



1.2- 2.8 GHz LOW NOISE AMPLIFIER WBA1330A¹

WBA1330A is a low noise figure, wideband, and high linearity amplifier. The amplifier offers typical 0.90 dB noise figure, +/- 0.25 dB exceptional gain flatness, 20.0 dB output P_{1dB}, and 35.0 dBm output IP₃ at the frequency range from 1.20 GHz to 2.8 GHz of GPS, DCS, PCS, 3G, and ISN bands.

WBA1330A is most suitable for cellular base stations, wireless data communications, tower top receiver amplifiers, last-mile wireless communication systems, and wireless measurement applications.

WBA1330A is designed to meet the rugged standards of MIL-STD-202, and MIL-STD-883.

Key Features:

Impedance:	50 Ohm
MTBF ² :	>300,000 hrs (34 years)
Unconditional Stable:	k>1
Low Noise:	0.90 dB
Output IP₃:	35 dBm
Input & Output VSWR:	1.45:1 & 1.20:1
Gain Flatness:	+/- 0.25 dB
Gain:	28.5 dB
P _{1dB} :	20.0 dBm
Single power supply:	150 mA @ +5V
Wide Bandwidth:	1.2 ~ 2.8 GHz
Operating Temperature:	-40 ~ +85 °C
Small size:	SMA Female, 1.00" x 1.08" x 0.41" (25.4 mm x 27.4 mm x 10.4 mm) gold plated housing.
Built-in Functions:	DC blocks at input and output, temperature compensation circuits, and auto DC biases.

Absolute Maximum Ratings³:

Symbol	Parameters	Units	Absolute Maximum
V _{dd}	DC Power Supply Voltage	V	6.0
I _{dd}	Drain Current	mA	200
P _{diss}	Total Power Dissipation	mW	700
P _{In,Max}	RF Input Power	dBm	10
T _{ch}	Channel Temperature	°C	150
T _{STG}	Storage Temperature	°C	-55 ~ 125
T _{O,MAX}	Maximum Operating Temperature	°C	-40 ~ 85
R _{th,c}	Thermal Resistance	°C/W	128

¹ Specifications are subject to change without notice.

² MTBF: Mean Time Between Failure, Per TR-NWT-000332, ISSUE 3, SEPTEMBER, 1990, T=40°C

³ Operation of this device above any one of these parameters may cause permanent damage.



Specifications:

a) **Table 1** Summary of the electrical specifications WBA1330A at room temperature

Index	Testing Item	Symbol	Test Constraints	Nom (RT)	Min	Max	Unit
1	Gain	S_{21}	1.2 – 2.8 GHz	28.5	27	30	dB
2	Gain Variation	ΔG	1.2 – 2.8 GHz	+/- 0.25		+/-0.60	dB
3	Input VSWR	SWR_1	1.2 – 2.8 GHz	1.45:1		1.8:1	
4	Output VSWR	SWR_2	1.2 – 2.8 GHz	1.2:1		1.5:1	
5	Reverse Isolation	S_{12}	1.2 – 2.8 GHz	40	35		dB
6	Noise figure	NF	1.2 – 2.8 GHz	0.90		1.10	dB
7	Output Power 1dB compression Point	P_{1dB}	1.2 – 2.8 GHz	20	18		dBm
8	Output-Third-Order Interception point	IP_3	Two-Tone, P_{out} +0 dBm each, 1 MHz separation	35	30		dBm
9	Current Consumption	I_{dd}	V_{dd} = +5 V	150	140	160	mA
10	Power Supply Voltage	V_{dd}		+5	+4.7	+5.3	V
11	Thermal Resistance	$R_{th,c}$	Junction to case			128	°C/W
12	Operating Temperature	T_o			-40	+85	°C
13	Maximum Average RF Input Power	$P_{IN, MAX}$	1.2 – 2.8 GHz			10	dBm

b) Passband Frequency Response

As shown in **Figure 1**, the typical gain of the WBA1330A is 28.5 dB across 1.2 to 2.8 GHz. The amplifier provides excellent gain flatness across the passband. The typical input and output VSWR are 1.45:1 and 1.20:1 across the frequency of 1.2 to 2.8 GHz.

Figure 2 shows P_{1dB} and IP_3 of the WBA1330A. The typical P_{1dB} and IP_3 are 20.0 dBm and 35.0 to 31.0 dBm in the frequency range of 0.80 to 2.8 GHz, respectively.

