



1.20-1.60 GHz LOW NOISE GPS AMPLIFIER WLA14-3030A¹

WLA14-3030A LNA is a low noise figure, wideband, and +3V operation low power consumption amplifiers with unconditional stable design for GPS applications. The amplifier offers typical 0.60 dB noise figure and minimum 21 dBm output IP₃ at the frequency range from 1.20 GHz to 1.60 GHz, which covers both L₁ band and L₂ band. WLA14-3030A LNA is most suitable for GPS communication system and other wireless measurement applications.

WLA14-3030A can be configured with built-in bias-T for remote +3.0 V DC power supply.



Key Features:

Characteristic Impedance:	50 Ohm
Unconditional Stability:	k>1
Low Noise:	0.60 dB
Output IP ₃ :	21 dBm minimum @ +3.0V DC Power
Gain:	30 dB
P _{1dB} :	10 dBm minimum
Current Consumption:	35 mA @ +3.0V, option: built-in bias-T for remote power supply
Frequency Range:	1.20 ~ 1.60 GHz
Operating Temperature:	-40 ~ +85 °C
Return Losses:	20 dB typical

Absolute Maximum Ratings²:

Symbol	Parameters	Units	Absolute Maximum
V _{dd}	DC Power Supply Voltage	V	5.0
I _{dd}	Drain Current	mA	50
P _{diss}	Total Power Dissipation	mW	250
P _{In,Max}	RF Input Power	dBm	5.0
T _{ch}	Channel Temperature	°C	150
T _{STG}	Storage Temperature	°C	-65 ~ 150
T _{O,MAX}	Maximum Operating Temperature	°C	-55 ~ +100
R _{th,c}	Thermal Resistance	°C/W	220

¹ Specifications are subject to change without notice.

² Operation of this device above any one of these parameters may cause permanent damage.

**Specifications:****a) Table 1** Summary of the electrical specifications WLA14-3030A at room temperature

Index	Testing Item	Symbol	Test Constraints	Nom (RT)	Min	Max	Unit
1	Gain	S_{21}	1.20 – 1.60 GHz	30	28		dB
2	Gain Variation	ΔG	1.20 – 1.60 GHz	+/- 0.25		+/- 0.5	dB
3	Input Return Loss	S_{11}	1.20 – 1.60 GHz	20	16		dB
4	Output Return Loss	S_{22}	1.20 – 1.60 GHz	20	16		dB
5	Reverse Isolation	S_{12}	1.20 – 1.60 GHz	40	35		dB
6	Noise figure	NF	1.20 – 1.60 GHz	0.6		0.70	dB
7	Output 1 dB Power Compression Point	P_{1dB}	1.20 – 1.60 GHz @ +3V	13	10		dBm
8	Output-Third-Order Interception Point	$TOIP_3$	Two-Tone, P_{out} +0 dBm each, 1 MHz separation, @ +3V	21	20		dBm
9	Current Consumption	I_{dd}	V_{dd} = +3 V	35		45	mA
10	Power Supply Voltage	V_{dd}		+3	+2.5	+5.5	V
11	Operating Temperature	T_o			-40	+85	°C
12	Maximum Average RF Input Power	$P_{IN, MAX}$	1.2 – 1.6 GHz			5.0	dBm

b) Passband Frequency Response

As shown in **Figure 1**, the typical gain of the WLA14-3030A is 30.0 dB across 1.2 GHz to 1.6 GHz. The typical input and output return losses are 20 dB, respectively.

The noise figure, as shown in **Figure 2**, of WLA14-3030A is 0.60 dB³ at room temperature and 0.20 dB higher at +85°C case temperature.

The output 1-dB compression point is shown in **Figure 3**. WLA14-3030A offers typical 12.0 dBm P_{1dB} .

Figure 4 demonstrates the stability factor k of the amplifier. k is greater than 1.0 in any frequency range thus the amplifier is unconditional stable.

Figure 5 demonstrates the frequency response of WLA14-3030A in the extended frequency range. The amplifier is usable in the 0.8 to 2.0 GHz range.

