Product Specification

RS3239 17dB Wideband Flat Gain LNA

General Description

The RS3239 is a cascadable, wideband gain block amplifier in a low-cost surface mount package.

The RS3239 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 RS3239 covers the DC – 20 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 – 20GHz operational frequency
  - Flat gain, over DC – 20 GHz, gain variation 1.5 dB
- Balanced performance in small package
  - 17 dB Gain
  - 25 dBm OIP3
  - 16 dBm OP1dB
  - 60mA current consumption under 5V
- ESD protection on all pins (HBM > 250 V)

Functional Diagram/Application Circuit

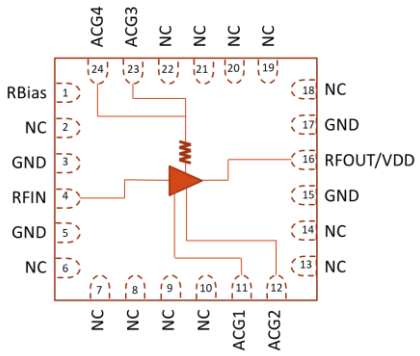


Figure 1

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Absolute Maximum Ratings

Table 1

Parameter	Min	Max	Units
VDD to GND	-0.3	6	V
Input Power, cw signal		22	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)	3	5	5.5	V
Operating Temp Range	-40	25	85	°C
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=5.0V, 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		DC		20	GHz
Gain			17		dB
Input Return Loss			-13		dB
Output Return Loss			-15		dB
Output P1dB	DC - 10 GHz		15		dBm
	10 - 20 GHz		12		dBm
Output IP3	Pout=+1dBm/tone, Δf=1MHz		25		dBm
Noise Figure	evaluation board trace loss excluded		2		dB
Device Current, IDD	ON, Normal operation,		60		mA
Thermal Resistance, θ_{jc}	Junction to case		TBD		°C/W

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Pin Diagram

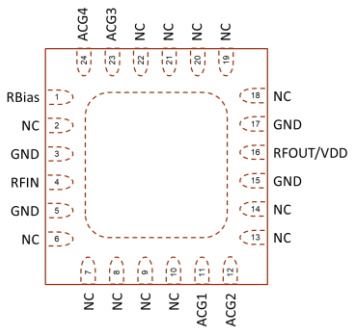


Figure 2

Pin Description

Table 4

Pad No.	Label	Description
4	RFIN	RF Input. Requires a DC-blocking capacitor.
3,5, 15, 17	GND	Ground. Connect to the PCB ground plane.
16	RFOUT/VDD	RF Output. Requires a DC-blocking capacitor and an inductor to feed VDD.
24	ACG4	AC grounding. Bypass cap is needed for low frequency.
11,12,23	ACG1, ACG2, ACG3	Ground. Connect to the PCB ground plane.
Others	NC	No connection. RF performance is measured with these pins grounded.