Figure 3 illustrates the noise figure performance of WBA1330A. The noise figure is 0.90 dB across the frequency range of 1.2 to 2.8 GHz at room temperature. At 85 °C, WBA1330A only has 0.18 dB noise increases. At -40 °C, WBA1330A offers approximately 0.15 dB less noise figure than that at room temperature.

Figure 4 is the plot of the stability factor k of WBA1330A. The amplifier is unconditional stable at all temperature since the stability factor k is great than 1 at all frequency ranges.

Figure 5 demonstrates the small signal performance of WBA1330A at the extended frequency range at room temperature. The amplifier works well from 0.80 GHz to 3.0 GHz frequency range.

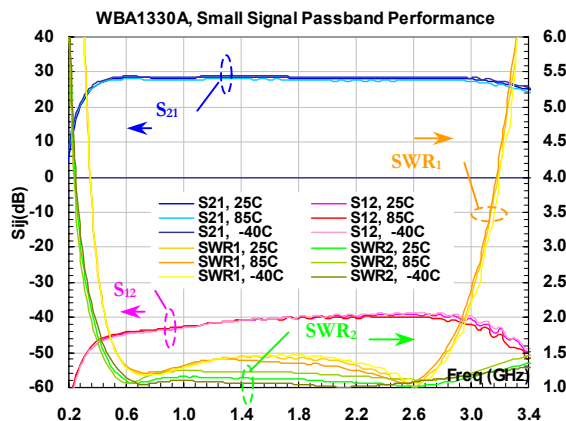


FIG. 1 Typical small signal performance.

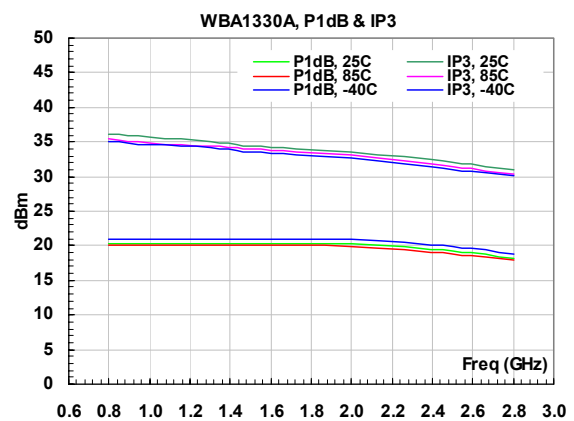


FIG. 2 Typical P_{1dB} and IP_3 at full temperature.

