



700-2000 MHz LOW NOISE AMPLIFIER WEA103¹

WEA103 LNA is a low cost, low noise figure, wideband, and high linearity amplifier. The amplifier offers typical 1.0 dB noise figure and output IP₃ of 26 dBm at the frequency range from 700 MHz to 1600 MHz and extendable to 2000 MHz of Cellular, GSM, LoTACS, HiTACS, GPS, DGPS, DCS, PCS, and 3G bands. WEA103 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
Low Noise:	1.0 dB
Output IP ₃ :	26 dBm
Gain:	17.0 dB
P _{1dB} :	13.0 dBm
Single power supply:	30 mA @ +5V
Frequency Range:	700 ~ 1600 MHz extendable to 2000 MHz
Operating Temperature:	-40 ~ +85 °C
Return Losses:	16 dB or better
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 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	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 Operation of this device above any one of these parameters may cause permanent damage.



Specifications:

a) **Table 1** Summary of the electrical specifications WEA103 at room temperature

Index	Testing Item	Symbol	Test Constraints	Nom (RT)	Min	Max	Unit
1	Gain	S_{21}	0.7 – 1.6 GHz	17	16	19	dB
2	Gain Variation	ΔG	0.7 – 1.6 GHz	2		2.5	dB
3	Input Return Loss	S_{11}	0.7 – 1.6 GHz	18	16		dB
4	Output Return Loss	S_{22}	0.7 – 1.6 GHz	17	15		dB
5	Reverse Isolation	S_{12}	0.7 – 1.6 GHz	22	20		dB
6	Noise figure	NF	0.7 – 1.6 GHz	1.0		1.2	dB
7	Output Power 1dB compression Point	P_{1dB}	0.7 – 1.6 GHz		13		dBm
8	Output-Third-Order Interception point	IP_3	Two-Tone, P_{out} +0 dBm each, 1 MHz separation	26	24		dBm
9	Current Consumption	I_{dd}	V_{dd} = +5 V	30	25	35	mA
10	Power Supply Voltage	V_{dd}		+5	+4.5	+5.5	V
11	Thermal Resistance	$R_{th,c}$	Junction to case			215	$^{\circ}C/W$
12	Operating Temperature	T_o			-55	+100	$^{\circ}C$
13	Maximum Average RF Input Power	$P_{IN, MAX}$	0.7 – 1.6 GHz			10	dBm

b) Passband Frequency Response

As shown in **Figure 1**, the typical gain of the WEA103 is 17.0 dB across 0.70 to 1.6 GHz. The typical input and output return losses are 18 dB across the frequency of 0.70 to 1.6 GHz and is better than 14 dB across the frequency of 1.60 to 2.0 GHz.

Figure 2 shows the measured P_{1dB} and IP_3 of the WEA103. The typical P_{1dB} and IP_3 are 13 dBm and 26 dBm in the frequency range of 0.7 GHz to 1.6 GHz, respectively.

Figure 3 illustrates the measured noise figure performance. The noise figure is 1.0 dB across the frequency range of 0.70 to 1.6 GHz. At 85 $^{\circ}C$, WEA103 only has 0.20 dB noise increases. At -40 $^{\circ}C$, WEA103 offers approximately 0.15 dB less noise figure than that at room temperature.

Figure 4 is the plot of the stability factor k of WEA103. The amplifier is conditional stable due to k is less than 1 in some frequency ranges.

Figure 5 demonstrates the small signal performance of WEA103 at the extended frequency range.

Figure 6 shows the mechanical outline of WEA103. 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.

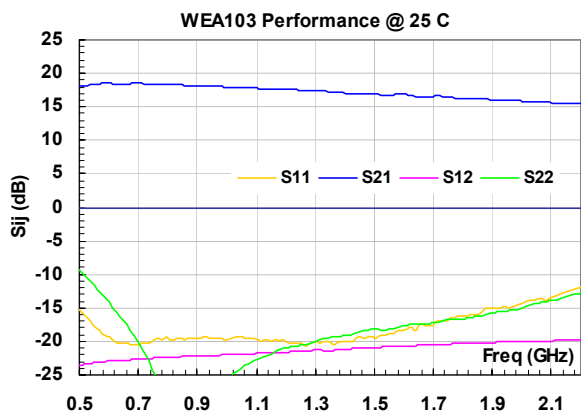


FIG. 1 Typical small signal performance.

