



1.2 – 1.6 GHz LOW NOISE AMPLIFIER WLA14-2030AC¹

WLA14-2030AC LNA is a low noise figure, wideband, and high linearity amplifier with exceptional low VSWR. The amplifier offers 0.90 dB noise figure, 18.5 dB gain, 1.25:1 VSWR, and 14.0 dBm P_{1dB} at the frequency range from 1.20 GHz to 1.60 GHz.

WLA14-2030AC is most suitable for GPS communication systems.

The remote power is optional (WLA14-2030ACBT).

WLA14-2030AC is designed to meet the rugged standards of MIL-STD-202, and MIL-STD-883.



Preliminary

Key Features:

Impedance:	50 Ohm
Low Noise:	0.90 dB
Gain:	18.5 dB
Gain Flatness:	+/-0.2 dB
Input VSWR:	1.25:1
Output VSWR:	1.25:1
P _{1dB} :	14.0 dBm
Single Power Supply:	30 mA, @ +5.0 V
Frequency Range:	1.2 ~ 1.6 GHz
Operating Temperature:	-40 ~ +85 °C

Absolute Maximum Ratings²:

Symbol	Parameters	Units	Absolute Maximum
V _{dd}	DC Power Supply Voltage	V	7.0
I _{dd}	Drain Current	mA	45
P _{diss}	Total Power Dissipation	mW	300
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	-40 ~ +85
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 of WLA14-2030AC at room temperature

Index	Testing Item	Symbol	Test Constraints	Nom (RT)	Min	Max	Unit
1	Gain	S_{21}	1.2 – 1.6 GHz	18.5	18.0	19.0	dB
2	Gain Variation	ΔG	1.2 – 1.6 GHz	+/- 0.2		+/- 0.3	dB
3	Input Return Loss	S_{11}	1.2 – 1.6 GHz	20	16		dB
4	Output Return Loss	S_{22}	1.2 – 1.6 GHz	20	18		dB
5	Reverse Isolation	S_{12}	1.2 – 1.6 GHz	22	20		dB
6	Noise figure	NF	1.2 – 1.6 GHz	0.90		1.0	dB
7	Output P_{1dB} compression	P_{1dB}	1.2 – 1.6 GHz	14.0			dBm
8	Current Consumption	I_{dd}	$V_{dd} = +5\text{ V}$	30			mA
9	Power Supply Voltage	V_{dd}		5.0	4.80	5.20	V
10	Operating Temperature	T_o			-40	+85	°C
11	Maximum Average RF Input Power	$P_{IN, MAX}$	1.2 – 1.6 GHz			5.0	dBm

As shown in **Figure 1**, the typical gain of the WLA14-2030AC is 18.5 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 WLA14-2030AC is 0.90 dB³ at room temperature.

The output 1-dB compression point is shown in **Figure 3**. WLA14-2030AC offers typical 14.0 dBm P_{1dB} .

Figure 4 demonstrates the stability factor k of the amplifier. k is less than 1.0 in one frequency range around 3.0 GHz and thus the amplifier is conditional stable.

Figure 5 demonstrates the frequency response of WLA14-2030AC in the extended frequency range. The amplifier is usable in the 1.0 to 2.0 GHz range.

Figure 6 is the block diagram of internal circuit of WLA14-2030AC. It is an one-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 WLA14-2030AC. The package is the gold plated WanTcom's standard housing, WP-5. All the RF ports are equipped with SMA female and feed through for the +5.0 V DC input. The DC power supply can be fed through the RF output SMA for remote power purpose (WLA14-2030ACBT model).