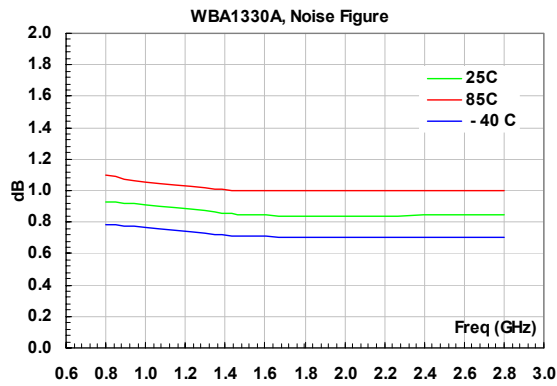


FIG. 3 Noise figure performance

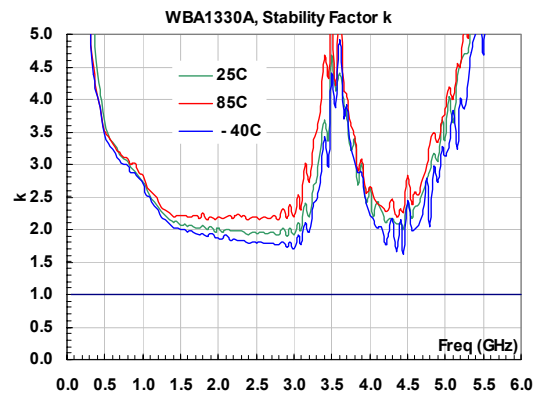


FIG. 4 Stability factor k of WBA1330A

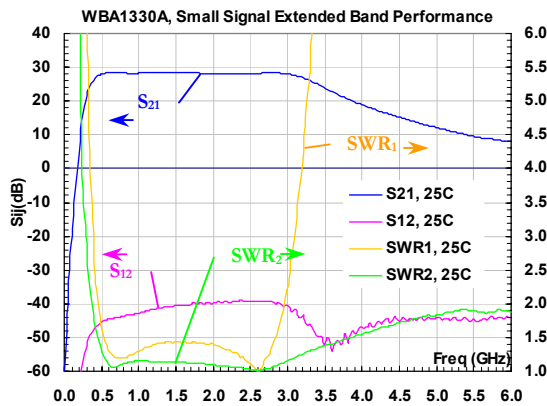


FIG. 5 Performance at the extended frequency band

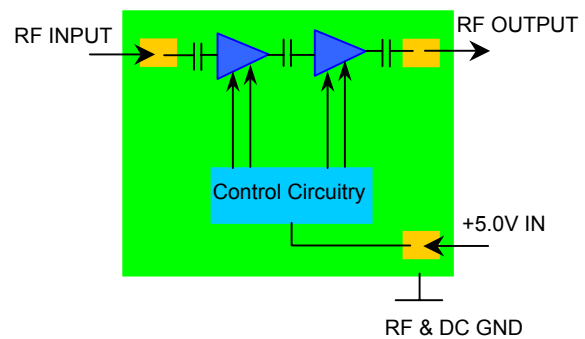


FIG. 6 Block diagram of WBA1330A

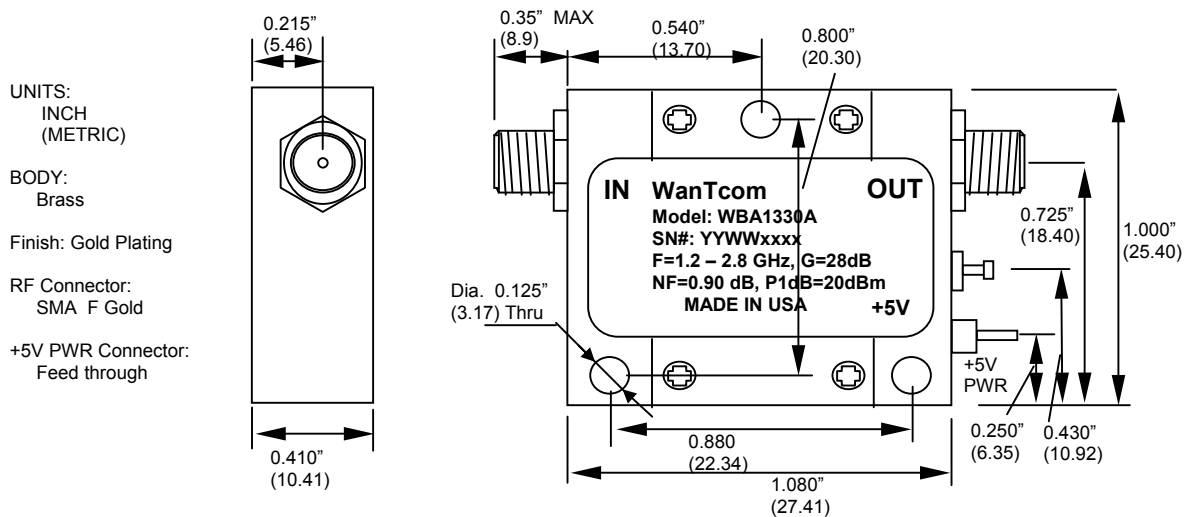


FIG. 7 WBA1330A outline



WBA1330A LNA Mechanical Outline, WP-5:

Figure 7 shows the mechanical outline of WBA1330A LNA. It is a WanTcom’s standard WP-5 housing with gold plating finish. Both RF input and output ports are equipped with SMA female connectors and the DC port connector is an EMI filtered feed thru pin.

Ordering Information

Model Number:	WBA1330A
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Small Signal S-Parameters:

IWBA1330A, +25C

Is-parameters at Vdd=5V, Idd=150mA. Last updated 11/7/05.

