Wan7com, Inc.

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100-2200 MHz LOW NOISE AMPLIFIER WEA102[1]

WEA102 LNA is a low noise figure, wideband, and high linearity amplifier. The amplifier offers typical noise figure of 0.80 dB and output IP_3 of 34 dBm at the frequency range from 0.1 GHz to 1.1 GHz and extendable to 2.2 GHz of VHF, UHF, Cellular, GSM, GPS, DCS, PCS, and 3G bands. WEA102 LNA is most suitable for cellular base stations, wireless data communications, tower top receiver amplifiers, last-mile wireless communication systems, and wireless measurement applications.

WEA102 is designed to meet rugged MIL-STD 202.

Key Features:

Impedance:	50 Ohm
MTBF[2]:	>300,000 hrs (34Years)
Low Noise:	0.80 dB
Output IP_3:	34.0 dBm
Gain:	20.0 dB
P_{1dB}:	17.0 dBm
Single power supply:	60 mA @ +5V
Frequency Range:	0.1 ~ 1.1 GHz Extendable to 2.2 GHz
Operating Temperature:	-40 ~ +85 ºC
Return Losses:	16.0 dB Typical
Small size:	SMA Female, 0.90" x 0.70" x 0.4" (41.9 mm x 17.8 mm x 10.2 mm)
Built-in Functions:	DC blocks at input and output, temperature compensation circuits, and auto DC biases.

Absolute Maximum Ratings[3]:

Symbol	Parameters	Units	Absolute Maximum
V_{dd}	DC Power Supply Voltage	V	6.0
I_{dd}	Drain Current	mA	75
P_{diss}	Total Power Dissipation	mW	450
$P_{In,Max}$	RF Input Power	dBm	10
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] MTBF: Mean Time Between Failure, Per TR-NWT-000332, ISSUE 3, SEPTEMBER, 1990, T=40℃
[3] Operation of this device above any one of these parameters may cause permanent damage.

Specifications:

a) Table 1 Summary of the electrical specifications WEA102 at room temperature

Index	Testing Item	Symbol	Test Constraints	Nom (RT)	Min	Max	Unit
1	Gain	S_{21}	0.1 – 1.1 GHz		17	24	dB
2	Gain Variation	ΔG	0.1 GHz Bandwidth	+/- 0.25		+/- 0.4	dB
3	Input Return Loss	S_{11}	0.1 – 1.1 GHz	18	16		dB
4	Output Return Loss	S_{22}	0.1 – 1.1 GHz	18	16		dB
5	Reverse Isolation	S_{12}	0.1 – 1.1 GHz	22	20		dB
6	Noise figure	NF	0.1 – 1.1 GHz	0.80		1.0	dB
7	Output Power 1dB compression Point	P_{1dB}	0.1 – 1.1 GHz	17	16		dBm
8	Output-Third-Order Interception point	IP_3	Two-Tone, P_{out} +0 dBm each, 1 MHz separation	34	30		dBm
10	Current Consumption	I_{dd}	V_{dd}= +5 V	60	55	70	mA
11	Power Supply Voltage	V_{dd}		+5	+4.7	+5.3	V
12	Thermal Resistance	$R_{th,c}$	Junction to case			220	^{o}C/W
13	Operating Temperature	T_o			-40	+85	^{o}C
14	Maximum Average RF Input Power	$P_{IN, MAX}$	0.1 – 2.0 GHz			10	dBm

b) Passband Frequency Response

As shown in **Figure 1**, the typical gain of the WEA102 is from 18.0 dB to 23.0 dB across 0.1 GHz to 1.1 GHz. The typical input and output return losses are 18 dB across the frequency of 0.1 to 1.1 GHz. The amplifier is usable up to 2.2 GHz.

Figure 2 shows the measured P_{1dB} and IP_3 of the WEA102. The typical P_{1dB} and IP_3 are 17.0 dBm and 34.0 dBm in the frequency range of 0.10 GHz to 2.2 GHz, respectively.

Figure 3 illustrates the measured noise figure performance. The noise figure is 0.80 dB across the frequency range of 0.10 to 1.1 GHz. At 85 ^{0}C, WEA102 only has 0.20 dB noise increases. At –40 ^{0}C, WEA102 offers approximately 0.15 dB less noise figure than that at room temperature.

Figure 4 is the plot of the stability factor *k* of WEA102. The amplifier is conditional stable due to *k* is slightly less than 1 in some frequency ranges.

Figure 5 demonstrates the small signal performance of WEA102 at the extended frequency range.

Figure 6 shows the mechanical outline of WEA102. It is a WanTcom's standard WP-10E housing. Both RF input and output ports are equipped with stainless SMA female connectors and the DC port connector is an EMI filtered feed thru pin.

