Product Specification

RS3192 Wideband Flat Gain Block

General Description

The RS3192 is a cascadable, wideband gain block amplifier in a low-cost surface mount package. At 3.5 GHz, the amplifier provides 22 dB gain, +33 dBm OIP3 and 0.9 dB Noise Figure while drawing 70 mA current from a 5V supply.

The RS3192 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 RS3192 covers the 1 – 6 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
  - 1 – 6 GHz operational frequency
  - Flat gain, over 1 – 6 GHz, gain variation +-1 dB
- Balanced performance in small package
  - 22 dB Gain @ 3.5 GHz
  - 33 dBm OIP3 @ 3.5 GHz
  - 0.9 dB Noise Figure @ 3.5 GHz
  - 70mA current consumption under 5V
  - 2 x 2mm QFN package
- ESD protection on all pins (HBM > 1000V)

Functional Diagram/Application Circuit

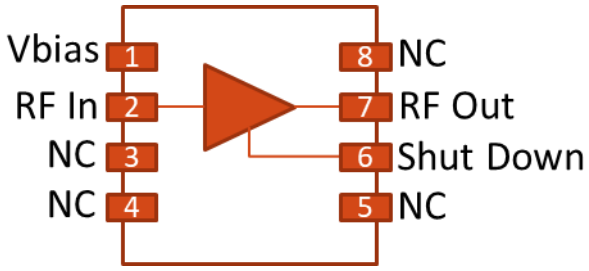


Figure 1

RFone Technology, Inc. www.rfonetech.com All Right Reserved

Absolute Maximum Ratings

Table 1

Parameter	Min	Max	Units
VDD to GND	-0.3	6	V
SD pin to GND	-0.3	6	V
Input Power,cw signal		23	dBm
Maximum Junction Temperature		175	°C
Storage Temperature Range	-65	150	°C
ESD Voltage– HBM (Per JESD22-A114)		Class 1 (1000V)	
ESD Voltage – CDM (Per JESD22-C101)		Class IV (500V)	

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.

 All Rights Reserved

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	105	°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.

 All Rights Reserved

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		1000		6000	MHz
Test Frequency			3500		MHz
Gain			22		dB
Input Return Loss			-10		dB
Output Return Loss			-11		dB
Output P1dB			20		dBm
Output IP3	Pout=+1dBm/tone, Δf=1MHz		33		dBm
Noise Figure	evaluation board trace loss excluded		0.95		dB
Device Current, IDD	ON, Normal operation,VSD = 0 V		70		mA
OFF, Shut down, VSD= 1.8 V			4		mA
Device Control Voltage, VSD	ON, Logic Low	0	0.63		V
OFF, Logic High		1.17		VDD	V
Control Pin Current, ISD			150		μA
Device ON or OFF Timing	50% of V_{PD} to 90% or 10% RF Output		200		nS
Thermal Resistance, θ_{jc}	Junction to case		TBD		°C/W

 All Rights Reserved

Pin Diagram

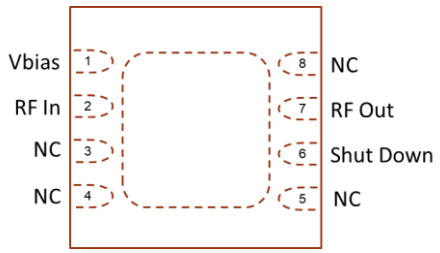


Figure 2

Pin Description

Table 4

Pad No.	Label	Description
1	Vbias	Bias voltage. Bias input voltage for reference, and internal control circuits
2	RF In	RF Input. Requires a DC-blocking capacitor and an inductor.
3,4,5,8	NC	No connection. Recommend to connect to the PCB ground plane.
6	Shut Down	Shutdown Input. A logic-high disables the device.
7	RF Out	RF Output. RFOUT is internally matched to 50Ω and incorporates an internal DC-blocking capacitor.