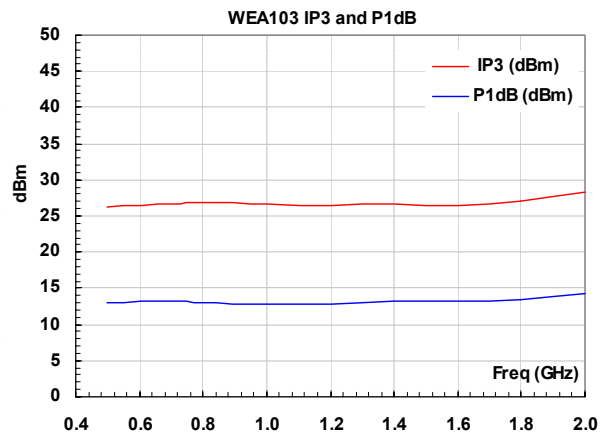


FIG. 2 Typical P_{1dB} and IP_3 at room temperature.

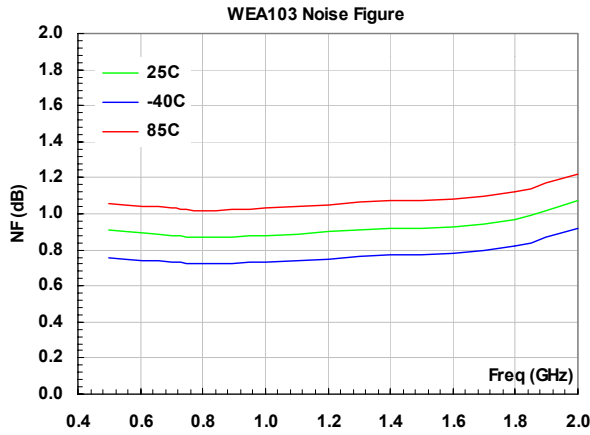


FIG. 3 Noise figure performance at full temperature

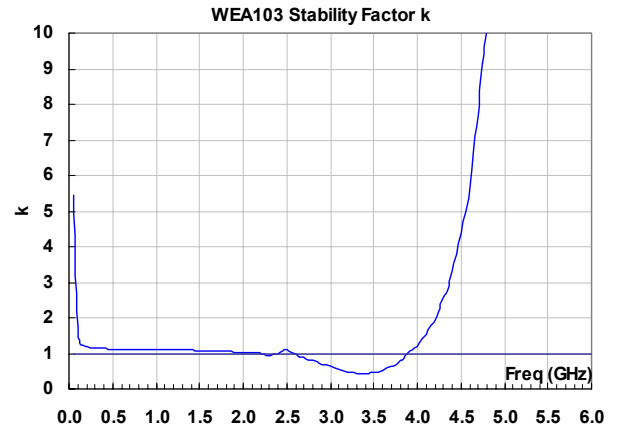


FIG. 4 Stability factor k of WEA103

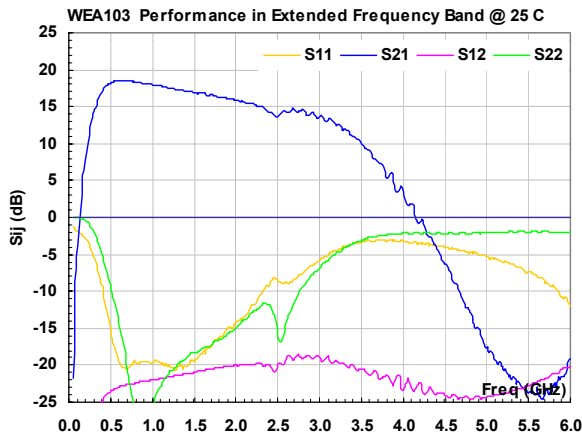


FIG. 5 Performance at the extended frequency band

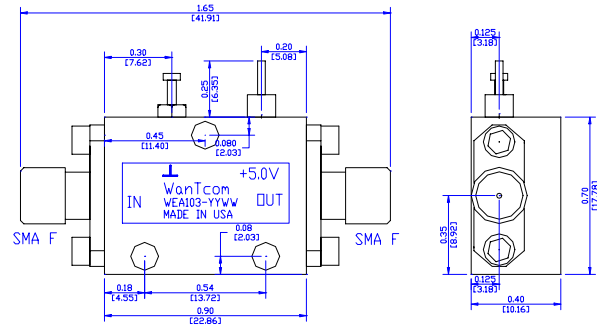


FIG. 6 WEA103 outline

WEA103 Mechanical Outline, WP-10E:

Fig. 6 shows the detail outline of WEA103. It is the WanTcom's standard LNA outline, WP-10E.

Ordering Information

Model Number	WEA103
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Small Signal S-Parameters:

IWEA103

Is-parameters at Vds=5V, Id=30 mA @ 25C

!Last updated 12/04/04.

