Product Specification

RS3217 Low Frequency Wideband LNA

General Description

The RS3217 is a cascadable, wideband LNA in a low-cost surface mount package. At 0.5 GHz, the amplifier provides 22 dB gain, +35 dBm OIP3 and 0.8 dB Noise Figure while drawing 77 mA current from a 5V supply.

The RS3217 provides excellent noise figure 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 to +5 volts. The amplifier is internally matched using a high-performance E-pHEMT process and is housed in a small 2 x 2 mm surface-mount package.

The RS3217 covers the 0.03 - 3GHz frequency band and is targeted for land mobile radio or other applications requiring high linearity and/or low noise figure.

Applications

- Land mobile radio
- Repeater/DAS
- General purpose RF
- TDD/FDD system

Features

- **Wideband and Robust**
  - 0.03 - 3 GHz operational frequency
  - Designed to withstand 20dBm input power
- **Outstanding performance in small package**
  - 22 dB Gain
  - 21.5 dBm P1dB
  - 35 dBm OIP3
  - 0.8 dB Noise Figure
  - 77 mA current consumption under 5 V
  - 2 x 2 mm LGA package
- **ESD protection on all pins (HBM > 500V)**

Functional Diagram/Application Circuit

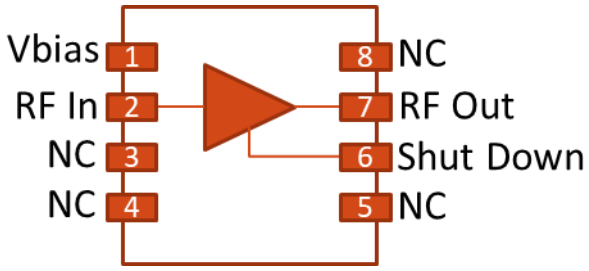


Figure 1

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Absolute Maximum Ratings

Table 1

Parameter	Min	Max	Units
VDD to GND	-0.3	6	V
ShutDown pin to GND	-0.3	6	V
Input Power		20	dBm
Maximum Junction Temperature		175	°C
Storage Temperature Range	-65	150	°C
ESD Voltage– HBM (Per JESD22-A114)		Class 1B (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.

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Recommended Operating Conditions

Table 2

Parameter	Min	Typical	Max	Unit
Supply Voltage (All VDD)	3	5	5.25	V
Operating Temp Range	-55	25	105	°C
Control Logic High Voltage	1.17	3.3	5	V
Control Logic Low Voltage	0		0.63	V
Input Power			19	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, 77mA IDD, 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		30		3000	MHz
Gain	30-1000MHz		22		dB
	1000- 2000MHz		20		
	2000- 3000MHz		17		
Input Return Loss	30-1000MHz		-22		dB
	1000-2000MHz		-18		
	2000-3000MHz		-15		
Output Return Loss	30-1000MHz		-12		dB
	1000-2000MHz		-14		
	2000-3000MHz		-13		
Output P1dB	5V, 77mA		21.5		dBm
Output IP3	5V, 77mA. Pout = +2 dBm/tone, Frequency Spacing = 1 MHz		35		dBm
Noise Figure	30-100MHz		1.8		dB
	100-3000MHz		0.7		
Device Current, IDD	ON, Normal operation, VSD = 0 V		77		mA
Device Control Voltage, VSD	ON, Logic Low	0	0.63		V
OFF, Logic High		1.17		VDD	V
ShutDown Current, ISD			8		mA
Device ON or OFF Timing	50% of VSD to 90% or 10% RF Output		0.5		µS

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Pin Diagram

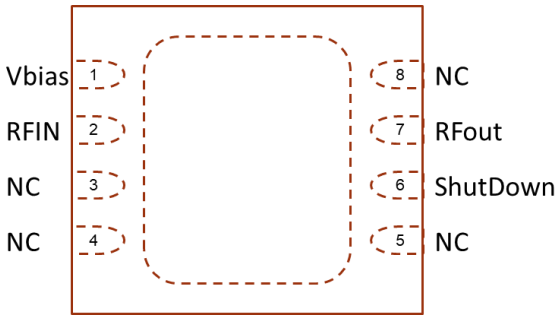


Figure 2

Pin Description

Table 4

Pad No.	Label	Description
1	Vbias	Bias voltage. Bias input voltage for reference, and internal control circuits
2	RFIN	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	RFOUT	RF Output. RFOUT is internally matched to 50Ω and incorporates an internal DC-blocking capacitor.

