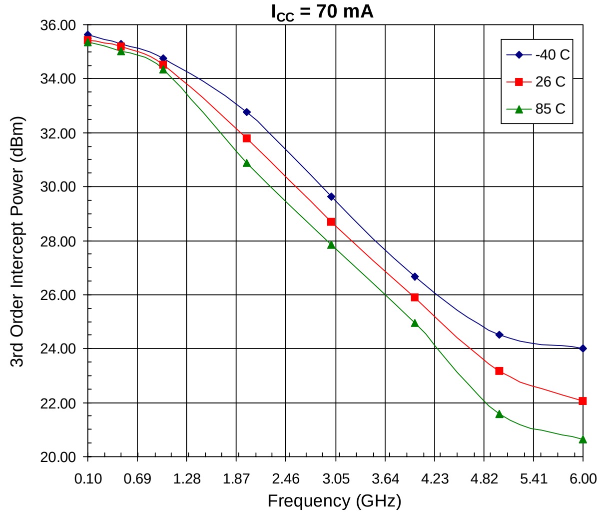
Gain versus Frequency Across Temperature
I_{CC} = 70 mA



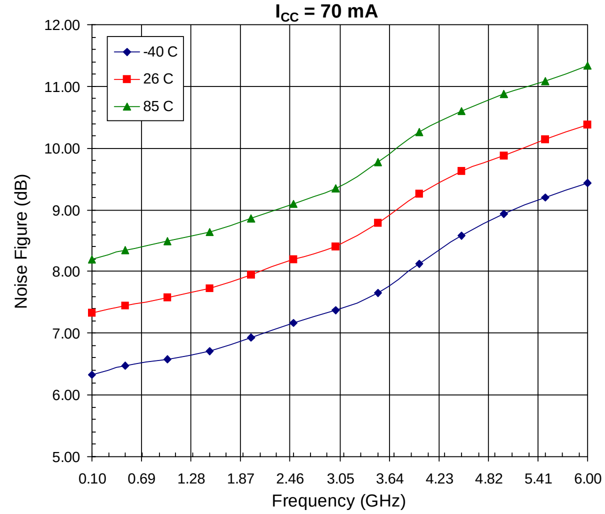
Output P1dB versus Frequency Across Temperature
I_{CC} = 70 mA



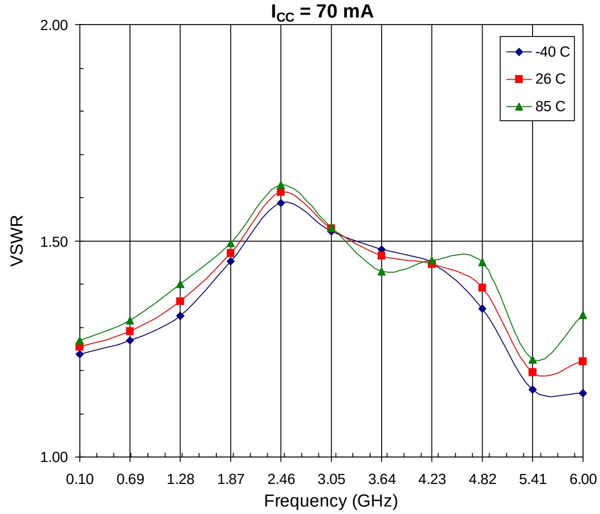
Output IP3 versus Frequency Across Temperature
I_{CC} = 70 mA



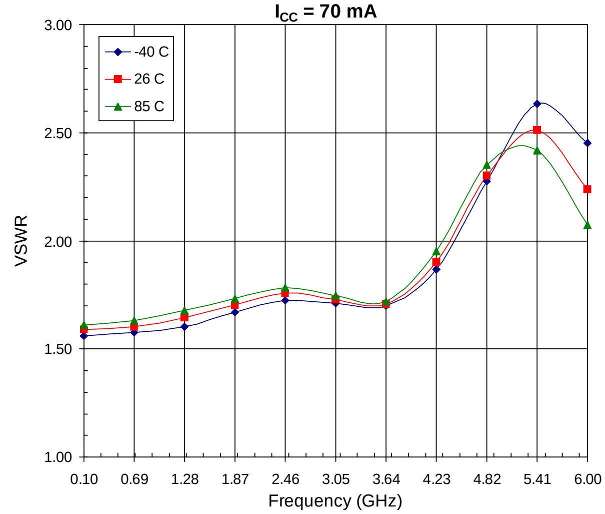
Noise Figure versus Frequency Across Temperature
I_{CC} = 70 mA



Input VSWR versus Frequency Across Temperature
I_{CC} = 70 mA



Output VSWR versus Frequency Across Temperature
I_{CC} = 70 mA



Reverse Isolation versus Frequency Across Temperature
I_{CC} = 70 mA