

L1 frequency band satellite navigation RF front-end low noise amplifier chip**AT2659****1 Overview**

AT2659 is a low noise amplifier (LNA) chip with high gain and low noise figure, which supports

Support L1 frequency band multi-mode global satellite positioning, can be applied to GPS, Beidou II, Galileo, Glonass

and other GNSS navigation receivers. The chip is manufactured using advanced SiGe process, using 1.5 mm X 1 mm ×

0.78 mm 6 pin DFN package.

application

automatic navigation

Location-enabled mobile devices

personal navigator

Mobile phone with integrated GPS

Notebook/PAD

underwater navigation

aviation equipment

main feature

- Support Beidou, GPS, GALILEO, GLONASS and other satellite navigation systems in the L1 frequency band;
- Typical noise figure: 0.80dB;
- Typical power gain: 21.5dB;
- Typical input P1dB: -14dBm;
- Working frequency: 1550MHz ~ 1615MHz;
- Current consumption: 4.3mA;
- Wide supply voltage range: 1.4V ~ 3.6V;
- 2.5KV HBM ESD pin protection circuit;
- Internal integrated 50Ω output matching circuit;
- The peripheral circuit is simple

2. Pins, functions and typical application block diagram

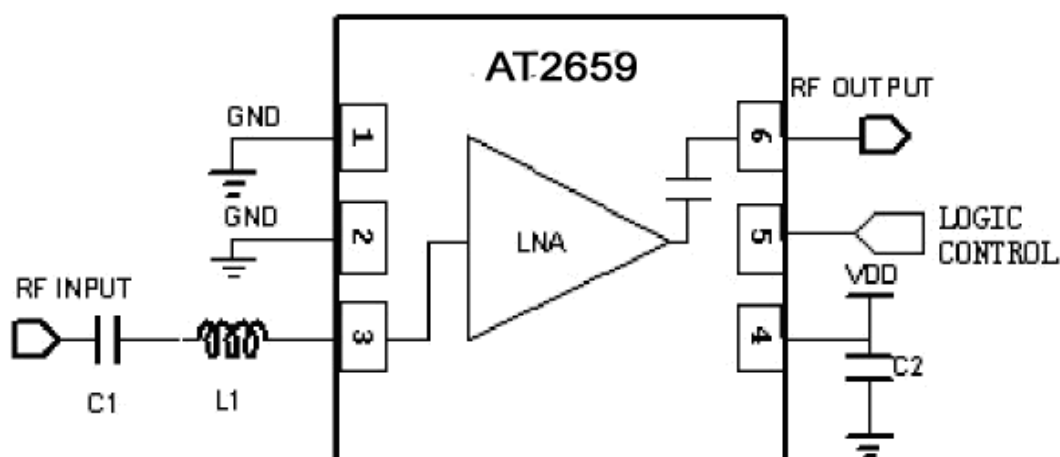


Figure 1. Typical application block diagram

pin	name	Function
1, 2	GND	grounding
3	RFIN	RF input
4	VDD	power supply
5	$\overline{\text{SHDN}}$	work (high level), sleep (low level),
6	RFOUT	RF output

Table 1. Pin Description

Component number	describe
C1	LNA input DC blocking capacitor, 470pF
C2	Power Supply Bypass Capacitor, 33 nF
L1	LNA input matching inductor 6.8 nH

Table 2. Description of Peripheral Components

3. DC electrical characteristics

parameter	condition	minimum value	typical value	maximum value	unit
voltage		1.4	3.0	3.6	V
supply current	$\overline{\text{SHDN}}=1$		4.3		mA
	$\overline{\text{SHDN}}=0$		2	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

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

parameter	condition	minimum value	typical value	maximum value	unit
working frequency		1550	1575.42	1615	MHz
power gain			21.5		dB
Noise Figure			0.80		dB
input return loss	L1: 6.8nH		15		dB
output return loss			15		dB
reverse isolation			30		
Enter IP3	Note 1		- 5		dBm
Input P1dB			- 14		dBm