Control Logic

Table 5

Mode	SD Pin 6 logic
Amplifier Enable	0
Amplifier Shunt down	1

Typical Performance Characteristics

Figure 3. Gain

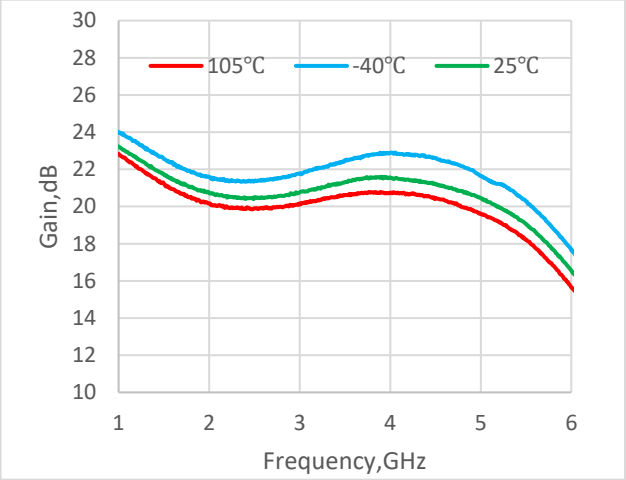


Figure 4. Input Return Loss

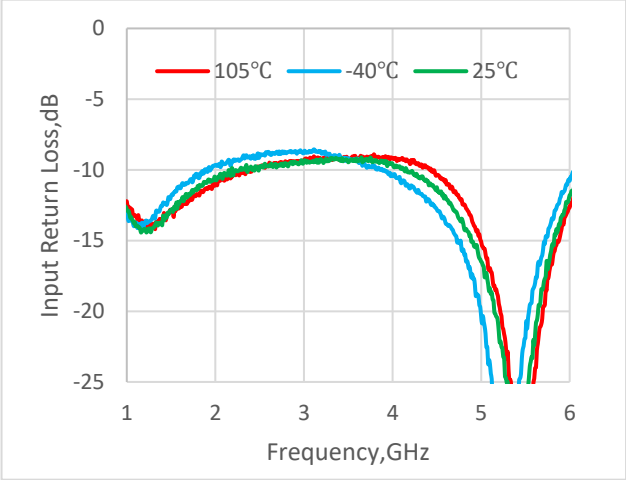


Figure 5. Output Return Loss

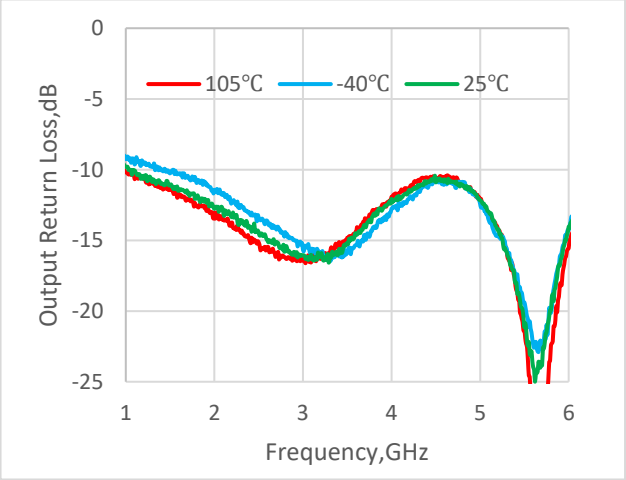


Figure 6. Noise Figure

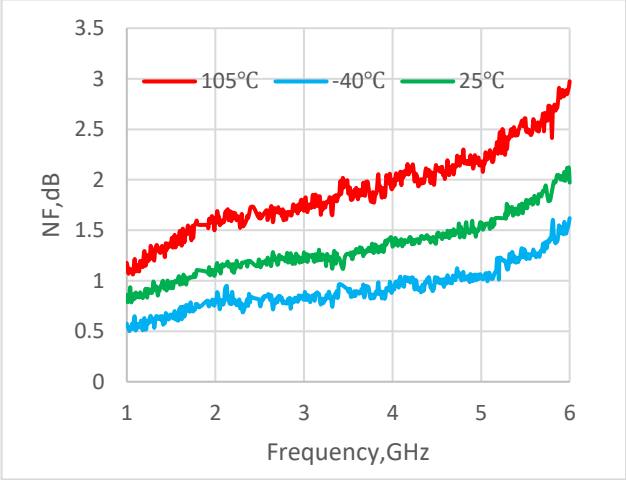


