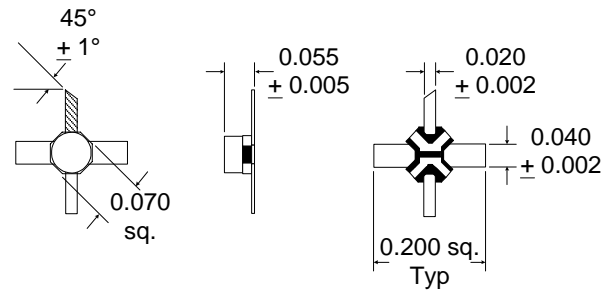


Typical Applications

- 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 RF2046 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 3000MHz. 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.

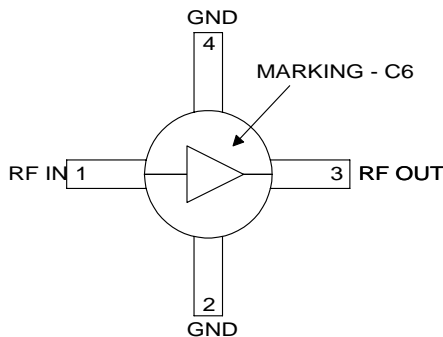
**4**  
GENERAL PURPOSE AMPLIFIERS

Optimum Technology Matching® Applied

- |                                     |  |                                      |
|-------------------------------------|--|--------------------------------------|
| <input type="checkbox"/> Si BJT     | <input checked="" type="checkbox"/> GaAs HBT | <input type="checkbox"/> GaAs MESFET |
| <input type="checkbox"/> Si Bi-CMOS | <input type="checkbox"/> SiGe HBT            | <input type="checkbox"/> Si CMOS     |

Package Style: Micro-X Ceramic

- Features**
- DC to 3000MHz Operation
  - Internally matched Input and Output
  - 22dB Small Signal Gain
  - 3.8dB Noise Figure
  - 10mW Linear Output Power
  - Single Positive Power Supply



Functional Block Diagram

**Ordering Information**

RF2046	General Purpose Amplifier
RF2046 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	75	mA
Input RF Power	+15	dBm
Operating Ambient Temperature	-40 to +85	°C
Storage Temperature	-60 to +150	°C



**Caution!** ESD sensitive device.

RF Micro Devices believes the furnished information is correct and accurate at the 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).

