



## 820-980 MHz LOW NOISE BALANCE AMPLIFIER WA08-2433A<sup>1</sup>

WA08-2433A LNA is a super low noise figure, wideband, and high linearity amplifier with unconditional stable design. The amplifier offers typical noise figure of 0.45 dB and typical output IP<sub>3</sub> of 38 dBm at the frequency range from 820 MHz to 980 MHz. WA08-2433A LNA is most suitable for cellular base stations, wireless data communications, tower top receiver amplifiers, cellular micro-cells, last-mile wireless communication systems, and wireless measurement applications.



### Key Features:

Impedance:	50 Ohm
MTBF <sup>2</sup> :	>300,000 hrs (34Years)
Unconditional Stable:	k>1
Low Noise:	0.45 dB typical
Output IP <sub>3</sub> :	38.0 dBm
Gain:	21.0 dB
P <sub>1dB</sub> :	19.0 dBm
Single power supply:	125 mA @ +7.0 ~ + 15V, option: +5V
Frequency Range:	0.82 ~ 0.98 GHz
Operating Temperature:	-40 ~ +85 °C
Return Losses:	20.0 dB
Alarm Output:	Soft Alarm, Hard Alarm, Soft Alarm Open Collector, Hard Alarm Open collector, Branch 1 Alarm, Branch 2 Alarm.

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

Symbol	Parameters	Units	Absolute Maximum
V <sub>dd</sub>	DC Power Supply Voltage	V	15
I <sub>dd</sub>	Drain Current	mA	135
P <sub>diss</sub>	Total Power Dissipation	W	2.0
P <sub>In,Max</sub>	RF Input Power	dBm	13
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 WA08-2433A at room temperature

Index	Testing Item	Symbol	Test Constraints	Nom (RT)	Min	Max	Unit
1	Gain	$S_{21}$	820 - 980 MHz	21.0			dB
2	Gain Variation	$\Delta G$	20 MHz Bandwidth	0.20		0.30	dB
3	Input Return Loss	$S_{11}$	820 - 980 MHz	20	19		dB
4	Output Return Loss	$S_{22}$	820 - 980 MHz	20	19		dB
5	Reverse Isolation	$S_{12}$	820 - 980 MHz		40		dB
6	Noise figure	NF	820 - 980 MHz	0.45		0.60	dB
7	Output P1dB compression	$P_{1dB}$	820 - 980 MHz		18		dBm
8	Output-Third-Order Interception point	$TOIP_3$	Two-Tone, Pout +0 dBm each, 1 MHz separation	38	36		dBm
9	Current Consumption	$I_{dd}$	$V_{dd} = +7 \sim +15$ V	125			mA
10	Power Supply Voltage	$V_{dd}$			+7	+15	V
11	Soft Alarm TTL Output	$V_s$	Normal/Fail, +/- 30% $I_{d1}$ or $I_{d2}$	4.65/0.0			V
	Soft Alarm Open Collector Output	$V_{so}$	Normal/Fail, External 10K to an external + $V_{cc}$	Low/High <sup>4</sup>			
	Hard Alarm TTL Output	$V_h$	Normal/Fail, +/- 30% $I_{dd}$	4.65/0.0			V
	Hard Alarm Open Collector Output	$V_{ho}$	Normal/Fail, External 10K to an external + $V_{cc}$	Low/High			
	Branch 1 Alarm TTL Output	$V_{a1}$	Normal/Fail, +/- 30% $I_{d1}$	4.65/0.0			V
	Branch 2 Alarm TTL Output	$V_{a2}$	Normal/Fail, +/- 30% $I_{d2}$	4.65/0.0			V
12	Maximum RF Input Power	$P_{inmax}$	820 - 980 MHz, single tone		15		dBm

**b) Passband Frequency Response**

As shown in **Figure 1**, the typical gain of the WA08-2433A is 21.0 dB across 0.82 GHz to 0.98 GHz frequency range. The typical input and output return losses are 20 dB or better across 0.82 GHz to 0.98 GHz frequency range.

**Figure 2** shows  $P_{1dB}$  and  $IP_3$  of the WA08-2433A. The typical  $P_{1dB}$  and  $IP_3$  are 19.0 dBm and 38.0 dBm in the frequency range of 0.82 GHz to 0.98 GHz, respectively.