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	0.875	143.9	0.084	52.8	0.0006	-129.3	0.999	-14.1
0.1	0.810	72.2	0.521	10.4	0.0039	-162.8	0.996	-28.7
0.2	0.722	-4.3	2.462	-45.2	0.0190	150.7	0.953	-60.8
0.3	0.545	-55.2	5.152	-91.6	0.0400	112.8	0.797	-96.6
0.4	0.333	-91.3	7.172	-131.9	0.0570	80.5	0.558	-130.2
0.5	0.174	-108.3	8.082	-164.7	0.0660	55.7	0.343	-158.1
0.6	0.109	-100.1	8.418	169.5	0.0710	38.0	0.195	178.7
0.7	0.094	-90.8	8.445	148.5	0.0740	24.2	0.099	155.3
0.8	0.106	-92.4	8.269	130.2	0.0750	12.7	0.036	118.1
0.9	0.104	-103.6	8.061	113.5	0.0770	2.8	0.025	7.5
1	0.107	-117.7	7.952	98.4	0.0800	-5.8	0.050	-33.5
1.1	0.103	-137.7	7.725	83.9	0.0810	-13.7	0.073	-49.9
1.2	0.101	-159.7	7.554	70.4	0.0830	-21.5	0.089	-65.1
1.3	0.099	178.0	7.367	57.5	0.0860	-29.0	0.100	-78.2
1.4	0.097	156.9	7.125	44.5	0.0870	-35.8	0.111	-87.6
1.5	0.107	135.0	6.999	31.6	0.0890	-42.9	0.121	-99.2
1.6	0.119	115.8	6.929	19.5	0.0910	-50.5	0.129	-113.3
1.7	0.139	97.1	6.755	7.8	0.0940	-58.0	0.137	-124.2
1.8	0.151	79.0	6.549	-4.6	0.0960	-65.1	0.147	-134.5
1.9	0.175	66.6	6.367	-17.2	0.0980	-72.5	0.162	-147.0
2	0.192	52.6	6.191	-29.2	0.1000	-80.4	0.178	-159.8
2.1	0.213	42.1	6.040	-41.9	0.1010	-87.7	0.201	-172.4
2.2	0.254	33.3	5.914	-53.7	0.1010	-95.4	0.228	171.3
2.3	0.305	21.1	5.715	-65.1	0.1020	-104.9	0.251	152.0
2.4	0.362	4.9	5.129	-76.5	0.1010	-111.8	0.255	128.2
2.5	0.378	-16.8	4.773	-83.6	0.1000	-111.1	0.165	111.9
2.6	0.357	-25.2	5.215	-95.8	0.1080	-117.9	0.189	134.0
2.7	0.381	-32.5	5.385	-110.3	0.1090	-129.6	0.270	123.8
2.8	0.418	-42.7	5.320	-123.3	0.1120	-141.5	0.337	108.8
2.9	0.466	-54.3	5.131	-136.7	0.1120	-152.8	0.401	92.8
3	0.514	-66.9	4.814	-150.4	0.1130	-163.3	0.459	75.9
3.1	0.556	-80.2	4.520	-165.0	0.1140	-172.4	0.514	59.4
3.2	0.593	-94.0	4.216	178.2	0.1070	179.3	0.570	42.9
3.3	0.642	-108.2	3.922	162.7	0.1030	168.6	0.619	25.5
3.4	0.669	-123.4	3.554	147.4	0.1010	159.5	0.661	8.3
3.5	0.677	-137.6	3.156	131.4	0.0940	153.1	0.695	-8.4
3.6	0.696	-151.9	2.834	117.6	0.0860	143.7	0.729	-25.4
3.7	0.701	-167.5	2.374	104.8	0.0840	131.8	0.750	-42.6
3.8	0.706	178.0	1.886	90.0	0.0840	126.5	0.760	-59.2
3.9	0.691	164.7	1.663	71.8	0.0760	120.7	0.774	-75.0
4	0.693	150.6	1.546	61.6	0.0680	107.4	0.781	-91.3
4.1	0.678	136.8	1.240	56.1	0.0700	93.1	0.780	-107.5
4.2	0.664	124.0	0.932	46.3	0.0750	86.7	0.777	-122.7
4.3	0.662	110.2	0.749	31.6	0.0690	80.7	0.783	-138.5
4.4	0.645	97.3	0.620	21.3	0.0630	67.8	0.781	-154.7
4.5	0.628	84.8	0.483	14.2	0.0630	54.9	0.776	-170.2
5	0.549	23.5	0.135	-13.7	0.0610	-4.4	0.787	117.1
5.5	0.428	-35.5	0.068	-41.3	0.0730	-71.6	0.794	49.1
6	0.253	-89.3	0.111	-158.3	0.0980	-133.1	0.779	-8.0
