WS7932DE-6/TR

High Band LTE LNA

Descriptions

The WS7932DE-6/TR is a low noise amplifier (LNA) with a bypass switch for LTE receiver applications, available in a small 6-pin DFN package. The WS7932DE-6/TR requires only one external inductor for input matching.

The WS7932DE-6/TR is designed to achieve low power dissipation and good performance. It is designed and optimized for the LTE high band: 2300MHz to 2690MHz.

Features

- Operating frequency: 2300 MHz to 2690 MHz
- Noise figure = 0.80 dB
- Power Gain = 18.1 dB
- Insertion Loss in bypass mode = 5.5 dB
- Gain mode in-band input IP3 = +1.5 dBm
- Gain mode input 1 dB compression point = -12.0 dBm
- Supply voltage: 1.6 V to 3.3 V
- Integrated supply decoupling capacitor
- Gain mode current: 12.2 mA
- Bypass mode current < 10µA
- One external matching inductor required
- Integrated output DC blocking cap
- ESD protection: HBM > 1500V for all pins
- Integrated output matching
- Package: 6-pin DFN, 1.1 x 0.7 x 0.55 mm^3

Applications

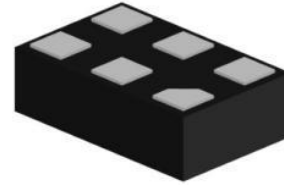- Cell phones
- Tablets
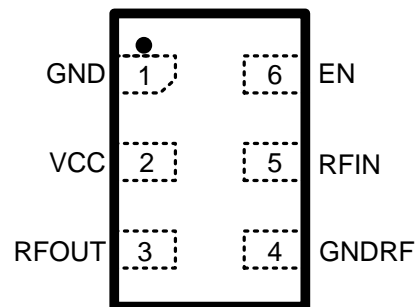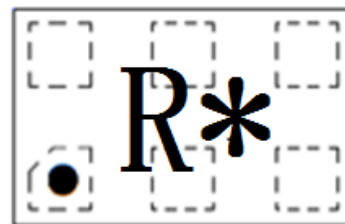- Other RF front-end modules

Figure1 DFN1107-6L (Bottom view)

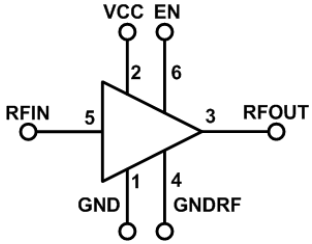**Figure2 Pin configuration (Top view)**

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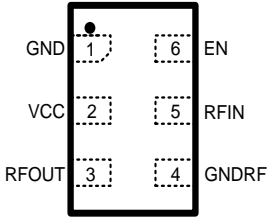
*   = Month code（A~Z）

Figure3 Marking (Top view)

Order information

Device	Package	Shipping
WS7932DE-6/TR	DFN1107-6L	10000/Reel&Tape

Pinning Information

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

Application Information
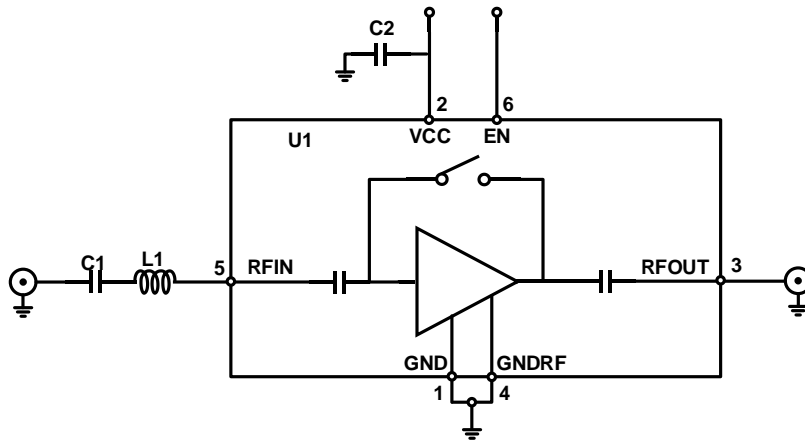
Figure4 Application Circuit

Symbol	Description	Footprint	Value	Supplier	Comment
U1	WS7932DE-6/TR	1.1x0.7x0.55 mm^3	NA	Will-Semi	DUT
C1[1]	Capacitor	0402	1 nF	Various	DC blocking
C2	Capacitor	0402	100 pF	Various	Supply decoupling
L1	Inductor	0402	4.7 nH	Murata LQW15	Input matching

[1] C1 is optional.