**Figure 3** illustrates the noise figure performance. The noise figure is 0.45 dB across the frequency range of 0.82 GHz to 0.98 GHz. At 85 °C, WA08-2433A only has 0.27 dB noise increases. At -40 °C, WA08-2433A offers approximately 0.20 dB less noise figure than that at room temperature.

**Figure 4** is the plot of the stability factor  $k$  of WA08-2433A. The amplifier is unconditional stable at room temperature due to  $k$  is great than 1 at all frequency ranges.

**Figure 5** illustrates the internal block diagram of WA08-2433A.

<sup>4</sup> Need a 10 k Ohm pull up resistor to a high potential voltage such as +5 V.

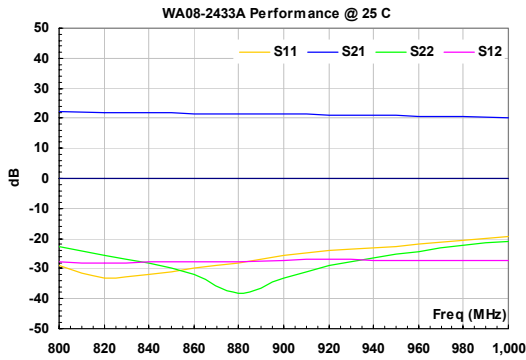


FIG. 1 Typical small signal performance.

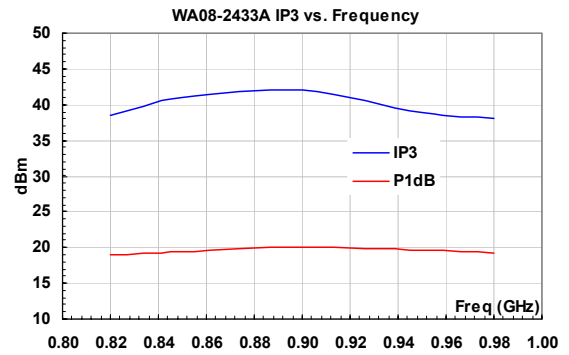


FIG. 2 Typical  $P_{1dB}$  and  $IP_3$  at room temperature.

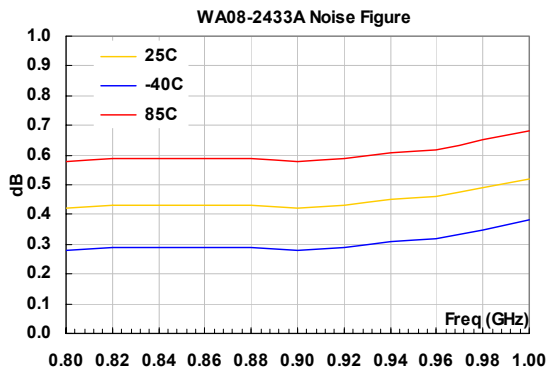


FIG. 3 Noise figure performance

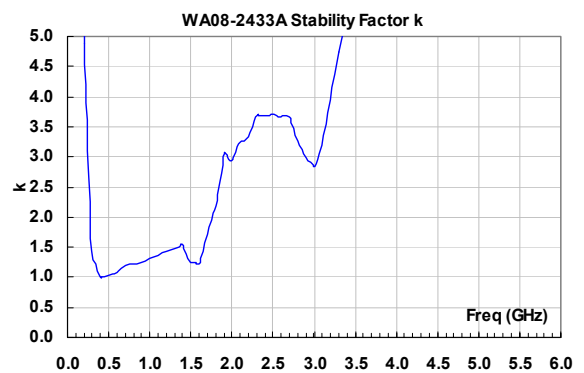


FIG. 4 Stability factor  $k$  of WA08-2433A

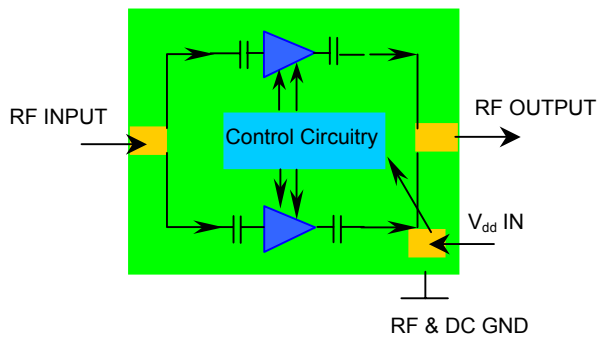


FIG. 5 Block diagram of WA08-2433A



### WA08-2433A Mechanical Outline, WP-1:

WA08-2433A has a WanTcom's standard WP-1 housing with no plating. Both RF input and output ports are equipped with SMA female connectors and the DC/Alarm port connector is 8-pin Molex socket connector 53048-0810.

