# Product Specification

## RS3235 15.5dB Wideband Flat Gain LNA

## General Description

The RS3235 is a cascadable, wideband gain block amplifier in a low-cost surface mount package.

The RS3235 provides very flat gain across a broad range of frequencies. The low noise figure and high linearity performance allows the device to be used in both receiver and transmitter chains for high performance systems. The internal active bias circuit also enables stable operation over bias and temperature variations and can be biased from a single positive supply ranging from +3.3 to +5 volts.

The RS3235 covers the 0.01 – 9 GHz frequency band and is targeted for test and measurement or other applications requiring high linearity and/or low noise figure

## Applications

- Test and Measurement
- General purpose RF

## Features

- Wideband
  - DC – 9 GHz operational frequency
  - Flat gain, over 0.01 – 9 GHz, gain variation 1.5 dB
- Balanced performance in small package
  - 15.5 dB Gain
  - 36 dBm OIP3@1GHz
  - 1.7dB NF
  - 65mA current consumption under 5V
- ESD protection on all pins (HBM > TBD V)

## Functional Diagram/Application Circuit

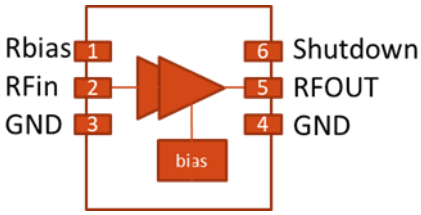



**Figure 1**

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## Absolute Maximum Ratings

**Table 1**

| Parameter | Min | Max | Units |
|---|---|---|---|
| VDD to GND | 2 | 6 | V |
| Input Power, pulse signal | | 20 | dBm |
| Maximum Junction Temperature | | 175 | °C |
| Storage Temperature Range | -65 | 150 | °C |
| ESD Voltage– HBM (Per JESD22-A114) | | 250 | V |
| ESD Voltage – CDM (Per JESD22-C101) | | TBD | |

*Stresses above those listed above may cause permanent damage to the device. Functional operation of the device at these or any other conditions above those indicated in the operational section of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.*

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## Recommended Operating Conditions

**Table 2**

| Parameter | Min | Typical | Max | Unit |
|---|---|---|---|---|
| Supply Voltage (All VDD) | 4.75 | 5 | 5.25 | V |
| Operating Temp Range | -40 | 25 | 85 | °C |
| Input Power, pulse signal | | | TBD | dBm |

*Operation should be restricted to the limits in the Recommended Operating Conditions table. Operation between operating range maximum and absolute maximum for extended periods may reduce reliability.*

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## Specification

Typical Application Circuit, VDD=5V, $T_C$ = +25°C, PCB board trace and connector losses are de-embedded unless otherwise noted.
**Table 3**

| Parameters | Conditions | Min | Typ | Max | Units |
|---|---|---|---|---|---|
| Operational Frequency Range | | 10 | | 9000 | MHz |
| Gain | 0.01 - 1 GHz | | 15.5 | | dB |
| | 1 - 6 GHz | | 15 | | |
| | 6 - 9 GHz | | 13 | | |
| Input Return Loss | 0.01 - 1 GHz | | -20 | | dB |
| | 1 - 6 GHz | | -16 | | |
| | 6 - 9 GHz | | -10 | | |
| Output Return Loss | 0.01 - 1 GHz | | -16 | | dB |
| | 1 - 6 GHz | | -18 | | |
| | 6 - 9 GHz | | -10 | | |
| Output P1dB | 0.01 - 1 GHz | | 18 | | dBm |
| | 1 - 6 GHz | | 17 | | |
| | 6 - 9GHz | | 16 | | |
| Output IP3<br>Pout=0dBm/tone, Δf=1MHz | 0.01 - 1 GHz | | 35 | | dBm |
| | 1 - 6 GHz | | 28 | | |
| | 6 - 9 GHz | | 25 | | |
| Noise Figure<br>evaluation board trace loss excluded | 0.01 - 1 GHz | | 1.8 | | dB |
| | 1 - 6 GHz | | 1.7 | | |
| | 6 - 9 GHz | | 2.5 | | |
| Device Current, IDD | | | 65 | | mA |
| OFF, Shut down, VSD = 1.8 V | | | 4.7 | | mA |
| Device Control Voltage, VSD | ON, Logic Low | 0 | 0.63 | | V |
| OFF, Logic High | | 1.17 | | VDD | V |
| Control Pin Current, ISD, VSD = 1.8 V | | | 77 | | μA |
| Device ON or OFF Timing | 50% of VSD to 90% or 10% RF Output | | 200 | | nS |
| Thermal Resistance, $\theta_{jc}$ | Junction to case | | TBD | | °C/W |

