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# RF2637

## RECEIVE AGC AMPLIFIER



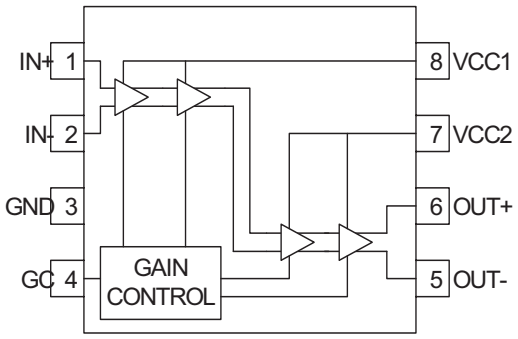

Package Style: MSOP-8

## Features

- Supports Basestation Applications
- -55dB to +51dB Gain Control Range at 85MHz
- Single 3V Power Supply
- -2dBm Input $IP_3$
- 12MHz to 385MHz Operation

## Applications

- 3V Basestation Systems
- General Purpose Linear IF Amplifier
- Commercial and Consumer Systems
- Portable Battery-Powered Equipment




Functional Block Diagram

## Product Description

The RF2637 is a complete AGC amplifier designed for the receive section of 3V cellular and PCS applications basestations. It is designed to amplify IF signals while providing more than 90dB of gain control range. Noise Figure, $IP_3$, and other specifications are designed for basestations. The IC is manufactured on an advanced high frequency SiGe process, and is packaged in a standard miniature 8-lead plastic MSOP package.

### Ordering Information

| | |
|---|---|
| RF2637SQ | Sample bag with 25 pieces |
| RF2637SR | 7” Reel with 100pieces |
| RF2637TR13 | 13” Reel with 2500 pieces |
| RF2637PCBA-410 | 12MHz to 385MHz PCBA with 5-piece sample bag |

### Optimum Technology Matching® Applied

| | | | |
|---|---|---|---|
| ☐ GaAs HBT | ☐ SiGe BiCMOS | ☐ GaAs pHEMT | ☐ GaN HEMT |
| ☐ GaAs MESFET | ☐ Si BiCMOS | ☐ Si CMOS | ☐ BiFET HBT |
| ☐ InGaP HBT | ☑ SiGe HBT | ☐ Si BJT | ☐ LDMOS |

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## Absolute Maximum Ratings

| Parameter | Value | Unit |
|---|---|---|
| Supply Voltage | -0.5 to +5.0 | $V_{DC}$ |
| Control Voltage | -0.5 to +5.0 | $V_{DC}$ |
| Input RF Power | +10 | dBm |
| Operating Ambient Temperature | -40 to +85 | °C |
| Storage Temperature | -40 to +150 | °C |

**Caution!** ESD sensitive device.

Exceeding any one or a combination of the Absolute Maximum Rating conditions may cause permanent damage to the device. Extended application of Absolute Maximum Rating conditions to the device may reduce device reliability. Specified typical performance or functional operation of the device under Absolute Maximum Rating conditions is not implied.

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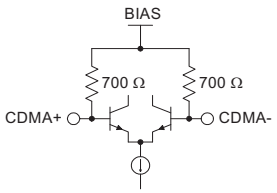
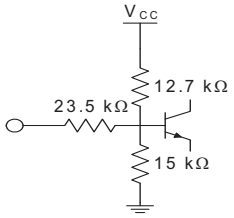
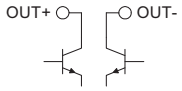
RFMD Green: RoHS compliant per EU Directive 2002/95/EC, halogen free per IEC 61249-2-21, < 1000ppm each of antimony trioxide in polymeric materials and red phosphorus as a flame retardant, and <2% antimony in solder.

