



## 800- 2100 MHz LOW NOISE AMPLIFIER WBA0820A<sup>1</sup>

WBA0820A LNA is a low noise figure, wideband, and high linearity amplifier with exceptional gain flatness design. The amplifier offers typical noise figure of 1.0 dB, 19 dB gain, maximum gain variation of +/- 0.20 dB, and output IP<sub>3</sub> of 28.0 dBm at the frequency range from 800 MHz to 2000 MHz.

WBA0820A is most suitable for cellular base stations, wireless data communications, tower top receiver amplifiers, cellular micro-cells, 3G, last-mile wireless communication systems, and wireless measurement applications.



### Key Features:

Impedance:	50 Ohm
MTBF <sup>2</sup> :	>300,000 hrs (34Years)
Low Noise:	1.0 dB typical
Output IP <sub>3</sub> :	28.0 dBm
Gain:	19 dB
Input VSWR:	1.5:1 maximum
Output VSWR:	1.5:1 maximum
P <sub>1dB</sub> :	15.0 dBm typical
Single Power Supply:	35 mA, @ +5V
Frequency Range:	800 ~ 2000 MHz
Operating Temperature:	-40 ~ +85 °C

### Absolute Maximum Ratings<sup>3</sup>:

Symbol	Parameters	Units	Absolute Maximum
V <sub>dd</sub>	DC Power Supply Voltage	V	6.0
I <sub>dd</sub>	Drain Current	mA	45
P <sub>diss</sub>	Total Power Dissipation	mW	240
P <sub>In,Max</sub>	RF Input Power	dBm	10
T <sub>ch</sub>	Channel Temperature	°C	150
T <sub>STG</sub>	Storage Temperature	°C	-65 ~ 150
T <sub>O,MAX</sub>	Maximum Operating Temperature	°C	-55 ~ 100
R <sub>th,c</sub>	Thermal Resistance	°C/W	220

<sup>1</sup> Specifications are subject to change without notice.

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

<sup>3</sup> Operation of this device above any one of these parameters may cause permanent damage.



**Specifications:**

a) **Table 1** Summary of the electrical specifications of WBA0820A at room temperature

Index	Testing Item	Symbol	Test Constraints	Nom (RT)	Min	Max	Unit
1	Gain	$S_{21}$	800 - 2000 MHz	19			dB
2	Gain Variation	$\Delta G$	800 - 2000 MHz	+/- 0.20		+/- 0.5	dB
3	Input Return Loss	$S_{11}$	800 - 2000 MHz	18	14		dB
4	Output Return Loss	$S_{22}$	800 - 2000 MHz	18	14		dB
5	Reverse Isolation	$S_{12}$	800 - 2000 MHz		20		dB
6	Noise figure	NF	800 - 2000 MHz	1.0		1.2	dB
7	Output $P_{1dB}$ compression	$P_{1dB}$	800 - 2000 MHz	15			dBm
8	Output-Third-Order Interception point	$IP_3$	Two-Tone, Pout 0 dBm each, 1 MHz separation		28.0		dBm
9	Current Consumption	$I_{dd}$	$V_{dd}$ = +5 V or 3.3V (B-Version)	35			mA
10	Power Supply Voltage	$V_{dd}$	+5V (+3.3V B-Version)	+5 (3.3)	+4.8 (3.0)	+5.2 (3.6)	V
11	Operating Temperature	$T_o$			-40	+85	°C
12	Maximum Average RF Input Power	$P_{IN, MAX}$	800 - 2000 MHz			10	dBm

**b) Frequency Response**

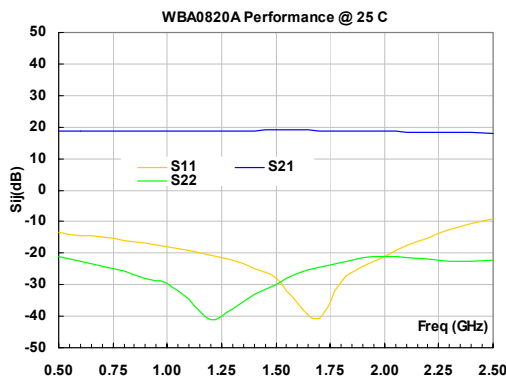
As shown in **Figure 1**, the typical gain of the WBA0820A is 18.8 dB across 0.8 GHz to 1.0 GHz. The typical input and output return losses are 15 dB and 18 dB, respectively.

