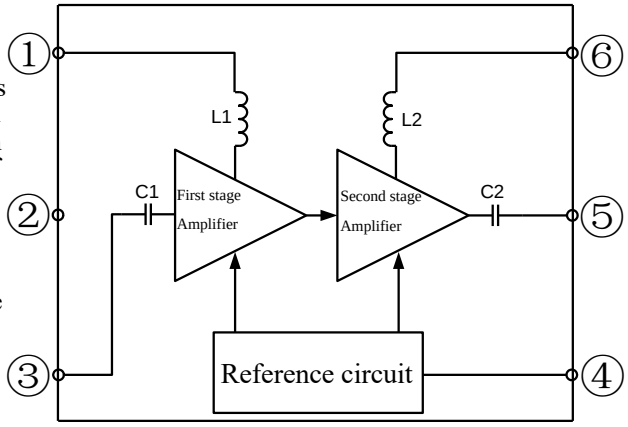
Description

XN115 is a low noise amplifier circuit used in GPS receivers. The design adopts BiCMOS process, which has the characteristics of high gain and low noise. The chip is applied to the front end of the GPS receiver, which can effectively improve the receiving sensitivity of the receiver and expand the application scope of the receiver.

XN115 can work under +1.8V～+3.3V power supply voltage. When the power supply voltage is 2.7V, the current consumption of the circuit is only 4.5mA, and the current consumption is less than 10uA in shutdown mode. The package is in the form of DFN6L with a size of 2.00mm×2.00mm×0.75mm.



Features

- 1.0dB ultra-low noise figure
- High gain: 28dB
- Only 4.5mA current consumption
- Power saving mode ($\overline{\text{SHDN}}$) selection
- Small package of 6-pin 2.00mm×2.00mm×0.75mm DFN6L

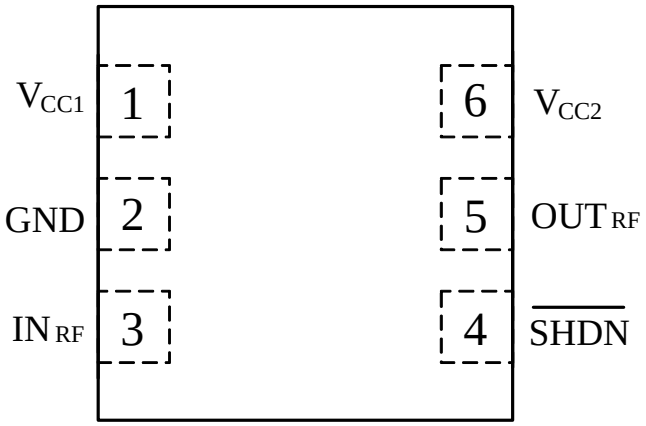
Device characteristics

Designation	Package Type	Operating Temperature
XN115	DFN6L	-40℃～+85℃

Applied range

- Vehicle navigation system
- Communication Systems
- Personal Navigation Device (PND)
- Mobile Phone with GPS function
- Laptop
- Aviation/Navigational Electronics
- GPS Antenna

Pin definition



Pin description

Pin	Symbol	Description
1	V_{CC1}	Power Supply
2	GND	Ground, connected to the ground of PCB board
3	IN_{RF}	RF input
4	$\overline{SHDN}$	Turn off mode selection, active at low level
5	OUT_{RF}	RF output
6	V_{CC2}	Power Supply

Maximum absolute rating

（All voltages are referenced to GND）

Parameter	Symbol	Condition	Rated Value	Unit
Supply voltage	V_{CC}	T_A= +25℃	+ 4.0	V
$\overline{SHDN}$ voltage	V_{PS}	T_A= +25℃	V_{CC}+0.3	V
Power dissipation	P_D	T_A= +85℃，On PCB	160	mW
Input power	P_{IN}		+ 10.0	dBm
Operating temperature	T_A		-40～+85	℃
Junction temperature	T_J		150	℃
Storage temperature	T_S		150	℃
Lead resistance to welding temperature	T_H	10s	300	℃

Recommended operating conditions

Characteristics	Symbol	Min.	Typical	Max.	Unit
Supply voltage	V_{CC}	1.8	2.7	3.3	V
Operating temperature	T_A	-40	+25	+85	℃
$\overline{SHDN}$ turn on voltage	V_{PSON}	1.8	---	V_{CC}	V
$\overline{SHDN}$ turn off voltage	V_{PSOFF}	0	---	0.4	V

Electrical characteristics

（Unless otherwise specified，V_{CC} =2.7V，T_A = 25℃，f_{in}=1575MHz）

Characteristics	Symbol	Condition	Min.	Typical	Max.	Unit
Supply voltage	I_{CC}	$\overline{SHDN}$ =“1”	---	4.5	---	mA
		$\overline{SHDN}$ =“0”	---	---	10	uA
Power gain	G_P		---	28	---	dB
Noise figure	N_F		---	1.0	---	dB
Input 1dB compression point	ICP1		---	-23.0	---	dBm
Input return loss	RL_{IN}		---	15.0	---	dB
Output return loss	RL_{OUT}		---	14.0	---	dB
Isolation	ISL		---	40.0	---	dB