GHZ s MA R 50

IFreq(GHz)	MAGS11	ANGS11	MAGS21	ANGS21	MAGS12	ANGS12	MAGS22	ANGS22
0.05	0.994	-19.3	0.046	-155.9	0.000175	-2.4	0.992	-20.6
0.1	0.989	-38.7	0.184	-102.4	0.000133	-111.9	0.955	-42.2
0.2	0.952	-82.8	3.190	-138.4	0.000442	-92.7	0.740	-87.3
0.3	0.745	-134.1	10.983	156.3	0.002420	-158.1	0.470	-122.9
0.4	0.463	176.6	19.437	98.7	0.004354	144.8	0.282	-157.1
0.5	0.252	131.6	23.985	53.3	0.005347	110.1	0.134	169.5
0.6	0.129	84.2	25.487	18.7	0.005911	85.6	0.047	124.0
0.7	0.093	28.8	25.797	-8.3	0.006250	68.4	0.031	17.1
0.8	0.091	-22.9	25.646	-30.6	0.006498	54.9	0.054	-30.3
0.9	0.108	-60.6	25.509	-49.6	0.006875	44.0	0.069	-53.6
1	0.129	-91.5	25.586	-66.9	0.007276	36.2	0.074	-72.9
1.1	0.150	-121.5	25.911	-83.2	0.007826	27.2	0.071	-87.0
1.2	0.164	-150.3	26.362	-99.2	0.008267	19.0	0.066	-97.6
1.3	0.175	-176.6	26.740	-115.4	0.008687	10.3	0.063	-105.3
1.4	0.179	160.8	26.773	-131.1	0.009134	2.1	0.063	-115.8
1.5	0.181	138.2	26.619	-146.5	0.009401	-6.4	0.061	-126.5
1.6	0.179	118.3	26.421	-161.4	0.009544	-14.0	0.062	-139.8
1.7	0.175	100.5	26.144	-175.7	0.009748	-21.2	0.059	-154.0
1.8	0.170	84.7	25.756	170.5	0.009717	-28.4	0.055	-169.3
1.9	0.169	69.3	25.499	156.8	0.009957	-36.1	0.051	175.3
2	0.165	54.2	25.301	143.3	0.010000	-45.1	0.044	155.6
2.1	0.156	39.6	25.075	129.8	0.010000	-52.9	0.038	137.2
2.2	0.138	25.2	24.959	116.4	0.011000	-60.3	0.034	118.8
2.3	0.120	9.7	24.887	103.1	0.011000	-67.6	0.028	99.2
2.4	0.096	-6.1	25.021	89.6	0.011000	-75.8	0.020	82.7
2.5	0.056	-31.2	25.232	75.6	0.011000	-84.1	0.012	70.2
2.6	0.013	-130.0	25.387	61.4	0.011000	-93.2	0.005	137.0
2.7	0.077	136.6	25.619	46.4	0.011000	-102.6	0.015	166.5
2.8	0.166	113.9	25.603	30.7	0.011000	-114.1	0.031	156.3
2.9	0.266	94.7	25.430	14.2	0.010000	-125.9	0.049	132.2
3	0.380	73.3	24.792	-3.1	0.009437	-136.7	0.069	108.2
3.1	0.505	52.7	23.599	-20.9	0.008218	-146.7	0.093	81.0
3.2	0.611	32.3	21.861	-38.2	0.006633	-157.0	0.112	55.0
3.3	0.694	12.6	19.850	-54.5	0.004785	-160.7	0.131	30.9
3.4	0.763	-6.3	17.692	-69.8	0.003236	-157.7	0.148	7.2
3.5	0.807	-22.8	15.572	-83.5	0.002418	-150.1	0.160	-13.9
3.6	0.848	-39.3	13.773	-95.9	0.002333	-137.1	0.170	-34.9
3.7	0.868	-54.3	12.213	-107.4	0.002656	-127.3	0.185	-54.1
3.8	0.878	-68.5	10.914	-118.2	0.003032	-122.1	0.194	-71.0
3.9	0.883	-82.1	9.803	-128.5	0.003563	-123.3	0.204	-87.1
4	0.888	-94.0	8.919	-138.1	0.004213	-123.5	0.216	-102.7
4.1	0.893	-105.8	8.115	-147.5	0.004694	-125.8	0.226	-116.5
4.2	0.899	-116.3	7.456	-156.8	0.005368	-129.0	0.238	-130.9
4.3	0.907	-128.0	6.857	-165.8	0.005217	-139.0	0.247	-143.9
4.4	0.914	-139.8	6.311	-174.7	0.005401	-148.3	0.254	-157.6
4.5	0.908	-149.8	5.862	176.6	0.005312	-153.5	0.266	-170.5
5	0.899	162.8	4.040	134.3	0.006001	170.9	0.294	131.7
5.5	0.873	119.3	2.878	93.7	0.005989	138.3	0.310	76.1
6	0.849	77.0	2.339	51.2	0.006267	103.3	0.308	20.6
