

L1 band satellite navigation RF front-end low noise amplifier chip

1. Overview

AT2659S is a low noise amplifier (LNA) with low power consumption, high gain and low noise figure.

Chip, supports L1 band multi-mode global satellite positioning, can be applied to Beidou II, GPS, Galileo, Glonass and other GNSS navigation equipment. The chip is manufactured using advanced SiGe technology and uses a 2.9 mm × 2.8 mm package. The 6-pin SOT23-6 package is 1.1 mm × 1.1 mm.

application

Navigation Antenna

Mobile phone with integrated navigation function

Automatic navigation

Location-enabled mobile devices

Personal Navigator

Notebook/PAD

Underwater navigation

Aviation equipment

Main Features

- Support multiple satellite navigation systems in L1 frequency band, including Beidou, GPS, GALILEO, GLONASS, etc.
- Typical noise figure: 0.8dB;
- Typical power gain: 20dB;
- Typical input P1dB: -15dBm;

-Working frequency: 1550MHz ~ 1615MHz;

- Current consumption: 4.4mA;
- Wide supply voltage range: 1.4V ~ 3.6V;
- 2.0KV HBM ESD pin protection circuit;
- Internally integrated 50Ω output matching circuit;
- Simple peripheral circuit

2. Pinout, Function and Typical Application Block Diagram

Figure 1. Typical application block diagram

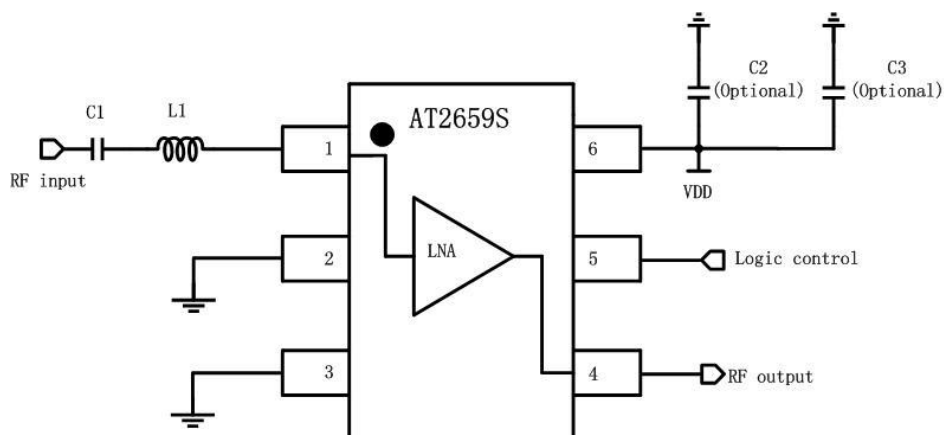


Table 1. Pin Description

Pins	name	Function
1	RFIN	RF Input
2.3	GND	Grounding
4	RFOUT	RF Output
5	$\overline{\text{SHDN}}$	Working (high level), sleeping (low level),
6	VDD	power supply

Table 1. Peripheral Component Description

Component number	describe
C1	Input DC blocking capacitor, 470 pF
L1	Input matching inductor, 6.8 nH
C2	Power supply bypass capacitor, 0.1 uF (optional)
C3	Power supply bypass capacitor, 100 pF (optional)

3. Absolute Maximum Ratings

parameter	unit	Minimum	Maximum
Supply voltage	V	0	3.6
Chip control pin voltage	V	0	3.6
Chip RF input pin voltage	V	0	1.0
Chip storage temperature range	°C	- 60	+ 160
Chip operating temperature range	°C	- 40	+ 85

4. DC electrical characteristics

parameter	condition	Minimum	Typical Value	Maximum	unit
Supply voltage		1.4	2.85	3.6	V
Supply Current	$\overline{\text{SHDN}}=1$	3.8	4.4	5.1	mA
	$\overline{\text{SHDN}}=0$			4	uA
Digital input logic high		1.1			V
Digital input logic low				0.4	V
RFIN DC bias voltage	$\overline{\text{SHDN}}=1$		0.83		V