**Figure 2** shows  $P_{1dB}$  and  $IP_3$  of the WBA0820A. The typical  $P_{1dB}$  and  $IP_3$  are 15.0 dBm and 28.0 dBm in the frequency range of 0.8 GHz to 1.0 GHz, respectively.

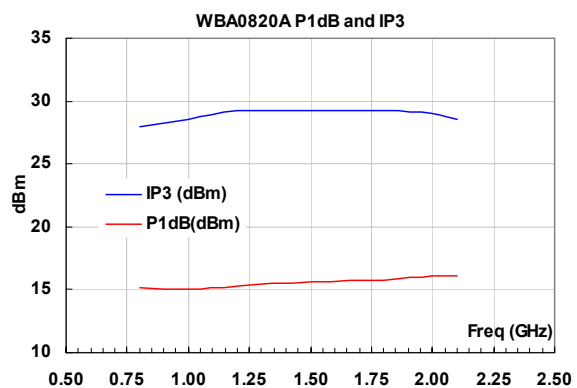
**Figure 3** illustrates the noise figure performance. The noise figure is 1.0 dB across the frequency range of 0.8 GHz to 1.0 GHz. At 85 °C, WBA0820A only has 0.25 dB noise increases. At -40 °C, WBA0820A offers approximately 0.20 dB less noise figure than that at room temperature.

**Figure 4** is the plot of the stability factor  $k$  of WBA0820A. The amplifier is conditional stable due to  $k$  is less than 1 at some frequency ranges.