Control Logic

Table 5

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

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Application Information

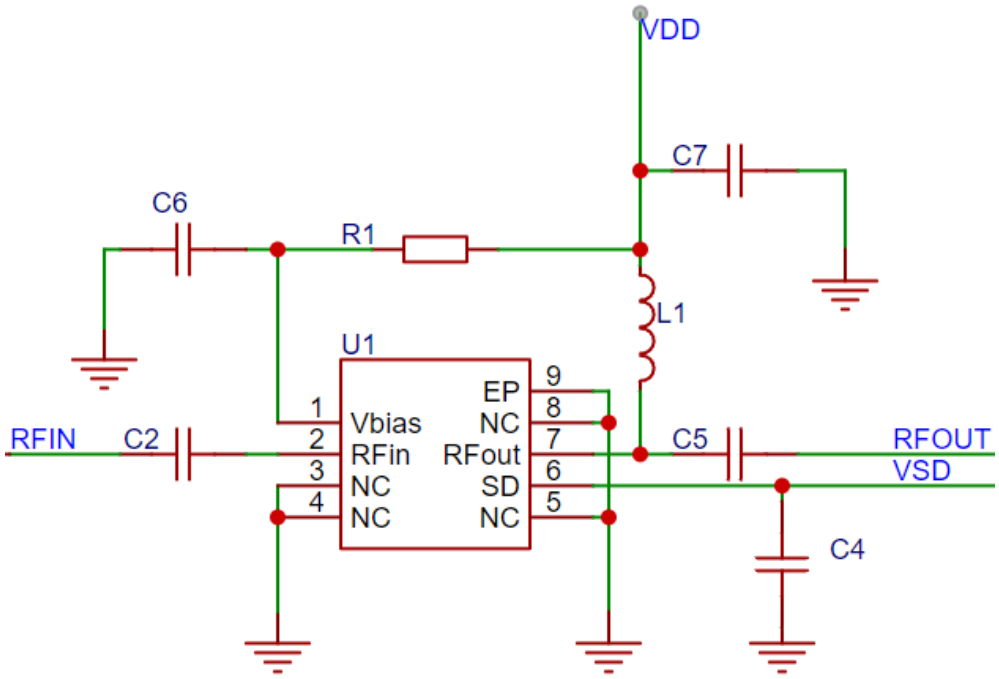


Figure 3

Table 6

Item	Quantity	Reference	Part	Footprint
1	1	R1	569Ω	R0402
2	3	C2,C5,C7	10nF	C0402
3	3	C4,C6	100pF	C0402
4	1	L1	901XJRW	L0402
5	1	U1	RS3217	

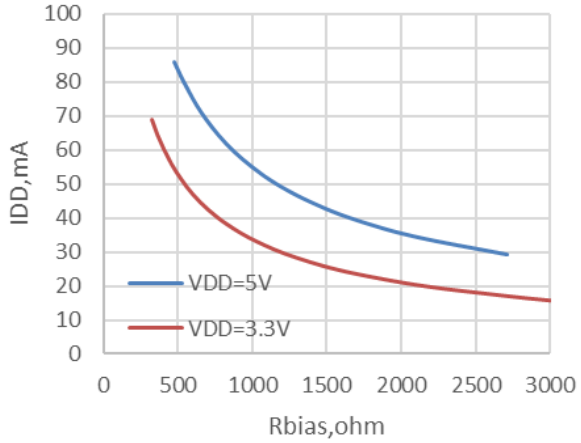


Figure 4. Rbias – IDD Curve

Typical Performance Characteristics(5V 77mA)