Figure 6 is the block diagram of internal circuit of WLA14-3030A. It is a two-stage amplifier with the DC block capacitors at the input and output RF ports. All the RF matching networks, DC-DC converter, DC bias circuitries, and temperature compensation circuits are built in.

Figure 7 shows the mechanical outline of WLA14-3030A. The package is the gold plated Wan7com's standard housing, WP-5. All the RF ports are equipped with SMA female and feed through for the +3.0 V DC input. The DC power supply can be fed through the RF output SMA for remote power purpose (WLA14-3030ABT model only).

³ In order to measure such low noise figure, a low ENR noise source such as HP465A is required to reduce the non-linearity of the detector due to the high ENR. Please refers to AN-106 which is available at www.wantcominc.com

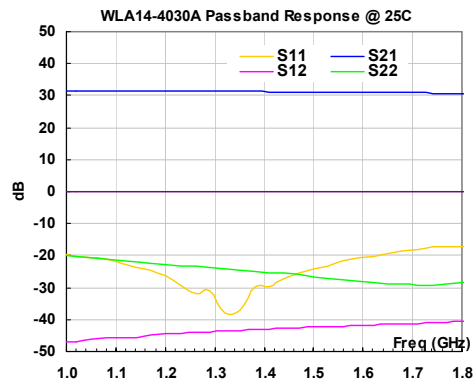


FIG. 1 Small signal performance of WLA14-2030A

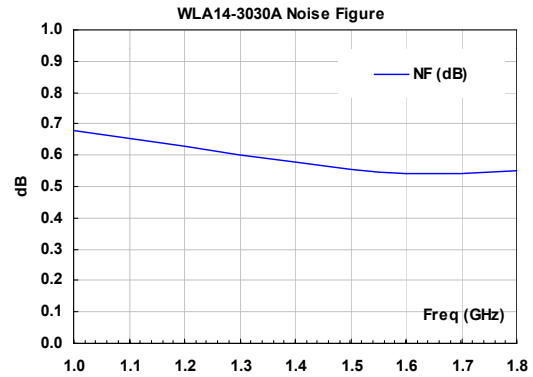


FIG. 2 Noise figure performance at room temperature

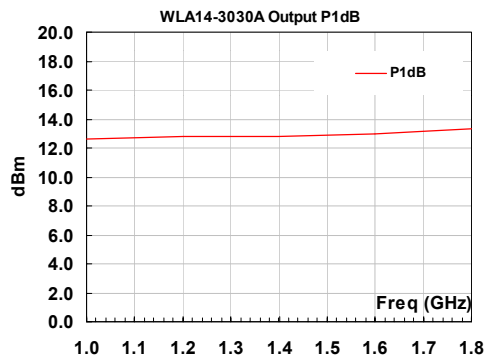


Fig. 3 Output 1-dB compression point

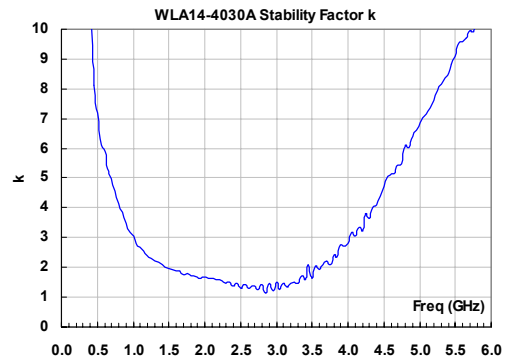


Fig. 4 Stability factor k

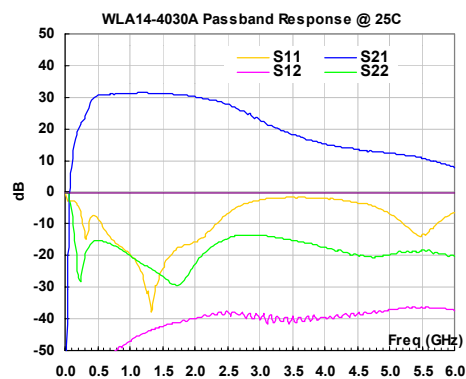


FIG. 5 Frequency response in the extended band.