5. AC electrical characteristics: Table 1 (center frequency 1575.42 MHz, 2.85V supply voltage)

parameter	condition	Minimum	Typical Value	Maximum	unit
Operating frequency		1550	1575.42	1615	MHz
Power Gain			20.0		dB
Noise Figure	Note1		0.8		dB

Input return loss	L1:6.8nH		13		dB
	L1:7.5nH		20		dB
Output return loss			15		dB
Reverse Isolation			33		dB
Input IP3	Note 2		- 6		dBm
Input P1dB			- 15		dBm

Note 1: Deduct 0.2dB of PCB, SMA and other board-level access losses;

Note 2: Two input signals with deviations from the center frequency (1575.42MHz) of -2MHz and 2MHz respectively are used.

The input signal strength is -40dBm;

6. AC electrical characteristics: Table 2 (center frequency 1561.098 MHz, 2.85V supply voltage)

parameter	condition	Minimum	Typical Value	Maximum	unit
Operating frequency		1550	1561.098	1615	MHz
Power Gain			20.0		dB
Noise Figure	Note1		0.8		dB
Input return loss	L1:6.8nH		14		dB
	L1:7.5nH		20		dB
Output return loss			15		dB
Reverse Isolation			34		dB
Input IP3	Note 2		- 6		dBm
Input P1dB			- 15		dBm

Note 1: Deduct 0.2dB of PCB, SMA and other board-level access losses;

Note 2: Two input signals with deviations from the center frequency (1561.098MHz) of -2MHz and 2MHz are used.

The input signal strength is -40dBm;

7. AC electrical characteristics: Table 3 (center frequency 1602 MHz, 2.85V supply voltage)

parameter	condition	Minimum	Typical Value	Maximum	unit
Operating frequency		1550	1602	1615	MHz
Power Gain			20.0		dB
Noise Figure	Note1		0.8		dB
Input return loss	L1:6.8nH		14		dB
	L1:7.5nH		20		dB
Output return loss			15		dB
Reverse Isolation			33		dB
Input IP3	Note 2		- 6		dBm
Input P1dB			- 15		dBm

Note 1: Deduct 0.2dB of PCB, SMA and other board-level access losses;

Note 2: Two input signals with deviations from the center frequency (1602MHz) of -2MHz and 2MHz are used.

Signal strength is -40dBm;

8. Typical operating characteristics

Typical operating conditions are: evaluation board level test, temperature is 25°C, power supply voltage is 2.85V, input

The signal is the center frequency signal (unless otherwise specified) .