| Parameter | Specification | | | Unit | Condition |
|---|---|---|---|---|---|
| | Min. | Typ. | Max. | | |
| **Overall** | | | | | T=25°C, 85MHz, $V_{CC}$=3.0V, $Z_S$=500Ω, $Z_L$=500Ω, 500Ω External Input Terminating Resistor, 500Ω External Output Terminating Resistor (Effective $Z_S$=333Ω, Effective $Z_L$=250Ω) (See Application Example) |
| Frequency Range | | 12 to 385 | | MHz | |
| Maximum Gain | +40 | +51 | +65 | dB | $V_{GC}$=2.5V, 85MHz |
| Minimum Gain | -65 | -55 | -40 | dB | $V_{GC}$=0.1V, 85MHz |
| Maximum Gain | +35 | +45 | +55 | dB | $V_{GC}$=2.5V, 385MHz |
| Minimum Gain | -68 | -58 | -48 | dB | $V_{GC}$=0.1V, 385MHz |
| Gain Slope | | 57 | | dB/V | Note 1 |
| Gain Control Voltage Range | | 0 to 2.5 | | $V_{DC}$ | Source impedance of 4.7kΩ |
| Gain Control Input Impedance | | 30 | | kΩ | |
| Noise Figure | | 5 | 7.2 | dB | At maximum gain and 85MHz |
| Input $IP_3$ | -46 | -40 | | dBm | At +40dB gain, referenced to 500Ω |
| | | -2 | | dBm | At minimum gain, referenced to 500Ω |
| Stability (Max VSWR) | 10:1 | | | | Spurious<-70dBm |
| **IF Input** | | | | | |
| Input Impedance | | 1 | | kΩ | CDMA, differential |
| **Power Supply** | | | | | |
| Voltage | | 2.7 to 3.4 | | V | |
| Current Consumption | 6 | 10 | 15 | mA | Minimum gain, $V_{CC}$=3.0V |
| | 7 | 11.5 | 15 | mA | Maximum gain, $V_{CC}$=3.0V |
| **Thermal** | | | | | |
| Thermal Resistance | | 150 | | °C/W | Theta J-Ref 85°C |
| Maximum Junction Temperature | | 90 | | °C | Ref 85°C |

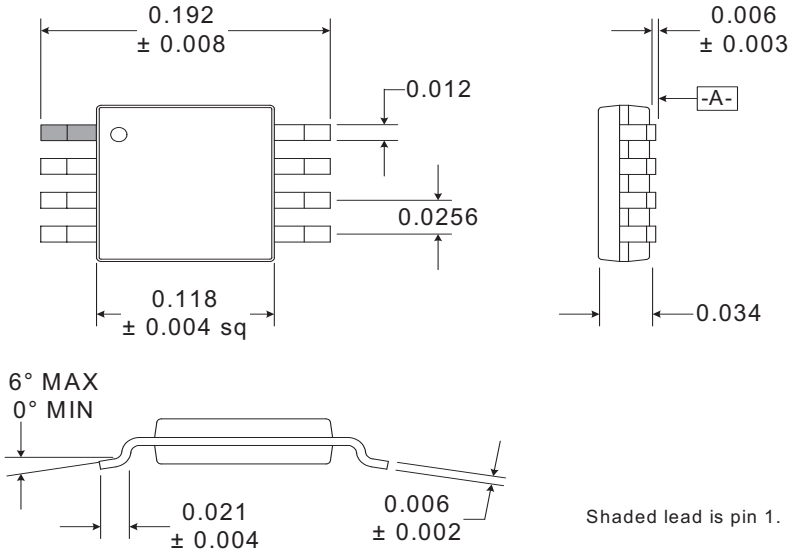
Note 1: Measured between a gain control voltage of 1.0V to 1.5V.



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| Pin | Function | Description | Interface Schematic |
|---|---|---|---|
| 1 | IN+ | CDMA balanced input pin. This pin is internally DC-biased and should be DC-blocked if connected to a device with a DC level other than $V_{CC}$ present. A DC to connection to $V_{CC}$ is acceptable. For single-ended input operation, one pin is used as an input and the other CDMA input is AC-coupled to ground. The balanced input impedance is 1kΩ, while the single-ended input impedance is 500Ω. |  |
| 2 | IN- | Same as pin 2, except complementary input. | See pin 1. |
| 3 | GND | Ground connection. For best performance, keep traces physically short and connect immediately to ground plane. | |
| 4 | GC | Analog gain adjustment for all amplifiers. Valid control ranges are from 0V to 2.5V. Maximum gain is selected with 2.5V. Minimum gain is selected with 0V. These voltages are only valid for a 4.7kΩ DC source impedance. |  |
| 5 | OUT- | Balanced output pin. This is an open-collector output, designed to operate into a 250Ω balanced load. The load sets the operating impedance, but an external choke or matching inductor to $V_{CC}$ must also be supplied in order to correctly bias this output. This bias inductor is typically incorporated in the matching network between the output and next stage. Because this pin is biased to $V_{CC}$, a DC-blocking capacitor must be used if the next stage's input has a DC path to ground. |  |
| 6 | OUT+ | Same as pin 5, except complementary output. | See pin 5. |
| 7 | VCC2 | Supply voltage pin. External bypassing is required. The trace length between the pin and the bypass capacitors should be minimized. The ground side of the bypass capacitors should connect immediately to ground plane. | |
| 8 | VCC1 | Same as pin 7. | See pin 7. |

