

WS7916DE-6/TR

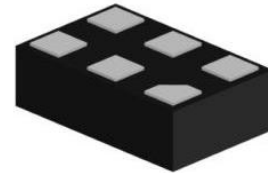
<http://omnivision-group.com>

CMOS High Gain GPS LNA

Descriptions

The WS7916DE-6/TR is a low noise amplifier (LNA) for GNSS receiver applications, available in a small 6-pin DFN package. The WS7916DE-6/TR requires only one external inductor for input matching.

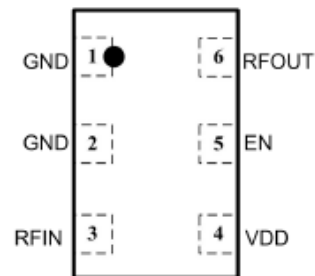
The WS7916DE-6/TR is designed to achieve low power dissipation and good performance.



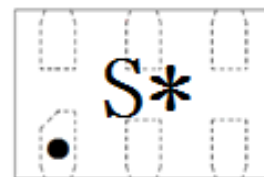
DFN1510-6L (Bottom view)

Features

- Operating frequency: 1550 MHz to 1615 MHz
- Noise figure = 0.55 dB
- Gain = 19.0 dB
- Input 1 dB compression point = -11.5 dBm
- In-band input IP3 = -0.7 dBm
- Supply voltage: 1.6 V to 3.1 V
- Integrated supply decoupling capacitor
- Supply current: 8.5 mA
- Power-down mode leakage current < 1μA
- One external matching inductor required
- Output decoupled to ground
- ESD protection: HBM > 2.0kV for all pins
- Integrated input/output DC block capacitor
- Integrated output matching
- Package: 6-pin DFN, 1.5 x 1.0 x 0.55 mm³



Pin configuration (Top view)



S = Device code
* = Month code (A~Z)

Marking (Top view)

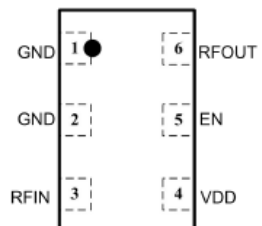
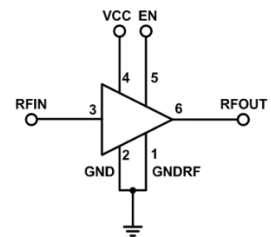
Applications

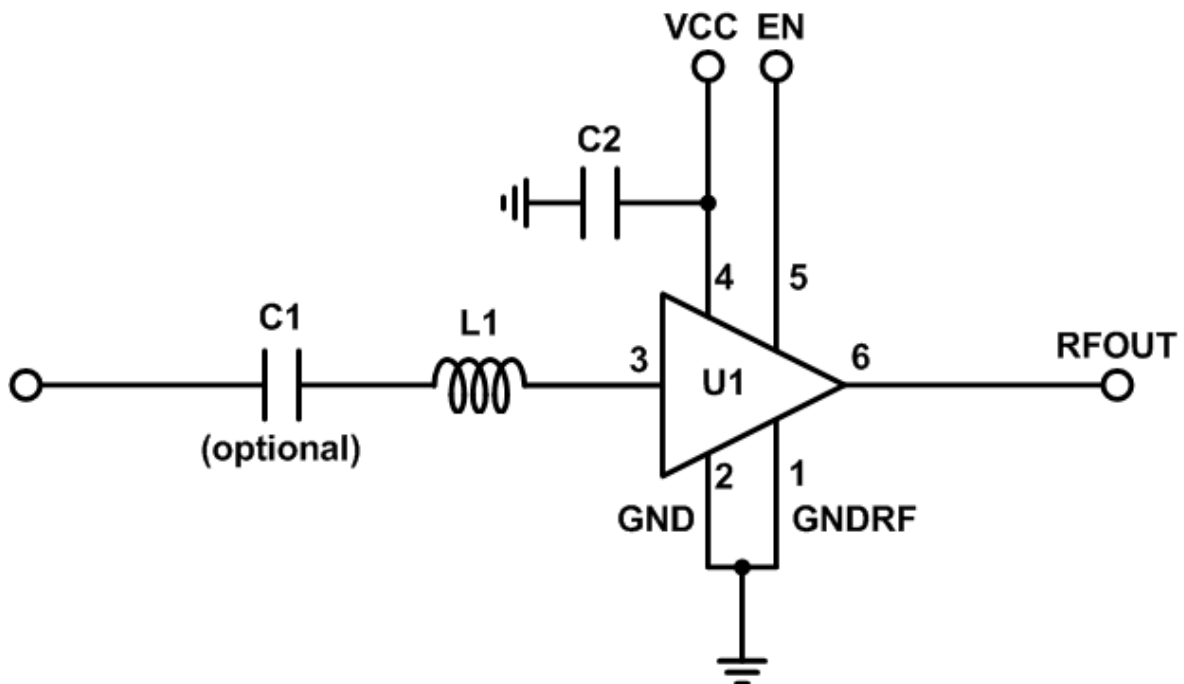
- Cell phones
- Tablets PCs
- Other RF front-end modules
- Personal Navigation Devices,
- Digital Video Cameras
- RF Front End modules;
- Complete GPS chipset modules;
- Theft protection(laptop, ATM);