（Unless otherwise specified，V_{CC} =1.8V，T_A = 25℃，f_{in}=1575MHz）

Characteristics	Symbol	Condition	Min.	Typical	Max.	Unit
Supply voltage	I_{CC}	$\overline{SHDN}$ =“1”	---	4	---	mA
		$\overline{SHDN}$ =“0”	---	---	10	uA
Power gain	G_P		---	27	---	dB
Noise figure	N_F		---	1.0	---	dB

Input 1dB compression point	ICP1		---	-25.0	---	dBm
Input return loss	RL_{IN}		---	15.0	---	dB
Output return loss	RL_{OUT}		---	14.0	---	dB
Isolation	ISL		---	40.0	---	dB

Function description

XN115 is a low-noise amplifier specially designed for GPS L1 frequency band applications. The chip integrates a power shutdown control module, eliminating the need for an external power control switch. The noise figure reaches 1.0dB, and the current consumption is only 4.5mA, and the input 1dB compression point reaches -23dBm.

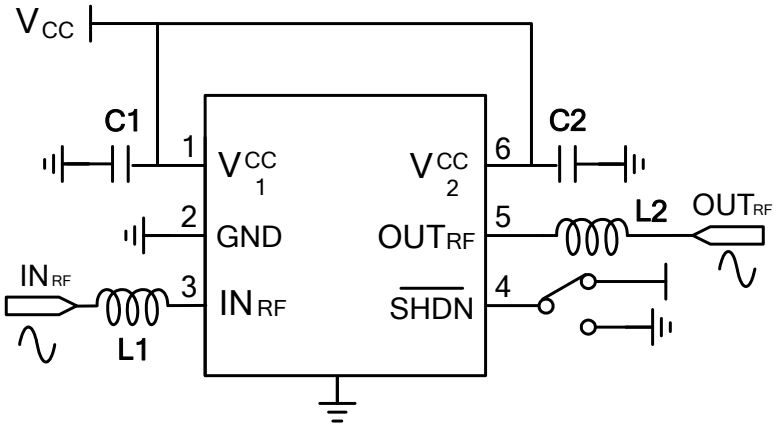
Input and output match

The recommended matching network can refer to the typical application circuit diagram of XN115.

Shutdown mode

The XN115 chip integrates a power control module. When PIN4 ($\overline{SHDN}$) is a logic high level, the chip works normally, and when PIN4 is a logic low level, the chip enters the shutdown mode.

Typical circuit used in GPS receiver

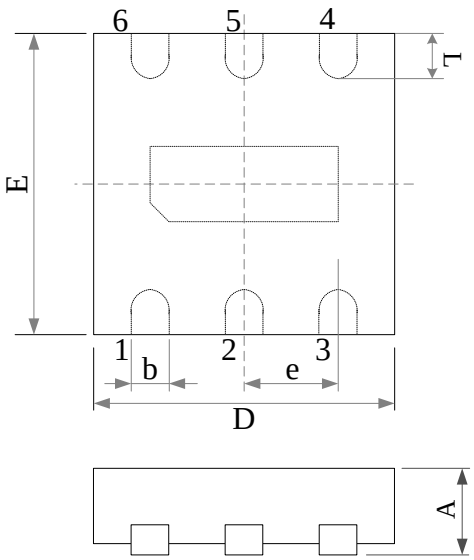


Symbol	Recommended value
C1	0.1uF
C2	0.1uF
L1	3.3nH
L2	4.3nH

XN115 Typical Application Circuit Diagram

Note: C1 and C2 are placed as close as possible to the pins on the PCB

Package outline



Unit: mm

Dimension symbol	Value			Dimension symbol	Value		
	Min.	Nominal	Max.		Min.	Nominal	Max.
A	*0.70*	--	*0. 80*	*e*	--	*0.65*	--
b	*0.25*	--	*0.35*	*E*	*1.95*	--	*2.05*
D	*1.95*	--	*2.05*	*L*	*0.25*	--	*0.40*

Precautions for use

1. This device is an electrostatic sensitive device, and anti-static measures must be used during transportation and use.
2. Use the device as recommended for typical applications.
3. The user should conduct a visual inspection before use, and the bottom, side, and surrounding areas of the circuit should be bright before welding. If oxidation occurs, the circuit can be treated by means of deoxidation, and the circuit must be soldered within 4 hours after the treatment is completed.
4. After the packaging bag is opened, the components that will be used in the reflow process or other high temperature process must meet:

a) Within 12 hours and the factory environment is temperature < 30 ℃, humidity ≤ 60%RH;
b) Dehumidification treatment is required before use (125℃, 4h baking is recommended).

Protection precautions

1. The product must be sealed and vacuum-packed, and it is recommended to store it in a dry cabinet for up to 12 months when the temperature is less than 30°C and the humidity is less than 60%.
2. After opening the package, if it is not used up, the remaining products need to be evacuated and placed in a drying cabinet for storage.
3. Expired products must be dehumidified and deoxidized before use.

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