Application Circuit

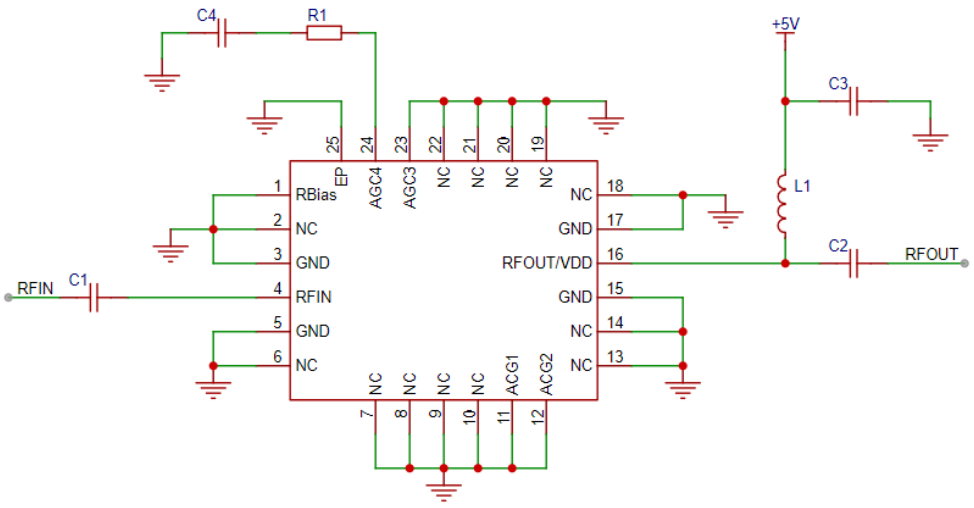


Figure 3

Table 5

Reference Designator	Value	Description
C1	100nF	0402
C2	100nF	0402
C3	Depends on customer's application	0402
C4	4.7uF	0402
L1	Depends on customer's application	0402
R1	10Ω	0402