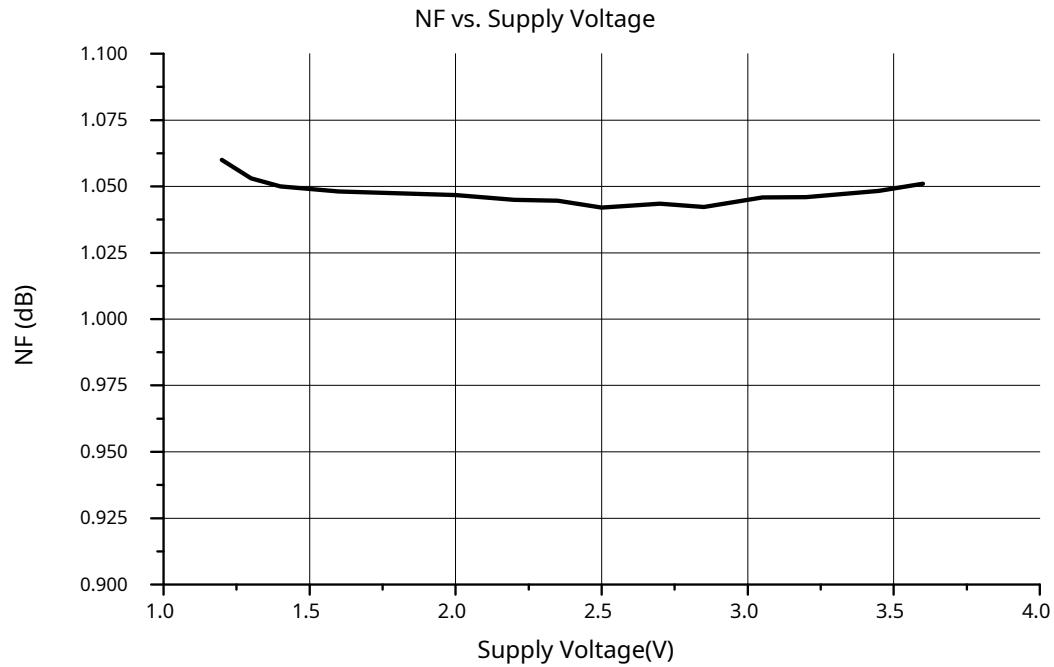


Figure 1. Noise figure vs. supply voltage curve

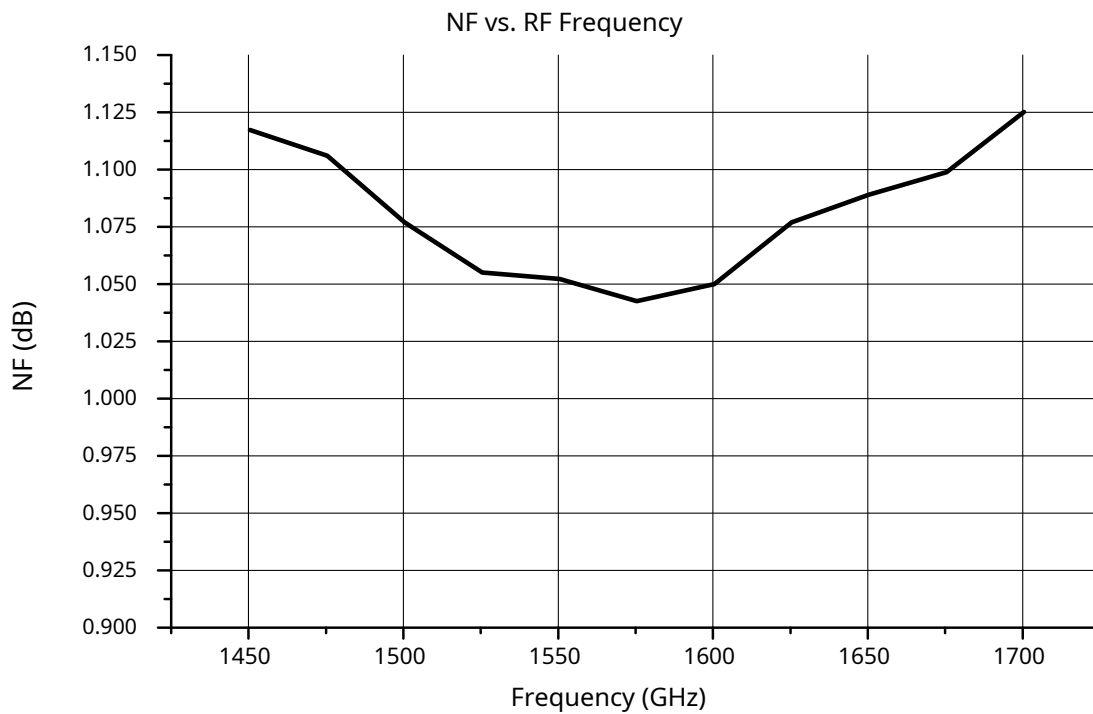


