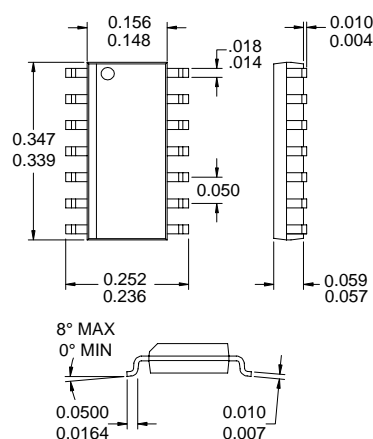


Typical Applications

- Digital Communication Systems
- Spread-Spectrum Communication Systems
- Driver for Higher Power Linear Applications
- Portable Battery-Powered Equipment
- Commercial and Consumer Systems
- Base Station Equipment

Product Description

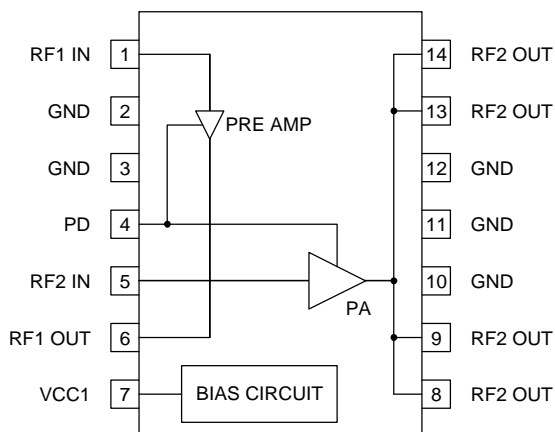
The RF2114 is a medium to high power linear amplifier IC. The device is manufactured on an advanced Gallium Arsenide Heterojunction Bipolar Transistor (HBT) process, and has been designed for use as the final linear RF amplifier in UHF radio transmitters operating between 1MHz and 600MHz. It may also be used as a driver amplifier in higher power applications. The device is self-contained with the exception of the output matching network, power supply feed line, and bypass capacitors. The device can be used in 3-cell battery applications. The maximum CW output at 3V is 125mW. The unit has a total gain of 35dB, depending upon the output matching network.



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: SOIC-14



Functional Block Diagram

Features

- 1 MHz to 600MHz Operation
- Over 800mW CW Output Power
- 35dB Small Signal Gain
- Single 2.7V to 6.5V Supply
- 45% Efficiency
- Digitally Controlled Power Down Mode

Ordering Information

| | |
|-------------|----------------------------------|
| RF2114 | Medium Power Linear Amplifier |
| RF2114 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 Voltage | -0.5 to +8.5 | V _{DC} |
| Power Down Voltage (V _{PD}) | -0.5 to +5.0 | V |
| DC Supply Current | 500 | mA |
| Input RF Power | +12 | dBm |
| Output Load VSWR | 20:1 | |
| Operating Ambient Temperature | -40 to +85 | °C |
| Storage Temperature | -40 to +150 | °C |