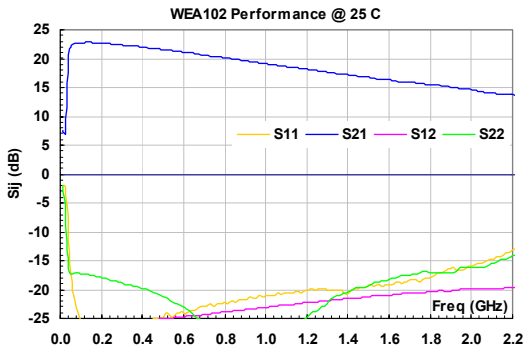

FIG. 1 Typical small signal performance.

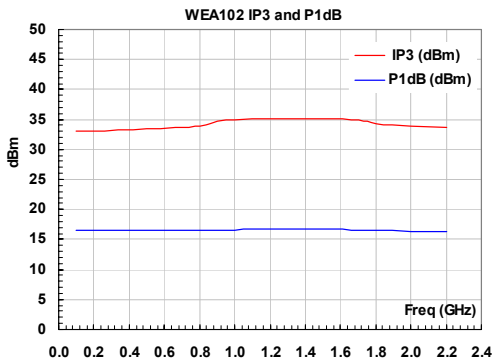

FIG. 2 Typical P_{1dB} and IP_3 at room temperature.

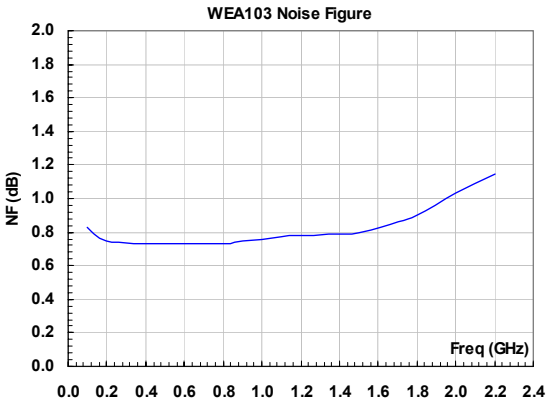

FIG. 3 Noise figure performance at room temperature

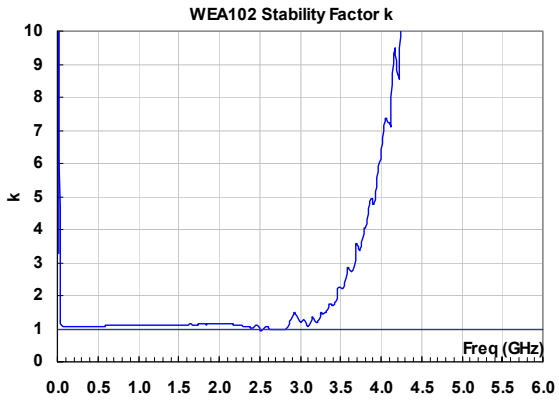

FIG. 4 Stability factor *k* of WEA102

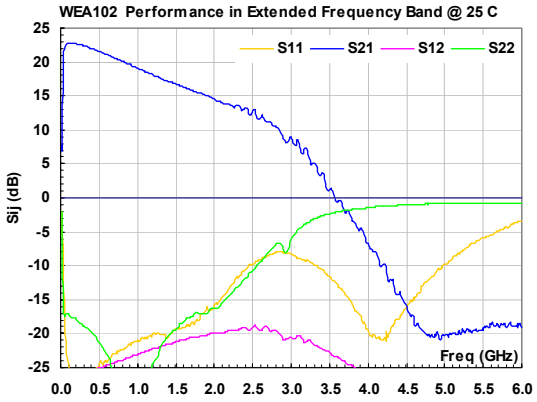

FIG. 5 Performance at the extended frequency band

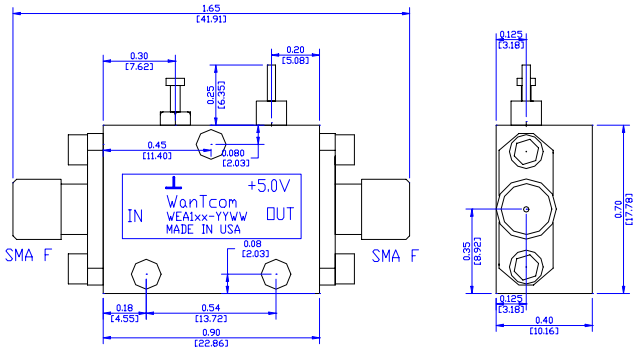

FIG. 6 WEA102 outline

WEA102 Mechanical Outline, WP-10E:

Fig. 6 shows the detail outline of WEA102. It is the gold plated WanTcom's standard LNA outline, WP-10E.

Ordering Information

Model Number	WEA102

Small Signal S-Parameters:

!WEA102
!s-parameters at Vds=5V, Id=60 mA @ 25C
!Last updated 1/15/05.