Figure 7. P1dB

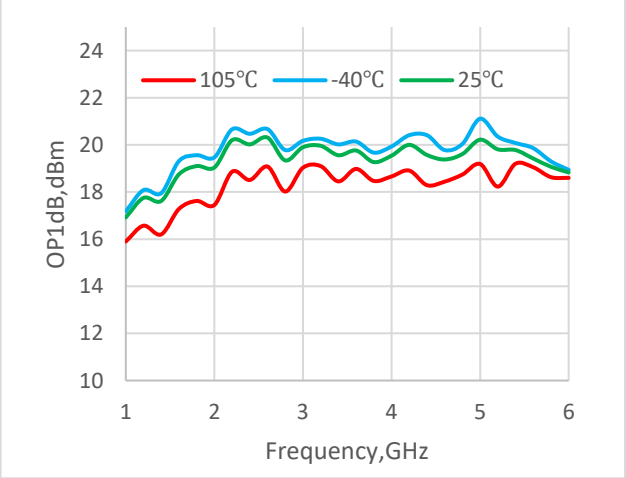
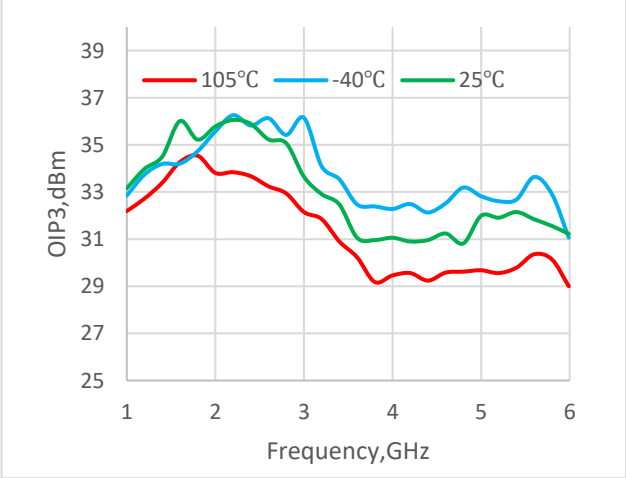


Figure 8. OIP3



 All Rights Reserved

Application Circuit

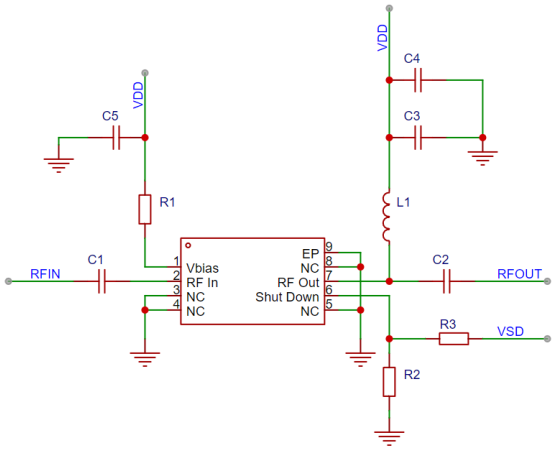


Figure 9

Table 6

Reference Designator	Value	Description
C1、C2	1nF	0402
C3	10nF	0402
C4	10uF	0402
C5	100pF	0402
R1	400Ω	0402
R2	20K	0402
R3	0Ω	0402
L1	20nH	0402