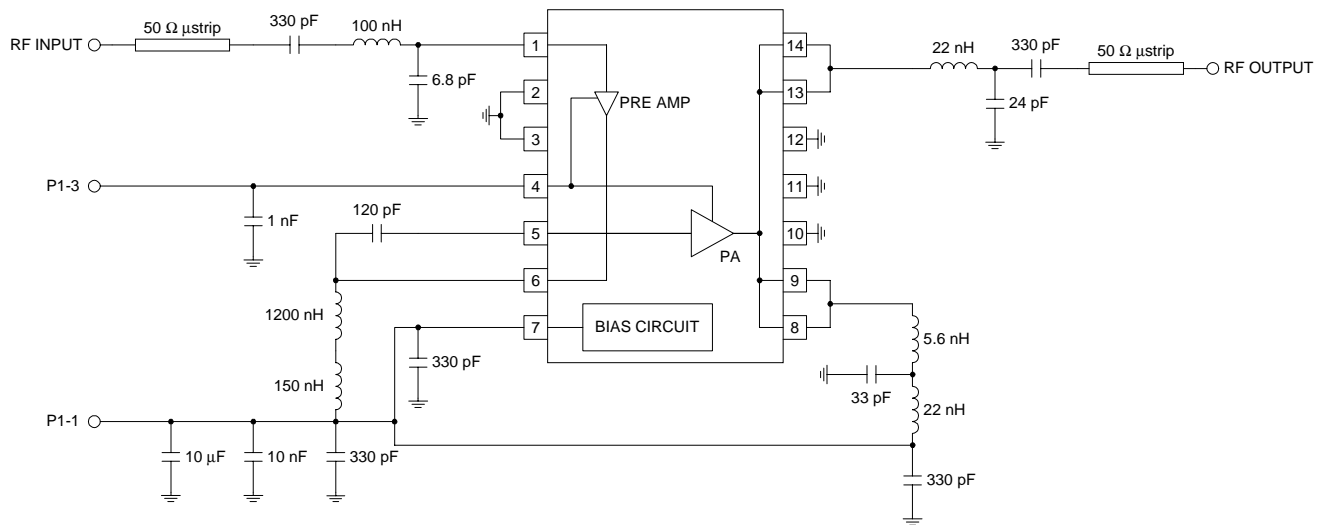
Caution! ESD sensitive device.

RF Micro Devices believes the furnished information is correct and accurate at the time of this printing. 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).

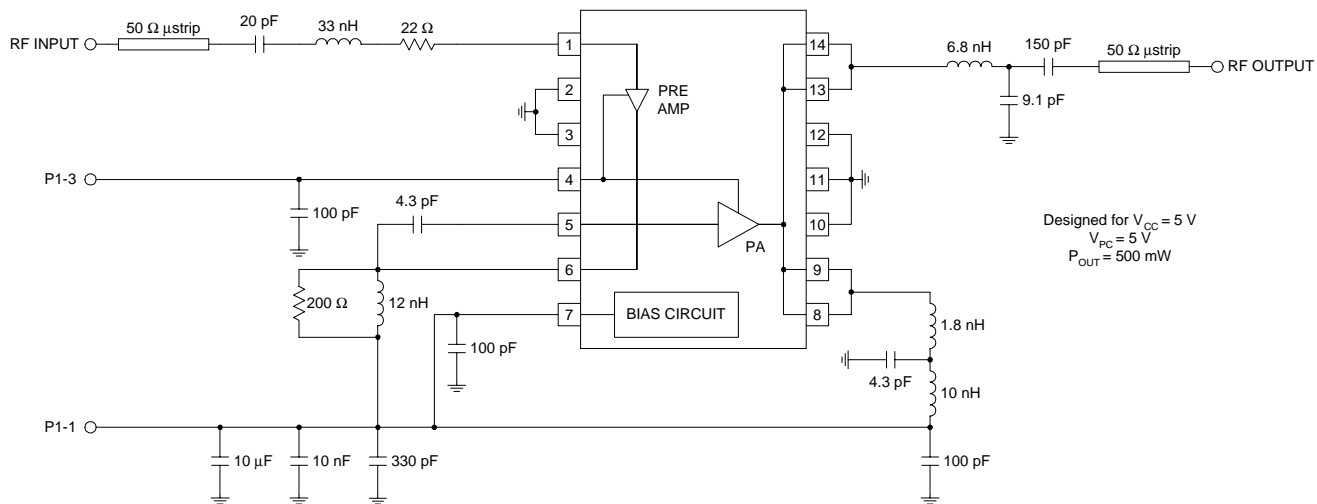
| Parameter | Specification | | | Unit | Condition |
|---------------------------|---------------|-----------------|------|--------|--|
| | Min. | Typ. | Max. | | |
| Overall | | | | | T=25°C, V _{CC} =5.8V, V _{PD} =4.0V, Z _{LOAD} =18Ω, P _{IN} =6dBm, Freq=150MHz |
| Frequency Range | | 1 to 600 | | MHz | |
| Saturated Output Power | +28 | +29 | +31 | dBm | |
| Output Power | | >+27 | | dBm | Frequency>450MHz |
| Power Gain | 30 | 36 | 40 | dB | |
| CW Total Efficiency | | 45 | | % | |
| Two Tone Total Efficiency | | 26 | | % | P _{OUT} = +19dBm/tone |
| IM ₃ | -50 | -40 | -25 | dBc | P _{OUT} = +19dBm/tone |
| IM ₅ | -70 | -43 | -30 | dBc | P _{OUT} = +19dBm/tone |
| Second Harmonic | | -24 | | dBc | Without external second harmonic trap |
| Third Harmonic | | -30 | | dBc | |
| Output Noise Power | | <-125 | | dBm/Hz | |
| Input VSWR | | <3:1 | | | With external matching network; see application schematic |
| Input Impedance | | 50 | | Ω | With external matching network; see application schematic |
| Load Impedance | | 18+j0 | | Ω | Load impedance for optimal match |
| Power Down Control | | | | | |
| Power Down "ON" | | V _{CC} | | V | Voltage supplied to the input; Part is "ON" |
| Power Down "OFF" | 0 | | 0.2 | V | Voltage supplied to the input; Part is "OFF" |
| Power Supply | | | | | |
| Power Supply Voltage | | 2.7 to 6.5 | | V | |
| Power Supply Idle Current | | 45 | 90 | mA | |
| Supply Current | 150 | 300 | 500 | mA | Total of pins 5 and 6 |
| V _{PD} Current | | <3.5 | | mA | Into pin 4 |
| Total "OFF" Current Drain | | | 10 | μA | V _{PD} < 0.1V _{DC} |
| Turn-on Time | | <100 | | ns | V _{PD} =0 to V _{PD} =+4V _{DC} |