Order information

Device	Package	Shipping
WS7916DE-6/TR	DFN1510-6L	3000/Reel&Tape

Pinning Information

Pin	Description	Transparent top view	Symbol view
1	GNDRF		
2	GND		
3	RFIN		
4	VDD		
5	EN		
6	RFOUT		

Application Information


Symbol	Description	Footprint	Value	Supplier	Comment
U1	WS7916DE-6/TR	1.5x1.0x0.55 mm ³	NA	Will-Semi	DUT
C1	Capacitor	0402	1 nF	Various	DC blocking
C2	Capacitor	0402	1 nF	Various	Supply decoupling
L1	Inductor	0402	12 nH	Murata LQW15	Input matching

Quick Reference Data

Freq = 1575.42 MHz; $V_{CC} = 2.8\text{ V}$; $V_{EN} > 1.2\text{ V}$; Temp = 25°C; input matched to 50 Ω with a 10 nH inductor. The condition is applied unless otherwise specified.

Symbol	Parameter	Condition	Min	Typ	Max	Unit
V_{CC}	Supply voltage		1.6	2.8	3.1	V
I_{CC}	Supply current			8.5		mA
G_p	Power gain			19.0		dB
NF	Noise figure			0.55		dB
IP_{1dB}	Input power at 1dB gain compression			-11.5		dBm
IIP_3	Input third-order intercept point			-0.7		dBm

Recommended Operating Conditions

Symbol	Parameter	Condition	Min	Typ	Max	Unit
V_{CC}	Supply voltage		1.6	2.8	3.1	V
Temp	Ambient temperature		-40	+25	+85	°C
V_{EN}	Input voltage on pin 6 (EN)	OFF state	0		0.3	V
		ON state	1.2		V_{CC}	V

Absolute Maximum Ratings

Maximum ratings are absolute ratings, exceeding only one of these values may cause irreversible damage to the integrated circuit.

Symbol	Parameter	Condition	Min	Max	Unit
V_{CC}	Supply voltage		-0.3	3.6	V
V_{EN}	Input voltage on pin EN		-0.3	V_{CC}	V
V_{RFIN}	Input voltage on pin RFIN		-0.3	V_{CC}	V
V_{RFOUT}	Input voltage on pin RFOUT		-0.3	V_{CC}	V
P_{in}	RF input power			20	dBm
T_{STG}	Storage temperature		-65	+150	°C
T_J	Junction temperature			150	°C
V_{ESD}	ESD capability all pins	HBM	± 2000		V
	ESD capability all pins	CDM	± 500		V