Typical Performance Characteristics

Figure 3. Gain

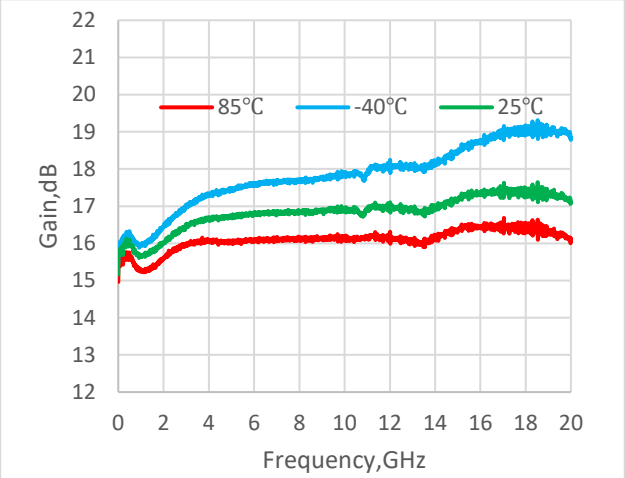


Figure 4. Input Return Loss

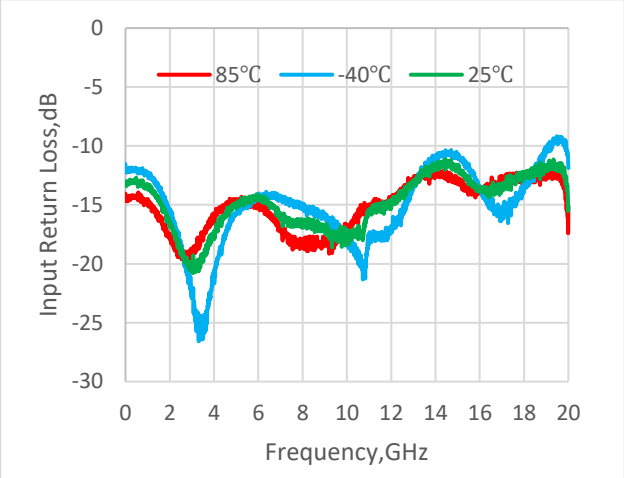


Figure 5. Output Return Loss

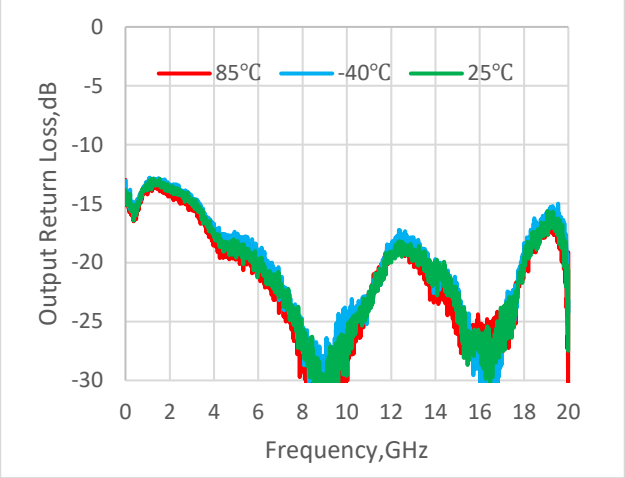


Figure 6. Noise Figure

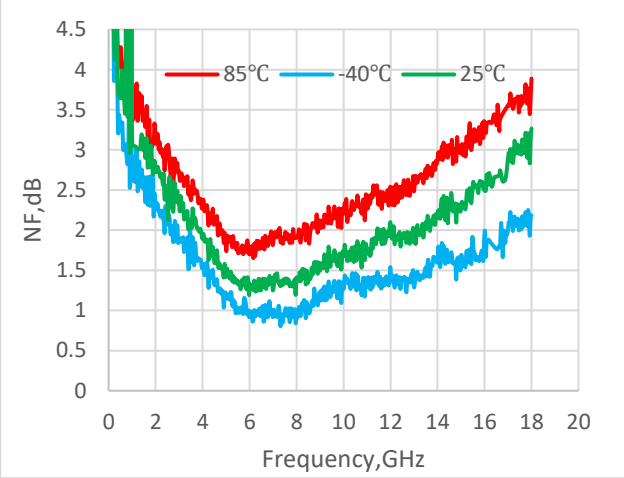


Figure 7. P1dB

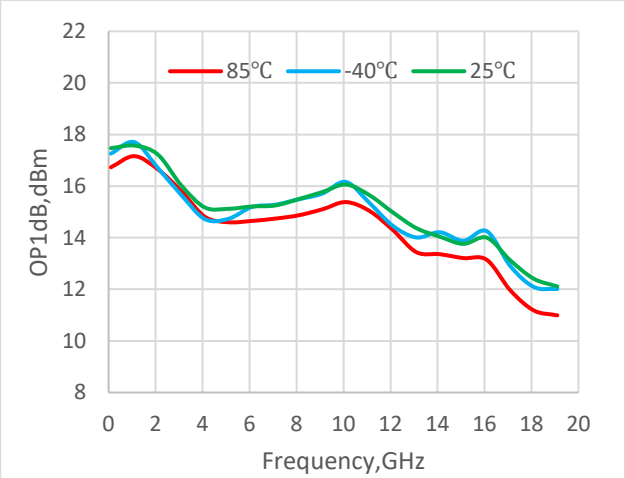
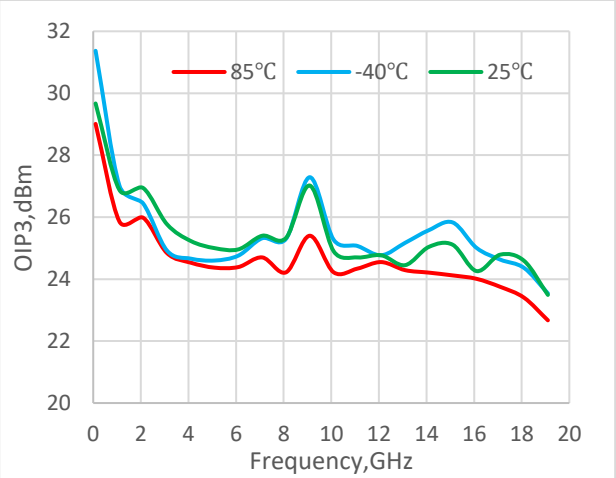


Figure 8. OIP3



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Typical Performance Characteristics(0MHz-100MHz)