| Pin | Function | Description | Interface Schematic |
|-----|----------|---|---------------------|
| 1 | RF1 IN | RF input pin. This pin is internally connected to the bias circuits. An external DC blocking capacitor is required. The value of this capacitor depends on the actual operating frequency. | |
| 2 | GND | Ground connection. Keep the connection to the backside ground plane as short as possible, by placing the vias close to the pin. | |
| 3 | GND | Same as pin 2. | |
| 4 | PD | Power down control voltage. When this pin is at 0V, the device will be in power down mode, dissipating minimum DC power. When this pin is at V_{CC} (but not higher than 5.0V max), the device will be in full power mode delivering maximum gain and output power capability. This pin may also be used to perform some degree of gain control or power control when set to voltages between 0V and V_{CC} or 5.0V, whichever is the lowest. It is not optimized for this function so the transfer function is not linear over a wide range as with other devices specifically designed for analog gain control. However, it may be usable for coarse adjustment or in some closed loop AGC systems. This pin should not, in any circumstance, be higher in voltage than V_{CC} . This pin should also have an external bypassing capacitor. | |
| 5 | RF2 IN | RF input of the power stage. This pin is internally connected to the bias circuits. An external DC blocking capacitor is required. This same capacitor can also be used for interstage matching. Typically this capacitor is between RF2 IN (pin 5) and RF1 OUT (pin 6); see the application schematics for details. | |
| 6 | RF1 OUT | RF output of the pre-amplifier. Power supply needs to be supplied to this pin through an inductor to V_{CC} . Together with the series capacitor between pin 5 and 6 the interstage matching circuit is formed. See the application schematics for values for different frequencies. | |
| 7 | VCC1 | Positive supply for the active bias circuits. This needs to be bypassed with a single capacitor, placed as close as possible to the package. Additional bypassing of 1 μ F is also recommended, but proximity to the package is not as critical. | |
| 8 | RF2 OUT | Amplifier RF output. This is an unmatched collector output of the final amplifier transistor. Pins 8, 9, 13, and 14 are connected internally. Bias for the final power amplifier output transistor must also be provided through one of these two pins. Typically, pins 8 and 9 are connected to a network that provides the DC bias and also creates a second harmonic trap. A capacitor series resonates with internal bond wires and some additional series inductance, and acts as a trap at two times the operating frequency, effectively shorting out the second harmonic. Shorting out this harmonic serves to increase the amplifier's maximum output power and efficiency, as well as to lower the level of the second harmonic output. Typically, pins 13 and 14 are externally connected very close to the package and used as the RF output with a matching network that presents the optimum load impedance to the PA for maximum power and efficiency, as well as providing DC blocking at the output. | |
| 9 | RF2 OUT | Same as pin 8. | |
| 10 | GND | Same as pin 2. | |
| 11 | GND | Same as pin 2. | |
| 12 | GND | Same as pin 2. | |
| 13 | RF2 OUT | Same as pin 8. | |
| 14 | RF2 OUT | Same as pin 8. | |