Note 1: Using two input signals whose deviation from the center frequency (1575.42MHz) is 5MHz and 10MHz respectively, the output

The incoming signal strength is -40dBm;

5.AC electrical characteristics: Table 2 (center frequency 1561.098 MHz, 3V power supply voltage)

parameter	condition	minimum value	typical value	maximum value	unit
working frequency		1550	1561.098	1615	MHz
power gain			20.5		dB
Noise Figure			0.80	0.93	dB
input return loss	L1: 6.8nH		15		dB

output return loss			15		dB
reverse isolation			32		
Enter IP3	Note 2		- 5		dBm
Input P1dB			- 14		dBm

Note 2: Using two input signals whose deviation from the center frequency (1561.098MHz) is 5MHz and 10MHz respectively,

The input signal strength is -40dBm;

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

parameter	condition	minimum value	typical value	maximum value	unit
working frequency		1550	1602	1615	MHz
power gain			21.5		dB
Noise Figure			0.80	0.93	dB
input return loss	L1: 6.8nH		15		dB
output return loss			15		dB
reverse isolation			31		
Enter IP3	Note 3		- 5		dBm
Input P1dB			- 14		dBm

Note 3: Using two input signals whose deviation from the center frequency (1575.42MHz) is 5MHz and 10MHz respectively, the output

The incoming signal strength is -40dBm;

5. Typical operating characteristics

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

Signals are those at the center frequency (unless otherwise stated)