Quick Reference Data

f = 2350 MHz; V_{CC} = 2.8 V; V_{EN} = V_{CC}; Temp = 25°C; The condition is applied unless otherwise specified.

Symbol	Parameter	Min	Typ	Max	Unit	Test Condition
V_{CC}	Supply voltage	1.6	2.8	3.3	V	-
I_{CC}	Supply current		12.2		mA	Gain mode
			7.4	10	µA	Bypass mode
G_p	Power gain		18.1		dB	Gain mode
			-4.5		dB	Bypass mode
NF	Noise figure		0.80		dB	Gain mode
IP_{1dB}	Input 1dB compression point		-10.0		dBm	Gain mode
			+6.0		dBm	Bypass mode
IIP_3	Input third-order intercept point		+3.5		dBm	Gain mode
			+17.5		dBm	Bypass mode

Recommended Operating Conditions

Symbol	Parameter	Condition	Min	Typ	Max	Unit
V_{CC}	Supply voltage		1.6	2.8	3.3	V
Temp	Ambient temperature		-40	+25	+85	°C
V_{EN}	Input voltage on pin 6 (EN)	Bypass mode	-	0	0.3	V
		Gain mode	0.8	-	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	Human Body Model (HBM)	1500		V

Characteristics

2300 MHz ≤ f ≤ 2690 MHz; V$_{CC}$ = 2.8 V; V$_{EN}$ = V$_{CC}$; Temp = 25°C; The condition is applied unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
I$_{CC}$	Supply current			12.2	16	mA
G$_p$	Power gain	f = 2350 MHz	16.4	18.1		dB
		f = 2650 MHz	15.8	17.3		dB
RL$_{in}$	Input return loss	f = 2350 MHz	5	7.0		dB
		f = 2650 MHz	5	8.0		dB
RL$_{out}$	Output return loss	f = 2350 MHz	12	18.0		dB
		f = 2650 MHz	8	11.5		dB
ISL	Reverse isolation	f = 2350 MHz	28	31.7		dB
		f = 2650 MHz	27	30.5		dB
NF	Noise figure	f = 2350 MHz		0.80	1.1	dB
		f = 2650 MHz		0.90	1.2	dB
IP$_{1dB}$	Input power at 1 dB gain compression	f = 2350 MHz		-10.0		dBm
		f = 2650 MHz		-8.2		dBm
IIP$_3$	Input third-order intercept point	f = 2350 MHz[1]		0.6		dBm
		f = 2650 MHz[2]		1.5		dBm
K[3]	Rollett stability factor		1			
t$_{on}$	Turn-on time			2.0	3.0	µs
t$_{off}$	Turn-off time			2.0	3.0	µs

[1] △f=1MHz

[2] △f=1MHz

[3] 10M~20GHz

2300 MHz ≤ f ≤ 2690 MHz; V_{CC} = 2.8 V; V_{EN} = 0 V; Temp = 25°C; The condition is applied unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
I_{CC}	Supply current			7.5	10	μA
G_p	Power gain	f = 2350 MHz	-6.5	-5.5		dB
		f = 2650 MHz	-6.7	-5.6		dB
RL_{in}	Input return loss	f = 2350 MHz	8	12.0		dB
		f = 2650 MHz	5	8.0		dB
RL_{out}	Output return loss	f = 2350 MHz	8	12.5		dB
		f = 2650 MHz	6	10.0		dB
IP_{1dB}	Input power at 1 dB gain compression	f = 2350 MHz		7.5		dBm
		f = 2650 MHz		5.5		dBm
IIP_3	Input third-order intercept point	f = 2350 MHz[1]		12.0		dBm
		f = 2650 MHz[2]		11.0		dBm

[1] △f=10MHz

[2] △f=10MHz

Package Outline Dimensions

DFN1107-6L（FC）
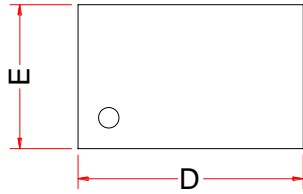
TOP VIEW
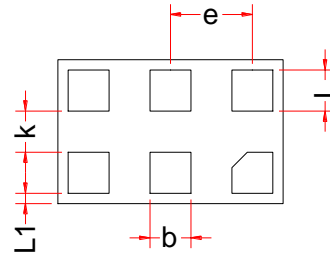
BOTTOM VIEW
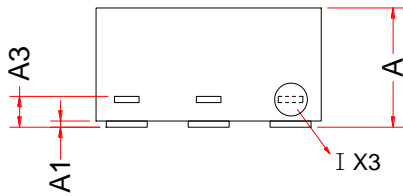
SIDE VIEW