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

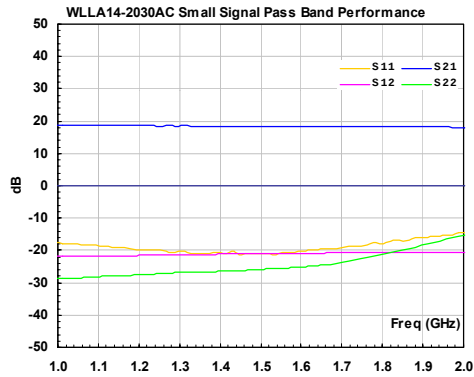


FIG. 1 Small signal performance of WLA14-2030AC

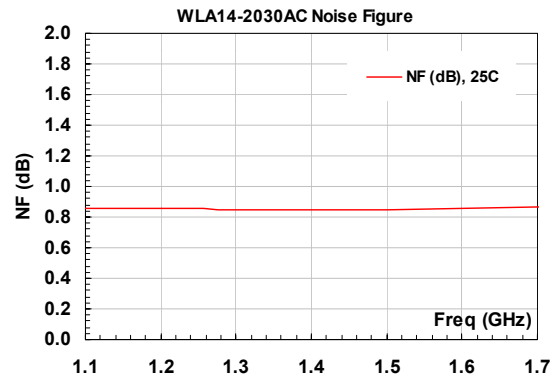


FIG. 2 Noise figure performance at full temperature

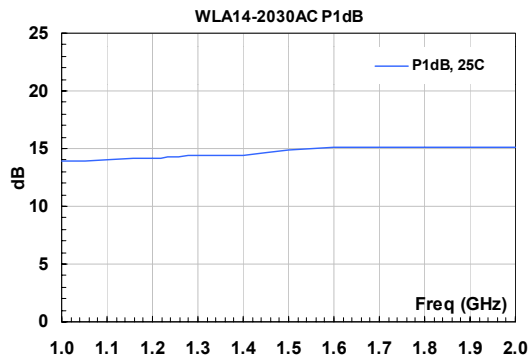


Fig. 3 Output 1-dB compression point

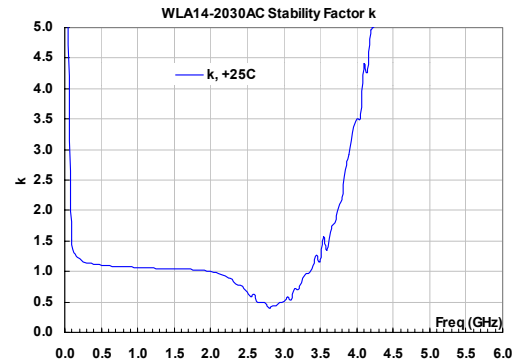


Fig. 4 Stability factor k

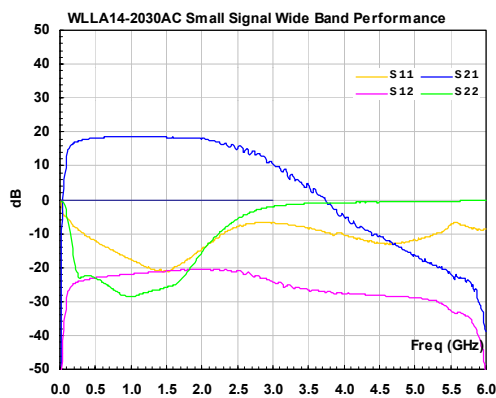


FIG. 5 Frequency response in the extended band.

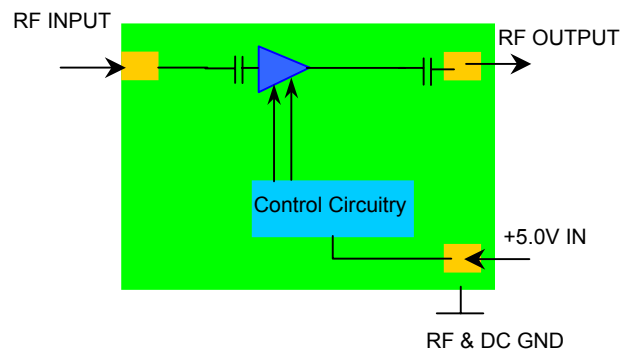


FIG. 6 Block diagram of WLA14-2030AC



WLA14-2030AC MECHANICAL OUTLINE: WP-5

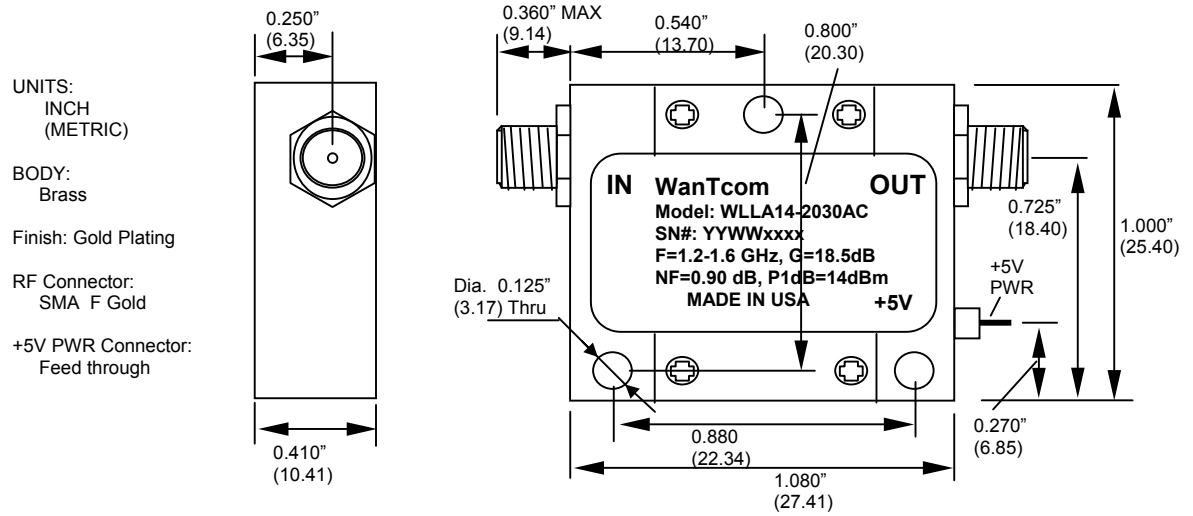


FIG. 7 WP-5 Outline

ORDERING INFORMATION

Function	Normal	With Bias-T
Model Number:	WLA14-2030AC	WLA14-2030ACBT

**SMALL SIGNAL S-PARAMETERS:**

IWLA14-2030AC

IS-parameters at $V_{dd}=5V$, $I_{dd}=30mA$. Last updated 5/18/05.