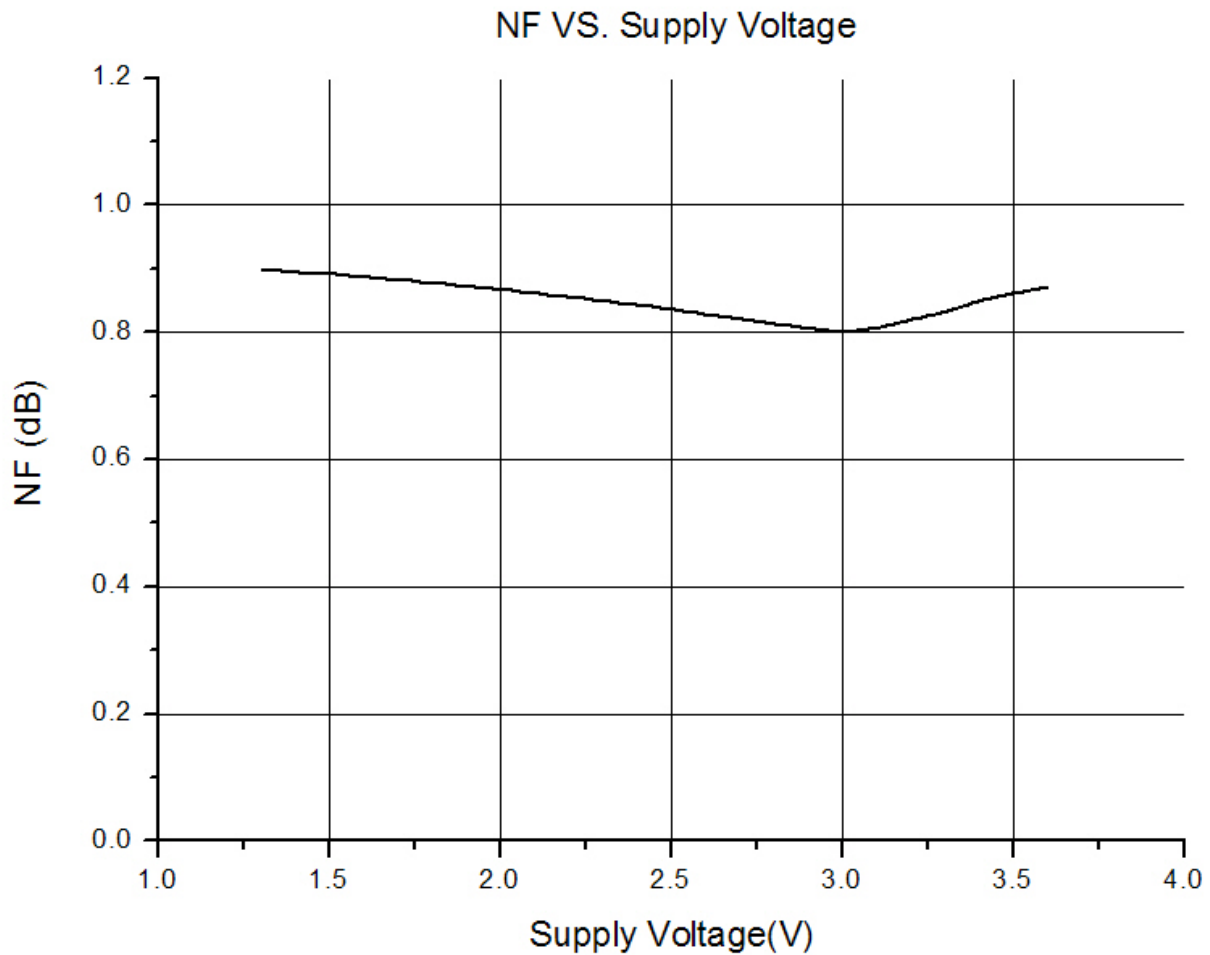


Figure 1. The curve of noise figure and supply voltage

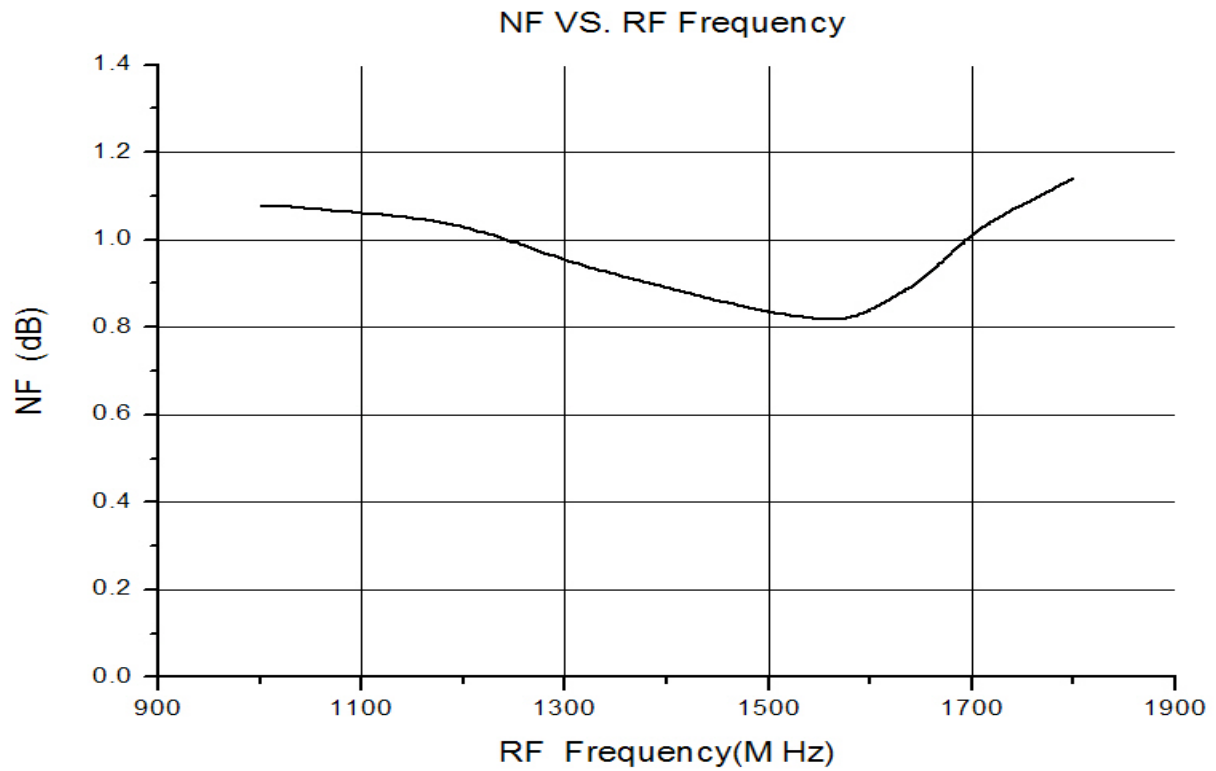


Figure 2. The curve of noise figure and operating frequency