**Figure 5** provides the internal block diagram of WBA0820A.



**FIG. 1** Typical small signal performance.



**FIG. 2** Typical  $P_{1dB}$  and  $IP_3$  at room temperature.

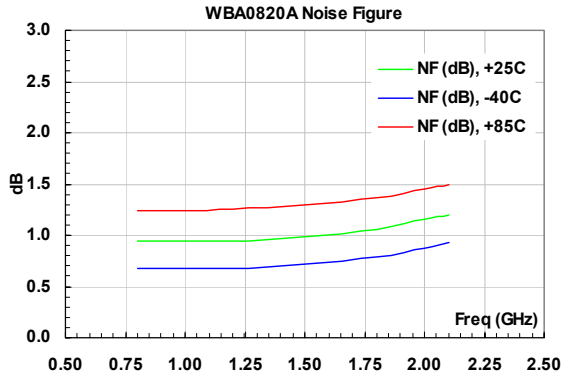


FIG. 3 Noise figure performance at room temperature

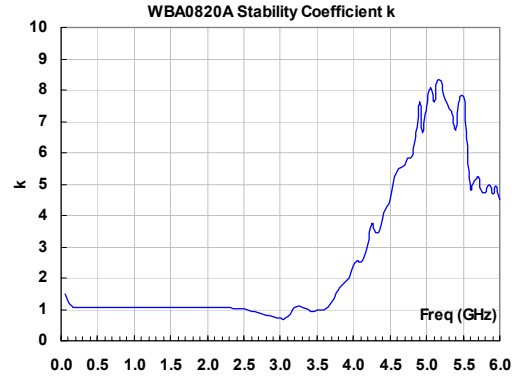


FIG. 4 Stability factor *k* of WBA0820A

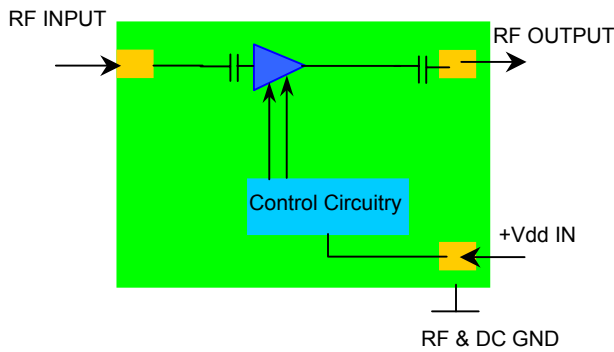
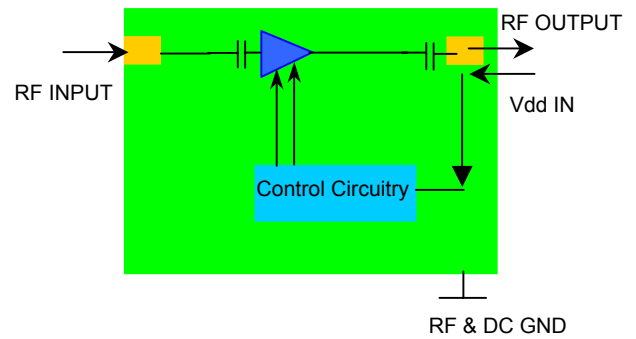


FIG. 5 Block diagram of WBA0820A/B



Block diagram of WBA0820ABT/BBT

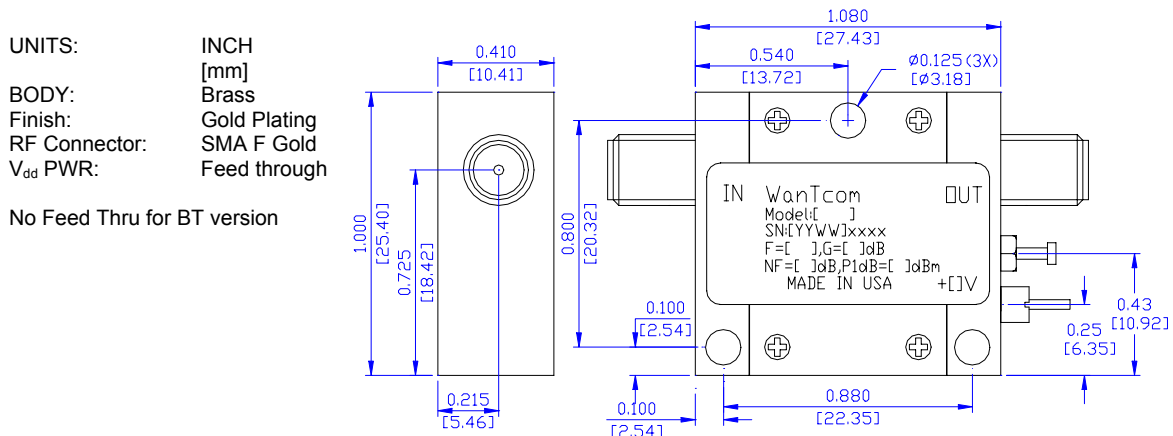


FIG. 6 WBA0820A outline



**WBA0820A Mechanical Outline, WP-5:**

Figure 6 shows the mechanical outline of WBA0820A. It is a WanTcom's standard WP-5 housing with gold plating. Both RF input and output ports are equipped with SMA female connectors and the DC port connector is an EMI filtered feed thru pin. No feed thru for BT version and DC power is fed through RF output port.

**Ordering Information**

<b>Model Number</b>	WBA0820A	WBA0820ABT	WBA0820B	WBA0820BBT
<b>Feature</b>	+5V PWR	Output Built-in Bias-T	+3.3V PWR	+3.3V PWR & Output Bias-T

**Small Signal S-Parameters:**

IWBA0820A

Is-parameters at Vdd=5V, Idd=35mA. Last updated 08/10/03.

