



1.0-4.2 GHz LOW NOISE AMPLIFIER WEA112¹

WEA112 LNA is a low cost, low noise figure, wideband, and high linearity amplifier. The amplifier offers typical 1.5 dB noise figure and output IP₃ of 25 dBm at the frequency range from 1.0 GHz to 4.2 GHz and extendable to 4.5 GHz bands. WEA112 LNA is most suitable for 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:	1.5 dB
Output IP ₃ :	25 dBm
Gain:	25.0 dB
P _{1dB} :	13.0 dBm
Single power supply:	50 mA @ +5V
Frequency Range:	1.0 ~ 4.2 GHz
Operating Temperature:	-40 ~ +85 °C
Return Losses:	14.0 dB
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	60
P _{diss}	Total Power Dissipation	mW	400
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 WEA112 at room temperature

Index	Testing Item	Symbol	Test Constraints	Nom (RT)	Min	Max	Unit
1	Gain	S_{21}	1.0 – 4.2 GHz	25	24	27	dB
2	Gain Variation	ΔG	1.0 – 4.2 GHz	+/- 0.50		+/- 1	dB
3	Input VSWR	$VSWR_1$	1.0 – 4.2 GHz	1.35:1		1.5:1	
4	Output VSWR	$VSWR_2$	1.0 – 4.2 GHz	1.35:1		1.5:1	
5	Reverse Isolation	S_{12}	1.0 – 4.2 GHz	50	45		dB
6	Noise figure	NF	1.0 – 4.2 GHz	1.50			dB
7	Output Power 1dB compression Point	P_{1dB}	1.0 – 4.2 GHz	13	12		dBm
8	Output-Third-Order Interception point	IP_3	Two-Tone, $P_{out} = +0$ dBm each, 1 MHz separation	25	24		dBm
9	Current Consumption	I_{dd}	$V_{dd} = +5$ V	50	45	55	mA
10	Power Supply Voltage	V_{dd}		+5	+4.7	+5.3	V
11	Thermal Resistance	$R_{th,c}$	Junction to case			220	°C/W
12	Operating Temperature	T_o			-40	+85	°C
13	Maximum Average RF Input Power	$P_{IN, MAX}$	1.0 – 4.2 GHz			10	dBm

b) Passband Frequency Response

As shown in **Figure 1**, the typical gain of the WEA112 is 25.0 dB across 1.0 to 4.2 GHz. The typical input and output return losses are 16 dB across the frequency of 1.0 to 4.2 GHz.

Figure 2 shows the measured P_{1dB} and IP_3 of the WEA112. The typical P_{1dB} and IP_3 are 13 dBm and 25 dBm in the frequency range of 1.0 to 4.2 GHz, respectively.

Figure 3 illustrates the noise figure performance. The noise figure is 1.5 dB across the frequency range of 1.0 to 4.2 GHz. At 85 °C, WEA112 only has 0.20 dB noise increases. At -40 °C, WEA112 offers approximately 0.15 dB less noise figure than that at room temperature.

Figure 4 is the plot of the stability factor k of WEA112. The amplifier is conditional stable due to k is less than 1 in some frequency ranges.

Figure 5 demonstrates the small signal performance of WEA112 at the extended frequency range.

Figure 6 shows the mechanical outline of WEA112. 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.

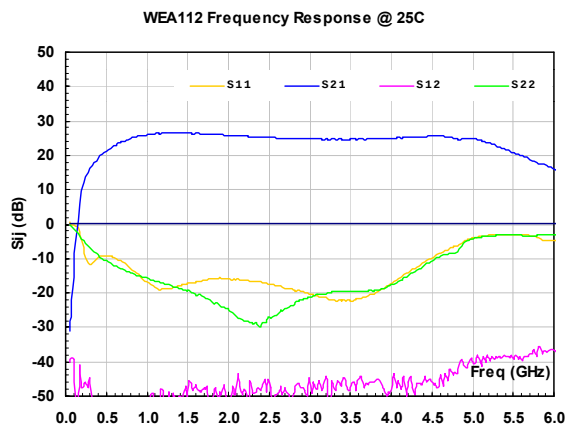


FIG. 1 Typical small signal performance.