### Ordering Information

<b>Model Number</b>	WA08-2433A
---------------------	------------

### Small Signal S-Parameters:

!WA08-2433A  
Is-parameters at Vdd=7~15V, Idd=125mA. Last updated 10/13/02.

# 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	0.38	-48.7	0.44	-35.2	0.00183	-69.3	0.99	-20.2
0.1	0.44	-84.2	1.85	-64.2	0.00068	158.4	0.98	-42.3
0.2	0.51	-148.7	8.79	-142.3	0.00526	129.6	0.64	-107.8
0.3	0.62	164.0	14.99	154.2	0.01500	85.3	0.17	-10.2
0.4	0.55	117.5	15.14	84.4	0.02100	19.8	0.40	-86.0
0.5	0.42	77.9	15.23	31.2	0.02700	-25.5	0.31	-119.2
0.6	0.29	41.4	14.92	-18.6	0.03200	-71.4	0.23	-136.1
0.7	0.16	0.6	14.02	-66.2	0.03500	-112.2	0.16	-158.6
0.8	0.04	-18.1	12.85	-112.5	0.04000	-156.9	0.07	170.2
0.9	0.05	26.2	11.56	-157.8	0.04400	164.0	0.02	-88.9
1	0.11	-59.7	10.29	157.6	0.04400	122.8	0.09	-90.4
1.1	0.25	-132.7	8.84	112.3	0.04500	81.4	0.09	-104.3
1.2	0.41	172.5	7.32	68.7	0.04300	39.1	0.10	-94.2
1.3	0.54	126.8	5.99	27.8	0.04000	0.8	0.15	-94.9
1.4	0.60	88.2	5.04	-9.9	0.03900	-35.0	0.21	-111.2
1.5	0.64	54.7	4.89	-51.9	0.04300	-70.4	0.32	-119.9
1.6	0.69	17.8	4.37	-105.5	0.03700	-117.7	0.52	-157.4
1.7	0.66	-25.9	3.64	-147.0	0.03400	-162.2	0.52	164.4
1.8	0.57	-75.5	3.36	169.5	0.03600	150.7	0.51	135.6
1.9	0.43	-136.0	2.88	121.9	0.03700	105.9	0.47	106.2
2	0.39	157.4	3.04	72.6	0.04100	63.0	0.42	90.0
2.1	0.36	91.8	2.80	21.1	0.04100	13.0	0.43	64.1
2.2	0.35	36.5	2.58	-24.0	0.04400	-29.7	0.42	33.9
2.3	0.27	-10.6	2.52	-70.3	0.04400	-74.0	0.39	3.5
2.4	0.16	-57.4	2.43	-115.2	0.04800	-120.6	0.38	-26.3
2.5	0.05	176.8	2.41	-156.1	0.04900	-161.8	0.37	-61.0
2.6	0.17	72.6	2.27	164.4	0.05000	157.1	0.38	-92.8
2.7	0.30	29.4	2.09	128.0	0.04900	117.4	0.40	-124.4
2.8	0.40	-8.1	1.94	90.2	0.05300	81.0	0.42	-154.0
2.9	0.44	-46.8	1.89	52.0	0.05500	48.5	0.45	-178.5
3	0.42	-90.8	1.92	13.6	0.05600	12.1	0.48	158.7
3.5	0.51	-50.5	1.11	171.7	0.03100	172.4	0.63	53.9
4	0.26	131.0	0.59	18.1	0.02400	38.3	0.52	-9.3
4.5	0.19	-151.3	0.36	-164.9	0.04000	-170.8	0.51	-80.1
5	0.64	-107.2	0.05	-56.7	0.00802	174.4	0.32	-131.2
5.5	0.08	-21.2	0.14	-145.8	0.01200	-142.7	0.29	-158.6
6	0.26	-167.2	0.13	-5.8	0.02300	-20.6	0.20	-150.7

\*\*\*\*\*