Figure 10. Rbias VS Idd@5V-Vdd

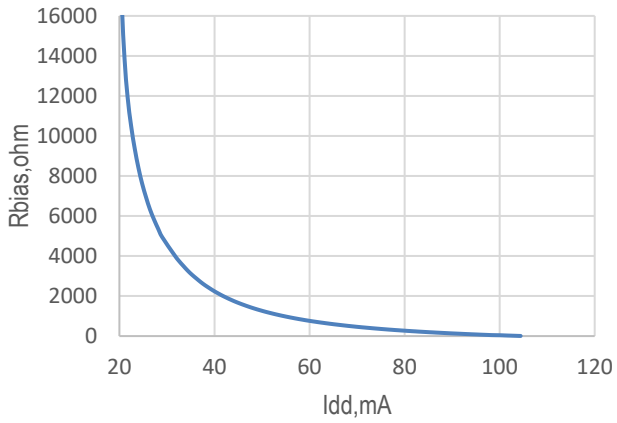
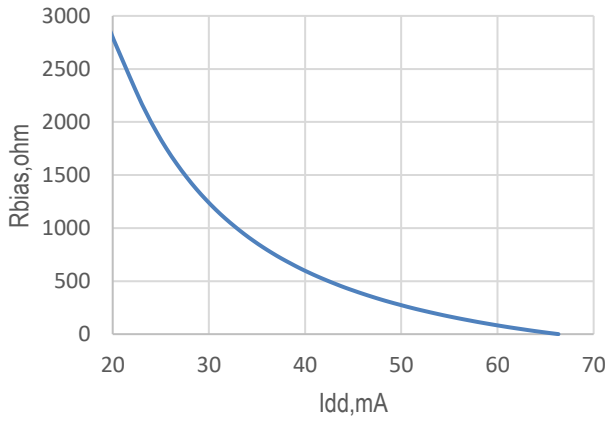
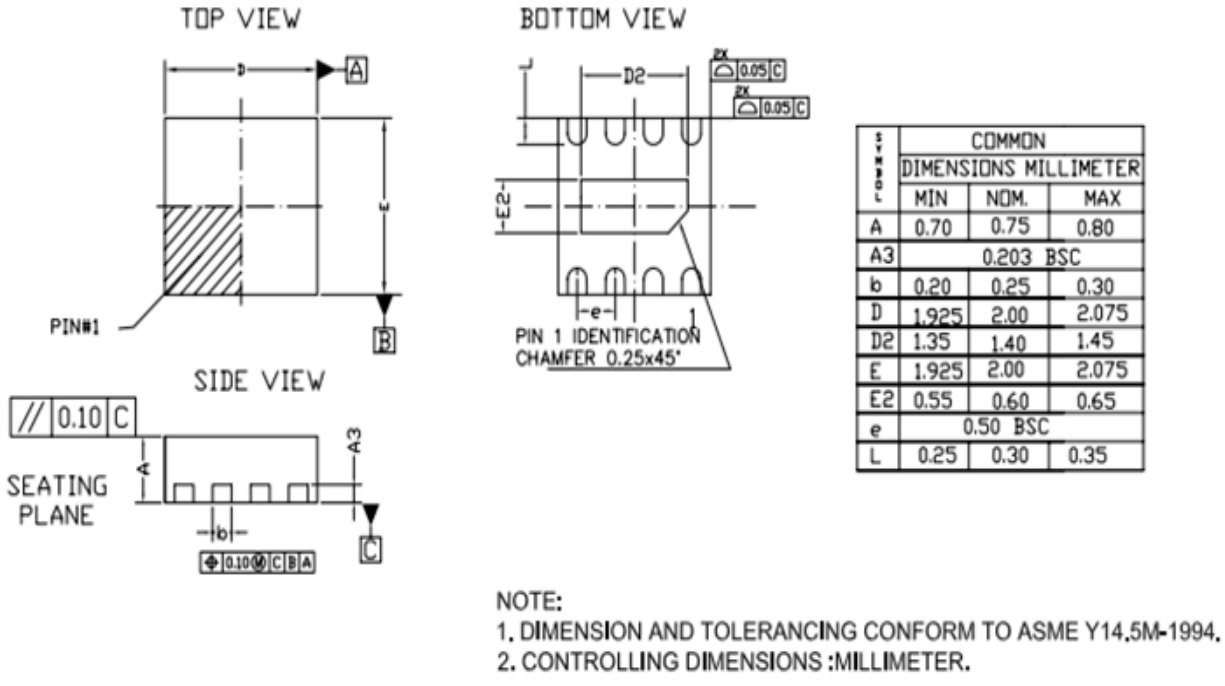


Figure 11. Rbias VS Idd@3.3V-Vdd



 All Rights Reserved

Package Drawing



SYMBOL	COMMON DIMENSIONS MILLIMETER		
	MIN	NOM.	MAX
A	0.70	0.75	0.80
A3		0.203 BSC	
b	0.20	0.25	0.30
D	1.925	2.00	2.075
D2	1.35	1.40	1.45
E	1.925	2.00	2.075
E2	0.55	0.60	0.65
e		0.50 BSC	
L	0.25	0.30	0.35

Figure 12

 All Rights Reserved

Revision History

Table 6

Revision Number	Revision Date	Description	Modifications
0	2020/11/7	Draft	
0.1	2020/12/8	Initial release	
0.2	2021/9/3		Update App circuit ,plots and data
0.3	2022/1/5	Released	
1.0	2022/2/15		
1.1	2022/2/28	Update	Modify Figure
1.2	2022/5/30	Update	Modify Figure&Information
1.3	2025/5/16	Update	Update General Description/Features/Specification/Pin Diagram/Typical Performance Characteristics/Application Circuit/

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).

Sales Contact

For additional information, contact Sales at sales@rfonetech.com.

Disclaimers

The information in this document is believed to be reliable. However, RFone Technology assumes no liability for the use of this information. Use shall be entirely at the user's own risk. No patent rights or licenses to any circuits described in this document are implied or granted to any third party. RFone Technology 's products are not designed or intended for use in devices or systems intended for surgical implant, or in other applications intended to support or sustain life, or in any application in which the failure of the RFone Technology product could create a situation in which personal injury or death might occur. RFone Technology assumes no liability for damages, including consequential or incidental damages, arising out of the use of its products in such applications.

Patent Statement

RFone Technology products are protected under one or more of the following Chinese patents.For details, visit patents.rfonetech.com

Copyright and Trademark

©2019 – 2025, RFone Technology Inc. All rights reserved. The RFone Technology name, logo are registered trademarks.