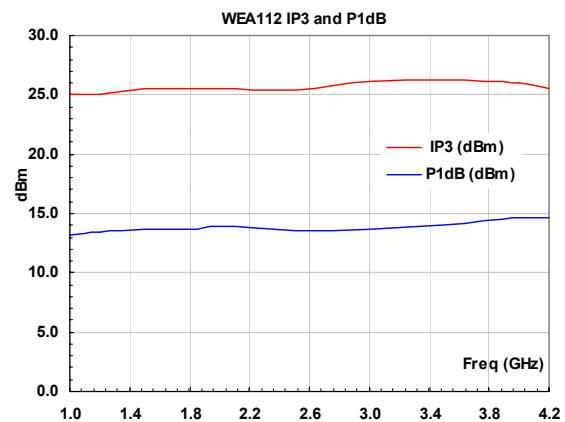


FIG. 2 Typical P_{1dB} and IP_3 at room temperature.

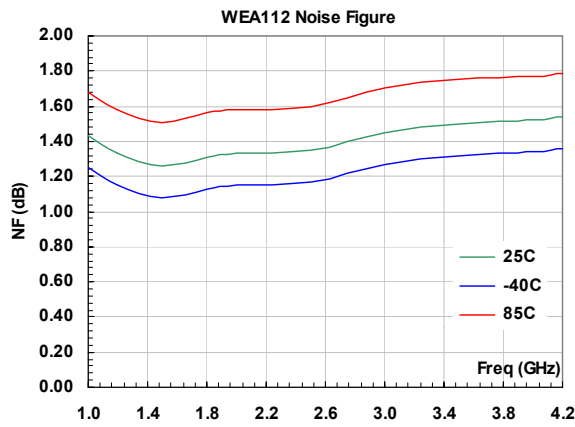


FIG. 3 Noise figure performance at full temperature

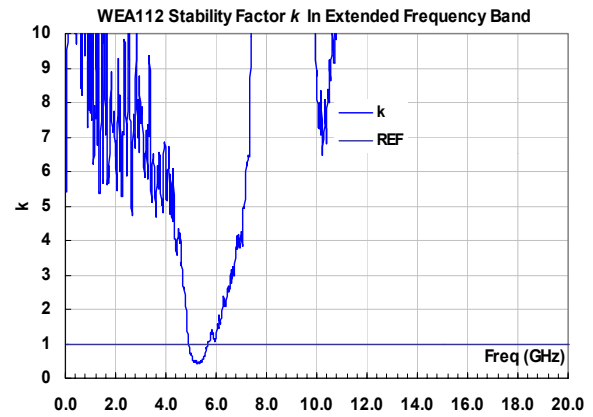


FIG. 4 Stability factor k of WEA112

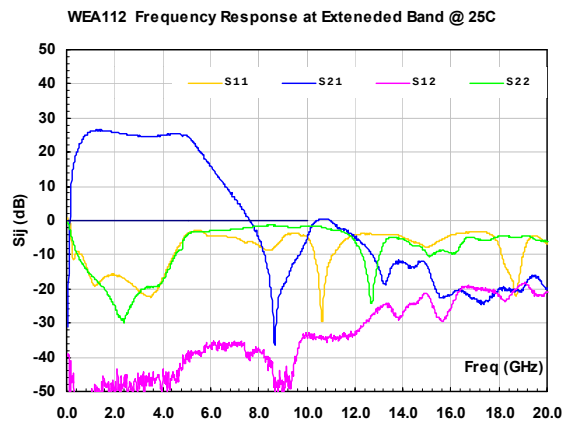


FIG. 5 Performance at the extended frequency band

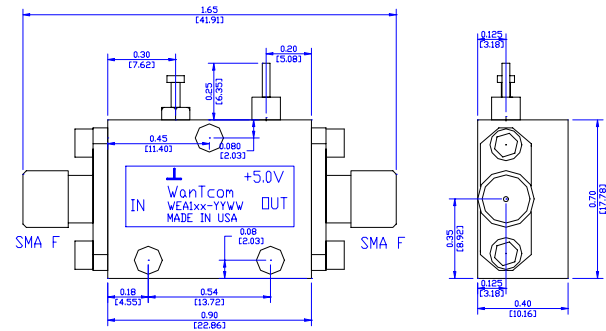


FIG. 6 WEA112 outline

WEA112 Mechanical Outline, WP-10E:

Fig. 6 shows the detail outline of WEA112. It is the WanTcom's standard LNA outline, WP-10E.

Ordering Information

Model Number	WEA112
--------------	--------



Small Signal S-Parameters:

IWEA112, @25C
Is-parameters at Vdd=5V, Idd=50 mA
!Last updated 12/11/04.