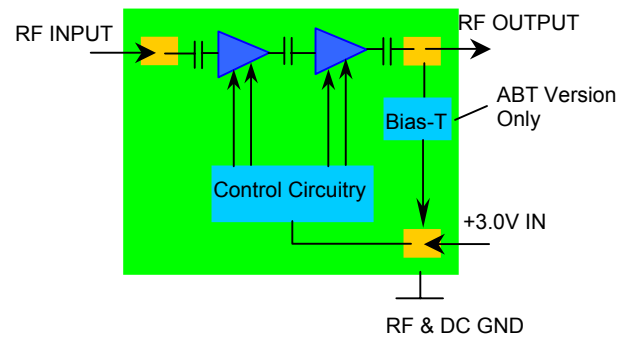


FIG. 6 Block diagram of WLA14-2030A



WLA14-3030A Mechanical Outline: WP-5

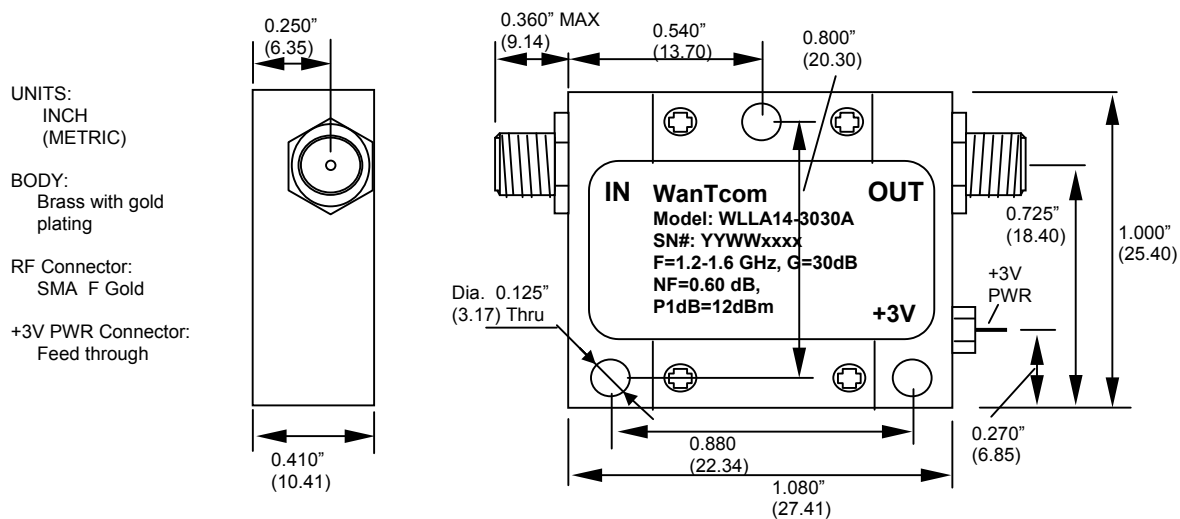


FIG. 7 WP-5 Outline

Ordering Information

Model Number	WLA14-3030A	WLA14-3030ABT
Built-In Bias-T	NO	Yes

**Small Signal S-Parameters:**

IWLA14-3030A

Is-parameters at $V_{dd}=+3V$, $I_{dd}=40mA$. Last updated 10/8/05.