Application Schematic for 150MHz Operation

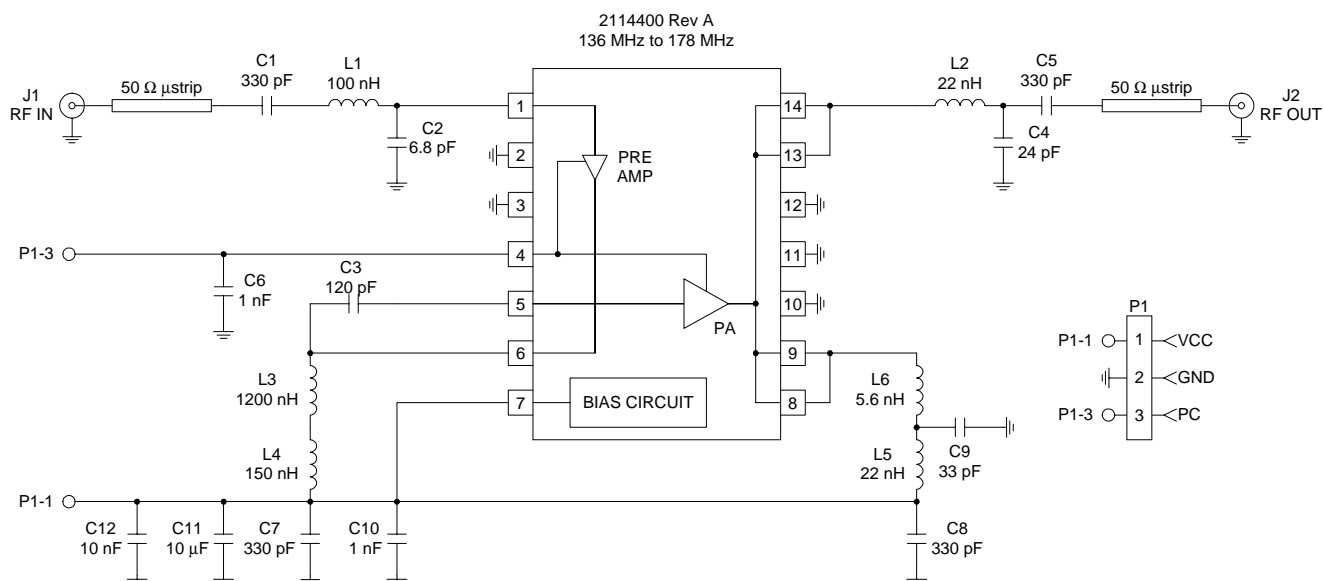


Application Schematic for 450MHz Operation



Evaluation Board Schematic (150MHz)

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



Evaluation Board Layout 2" x 3"

