

### Typical Applications

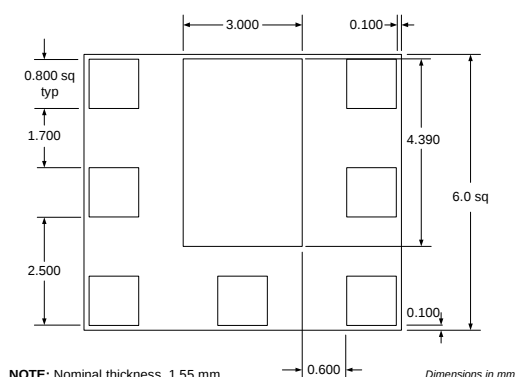
- 3V CDMA Korean-PCS Handsets
- Spread-Spectrum Systems
- Designed for Compatibility with Qualcomm Chipsets

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POWER AMPLIFIERS

### Product Description

The RF3100-3K is a high-power, high-efficiency linear amplifier IC targeting 3V hand-held systems. The device is manufactured on an advanced Gallium Arsenide Heterojunction Bipolar Transistor (HBT) process, and has been designed for use as the final RF amplifier in dual-mode 3V CDMA hand-held digital cellular equipment, spread-spectrum systems, and other applications in the 1750MHz to 1780MHz band. The RF3100-3K has a digital control line for low power application to reduce the current drain. The device is self-contained with 50Ω input and output that is matched to obtain optimum power, efficiency, and linearity characteristics. The module is an ultra-small 6mmx6mm land grid array with backside ground.



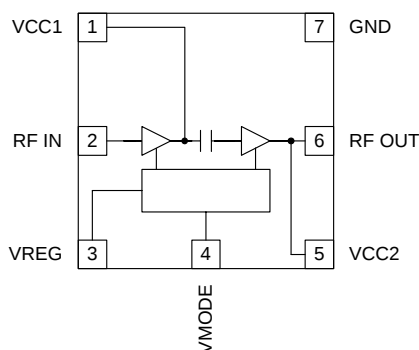
### Optimum Technology Matching® Applied

- |                                     |                                              |                                      |
|-------------------------------------|----------------------------------------------|--------------------------------------|
| <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: LGM (6 mm x 6 mm)

### Features

- Input/Output Internally Matched @ 50Ω
- Single 3V Supply
- 28dBm Linear Output Power
- -141dBm/Hz Noise Power
- 35% Linear Efficiency
- 45mA Idle Current (Low Power Mode)



Functional Block Diagram

### Ordering Information

RF3100-3K 3V 1700MHz Linear Amplifier Module  
RF3100-3K PCBA Fully Assembled Evaluation Board

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# RF3100-3K

## Absolute Maximum Ratings

| Parameter                                | Rating      | Unit            |
|------------------------------------------|-------------|-----------------|
| Supply Voltage (RF off)                  | +8.0        | V <sub>DC</sub> |
| Supply Voltage (P <sub>OUT</sub> ≤29dBm) | +5.2        | V <sub>DC</sub> |
| Control Voltage (V <sub>REG</sub> )      | +4.2        | V <sub>DC</sub> |
| Mode Voltage (V <sub>MODE</sub> )        | +3.5        | V <sub>DC</sub> |
| Input RF Power                           | +10         | dBm             |
| Operating Case Temperature               | -30 to +110 | °C              |
| Storage Temperature                      | -30 to +150 | °C              |



**Caution!** ESD sensitive device.

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| Parameter                                          | Specification |      |       | Unit   | Condition                                                                                                                                                         |
|----------------------------------------------------|---------------|------|-------|--------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                    | Min.          | Typ. | Max.  |        |                                                                                                                                                                   |
| <b>High Power State</b><br>(V <sub>MODE</sub> Low) |               |      |       |        | Typical Performance at V <sub>CC</sub> =3.2V,<br>V <sub>REG</sub> =2.85V, T <sub>AMB</sub> =25°C,<br>Frequency=1750MHz to 1780MHz<br>(unless otherwise specified) |
| Frequency Range                                    | 1750          |      | 1780  | MHz    |                                                                                                                                                                   |
| Linear Gain                                        | 25.5          | 27.5 |       | dB     |                                                                                                                                                                   |
| Second Harmonic                                    |               | -49  |       | dBc    |                                                                                                                                                                   |
| Third Harmonic                                     |               | -52  |       | dBc    |                                                                                                                                                                   |
| Maximum Linear Output Power<br>(CDMA Modulation)   | 28            |      |       | dBm    |                                                                                                                                                                   |
| Total Linear Efficiency                            |               | 35   |       | %      | P <sub>OUT</sub> =28dBm                                                                                                                                           |
| Adjacent Channel Power<br>Rejection                |               | -46  | -44.5 | dBc    | ACPR @ 1.25MHz, P <sub>OUT</sub> =28dBm                                                                                                                           |
|                                                    |               | -60  | -57.5 | dBc    | ACPR @ 2.25MHz, P <sub>OUT</sub> =28dBm                                                                                                                           |
| Input VSWR                                         |               | <2:1 |       |        |                                                                                                                                                                   |
| Output VSWR                                        |               |      | 10:1  |        | No damage.                                                                                                                                                        |
|                                                    |               |      | 6:1   |        | No oscillations. >-70dBc                                                                                                                                          |
| Noise Power                                        |               | -141 |       | dBm/Hz | At 90MHz offset.                                                                                                                                                  |
| <b>Low Power State</b><br>(V <sub>MODE</sub> High) |               |      |       |        | Typical Performance at V <sub>CC</sub> =3.2V,<br>V <sub>REG</sub> =2.85V, T <sub>AMB</sub> =25°C,<br>Frequency=1750MHz to 1780MHz<br>(unless otherwise specified) |
| Frequency Range                                    | 1750          |      | 1780  | MHz    |                                                                                                                                                                   |
| Linear Gain                                        | 17            | 20   |       | dB     |                                                                                                                                                                   |
| Second Harmonic                                    |               | -49  |       | dBc    |                                                                                                                                                                   |
| Third Harmonic                                     |               | -52  |       | dBc    |                                                                                                                                                                   |
| Maximum Linear Output Power<br>(CDMA Modulation)   | 16            |      |       | dBm    |                                                                                                                                                                   |
| Adjacent Channel Power<br>Rejection                |               | -52  | -46.5 | dBc    | ACPR @ 1.25MHz                                                                                                                                                    |
|                                                    |               | -66  | -61   | dBc    | ACPR @ 2.25MHz                                                                                                                                                    |
| Input VSWR                                         |               | <2:1 |       |        |                                                                                                                                                                   |
| Output VSWR                                        |               |      | 10:1  |        | No damage.                                                                                                                                                        |
|                                                    |               |      | 6:1   |        | No oscillations. >-70dBc                                                                                                                                          |

