Product Specification

RS3237 20dB Wideband Flat Gain LNA

General Description

The RS3237 is a cascadable, wideband gain block amplifier in a low-cost surface mount package. At 3.5 GHz, the amplifier provides 19 dB gain, +28 dBm OIP3 and 1.4 dB Noise Figure while drawing 55 mA current from a 5V supply.

The RS3237 provides very flat gain across a broad range of frequencies with the integration of a shut-down biasing capability to allow for operation for TDD applications. 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 amplifier is internally matched using a high-performance E-pHEMT process and is housed in a small 2x2 mm surface-mount package.

The RS3237 covers the 0.01 – 9 GHz frequency band and is targeted for wireless infrastructure or other applications requiring high linearity and/or low noise figure

Applications

- 5G massive MIMO
- 2G/3G/4G mobile infrastructure
- Repeater/DAS
- General purpose RF
- TDD/FDD system

Features

- Wideband
  - 0.01 – 9 GHz operational frequency
  - Flat gain, over 0.01 – 9 GHz, gain variation 1.5 dB
- Balanced performance in small package
  - 19 dB Gain @ 3 GHz
  - 28.8 dBm OIP3 @ 3 GHz
  - 18.5 dBm OP1dB @ 3 GHz
  - 55mA current consumption under 5V
  - 2 x 2mm QFN package

Functional Diagram/Application Circuit

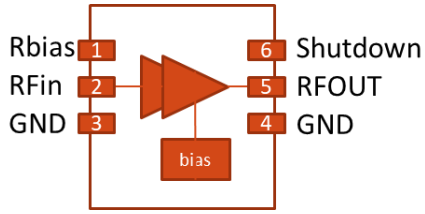


Figure 1

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Absolute Maximum Ratings

Table 1

Parameter	Min	Max	Units
VDD to GND	-0.3	6	V
Shut Down pin to GND	-0.3	6	V
Input Power , CW signal		24	dBm
Maximum Junction Temperature		175	°C
Storage Temperature Range	-65	150	°C
ESD Voltage– HBM (Per JESD22-A114)		TBD	
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
Control Logic High Voltage	1.4	3.3	5	V
Control Logic Low Voltage	0		0.63	V
Input Power, CW signal			20	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, TC = +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		19		dB
	1 - 6 GHz		18.5		
	6 - 9 GHz		17		
Input Return Loss			-12		dB
Output Return Loss			-12		dB
Output P1dB	0.01 - 1 GHz		19		dBm
	1 - 6 GHz		18.5		
	6 - 9 GHz		18		
Output IP3 Pout = +1 dBm/tone, Δf = 1 MHz	0.01 - 1 GHz		34		dBm
	1 - 6 GHz		28		
	6 - 9 GHz		25		
Noise Figure	0.01 - 1 GHz		1.2		dB
	1 - 6 GHz		1.4		
	6 - 9 GHz		2.5		
Device Current, IDD	ON, Normal operation, VSD = 0 V		55		mA
OFF, Shut down, VSD = 1.8 V			2.9		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			66		µA
Device ON or OFF Timing	50% of VSD to 90% or 10% RF Output		200		ns
Thermal Resistance, θjc	Junction to case		TBD		°C/W

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Pin Diagram

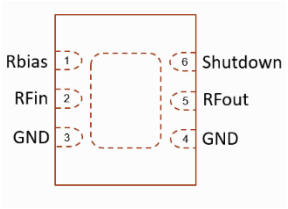


Figure 2

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. Requires a DC-blocking capacitor and an inductor.
3, 4	GND	Ground. Connect to the PCB ground plane.
5	RFout	RF Output. RFout is internally matched to 50ohm.
6	SD	Shutdown Input. A logic-high disables the device.