Characteristics

1550 MHz \leq f \leq 1615 MHz; V_{CC} = 2.8 V; V_{EN} > 1.2 V; Temp = 25°C; input matched to 50 Ω with a 12 nH inductor; The condition is applied unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
I _{CC}	Supply current	On state		8.5		mA
		Off state		1		μ A
G _p	Power gain	f = 1575 MHz		19.0		dB
RL _{in}	Input return loss	f = 1575 MHz		9.0		dB
RL _{out}	Output return loss	f = 1575 MHz		11.0		dB
ISL	Reverse isolation	f = 1575 MHz		35.0		dB
NF	Noise figure	f = 1575 MHz		0.55		dB
IP _{1dB}	Input power at 1dB gain compression	f = 1575 MHz		-11.5		dBm
IIP ₃	Input third-order intercept point ^[1]			-0.7		dBm
K	Rollett stability factor ^[2]		1			
t _{on}	Turn-on time				3	μ s
t _{off}	Turn-off time				3	μ s

[1] f₁ = 1713 MHz, f₂ = 1851 MHz, P_{in} = -20 dBm

[2] 10M~20GHz

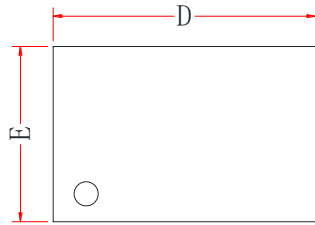
Characteristics

1550 MHz ≤ f ≤ 1615 MHz; V_{CC} = 1.8 V; V_{EN} > 1.2 V; Temp = 25°C; input matched to 50 Ω with a 12 nH inductor; The condition is applied unless otherwise specified.

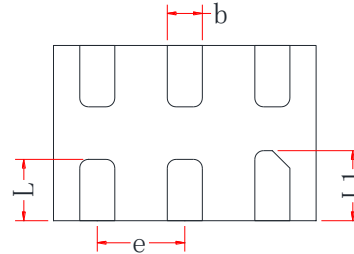
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
I _{CC}	Supply current	On state		7.3		mA
		Off state		1		μA
G _p	Power gain	f = 1575 MHz		18.8		dB
RL _{in}	Input return loss	f = 1575 MHz		8.0		dB
RL _{out}	Output return loss	f = 1575 MHz		10.0		dB
ISL	Reverse isolation	f = 1575 MHz		35.0		dB
NF	Noise figure	f = 1575 MHz		0.55		dB
IP _{1dB}	Input power at 1 dB gain compression	f = 1575 MHz		-12.5		dBm
IIP ₃	Input third-order intercept point ^[1]			-0.8		dBm
K	Rollett stability factor ^[2]		1			
t _{on}	Turn-on time				3	μs
t _{off}	Turn-off time				3	μs