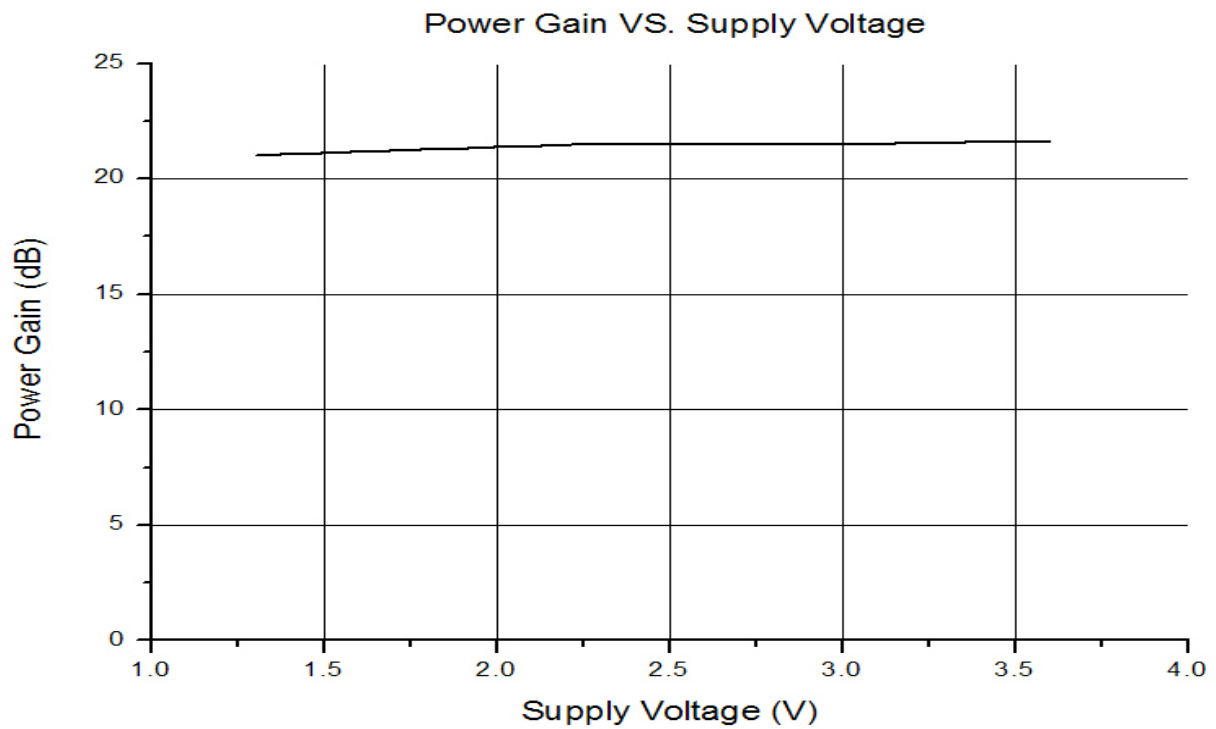


Figure 3. The curve of power gain and supply voltage

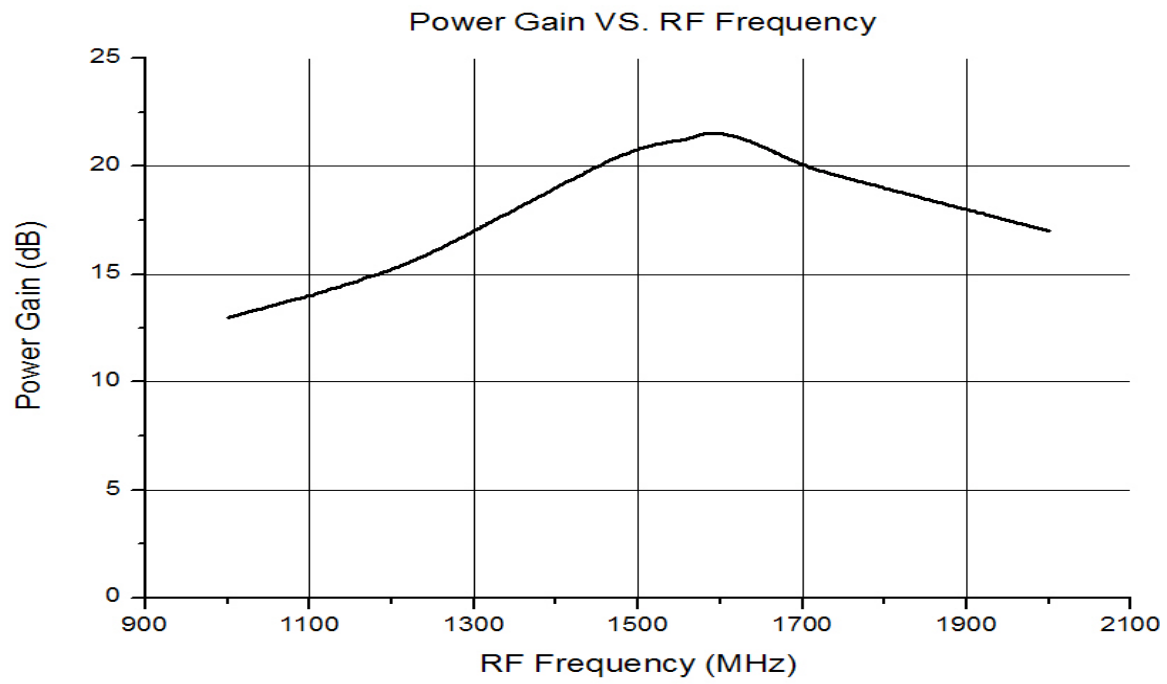


Figure 4. The curve of power