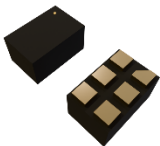


Description

The ALND-WB-0014 is an ultra-low noise amplifier (LNA) from 1550 MHz to 1615 MHz. For GNSS, it provides simultaneous, uncompromised performance across all frequency bands of all major constellations including GPS, GLONASS, Beidou, Galileo from 1550 to 1615 MHz with a single, simple matching network. The device is housed in an ultra-compact 1.1 x 0.7 mm 6-Lead DFN (Dual Flat No-Lead) package, provides 0.8 dB noise figure with current as low as 5.5 mA for 1.5V to 3.6V operation. ALND-WB-0014 has integrated ESD protection on all pins and requires only one external inductor and capacitor for conventional GNSS bands from 1550 to 1615 MHz.



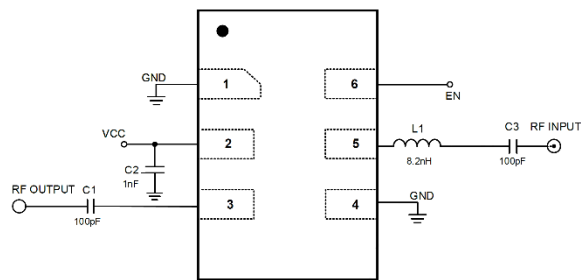
Key Features

- GNSS L1 support (1550 - 1615 MHz)
- Low noise figure: 0.8 dB
- Power gain: 17 dB
- Low supply current 5.5 mA
- Integrated ESD for 2KV HBM & 1KV CDM
- Ultra-small DFN-6L package: 1.1 x 0.7 x 0.55 mm
- [RoHS Compliant | MSL Level 1](#)

Typical Applications

- High-precision GNSS modules
- GNSS for smart watches, wearables
- UAVs and drones
- Robotics and autonomous driving
- Real-Time Kinematic (RTK)
- Intelligent transportation
- Precision land survey positioning

Functional Block Diagram



Ordering Information

Part No.	Description
ALND-WB-0014	Ultra-Low Noise Amplifier on Cut Tape
ALND-WB-0014-T	Ultra-Low Noise Amplifier on Tape & Reel
ALND-WB-0014-EVB	Ultra-Low Noise Amplifier Evaluation board

Additional Resources

- [Download STEP File, Package Drawing, 3D PDF](#)

Absolute Maximum Ratings

Parameter	Symb ol	Absolute Maximum			Unit
Supply Voltage	V _{DD}	4.0			V
Enable Voltage	V _{EN}	4.0			V
Max Input Power	P _{IN, MAX}	10			dBm
Maximum Current	-	30			mA
Junction Temperature	-	150			°C
Operating Temperature	T _{OP}	-40	-	+85	°C
Storage Temperature	T _{STG}	-40	-	+85	°C
Moisture Sensitivity Level	-	MSL1			-
ESD capability all pins	V _{ESD_HB M}	-2000	-	+2000	V
	V _{ESD_CD M}	-1000	-	+1000	V

Operation of this device outside the parameter ranges given above may cause permanent damage.

Recommended Operating Conditions

Parameter	Min.	Typ.	Max.	Unit
V _{CC}	1.5	-	3.6	V

Electrical specifications are measured at specified test conditions. Specifications are not guaranteed over all recommended operating conditions.