Control Logic

Table 5

Mode	Shut Down Pin 6 logic
Amplifier Enable	0
Amplifier Shut down	1

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Application Circuit

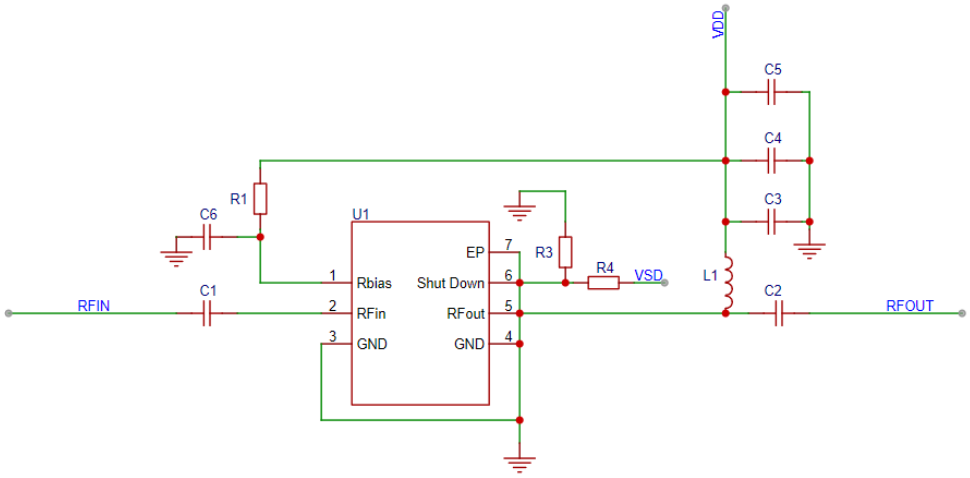


Figure **3**

Table 6

Reference Designator	Value	Description
C1、C2	0.1uF	531Z104KT16T
L1	0.9uH	901XJRW
C3, C6	100pF	C0402
C4	0.1uF	C0402
C5	10uF	C0402
R1	TBD	IDD VS RBIAS
R3	10K	C0402
R4	0	C0402