| Parameter                  | Specification |      |      | Unit          | Condition                                    |
|----------------------------|---------------|------|------|---------------|----------------------------------------------|
|                            | Min.          | Typ. | Max. |               |                                              |
| <b>DC Supply</b>           |               |      |      |               | $T_{AMB}=25^{\circ}\text{C}$                 |
| Supply Voltage             | 3.2           | 3.7  | 4.2  | V             |                                              |
| Quiescent Current          |               | 170  | 240  | mA            | $V_{MODE}=\text{Low}, V_{REG}=2.85\text{V}$  |
|                            |               | 50   | 80   | mA            | $V_{MODE}=\text{High}, V_{REG}=2.85\text{V}$ |
| $V_{REG}$ Current          |               | 6    | 10   | mA            |                                              |
| $V_{MODE}$ Current         |               |      | 1.5  | mA            |                                              |
| Turn On/Off Time           |               |      | 6    | $\mu\text{s}$ |                                              |
| Total Current (Power Down) |               | 5    | 10   | $\mu\text{A}$ | $V_{REG}=\text{Low}, V_{MODE}=\text{Low}$    |
| $V_{REG}$ "Low" Voltage    | 0             |      | 0.5  | V             |                                              |
| $V_{REG}$ "High" Voltage   | 2.8           | 2.85 | 2.9  | V             |                                              |
| $V_{MODE}$ "Low" Voltage   | 0             |      | 0.5  | V             |                                              |
| $V_{MODE}$ "High" Voltage  | 2.0           |      | 3.0  | V             |                                              |

# RF3100-3K

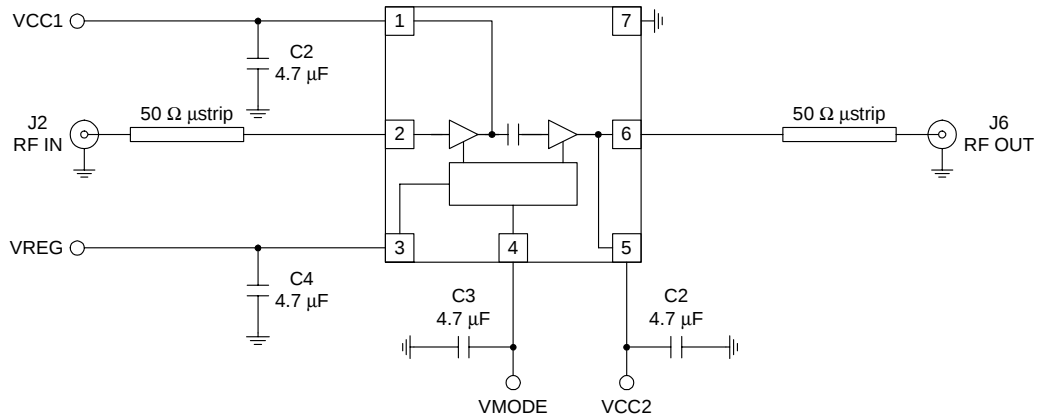
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### POWER AMPLIFIERS

| Pin      | Function | Description                                                                                                                                                                                                         | Interface Schematic |
|----------|----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| 1        | VCC1     | First stage collector supply. A low frequency decoupling capacitor (e.g., 1 $\mu$ F) is required.                                                                                                                   |                     |
| 2        | RF IN    | RF input internally matched to 50 $\Omega$ . This input is internally AC-coupled.                                                                                                                                   |                     |
| 3        | VREG     | Regulated voltage supply for amplifier bias. In Power Down mode, both V <sub>REG</sub> and V <sub>MODE</sub> need to be LOW (<0.5V).                                                                                |                     |
| 4        | VMODE    | For nominal operation (High Power Mode), V <sub>MODE</sub> is set LOW. When set HIGH, devices are turned off to improve efficiency.                                                                                 |                     |
| 5        | VCC2     | Output stage collector supply. A low frequency decoupling capacitor (e.g., 1 $\mu$ F) is required.                                                                                                                  |                     |
| 6        | RF OUT   | RF output internally matched to 50 $\Omega$ . This output is internally AC-coupled.                                                                                                                                 |                     |
| 7        | GND      | Ground connection. Connect to package base ground. For best performance, keep traces physically short and connect immediately to ground plane.                                                                      |                     |
| Pkg Base | GND      | Ground connection. The backside of the package should be soldered to a top side ground pad which is connected to the ground plane with multiple vias. The pad should have a short thermal path to the ground plane. |                     |

## 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, Multi-Layer, Ground Plane at 0.014"

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POWER AMPLIFIERS