Mechanical

Parameter	Specification
Dimensions	1.1 x 0.7 x 0.55 mm

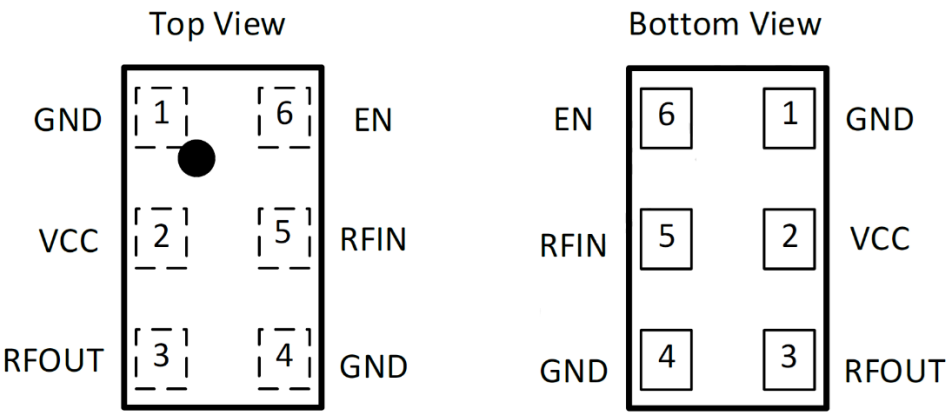
Electrical Specifications

Parameters		Condition	Specification			Unit
			Minimum	Typical	Maximum	
DC ELECTRICAL CHARACTERISTICS						
F _O	Operating frequency	-	1550	-	1615	MHz
V _{CC}	Operating voltage	-	1.5	-	3.6	V
I _{CC}	Supply current	V _{EN} = High	-	5.26	7.5	mA
I _{SD}	Enable current	V _{EN} = 1.8V	-	0.9	-	uA
I _{SD}	Shutdown current	V _{EN} = Low	-	-	1.0	uA
V _{EN}	Digital Input-logic high	-	1.2	-	-	V
V _{EN}	Digital Input-logic low	-	-	-	0.2	V
AC ELECTRICAL CHARACTERISTICS						
G _P	Power gain	-	15	16	17	dB
ISL	Reverse isolation	-	28.0	35.0	-	dB
NF	Noise figure	Z _s = 50 ohm; No jammer	-	0.85	1.0	dB
K _f	Stability factor	F = 20 MHz ...10 GHz	1.0	-	-	
NF	Noise figure with jammer	P _{jam} = -20 dBm; f _{jam} = 850 MHz;	-	-	1.22	dB
		P _{jam} = -20 dBm; f _{jam} = 1850 MHz;			1.15	
IP _{1dB}	In band input 1dB-compression point	f = 1575.42 MHz;	-16.0	-12.7	-	dBm
OOB-IIP ₃	Out-of-band input 3rd-order intercept point	f ₁ = 1712.7 MHz; f ₂ = 1850 MHz; P _{in} = -20 dBm	-2	-0.7	-	dBm
		f ₁ = 1712.7 MHz; f ₂ = 1850 MHz; P _{in} = -30 dBm	-2	-0.3	-	
H2-input referred	LTE band-13 2nd Harmonic	f = 787.76 MHz; P _{in} = -25 dBm; f _{H2} = 1575.52 MHz	-	-38	-36	dBm
t _{ON}	Turn-on time	-	-	2.2	-	us
t _{OFF}	Turn-off time	-	-	1.7	-	us

Note1: input matched to 50 ohms using a high quality-factor 8.2nH inductor

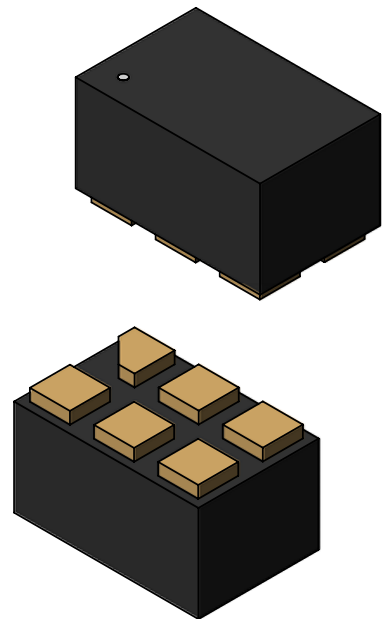
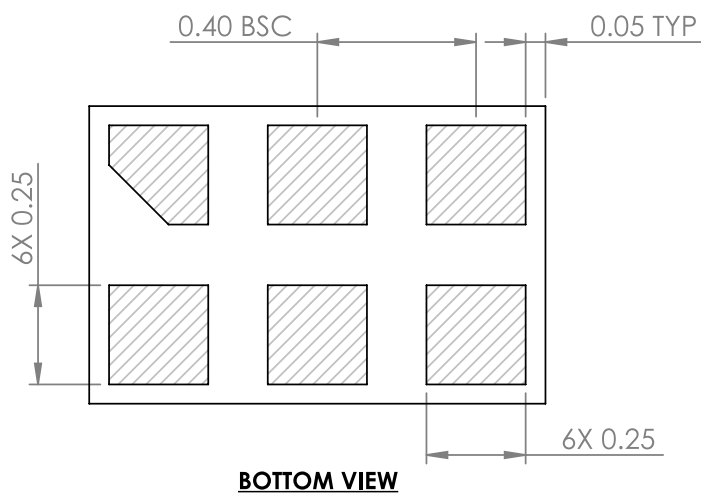
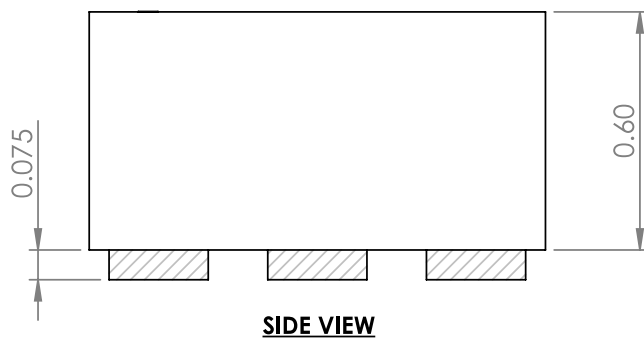
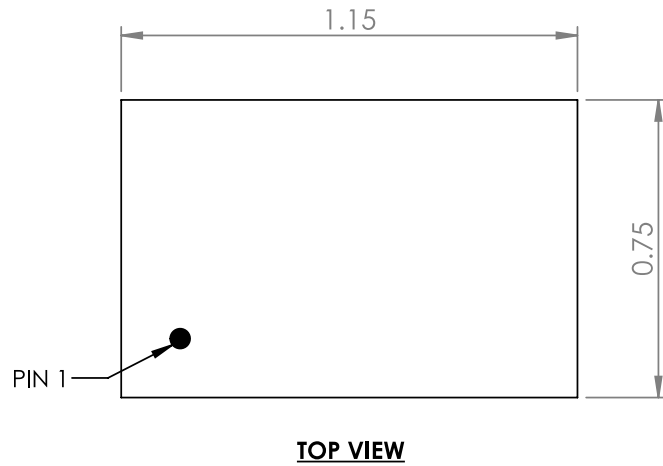
Note2: EVB PCB 0.2 dB loss removed. (ALND-WB-0014 EVB; VCC = 1.5 to 3.6V, TA = -40 to +85°C, f = 1550 MHz to 1615 MHz; Typical values are at VCC = 1.8V and Tamb = +25°C, f = 1575.42 MHz, unless otherwise noted.)