1.
2. (N/A)
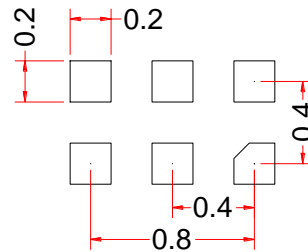
RECOMMENDED LAND PATTERN(unit:mm)

Symbol	Dimensions in Millimeters		
	Min.	Typ.	Max.
A	0.50	0.55	0.60
A1	0.00	-	0.08
A3	0.15 Ref.		
b	0.15	0.20	0.25
D	1.00	1.10	1.20
E	0.60	0.70	0.80
e	0.40 BSC.		
k	0.20 Ref.		
L	0.15	0.20	0.25
L1	0.05 Ref.		

Tape and Reel Information

Reel Dimensions
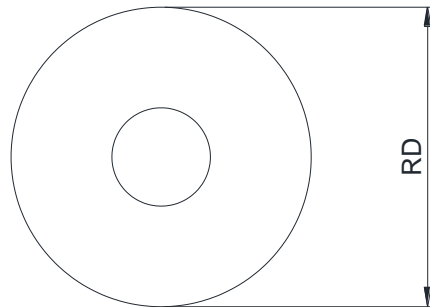
Tape Dimensions
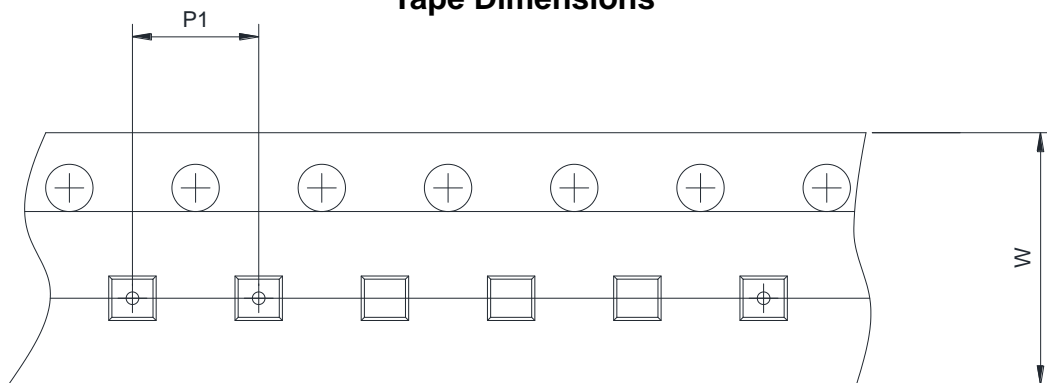
Quadrant Assignments For PIN1 Orientation In Tape

User Direction of Feed
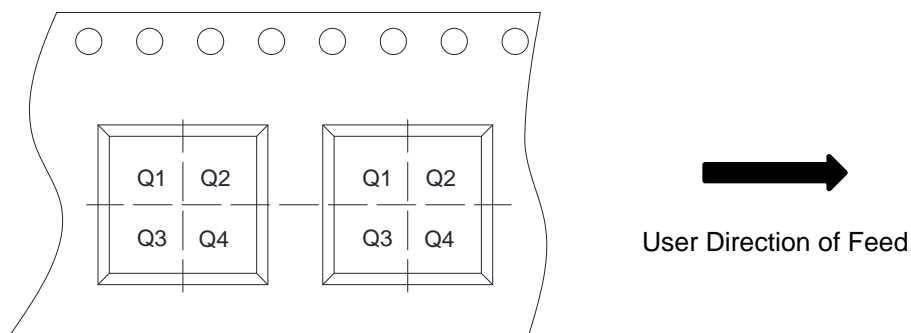
RD	Reel Dimension	☑ 7inch	☐ 13inch		
W	Overall width of the carrier tape	☑ 8mm	☐ 12mm	☐ 16mm	
P1	Pitch between successive cavity centers	☑ 2mm	☐ 4mm	☐ 8mm	
Pin1	Pin1 Quadrant	☑ Q1	☐ Q2	☐ Q3	☐ Q4