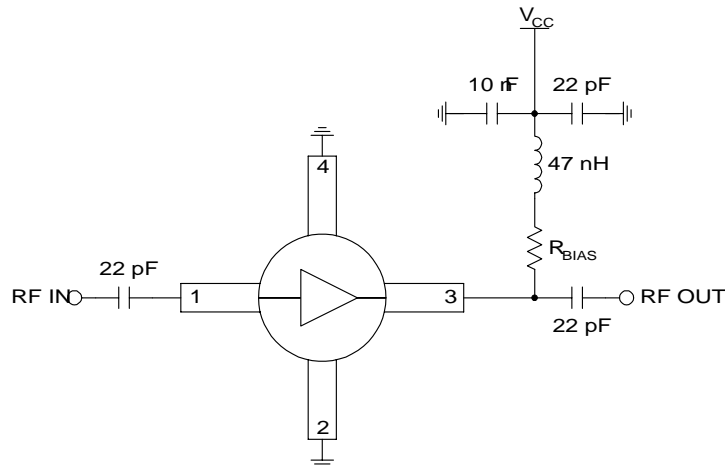
**4**  
GENERAL PURPOSE  
AMPLIFIERS

Parameter	Specification			Unit	Condition
	Min.	Typ.	Max.		
<b>Overall</b>					T=25 °C, V <sub>D</sub> =3.5V, I <sub>CC</sub> =35mA
Frequency Range		DC to 3000		MHz	
Gain	18	22.9		dB	Freq=100MHz
		22.2		dB	Freq=1000MHz
		20.8		dB	Freq=2000MHz
		19.2		dB	Freq=3000MHz
Gain Flatness		±1.1		dB	100MHz to 2000MHz
Noise Figure		3.8		dB	Freq=2000MHz
Input VSWR		1.7:1			In a 50Ω system, DC to 3000MHz
Output VSWR		1.7:1			In a 50Ω system, DC to 3000MHz
Output IP <sub>3</sub>		+23		dBm	Freq=2000MHz±100kHz, P <sub>TONE</sub> =-18dBm
Output P <sub>1dB</sub>		+12.1		dBm	Freq=2000MHz
Reverse Isolation		23.2		dB	Freq=2000MHz
<b>Thermal</b>					I <sub>CC</sub> =35mA, P <sub>DISS</sub> =120mW
Theta <sub>JC</sub>		199		°C/W	
Maximum junction temperature		109		°C	
Mean Time Between Failures		2.0x10 <sup>4</sup>		years	T <sub>AMB</sub> =+85°C
Mean Time Between Failures		1.4x10 <sup>7</sup>		years	T <sub>AMB</sub> =+25°C
Mean Time Between Failures		5.3x10 <sup>11</sup>		years	T <sub>AMB</sub> =-40°C
<b>Power Supply</b>					With 22Ω bias resistor
Operating Voltage	3.0	3.5	4.0	V	At pin 3 with I <sub>CC</sub> =35mA
Operating Current		35		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:  $R = \frac{(V_{SUPPLY} - V_{DEVICE})}{I_{CC}}$ <p>Care should also be taken in the resistor selection to <b>ensure that the current into the part never exceeds 75 mA over the planned operating temperature</b>. This means that a resistor between the supply and this pin is always required, even if a supply near 3.6V 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.</p>	
4	GND	Same as pin 2.	