Pin Configuration



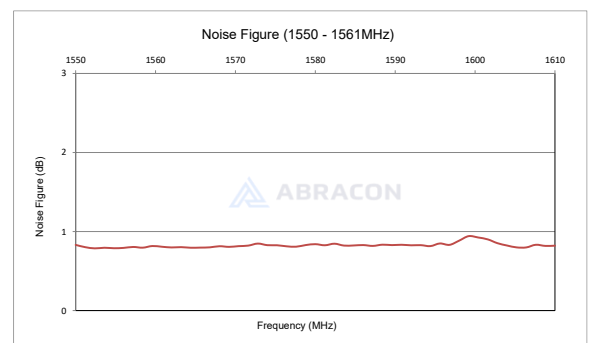
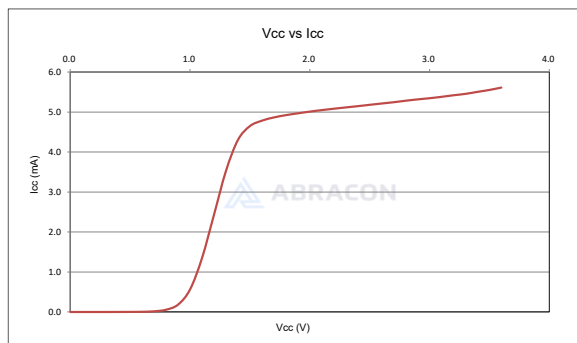
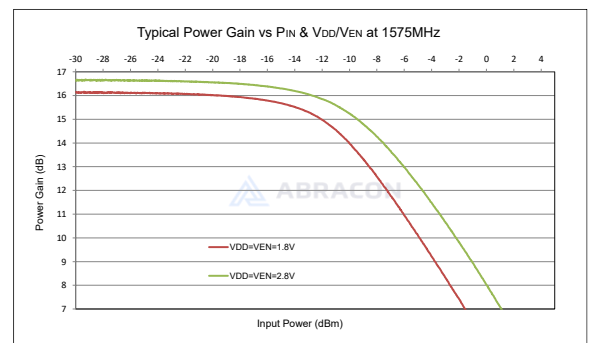
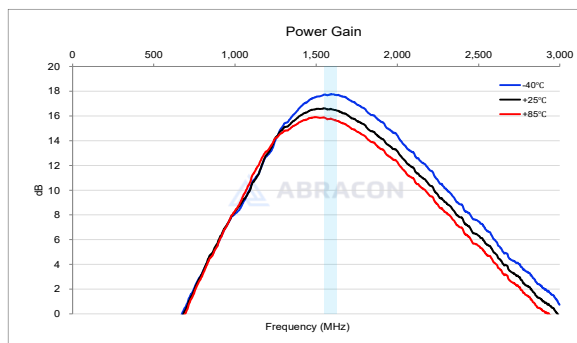
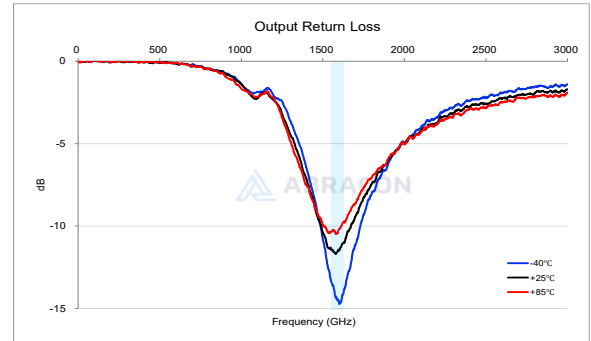
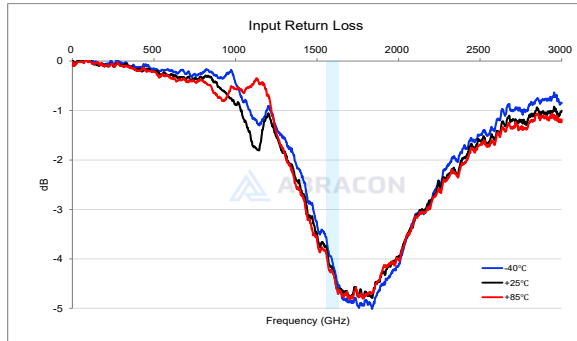
Pin	Name	Description
1	GND	Ground
2	VCC	DC Voltage Supply
3	RFOUT	RF Output
4	GND	Ground
5	RFIN	RF Input
6	EN	Enable Output