## Pin Diagram

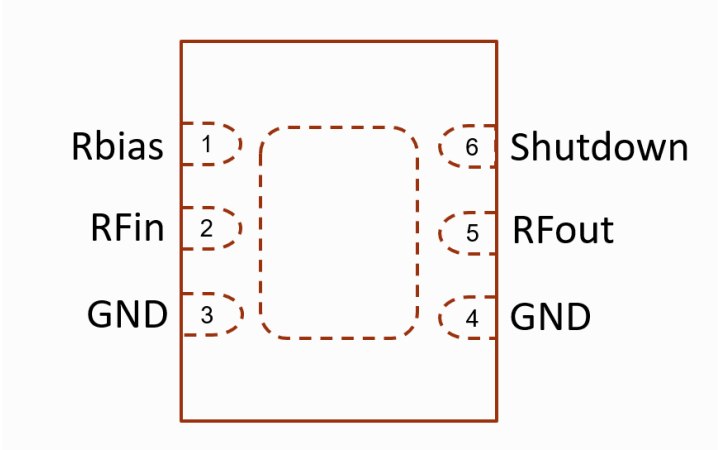



**Figure 2**

## Pin Description

**Table 4**

| Pad No. | Label | Description |
|---|---|---|
| 1 | Rbias | Bias control. Use the RBIAS pin via the external resistor to set the current of amplifier. |
| 2 | RFin | RF Input. The RFIN pin is ac-coupled and matched to 50 Ω. |
| 3,4 | GND | No connection. RF performance is measured with these pins grounded |
| 5 | RFout | RF Output and Drain Bias Voltage: The RF output is DC coupled and also serves as the drain biasing node. Connect a dc bias network to provide the drain current and ac-couple the RF output path. |
| 6 | Shutdown | Shutdown Input. A logic-high disable the device. |

## Control Logic

**Table 5**

| Mode | SD Pin 6 logic |
|---|---|
| Amplifier Enable | 0 |
| Amplifier Shut down | 1 |

## Application Circuit

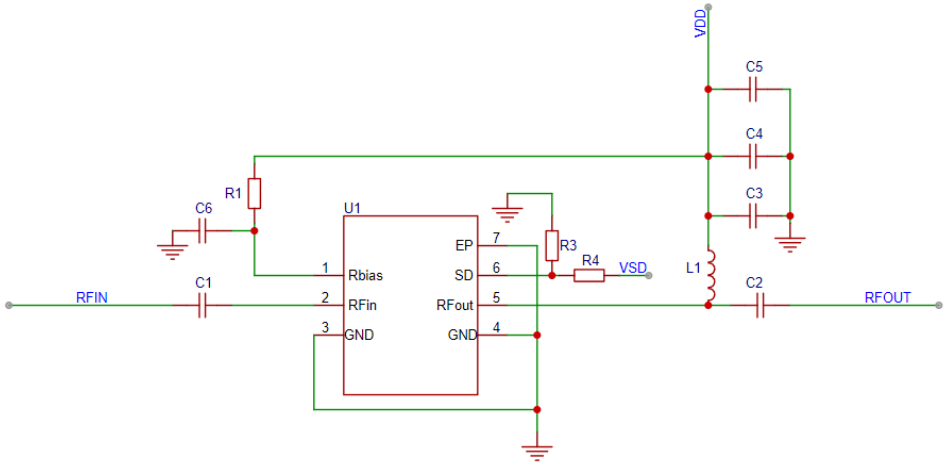



**Figure 3**

**Table 5**

| Reference Designator | Value | Description |
|---|---|---|
| C1、C2 | 0.1uF | 531Z104KT16T |
| L1 | 0.9uH | 901XJRW |
| C3, C6 | 100pF | 0402 |
| C4 | 0.1uF | 0402 |
| C5 | 10uF | 0402 |
| R1 | TBD | IDD VS RBIAS |
| R3 | 10K | 0402 |
| R4 | 0 | 0402 |