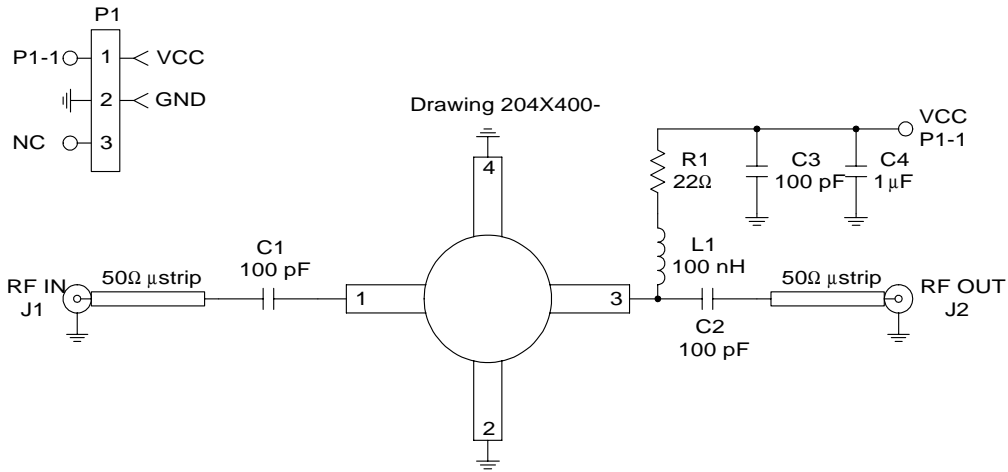
4  
GENERAL PURPOSE  
AMPLIFIERS

### Application Schematic

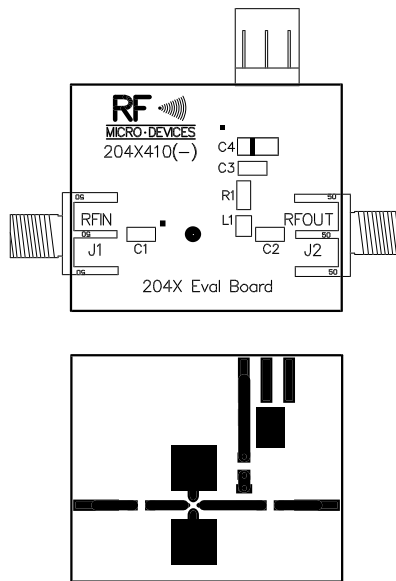


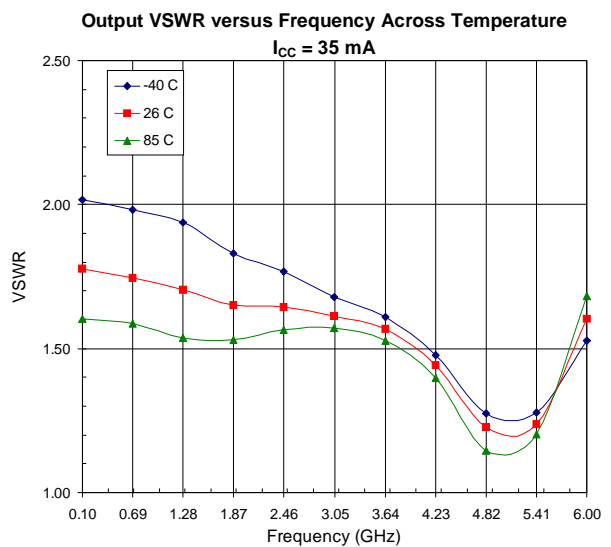
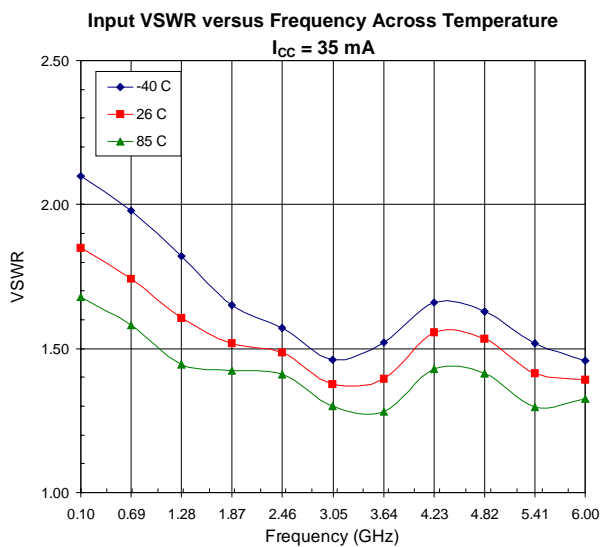
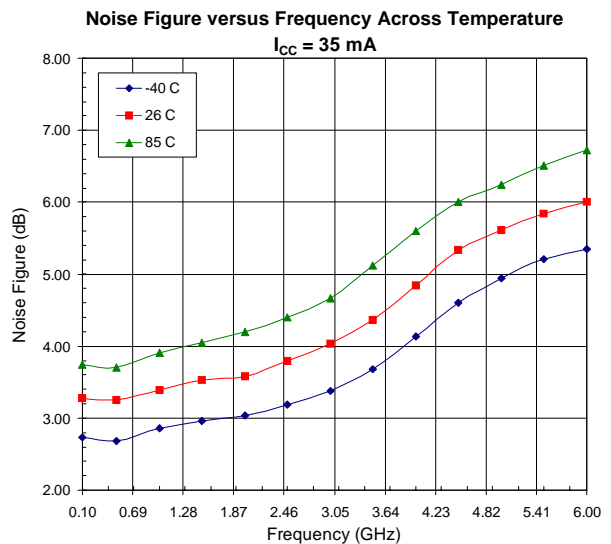
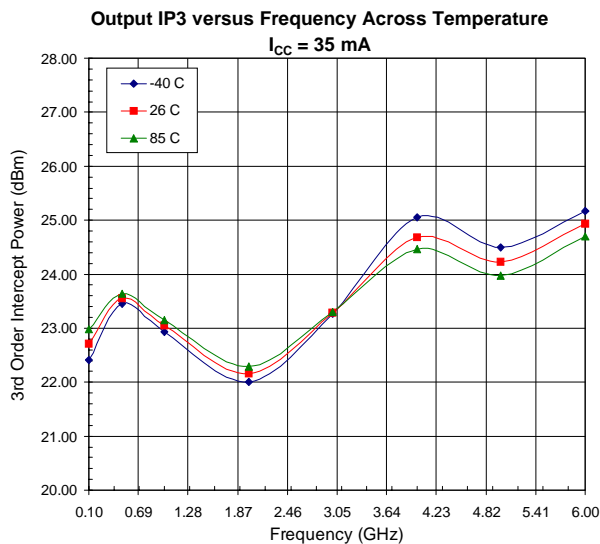
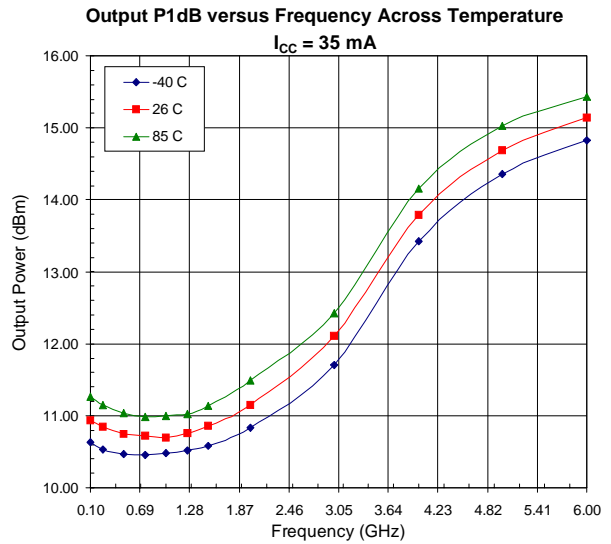