Product Dimensions



Unit: mm

Performance Plots

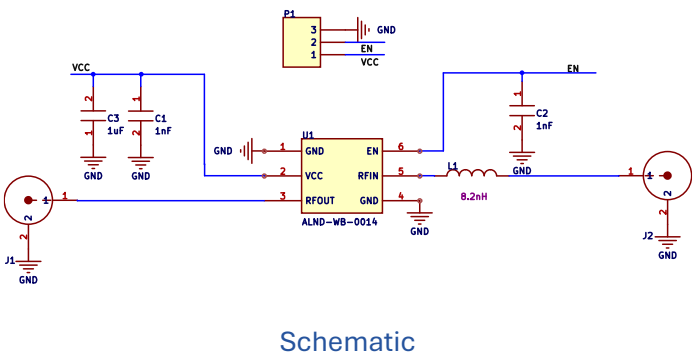
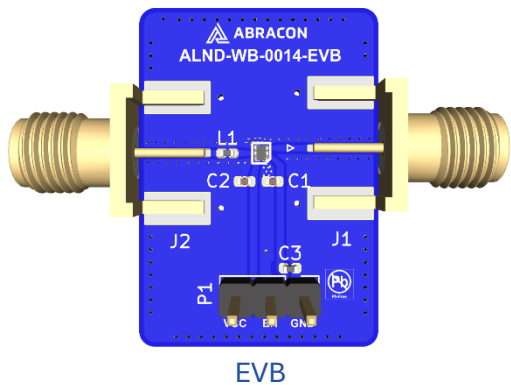


ALND-WB-0014

Ultra-Miniature Low Current GNSS L1 Low-Noise Amplifier



Evaluation Board ALND-WB-0014-EVB



Bill of Material

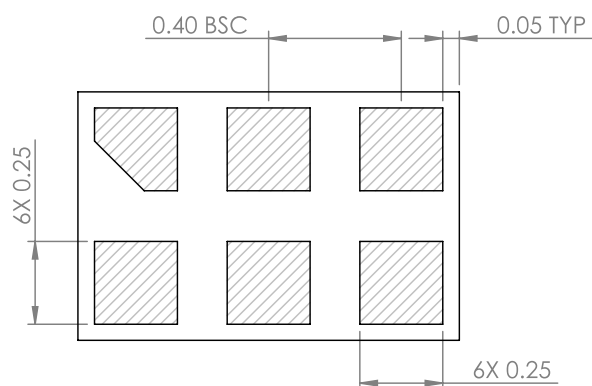
Component	Description	Manufacturer	Manufacturer Part	QTY
U1	Ultra-Miniature Low Current GNSS L1 Low-Noise Amplifier	Abracon	ALND-WB-0014	1
L1	8.2nH	Murata	LQW15AN8N2J00D	1
C1, C2	1nF	Murata	GRM155R70J102KA01D	2
C3	1uF	Murata	GRM155R70J105KA12D	1

Note: When DC bias exists in the signal path, a 100 pF capacitor must be connected in series at both the RF input and RF output ports.