Figure5. Gain

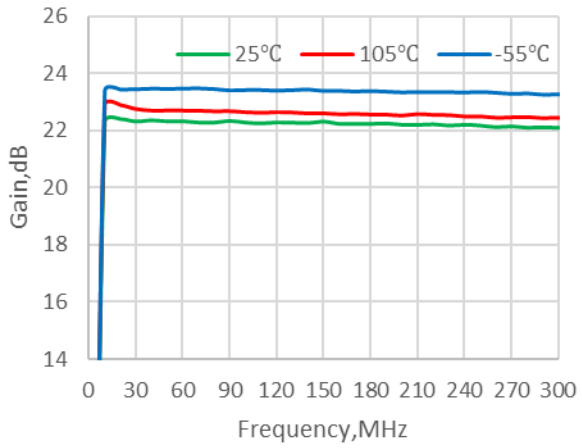


Figure 6. Gain

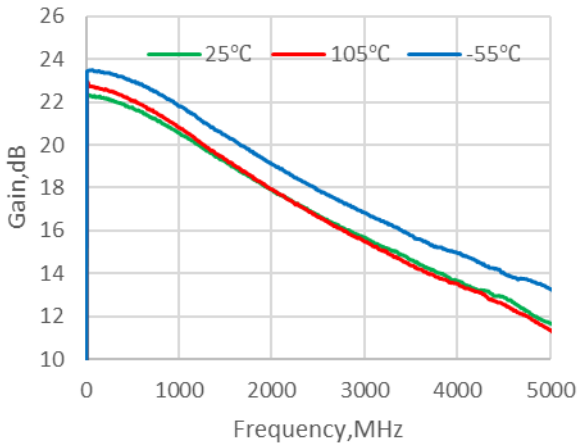


Figure7. Input Return Loss

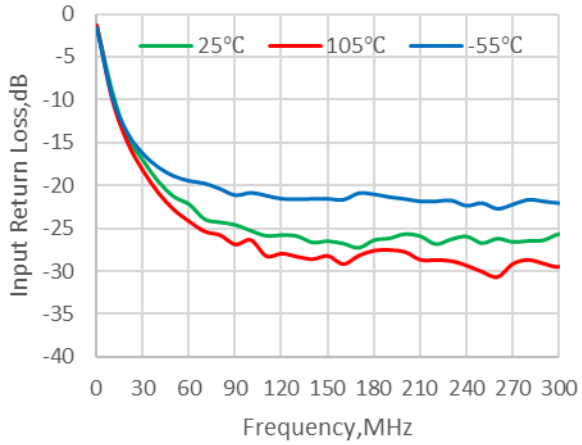


Figure 8. Input Return Loss

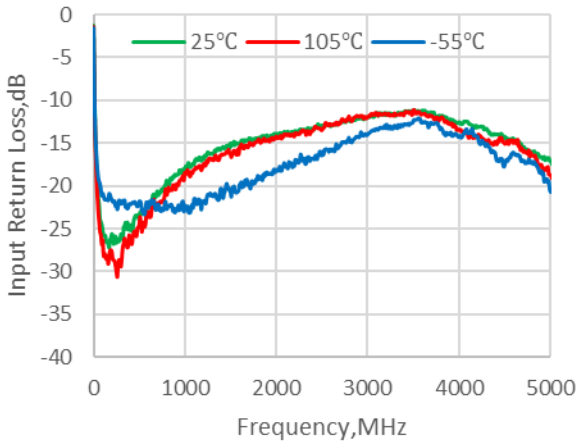


Figure9. Output Return Loss

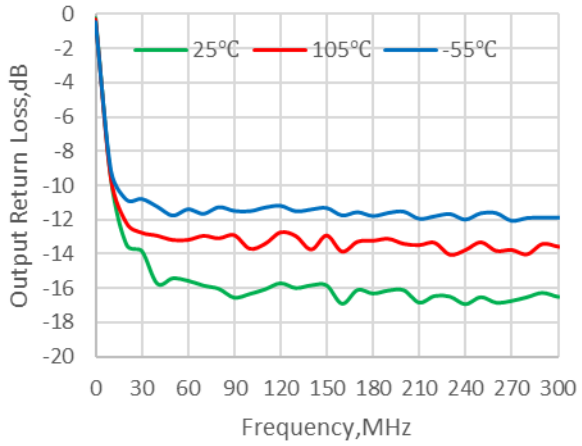
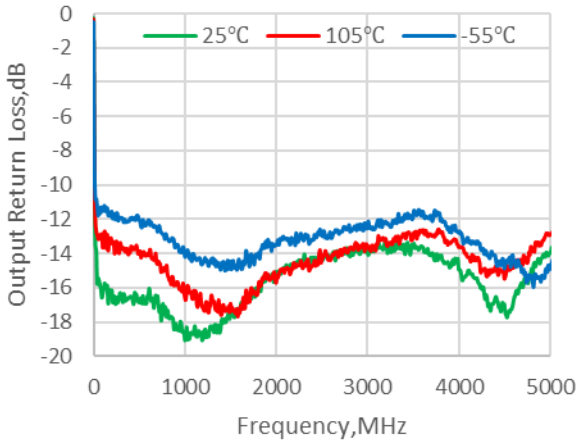