## Package Drawing

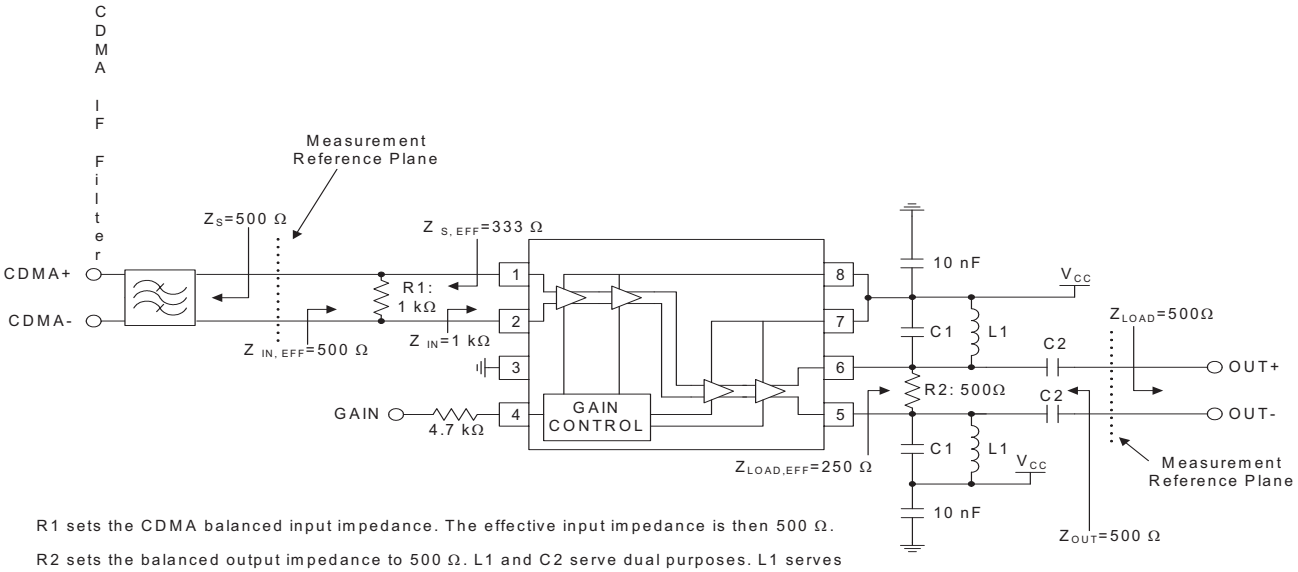



Shaded lead is pin 1.



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## Application Schematic

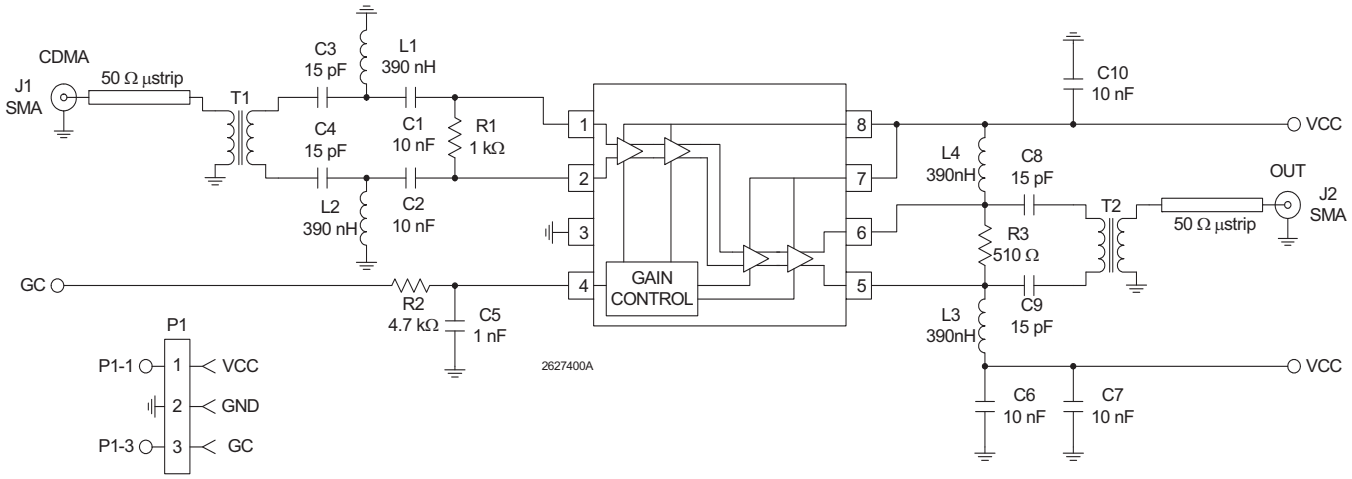



R1 sets the CDMA balanced input impedance. The effective input impedance is then 500 Ω.