Figure 9. Gain

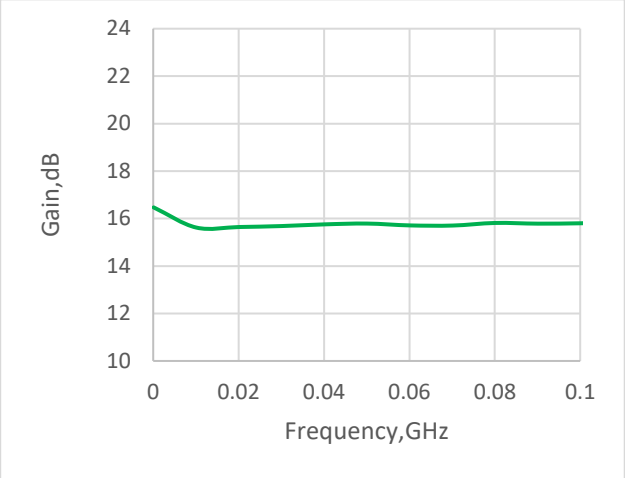


Figure 10. Input Return Loss

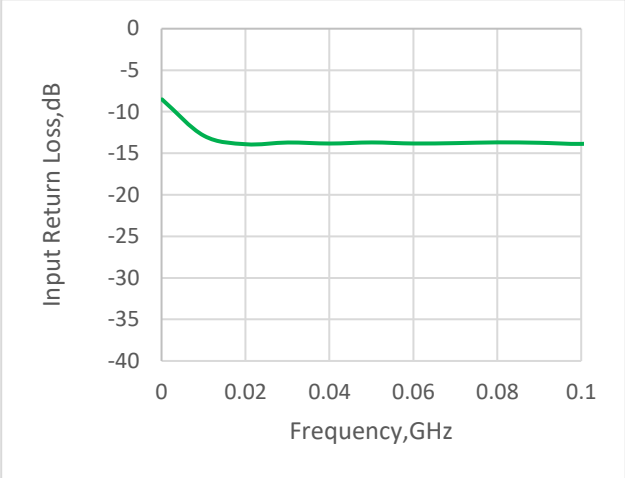


Figure 11. Output Return Loss

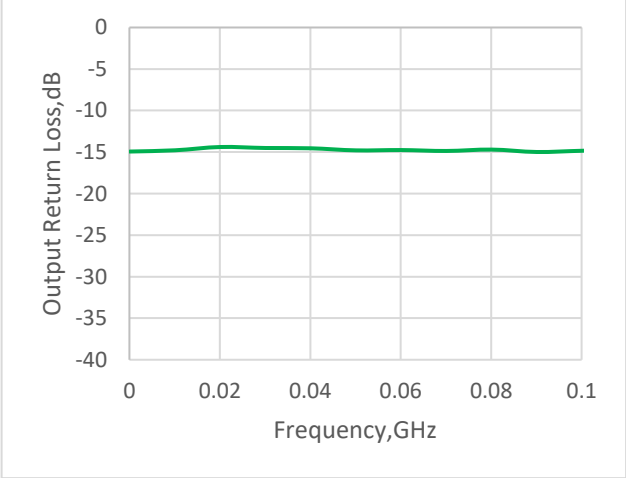


Figure 12. Noise Figure

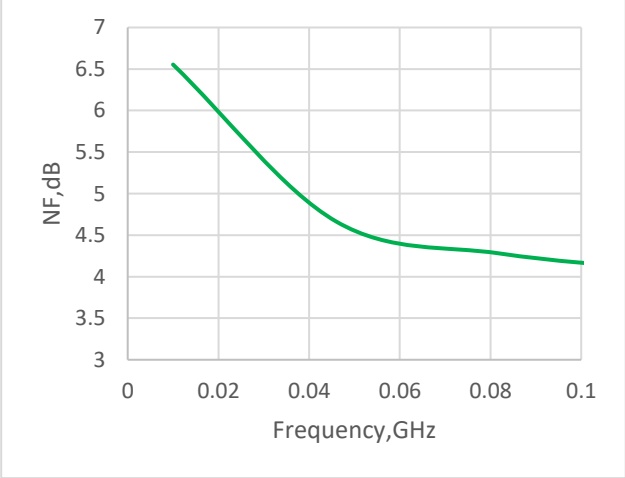


Figure 13. P1dB

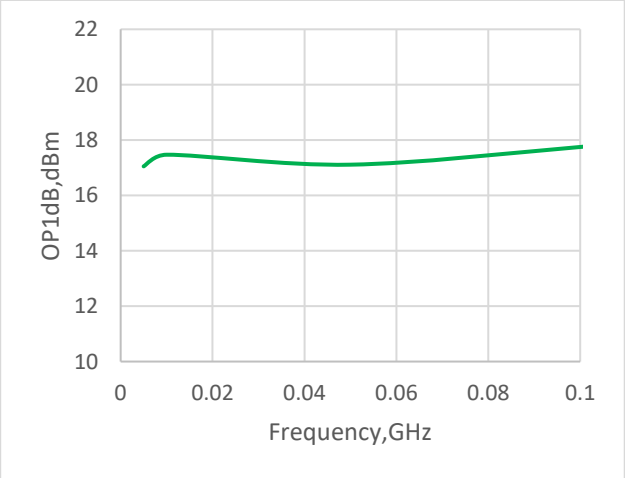
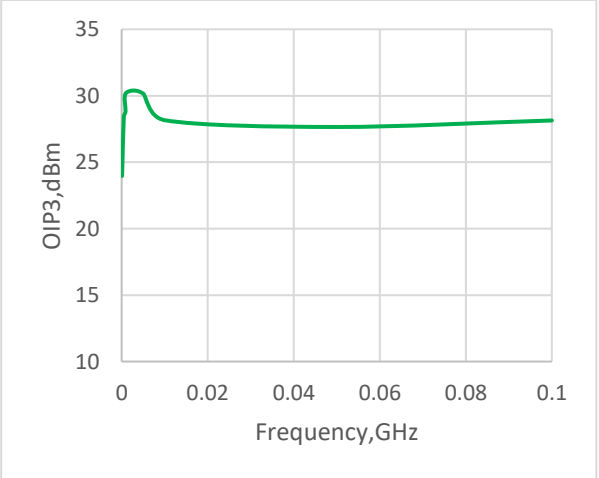
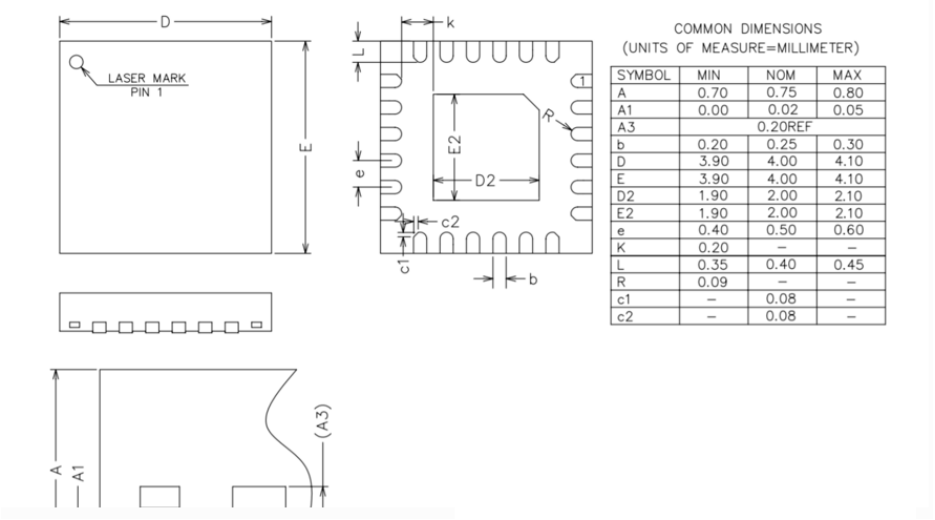


Figure 14. OIP3



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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	0.20	0.25	0.30
D	3.90	4.00	4.10
E	3.90	4.00	4.10
D2	1.90	2.00	2.10
E2	1.90	2.00	2.10
e	0.40	0.50	0.60
K	0.20	–	–
L	0.35	0.40	0.45
R	0.09	–	–
c1	–	0.08	–
c2	–	0.08	–

Figure 15

Revision History

Table 6

Revision Number	Revision Date	Description	Modifications
0.1	2023/7/31	Draft	
0.2	2024/5/15		
0.3	2024/7/2		
0.4	2024/7/29		Update app circuit, pin definition.
0.5	2024/8/26		
0.6	2025/5/8		Update 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

The datasheet contains preliminary data. Additional data may be added at a later date. RFone Technology reserves the right to change specifications at any time without notice in order to supply the best possible product.

Product Specification

The datasheet contains final data. In the event RFone Technology decides to change the specifications, RFone Technology will notify customers of the intended changes by issuing a CNF (Customer Notification Form).

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