Figure 10. Output Return Loss



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Application Information

Figure 11. Noise Figure

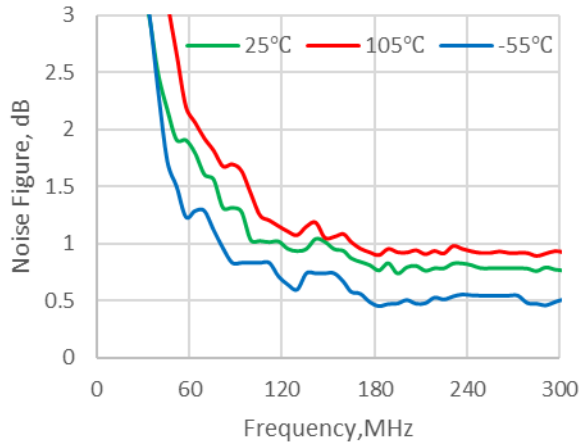


Figure 12. Noise Figure

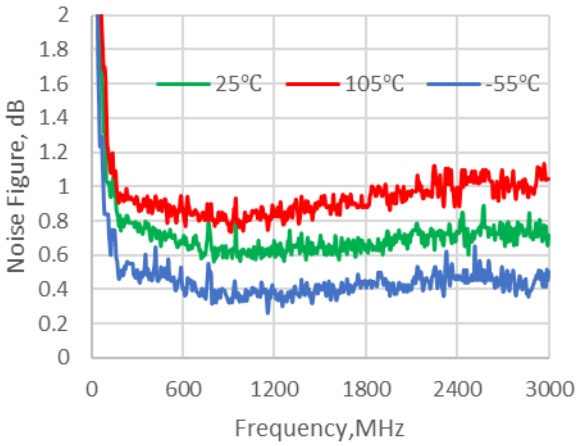


Figure 13. Output IP3

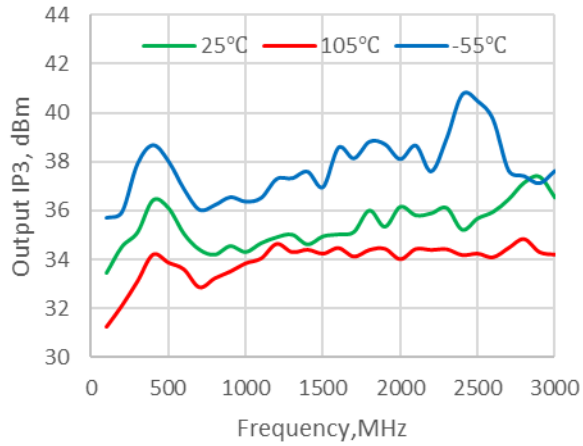
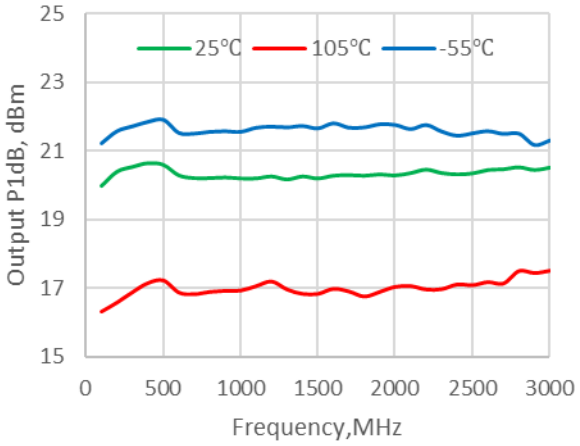


Figure 14. Output P1dB