Figure 2. Noise figure vs. operating frequency

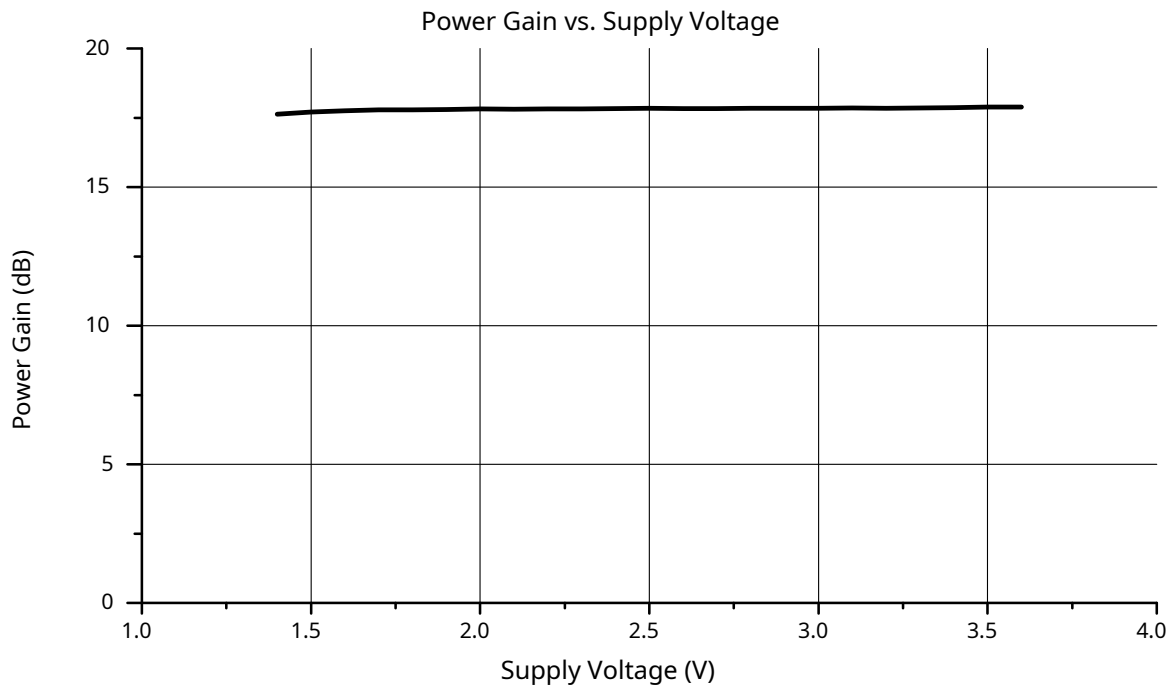


Figure 3. Power gain vs. supply voltage curve

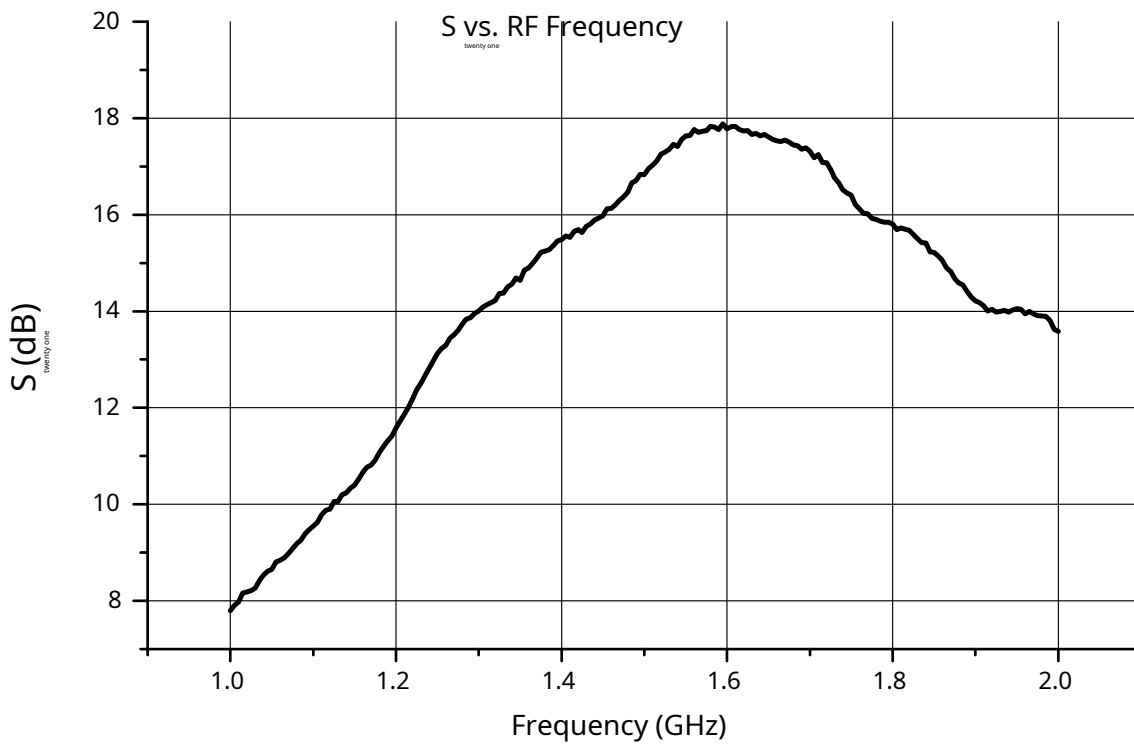