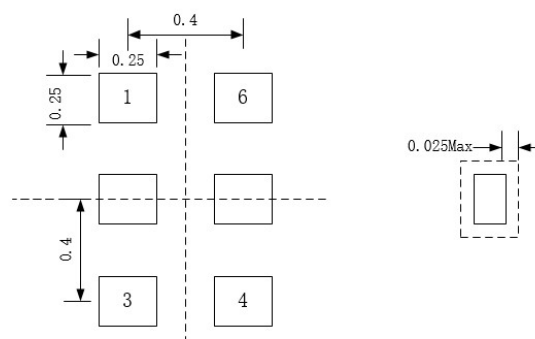
Transmission Line

The transmission line should be kept as short as possible and be designed to have a characteristic impedance of 50Ω. Abracon recommends using a Co-Planar Waveguide with Ground (CPWG), which dimensions can be derived by any trusted calculator, using the correct input for PCB materials and layer stack-up.

IC Footprint & PCB Land Pattern



Footprint



Land Pattern

Unit: mm

Reflow Profile [JEDEC J-STD-020]

Solder paste: Sn/3.0Ag/0.5Cu

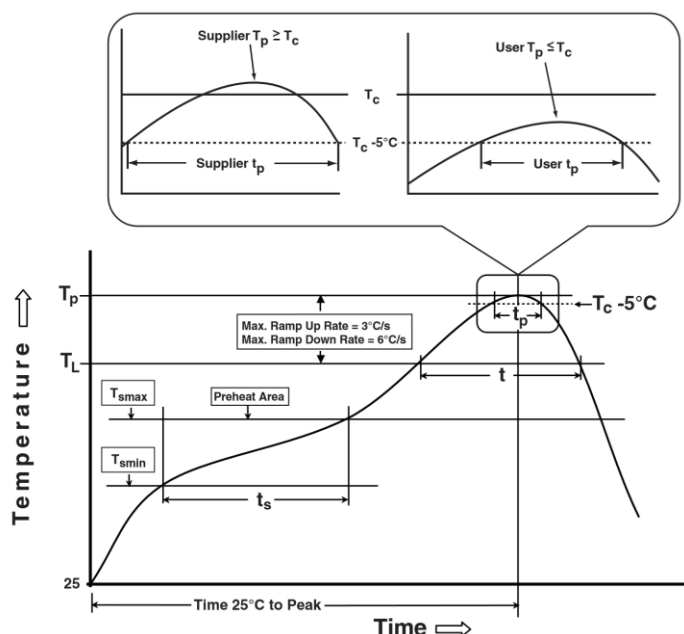


Table 1

SnPb Eutectic Process

Classification Temperatures (T_c)

Package Thickness	Volume mm^3 <350	Volume mm^3 ≥ 350
<2.5mm	235°C	220°C
$\geq 2.5\text{mm}$	220°C	220°C

Table 2

Pb-Free Process

Classification Temperatures (T_c)

Package Thickness	Volume mm^3 <350	Volume mm^3 350-2000	Volume mm^3 >2000
<1.6mm	260°C	260°C	260°C
1.6mm - 2.5mm	260°C	250°C	245°C
>2.5mm	250°C	245°C	245°C

Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
Preheat / soak		
Temperature minimum (T_{smin})	100°C	150°C
Temperature maximum (T_{smx})	150°C	200°C
Time (T_{smin} to T_{smx}) (t_s)	60 – 120 sec.	60 – 120 sec.
Average ramp-up rate (T_{smx} to T_p)	3°C/sec. max	3°C/sec. max
Liquidous temperature (T_L)	183°C	217°C
Time at Liquidous (T_L)	60 – 90 sec.	60 – 90 sec.
Peak package body temperature (T_p)*	See Table 1	See Table 2
Time (T_p)** within 5°C of the specified classification temperature (T_c)	20 sec.	10 sec.
Ramp-down rate (T_p to T_{smx})	3°C/sec. max	3°C/sec. max
Time 25°C to peak temperature	6 min. max	8 min. max
Reflow cycles	2 max	2 max

*Tolerance for peak profile temperature (T_p) is defined as a supplier minimum and a user maximum.

**Tolerance for time at peak profile temperature (t_p) is defined as a supplier minimum and a user maximum.

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