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Package Drawing

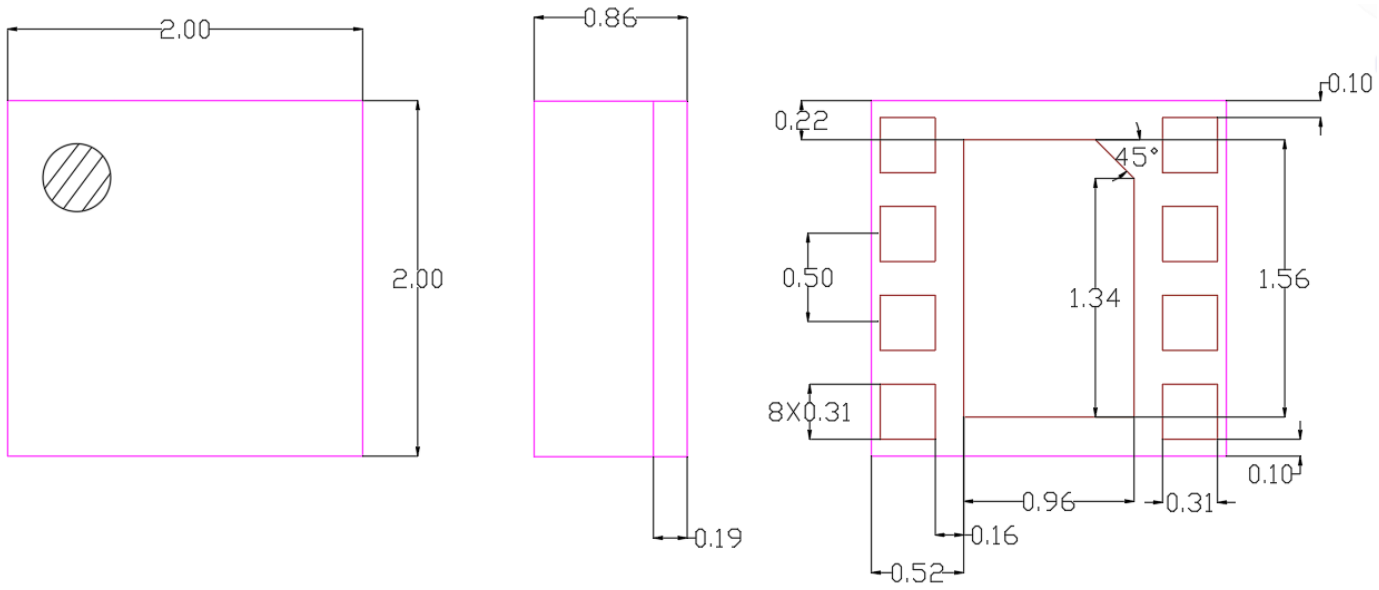


Figure 15

Revision History

Table 7

Revision Number	Revision Date	Description	Modifications
0.1	2025/02/07	Draft	—
0.5	2025/0716	Product Specification	Update Data

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.

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