GHZ s MA R 50

!F(GHz)	MAG S11	ANG S11	MAG S21	ANG S21	MAG S12	ANG S12	MAG S22	ANG S22
0.05	0.203	110.5	12.206	-121.2	0.0430	67.9	0.141	-171.6
0.1	0.053	36.9	13.807	-167.2	0.0500	27.9	0.137	174.2
0.2	0.048	-27.1	13.658	161.8	0.0510	10.6	0.127	144.2
0.3	0.048	-73.5	13.148	141.6	0.0520	3.3	0.114	119.6
0.4	0.052	-102.3	12.660	124.0	0.0540	-1.7	0.103	99.5
0.5	0.060	-132.9	12.010	108.2	0.0560	-6.1	0.087	79.5
0.6	0.062	-158.4	11.331	93.4	0.0580	-10.3	0.070	63.3
0.7	0.074	179.8	10.726	79.0	0.0610	-14.7	0.051	49.9
0.8	0.078	160.7	10.118	65.4	0.0640	-19.7	0.032	45.0
0.9	0.082	144.3	9.534	51.9	0.0670	-24.6	0.017	71.2
1	0.088	130.0	9.026	39.4	0.0700	-29.9	0.023	120.8
1.1	0.095	118.2	8.517	26.6	0.0740	-35.7	0.039	127.4
1.2	0.098	105.9	8.077	14.4	0.0770	-41.5	0.058	121.5
1.3	0.099	99.6	7.586	2.0	0.0800	-47.7	0.077	114.0
1.4	0.096	90.7	7.212	-9.7	0.0830	-54.5	0.095	105.0
1.5	0.110	86.0	6.872	-21.5	0.0870	-60.6	0.107	95.2
1.6	0.111	83.5	6.552	-33.1	0.0890	-68.1	0.123	86.8
1.7	0.122	79.8	6.216	-44.6	0.0940	-75.1	0.132	77.1
1.8	0.130	73.0	5.914	-56.3	0.0950	-82.2	0.141	67.6
1.9	0.150	66.8	5.680	-68.1	0.0970	-90.3	0.141	64.2
2	0.159	62.8	5.327	-81.1	0.1010	-98.3	0.154	58.7
2.1	0.184	60.6	5.041	-92.1	0.1020	-106.2	0.166	58.4
2.2	0.215	55.0	4.850	-103.7	0.1050	-113.6	0.192	54.1
2.3	0.261	43.7	4.810	-115.3	0.1060	-121.7	0.219	48.1
2.4	0.296	31.4	4.550	-128.2	0.1100	-132.4	0.253	42.4
2.5	0.323	19.6	4.329	-139.6	0.1110	-138.4	0.289	35.3
2.6	0.352	5.8	3.929	-153.9	0.1050	-151.1	0.339	26.3
2.7	0.376	-6.5	3.646	-169.4	0.1090	-163.1	0.394	15.6
2.8	0.392	-21.4	3.290	174.8	0.1060	-171.6	0.449	2.7
2.9	0.399	-36.7	2.752	159.8	0.0900	179.3	0.418	-15.0
3	0.386	-51.2	2.793	151.8	0.0940	173.8	0.488	-10.2
3.1	0.360	-64.4	2.601	134.0	0.0970	164.6	0.585	-25.3
3.2	0.339	-77.7	2.311	120.0	0.0870	155.2	0.647	-39.8
3.3	0.318	-89.0	1.775	109.1	0.0830	143.0	0.696	-54.2
3.4	0.296	-100.8	1.497	97.6	0.0770	135.4	0.735	-68.3
3.5	0.256	-112.5	1.150	87.5	0.0720	126.4	0.764	-82.2
3.6	0.228	-122.8	0.927	77.7	0.0670	119.7	0.787	-96.3
3.7	0.193	-131.5	0.766	67.1	0.0620	111.5	0.805	-109.8
3.8	0.159	-138.7	0.677	59.1	0.0580	104.5	0.821	-123.0
3.9	0.139	-141.5	0.581	53.3	0.0530	98.6	0.834	-136.0
4	0.109	-138.7	0.457	41.5	0.0490	90.9	0.844	-149.0
4.1	0.095	-135.0	0.392	37.2	0.0470	84.6	0.856	-161.9
4.2	0.090	-122.0	0.329	33.5	0.0430	78.8	0.865	-174.1
4.3	0.108	-119.7	0.250	27.2	0.0410	72.1	0.874	173.1
4.4	0.128	-110.5	0.200	25.5	0.0380	66.0	0.882	160.8
4.5	0.155	-116.9	0.164	20.9	0.0360	58.9	0.887	148.7
5	0.320	-154.5	0.100	40.5	0.0260	27.5	0.903	90.1
5.5	0.508	153.9	0.110	33.5	0.0160	14.2	0.909	36.6
6	0.675	106.0	0.113	-4.8	0.0230	-11.8	0.916	-10.5

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