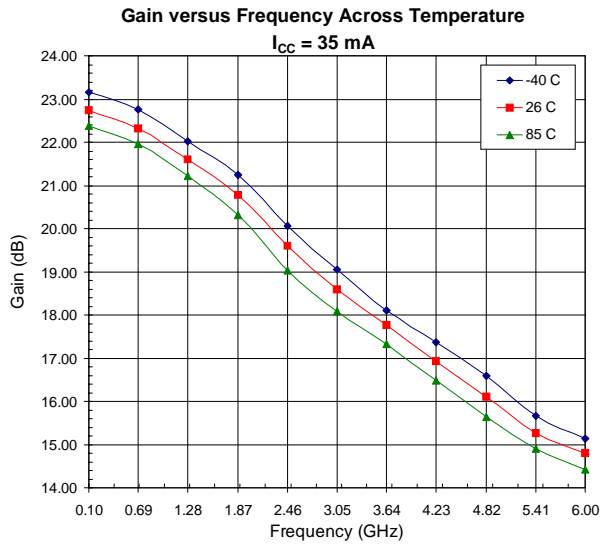
## Evaluation Board Schematic

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

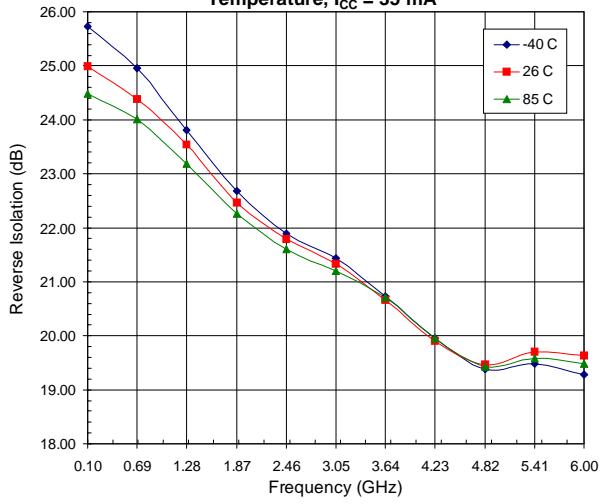


## Evaluation Board Layout Board Size 1.195" x 1.000"





Reverse Isolation versus Frequency Across  
Temperature,  $I_{CC} = 35\text{ mA}$



50 Ohms, 35 mA