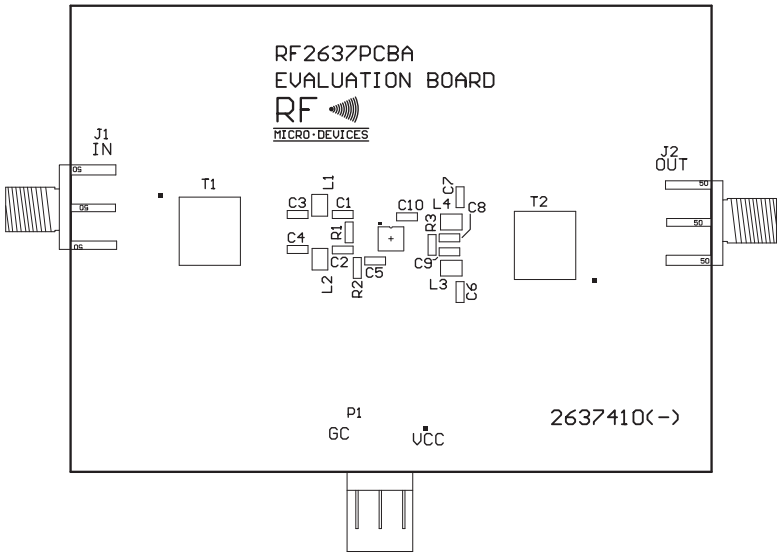
R2 sets the balanced output impedance to 500 Ω. L1 and C2 serve dual purposes. L1 serves as an output bias choke, and C2 serves as a series DC block. In addition, the values of L1 and C2 may be chosen to form an impedance matching network of the load impedance is not 500 Ω. Otherwise, the values of L1 and C1 are chosen to form a parallel-resonant tank circuit at the IF when the load impedance is 500 Ω.

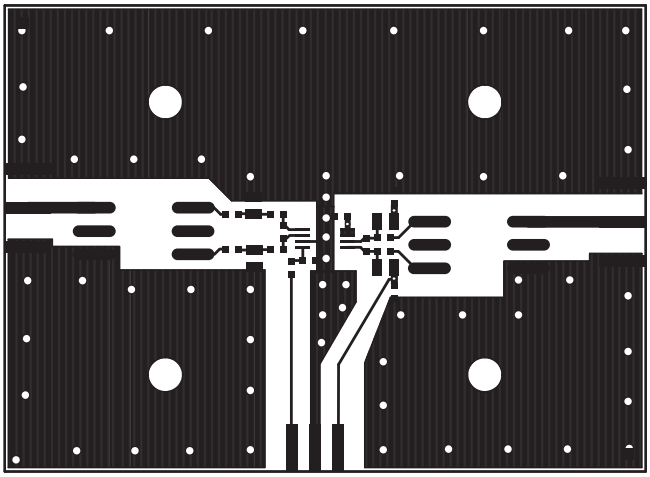
## Evaluation Board Schematic

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



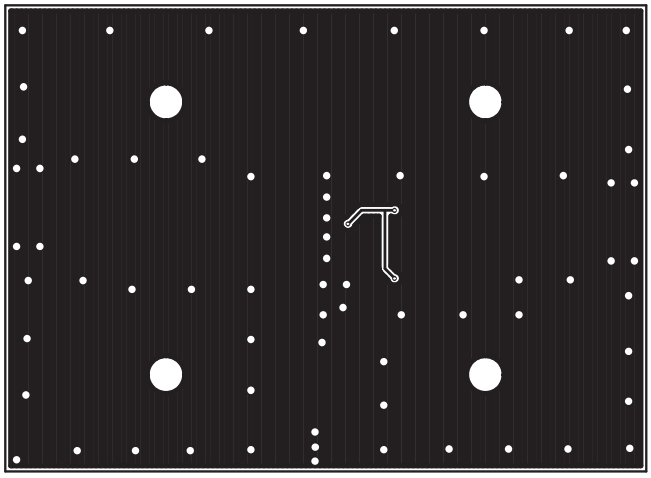
## Evaluation Board Layout
## Board Size 2.750" x 2.000"
### Board Thickness 0.031", Board Material FR-4