[1] f₁ = 1713 MHz, f₂ = 1851 MHz, P_{in} = -20 dBm

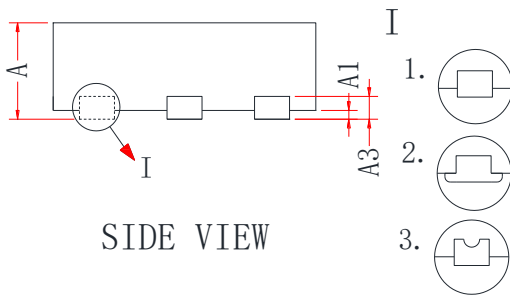
[2] 10M~20GHz

Package Outline dimensions
DFN1510-6L


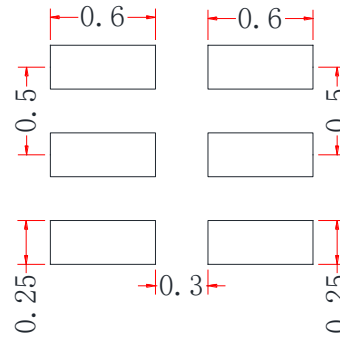
TOP VIEW



BOTTOM VIEW

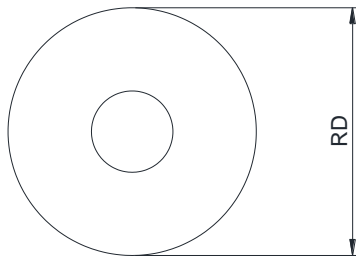
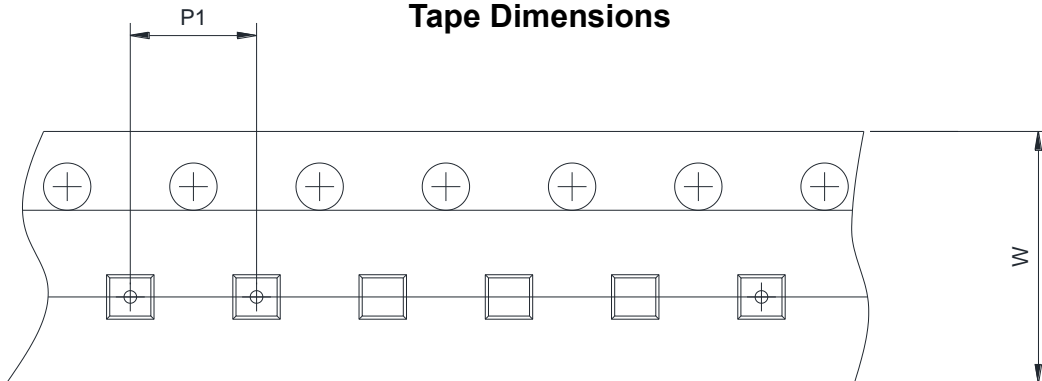
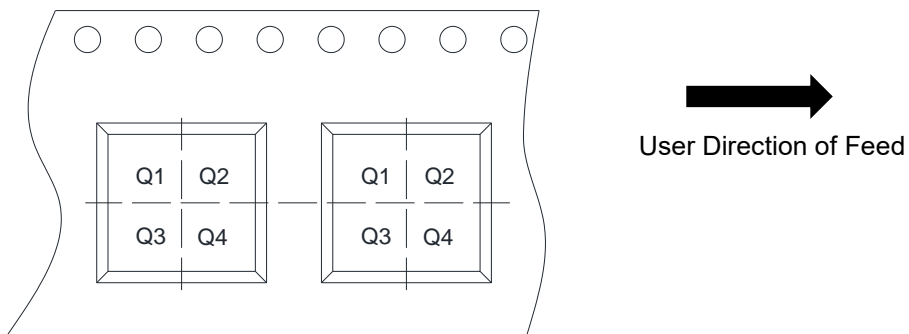


SIDE VIEW



RECOMMENDED LAND PATTERN (Unit:mm)

Symbol	Dimensions in Millimeters		
	Min.	Typ.	Max.
A	0.50	0.55	0.60
A1	0.00	-	0.05
A3	0.13Ref		
D	1.40	1.50	1.60
E	0.90	1.00	1.10
b	0.15	0.20	0.25
e	0.40	0.50	0.60
L	0.27	-	0.43
L1	0.32	-	0.48

Tape and Reel Information
Reel Dimensions

Tape Dimensions

Quadrant Assignments For PIN1 Orientation In Tape


RD	Reel Dimension	<input checked="" type="checkbox"/> 7inch	<input type="checkbox"/> 13inch
W	Overall width of the carrier tape	<input checked="" type="checkbox"/> 8mm	<input type="checkbox"/> 12mm <input type="checkbox"/> 16mm
P1	Pitch between successive cavity centers	<input type="checkbox"/> 2mm	<input checked="" type="checkbox"/> 4mm <input type="checkbox"/> 8mm
Pin1	Pin1 Quadrant	<input checked="" type="checkbox"/> Q1	<input type="checkbox"/> Q2 <input type="checkbox"/> Q3 <input type="checkbox"/> Q4