Figure 4. Power gain vs. operating frequency curve

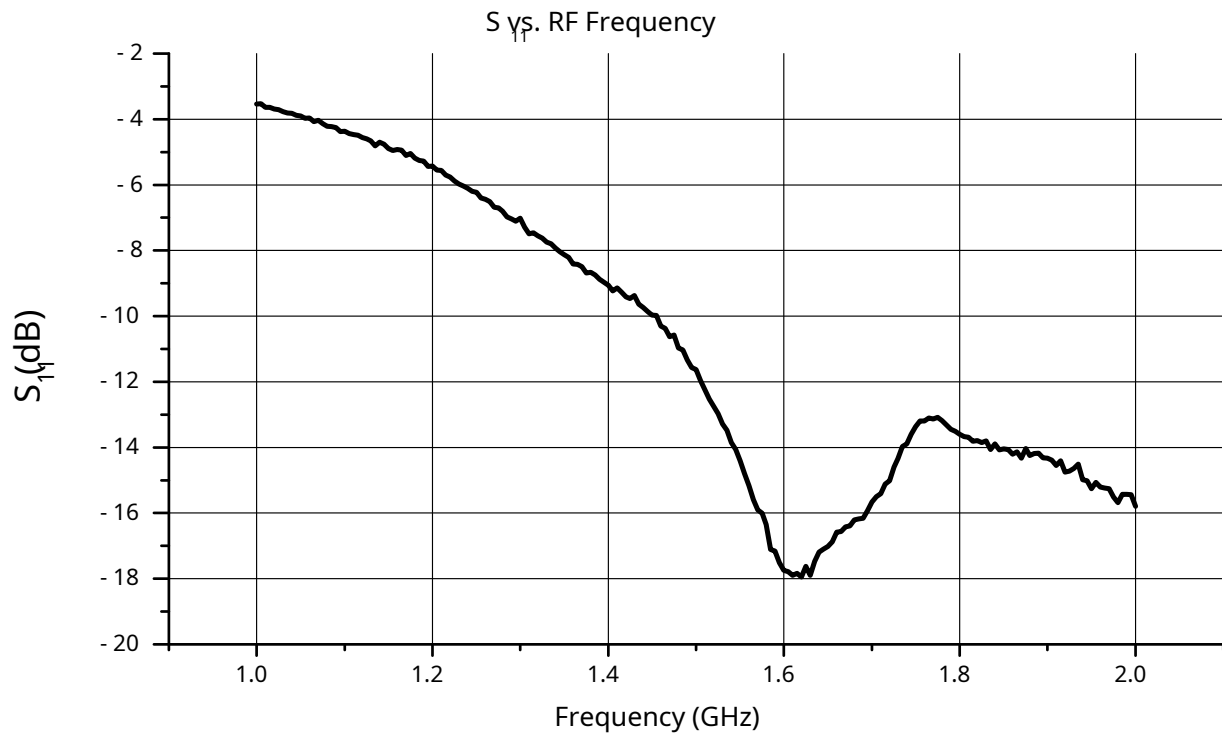


Figure 5. Input return loss vs. operating frequency