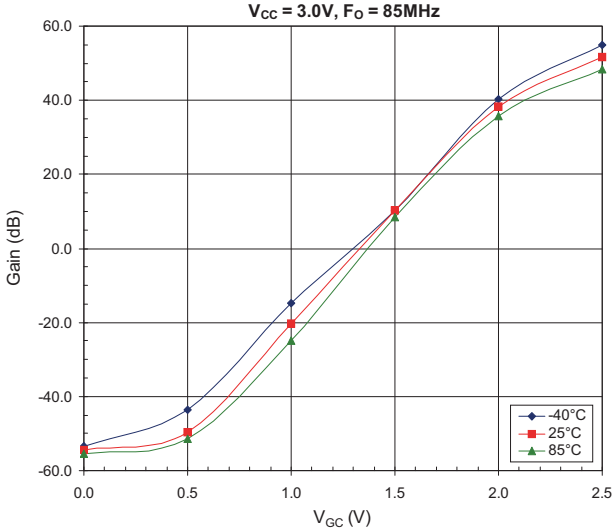





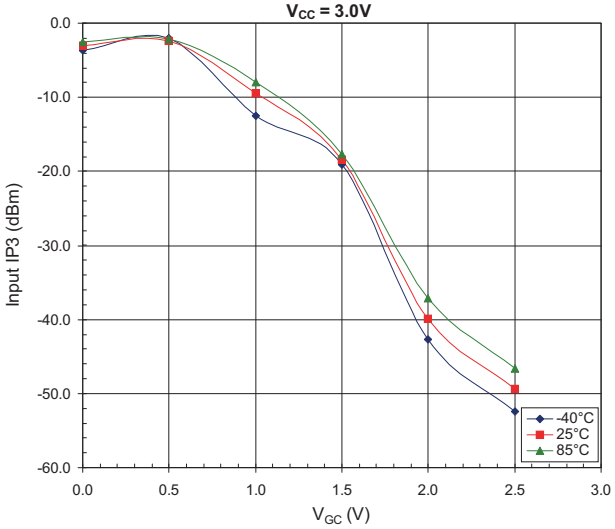
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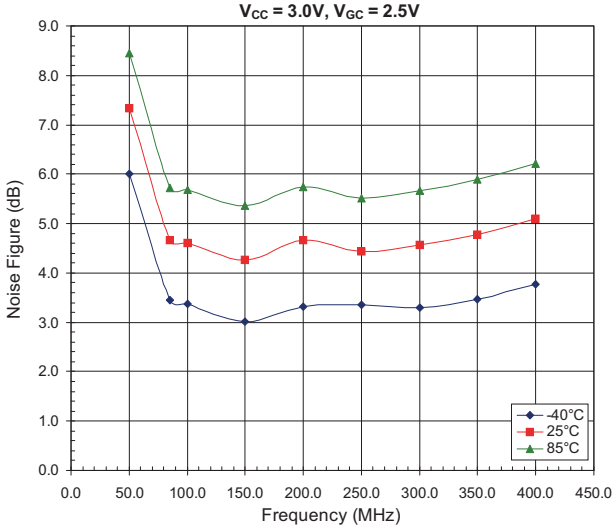
**Gain versus VGC Across Temperature,**
**$V_{CC}$ = 3.0V, $F_O$ = 85MHz**




**Input IP3 versus $V_{GC}$ Across Temperature,**
**$V_{CC}$ = 3.0V**




**Noise Figure versus Frequency Across Temperature,**
**$V_{CC}$ = 3.0V, $V_{GC}$ = 2.5V**






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# RoHS* Banned Material Content

| | |
|---|---|
| RoHS Compliant: | Yes |
| Package total weight in grams (g): | 0.025 |
| Compliance Date Code: | N/A |
| Bill of Materials Revision: | - |
| Pb Free Category: | e3 |

| Bill of Materials | Parts Per Million (PPM) | | | | | |
|---|---|---|---|---|---|---|
| | Pb | Cd | Hg | Cr VI | PBB | PBDE |
| Die | 0 | 0 | 0 | 0 | 0 | 0 |
| Molding Compound | 0 | 0 | 0 | 0 | 0 | 0 |
| Lead Frame | 0 | 0 | 0 | 0 | 0 | 0 |
| Die Attach Epoxy | 0 | 0 | 0 | 0 | 0 | 0 |
| Wire | 0 | 0 | 0 | 0 | 0 | 0 |
| Solder Plating | 0 | 0 | 0 | 0 | 0 | 0 |

This RoHS banned material content declaration was prepared solely on information, including analytical data, provided to RFMD by its suppliers, and applies to the Bill of Materials (BOM) revision noted

* DIRECTIVE 2002/95/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 27 January 2003 on the restriction of the use of certain hazardous substances in electrical and electronic equipment


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