# GHZ s MA R 50

IF(GHz)	MAG S11	ANG S11	MAG S21	ANG S21	MAG S12	ANG S12	MAG S22	ANG S22
0.05	0.730	148.9	3.729	-67.6	0.0340	114.2	0.619	129.1
0.1	0.533	108.8	5.832	-110.8	0.0530	74.3	0.392	82.8
0.2	0.334	51.5	8.090	-161.1	0.0730	29.1	0.189	17.9
0.3	0.267	23.9	8.489	173.6	0.0760	10.2	0.128	-7.9
0.4	0.229	6.0	8.627	155.2	0.0800	-3.2	0.105	-24.6
0.5	0.213	-9.5	8.665	140.0	0.0790	-12.7	0.087	-36.7
0.6	0.192	-22.4	8.650	125.4	0.0780	-22.9	0.073	-45.9
0.7	0.178	-32.2	8.652	112.4	0.0780	-29.8	0.062	-56.3
0.8	0.160	-41.0	8.697	99.7	0.0800	-38.2	0.053	-63.0
0.9	0.146	-49.5	8.695	87.4	0.0790	-44.8	0.039	-77.6
1	0.128	-59.1	8.724	75.2	0.0790	-50.9	0.033	-83.0
1.1	0.112	-63.3	8.744	63.0	0.0780	-56.2	0.018	-79.3
1.2	0.095	-71.1	8.775	50.9	0.0790	-63.5	0.009	-57.7
1.3	0.077	-77.1	8.759	38.9	0.0790	-69.4	0.013	4.7
1.4	0.058	-81.8	8.799	26.4	0.0780	-76.1	0.023	26.7
1.5	0.040	-87.9	8.830	13.9	0.0790	-82.3	0.032	21.9
1.6	0.016	-74.3	8.848	1.2	0.0800	-88.2	0.048	13.2
1.7	0.009	49.6	8.804	-11.4	0.0780	-94.4	0.059	5.0
1.8	0.034	56.0	8.782	-24.7	0.0780	-101.0	0.069	-12.0
1.9	0.062	45.4	8.728	-38.4	0.0780	-107.5	0.083	-30.5
2	0.090	41.9	8.586	-51.7	0.0780	-113.9	0.088	-48.6
2.1	0.130	39.3	8.414	-64.9	0.0780	-120.4	0.086	-67.5
2.2	0.176	31.7	8.364	-78.4	0.0780	-126.0	0.083	-80.4
2.3	0.239	23.6	8.277	-92.5	0.0810	-133.5	0.076	-102.8
2.4	0.300	11.4	8.122	-106.9	0.0820	-141.1	0.073	-132.3
2.5	0.355	0.4	7.866	-122.1	0.0820	-148.4	0.077	-170.9
2.6	0.419	-11.8	7.581	-137.9	0.0820	-156.8	0.098	150.9
2.7	0.479	-24.8	7.196	-153.8	0.0810	-167.5	0.132	114.5
2.8	0.541	-37.3	6.722	-170.1	0.0800	-177.9	0.180	83.1
2.9	0.589	-50.3	6.185	173.8	0.0770	172.6	0.240	56.5
3	0.629	-63.7	5.480	157.2	0.0730	163.1	0.299	32.1
3.1	0.647	-77.2	4.677	141.3	0.0650	154.0	0.338	8.0
3.2	0.631	-89.4	3.955	130.9	0.0610	152.3	0.318	-8.0
3.3	0.621	-98.0	3.639	120.7	0.0630	145.1	0.367	-8.6
3.4	0.627	-107.4	3.284	106.3	0.0590	131.7	0.489	-21.1
3.5	0.628	-117.5	2.858	91.1	0.0550	122.1	0.583	-38.3
3.6	0.619	-126.4	2.488	78.8	0.0540	110.3	0.650	-54.5
3.7	0.603	-135.5	2.130	66.7	0.0480	100.8	0.698	-68.8
3.8	0.586	-143.4	1.817	55.8	0.0420	93.7	0.736	-82.6
3.9	0.563	-150.4	1.548	45.4	0.0390	84.1	0.771	-95.3
4	0.546	-156.8	1.346	34.7	0.0330	76.6	0.802	-107.2

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