IDD VS RBIAS

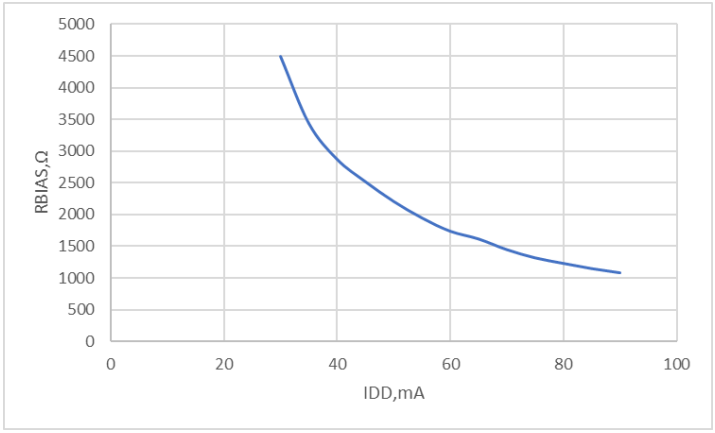


Figure 4

Typical Performance Characteristics

Figure 5. Gain

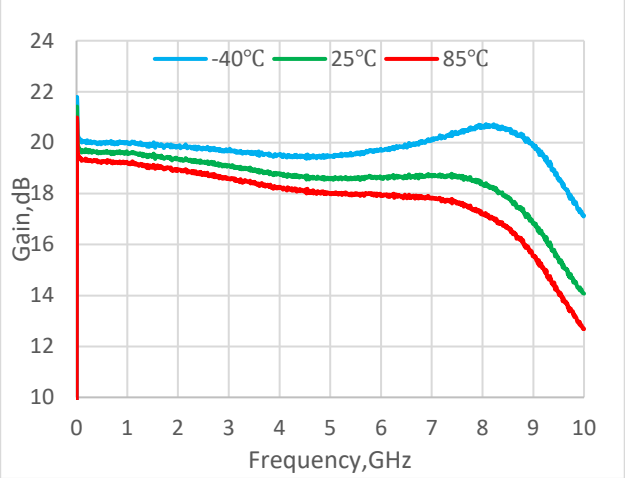


Figure 6. Input Return Loss

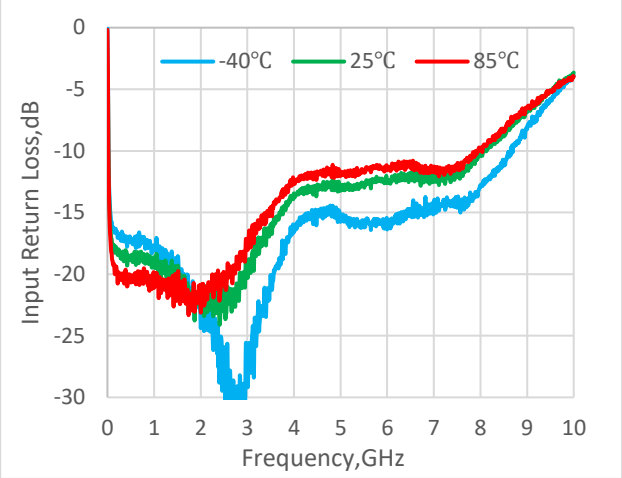


Figure 7. Output Return Loss

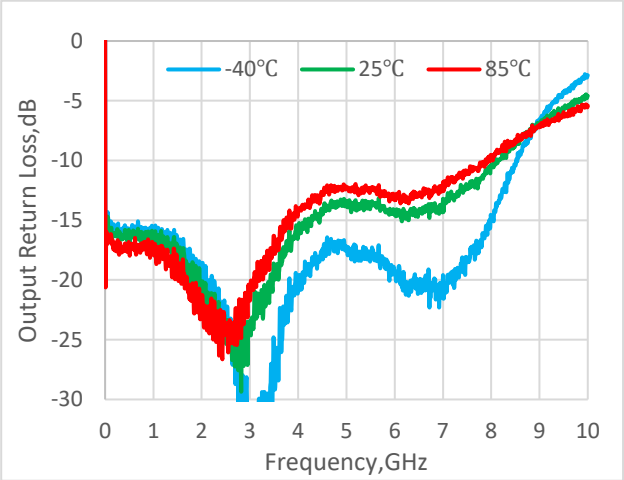


Figure 8. Noise Figure

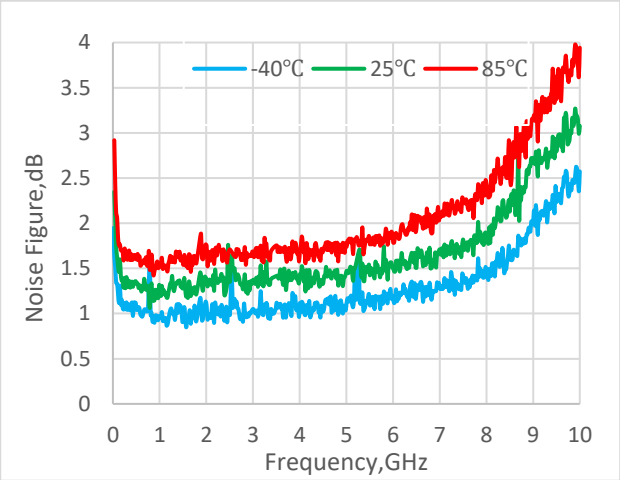


Figure 9. P1dB

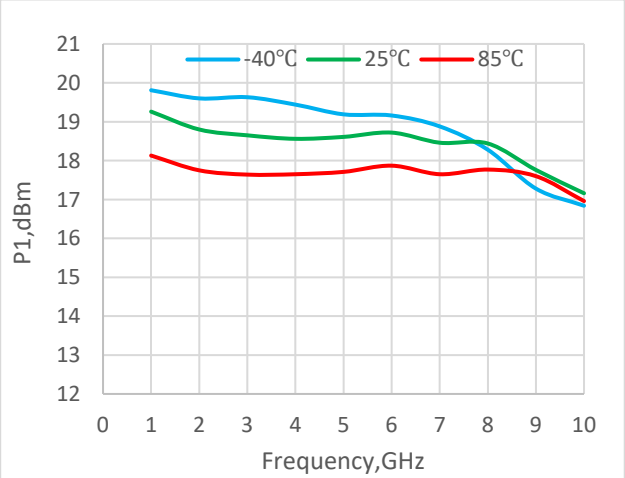
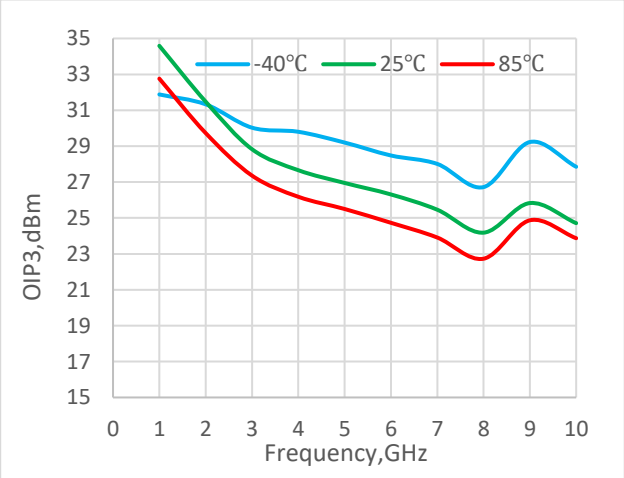
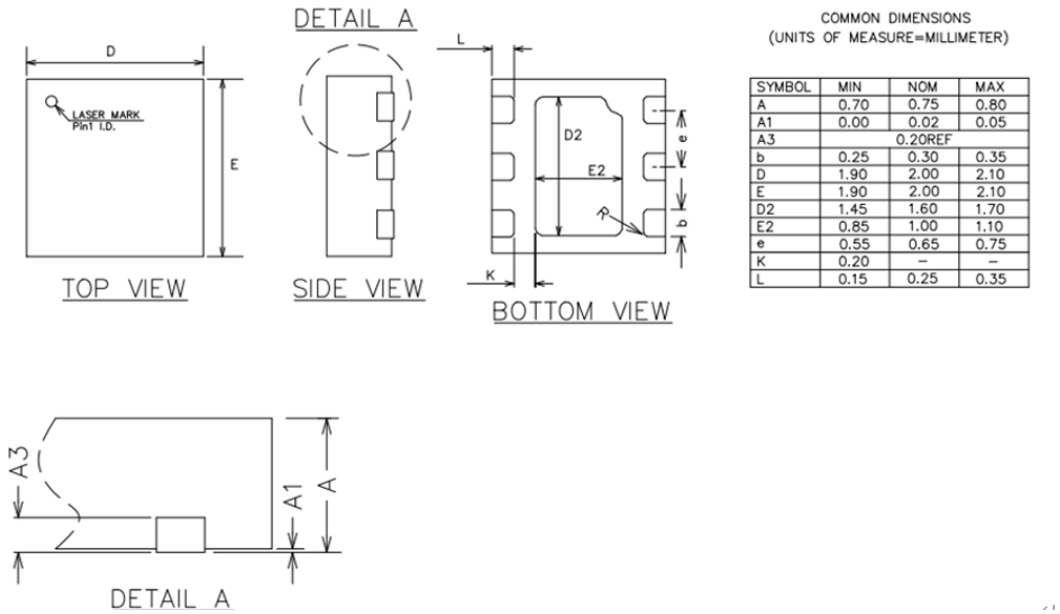


Figure 10. OIP3



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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	2023/11/22		Add plots
0.3	2024/12/16	Preliminary	
0.4	2025/05/08		General Description/Features/Specification/Pin Diagram/Typical Performance Characteristics/Application Circuit/Package Drawing

Document Categories

Advance Information

The product is in a formative or design stage. The datasheet contains design target specifications for product development. Specifications and features may change in any manner without notice.

Preliminary Specification

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Product Specification

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