## IDD VS RBIAS

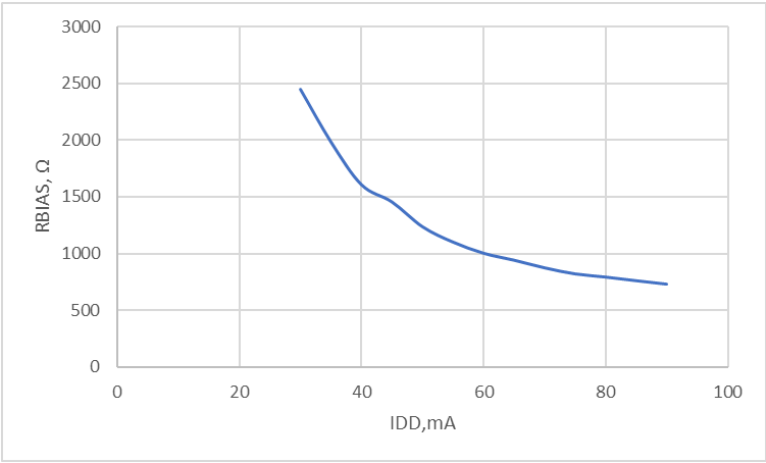



**Figure 4**

## Typical Performance Characteristics

Figure 5 Gain

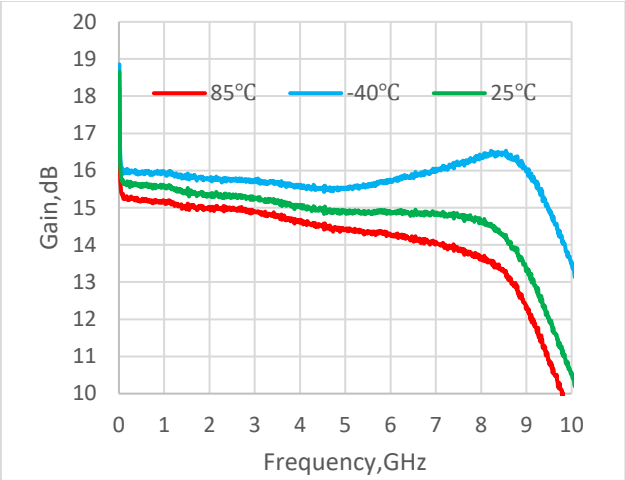



Figure 6 Input Return Loss

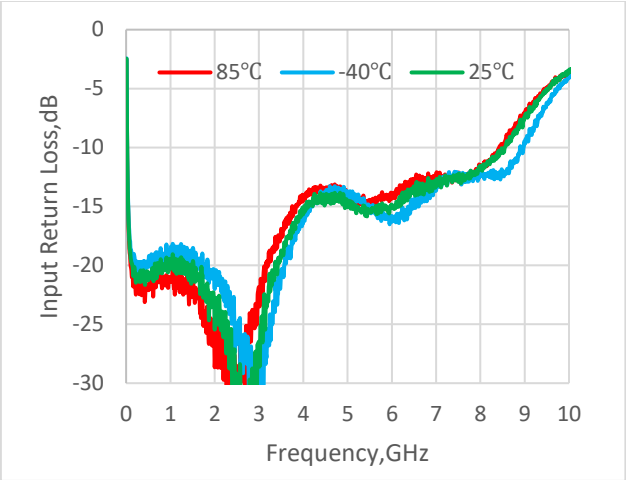



Figure 7 Output Return Loss

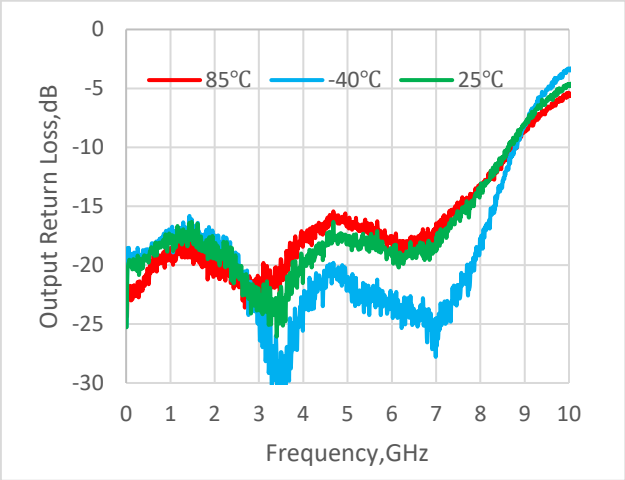



Figure 8 Noise Figure

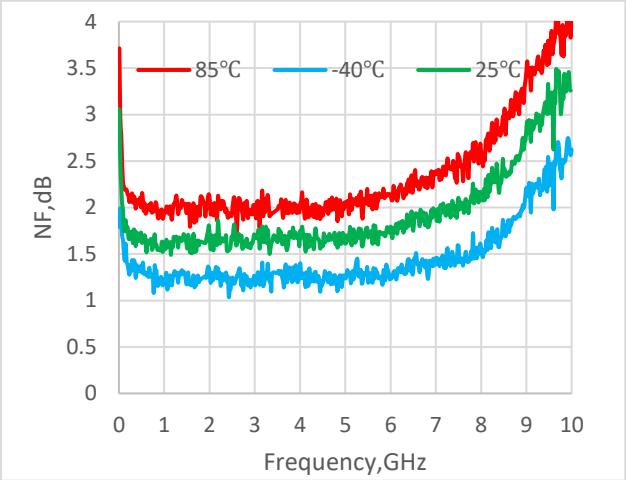



Figure 9 P1dB

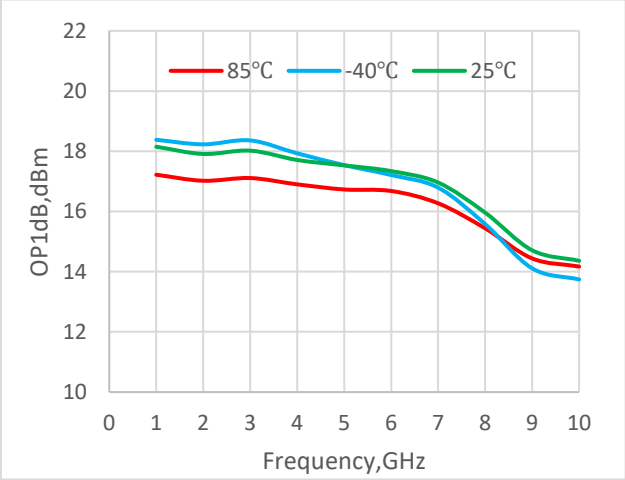
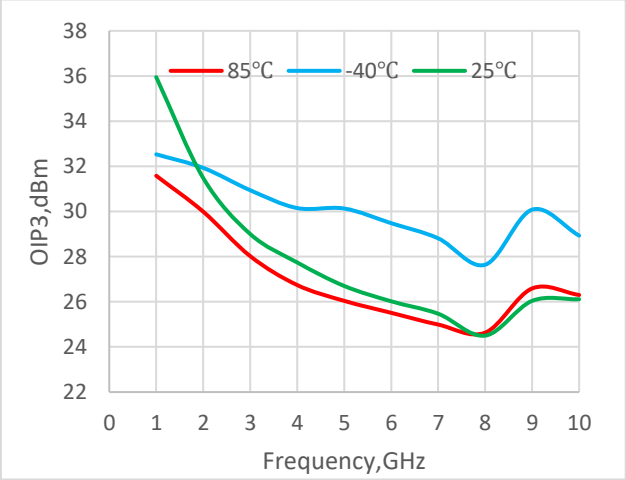