GHZ s MA R 50

IFreq (GHz)	MAGS11	ANGS11	MAGS21	ANGS21	MAGS12	ANGS12	MAGS22	ANGS22
0.05	0.729	-11.8	0.254	-92.5	0.00006	-14.6	0.825	-45.7
0.1	0.737	-24.3	2.149	-142.3	0.00007	-56.0	0.566	-91.0
0.2	0.636	-59.5	9.287	131.4	0.00018	-166.1	0.066	-139.7
0.3	0.224	-80.6	14.500	89.9	0.00047	-162.1	0.094	-18.9
0.4	0.407	-41.0	27.080	58.3	0.00109	179.7	0.155	-41.2
0.5	0.394	-78.0	33.565	15.6	0.00169	145.6	0.172	-66.4
0.6	0.271	-96.3	34.665	-15.1	0.00221	123.2	0.167	-89.5
0.7	0.196	-102.5	35.186	-39.3	0.00270	107.8	0.154	-112.8
0.8	0.152	-103.2	35.666	-60.4	0.00331	94.3	0.137	-136.9
0.9	0.129	-105.6	36.265	-79.9	0.00393	82.5	0.117	-162.7
1	0.107	-113.8	36.649	-99.2	0.00449	72.5	0.099	168.0
1.1	0.081	-125.6	37.007	-117.9	0.00517	59.5	0.082	135.0
1.2	0.046	-145.9	37.109	-136.1	0.00587	47.8	0.068	97.5
1.3	0.023	171.8	36.924	-153.8	0.00644	38.1	0.060	57.3
1.4	0.032	71.0	36.530	-171.2	0.00701	27.0	0.054	16.6
1.5	0.060	41.5	36.163	172.2	0.00753	17.1	0.046	-20.4
1.6	0.092	24.6	35.603	154.9	0.00811	7.5	0.041	-58.2
1.7	0.119	12.1	34.987	138.1	0.00872	-2.1	0.038	-102.0
1.8	0.137	0.0	34.208	120.8	0.00925	-10.0	0.039	-152.2
1.9	0.150	-4.6	33.023	104.2	0.00966	-20.0	0.051	160.2
2	0.163	-8.2	31.996	87.5	0.01000	-29.5	0.070	123.9
2.1	0.188	-6.7	30.929	71.3	0.01000	-40.1	0.094	91.7
2.2	0.231	-6.8	29.853	54.7	0.01100	-51.2	0.116	65.7
2.3	0.296	-11.4	28.573	37.8	0.01200	-62.4	0.139	43.3
2.4	0.375	-21.9	26.920	21.0	0.01200	-74.2	0.162	21.6
2.5	0.458	-31.9	24.662	4.4	0.01300	-83.8	0.181	0.3
2.6	0.540	-44.5	22.357	-12.1	0.01200	-92.9	0.195	-19.6
2.7	0.603	-56.1	19.807	-28.2	0.01100	-102.4	0.202	-37.8
2.8	0.666	-70.0	17.350	-43.3	0.01100	-109.9	0.208	-55.4
2.9	0.719	-82.3	15.371	-57.0	0.00987	-119.1	0.209	-71.5
3	0.754	-94.9	13.845	-70.5	0.00948	-131.4	0.207	-86.1
3.1	0.778	-106.9	12.497	-82.0	0.00971	-141.7	0.202	-100.2
3.2	0.808	-118.2	11.135	-93.4	0.00956	-147.2	0.198	-113.6
3.3	0.816	-129.4	10.040	-103.6	0.01000	-152.5	0.193	-125.6
3.4	0.823	-139.5	9.031	-112.4	0.01000	-153.3	0.183	-137.2
3.5	0.831	-149.9	8.260	-121.7	0.01100	-157.9	0.176	-147.5
3.6	0.825	-160.0	7.657	-131.2	0.01000	-159.9	0.167	-156.6
3.7	0.823	-168.9	7.045	-141.7	0.00966	-169.1	0.157	-165.1
3.8	0.824	-178.5	6.555	-150.7	0.00957	-174.3	0.150	-172.8
3.9	0.814	171.7	6.119	-160.6	0.00954	178.9	0.142	179.5
4	0.805	162.9	5.860	-169.4	0.01000	169.8	0.134	171.2
4.1	0.786	153.9	5.585	-178.1	0.01100	160.9	0.127	164.7
4.2	0.773	144.4	5.358	172.6	0.01100	154.4	0.118	158.8
4.3	0.745	136.8	5.118	163.5	0.01200	150.5	0.109	155.5
4.4	0.712	127.3	4.968	153.6	0.01200	143.8	0.101	153.3
4.5	0.680	118.3	4.719	141.9	0.01200	136.1	0.097	152.1
5	0.464	75.8	4.161	92.7	0.01400	94.7	0.098	131.5
5.5	0.203	83.7	3.456	34.3	0.01500	47.4	0.113	84.5
6	0.481	83.4	2.489	-22.4	0.01400	1.8	0.091	42.4