gain and operating frequency

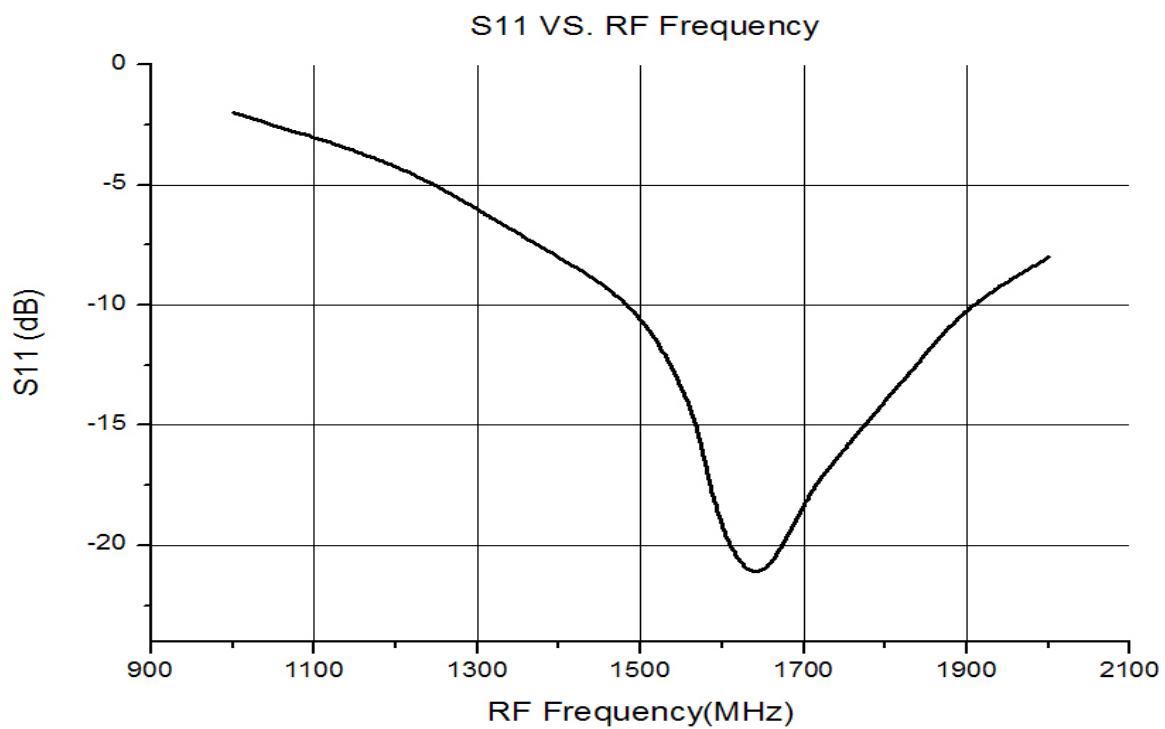


Figure 5. The curve of input return loss and operating frequency

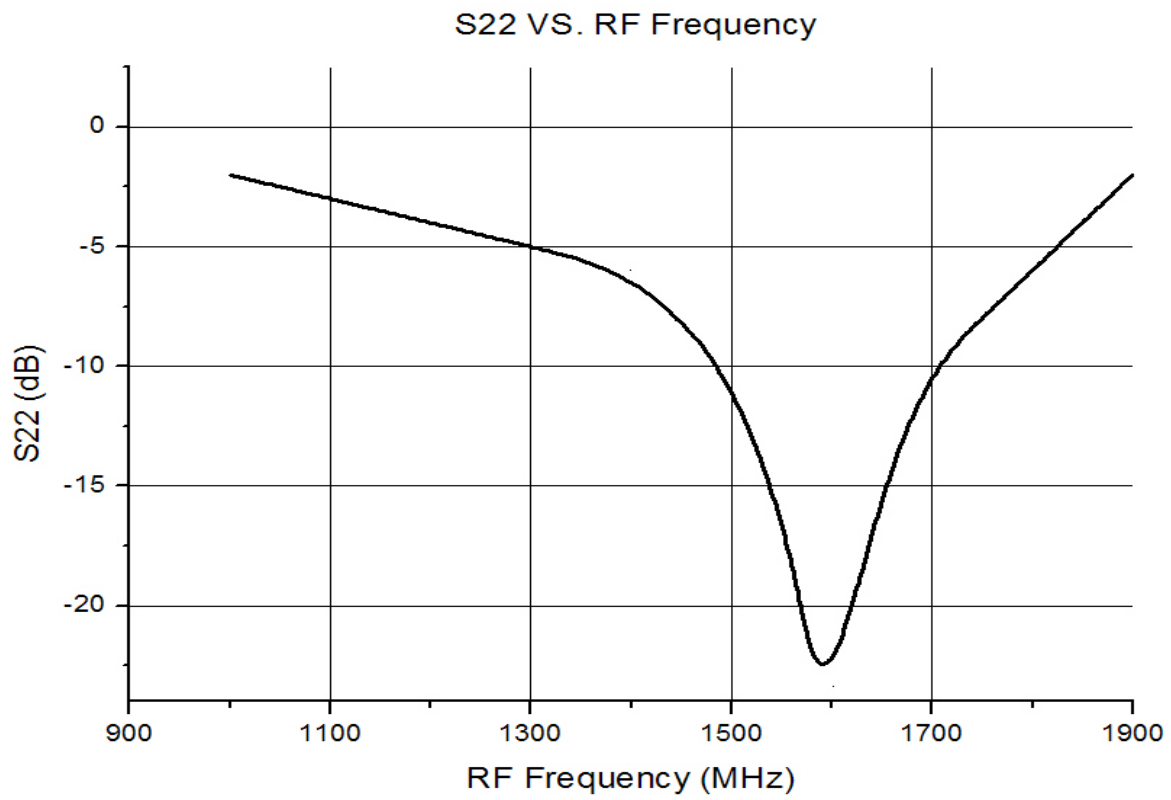