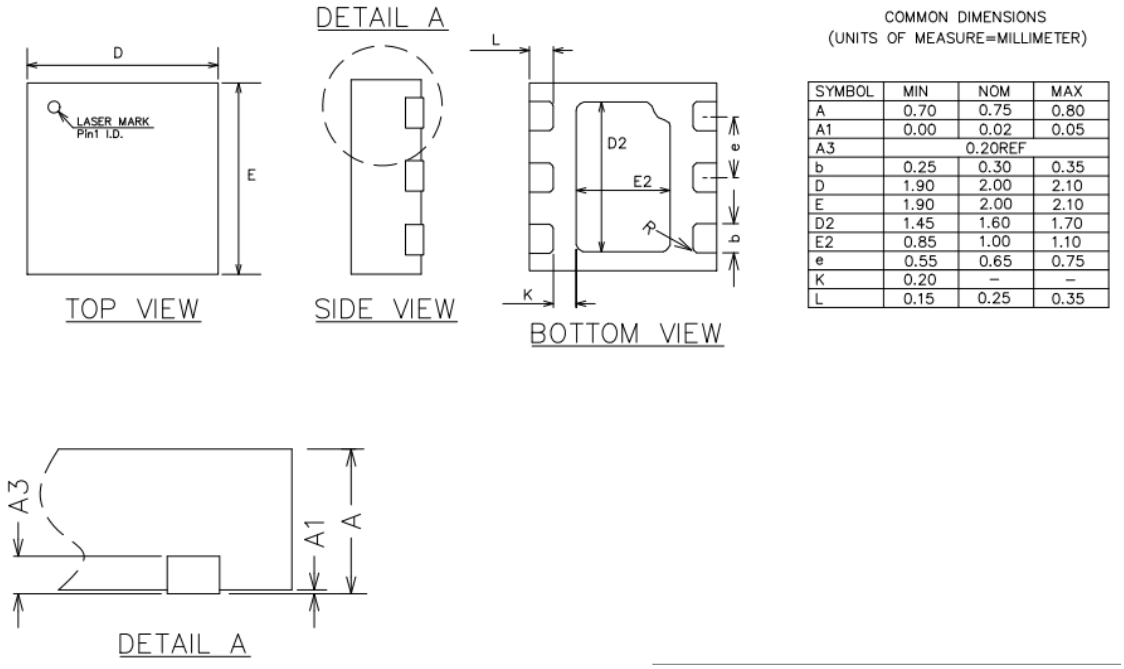



Figure 10 OIP3




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## Package Drawing




COMMON DIMENSIONS
(UNITS OF MEASURE=MILLIMETER)

| SYMBOL | MIN | NOM | MAX |
|---|---|---|---|
| A | 0.70 | 0.75 | 0.80 |
| A1 | 0.00 | 0.02 | 0.05 |
| A3 | | 0.20REF | |
| b | 0.25 | 0.30 | 0.35 |
| D | 1.90 | 2.00 | 2.10 |
| E | 1.90 | 2.00 | 2.10 |
| D2 | 1.45 | 1.60 | 1.70 |
| E2 | 0.85 | 1.00 | 1.10 |
| e | 0.55 | 0.65 | 0.75 |
| K | 0.20 | – | – |
| L | 0.15 | 0.25 | 0.35 |

**Figure 11**

## Revision History

**Table 7**

| Revision Number | Revision Date | Description | Modifications |
|---|---|---|---|
| 0.1 | 2023/7/31 | Draft | |
| 0.2 | 2024/5/15 | | |
| 0.3 | 2024/12/15 | Preliminary | |
| 0.4 | 2025/5/8 | | General Description/Features/Specification/Pin Diagram/Typical Performance Characteristics/Application Circuit/Package Drawing |

## Document Categories

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