GHZ s MA R 50

IFreq (GHz)		MAGS11	ANGS11	MAGS21	ANGS21	MAGS12	ANGS12	MAGS22	ANGS22
0.05	0.642	156.0	1.177	3.2	0.0096	-173.3	0.894	122.5	
0.1	0.540	99.3	4.408	-68.1	0.0360	119.4	0.621	56.6	
0.2	0.402	34.2	6.873	-138.6	0.0570	55.9	0.131	-51.1	
0.3	0.336	-1.0	7.567	-169.9	0.0630	31.5	0.071	-159.7	
0.4	0.283	-25.7	7.930	168.7	0.0670	16.9	0.075	147.9	
0.5	0.244	-43.8	8.126	150.4	0.0700	5.9	0.069	118.5	
0.6	0.215	-59.3	8.238	134.5	0.0720	-3.5	0.061	99.1	
0.7	0.190	-73.3	8.354	119.3	0.0750	-12.3	0.052	84.3	
0.8	0.167	-86.3	8.399	104.9	0.0770	-19.8	0.044	76.0	
0.9	0.147	-98.0	8.445	91.1	0.0780	-27.1	0.039	70.4	
1	0.133	-112.4	8.455	77.7	0.0800	-34.6	0.037	68.6	
1.1	0.116	-125.8	8.440	64.1	0.0820	-41.7	0.039	64.2	
1.2	0.104	-141.3	8.441	50.6	0.0830	-48.7	0.041	56.6	
1.3	0.096	-158.6	8.422	37.3	0.0850	-56.0	0.045	43.4	
1.4	0.091	-177.6	8.387	23.9	0.0880	-62.8	0.047	25.5	
1.5	0.091	161.3	8.338	10.6	0.0890	-70.1	0.050	1.4	
1.6	0.097	135.9	8.269	-2.7	0.0900	-77.9	0.054	-27.0	
1.7	0.110	118.2	8.248	-15.9	0.0920	-85.1	0.065	-61.4	
1.8	0.132	97.0	8.224	-30.4	0.0920	-92.8	0.087	-92.6	
1.9	0.159	77.2	8.161	-45.2	0.0930	-101.7	0.120	-122.5	
2	0.191	59.6	7.981	-60.2	0.0940	-109.7	0.169	-148.4	
2.1	0.228	46.3	7.631	-76.8	0.0940	-118.1	0.228	-173.0	
2.2	0.269	31.6	7.161	-91.7	0.0950	-126.1	0.291	165.3	
2.3	0.315	14.8	6.485	-104.4	0.0920	-133.7	0.362	144.8	
2.4	0.360	-1.4	6.175	-119.2	0.0900	-144.9	0.442	125.1	
2.5	0.395	-18.3	5.574	-132.0	0.0900	-150.3	0.514	105.5	
2.6	0.425	-35.3	5.005	-146.4	0.0780	-159.7	0.593	85.5	
2.7	0.449	-49.7	4.990	-160.8	0.0760	-172.3	0.660	67.4	
2.8	0.460	-64.0	4.762	-179.7	0.0750	-178.5	0.713	49.7	
2.9	0.463	-78.4	3.885	156.4	0.0680	176.7	0.756	32.6	
3	0.455	-91.1	3.373	147.8	0.0620	169.4	0.791	16.5	
3.1	0.449	-103.4	2.967	132.0	0.0610	165.1	0.820	1.7	
3.2	0.436	-114.7	2.448	114.2	0.0540	164.5	0.842	-12.6	
3.3	0.420	-126.0	2.062	109.6	0.0490	156.6	0.856	-26.2	
3.4	0.398	-135.7	1.790	101.3	0.0480	153.0	0.870	-39.4	
3.5	0.387	-144.8	1.710	91.9	0.0470	147.5	0.880	-51.9	
3.6	0.363	-154.4	1.420	77.2	0.0470	144.7	0.889	-64.0	
3.7	0.340	-163.5	1.099	68.9	0.0450	140.6	0.895	-75.6	
3.8	0.317	-169.3	0.877	62.1	0.0450	135.7	0.902	-87.0	
3.9	0.319	-172.4	0.679	50.6	0.0410	133.4	0.906	-97.9	
4	0.303	176.5	0.575	47.2	0.0400	128.3	0.909	-108.8	
4.1	0.282	169.8	0.441	46.0	0.0410	122.6	0.913	-119.2	
4.2	0.265	164.9	0.383	44.8	0.0400	118.5	0.917	-129.5	
4.3	0.249	162.3	0.357	37.8	0.0400	113.2	0.915	-139.5	
4.4	0.239	158.0	0.303	32.5	0.0400	108.4	0.919	-149.0	
4.5	0.228	155.8	0.287	28.5	0.0390	103.9	0.917	-158.4	
5	0.260	145.4	0.149	8.0	0.0360	71.6	0.928	154.7	
5.5	0.420	123.9	0.081	-12.6	0.0230	27.5	0.952	111.8	
6	0.368	82.6	0.014	11.6	0.0027	-5.2	0.974	70.9	