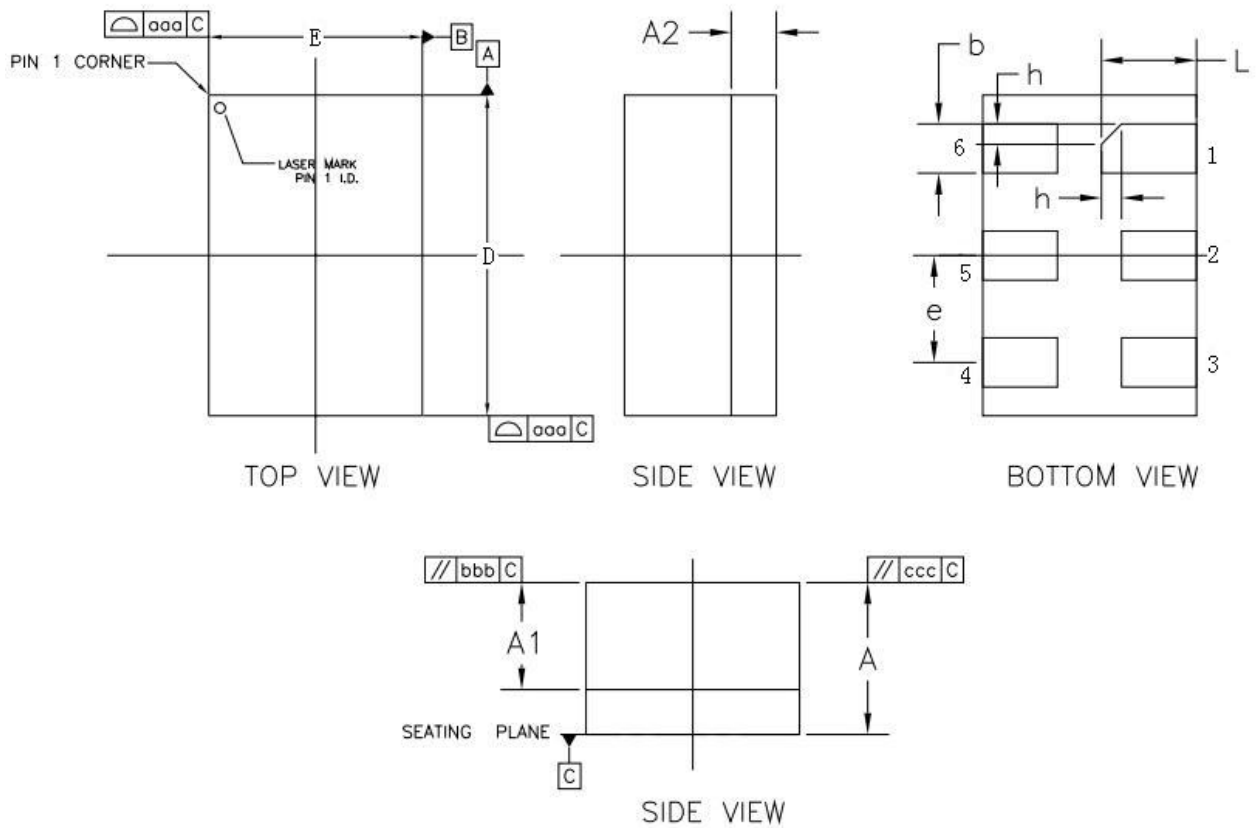


Figure 6. The curve of output return loss and operating frequency

6. Package Description



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	---	---	0.80
A2	0.17	0.21	0.25
A1	0.50 BASIC		
D	1.40	1.50	1.60
E	0.90	1.00	1.10
b	0.18	0.23	0.28
e	0.45	0.50	0.55
L	0.345	0.445	0.545
h	0.045	0.095	0.145
aaa	0.15		
bbb	0.25		
ccc	0.20		