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	0.999	-15.4	0.028	-171.8	0.0080	-6.8	0.921	-31.6
0.1	0.997	-38.3	0.236	-72.0	0.0042	-82.7	0.866	-56.6
0.2	0.614	-89.3	2.992	-158.2	0.0014	156.8	0.612	-98.9
0.3	0.260	-74.6	6.467	131.4	0.0024	75.9	0.452	-130.3
0.4	0.326	-69.0	9.018	90.7	0.0014	176.0	0.353	-154.7
0.5	0.350	-84.8	11.540	59.8	0.0035	14.8	0.293	-176.2
0.6	0.322	-103.3	13.689	33.1	0.0008	-135.0	0.249	165.0
0.7	0.283	-119.0	15.806	9.8	0.0022	60.5	0.219	148.3
0.8	0.226	-132.1	17.589	-12.2	0.0022	92.2	0.196	132.4
0.9	0.180	-142.8	19.014	-33.5	0.0017	118.2	0.176	118.1
1	0.145	-146.6	19.785	-53.4	0.0031	40.4	0.163	106.6
1.1	0.121	-145.3	20.391	-71.9	0.0033	50.4	0.149	94.5
1.2	0.115	-141.4	20.938	-90.0	0.0034	20.5	0.140	83.3
1.3	0.118	-141.0	21.013	-107.6	0.0021	13.4	0.125	72.0
1.4	0.130	-144.8	20.832	-123.6	0.0046	38.0	0.118	62.4
1.5	0.138	-148.4	20.761	-138.7	0.0025	15.7	0.107	53.5
1.6	0.146	-159.0	20.749	-153.5	0.0017	42.0	0.092	43.3
1.7	0.153	-166.4	20.505	-168.6	0.0019	45.3	0.087	37.5
1.8	0.157	-176.2	20.034	177.3	0.0042	9.8	0.075	27.7
1.9	0.161	172.6	19.819	163.5	0.0033	5.9	0.067	21.8
2	0.159	163.2	19.585	149.7	0.0032	7.6	0.054	19.4
2.1	0.155	152.5	19.217	136.6	0.0046	-9.0	0.045	20.1
2.2	0.153	141.8	18.906	123.6	0.0043	3.3	0.039	23.0
2.3	0.151	130.8	18.644	111.0	0.0050	-15.7	0.035	29.3
2.4	0.143	119.7	18.419	98.5	0.0025	-6.7	0.035	37.4
2.5	0.134	109.4	18.161	86.0	0.0045	-31.7	0.044	50.7
2.6	0.126	98.4	17.912	73.9	0.0033	-33.4	0.049	52.2
2.7	0.120	87.5	17.750	61.9	0.0060	-21.9	0.061	51.3
2.8	0.113	78.0	17.637	50.1	0.0039	-13.7	0.067	46.1
2.9	0.104	66.2	17.472	37.7	0.0037	-34.0	0.077	39.3
3	0.095	55.8	17.294	25.7	0.0030	-36.9	0.087	33.0
3.1	0.089	44.1	17.192	14.0	0.0036	-31.1	0.096	25.8
3.2	0.083	29.1	17.280	1.9	0.0048	-44.9	0.100	17.0
3.3	0.080	16.6	17.242	-10.4	0.0044	-36.1	0.105	10.0
3.4	0.079	2.9	17.095	-22.2	0.0029	-43.8	0.107	3.3
3.5	0.076	-11.4	17.078	-33.9	0.0055	-53.5	0.105	-3.4
3.6	0.082	-27.2	17.106	-45.9	0.0049	-54.4	0.106	-7.7
3.7	0.090	-42.4	17.092	-58.3	0.0049	-57.6	0.107	-10.3
3.8	0.100	-57.7	17.198	-70.6	0.0042	-62.8	0.112	-12.7
3.9	0.114	-71.6	17.375	-82.8	0.0055	-60.5	0.116	-12.7
4	0.140	-85.0	17.690	-95.3	0.0041	-60.7	0.127	-13.4
4.1	0.164	-97.1	17.895	-108.6	0.0046	-63.8	0.148	-15.9
4.2	0.195	-108.7	18.068	-121.8	0.0056	-64.3	0.173	-19.4
4.3	0.232	-121.1	18.277	-135.3	0.0053	-63.5	0.208	-25.2
4.4	0.277	-132.5	18.631	-149.5	0.0057	-81.2	0.246	-33.2
4.5	0.325	-144.9	18.917	-164.9	0.0058	-61.7	0.292	-43.0
5	0.619	150.6	17.399	115.4	0.0110	-78.9	0.606	-101.8
5.5	0.715	87.0	10.916	33.8	0.0120	-117.9	0.689	-175.6
6	0.590	44.2	6.272	-34.3	0.0180	-152.7	0.704	129.9