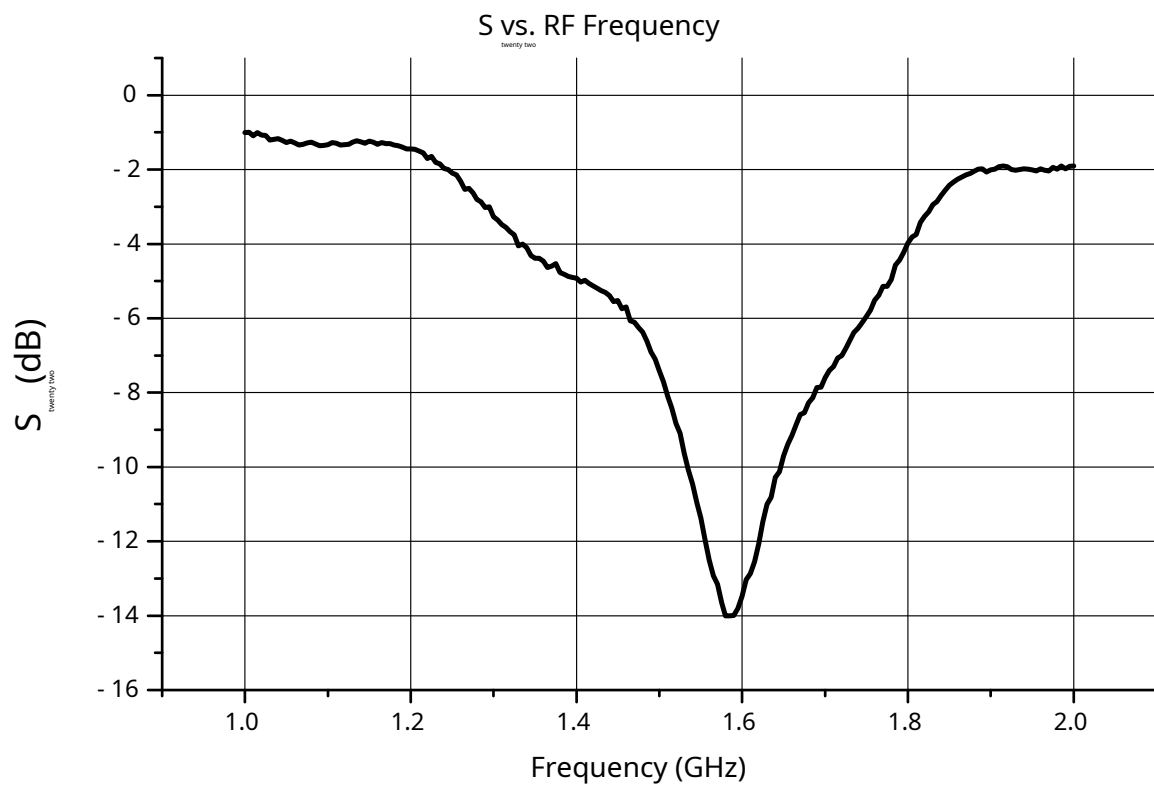


Figure 6. Output return loss vs. operating frequency curve

6. Packaging description

