Wan7com, Inc.

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1.5-1.7 GHZ LOW NOISE 4-WATTS POWER AMPLIFIER WBPA1517A[1]

WBPA1517A low noise power amplifier is a low noise figure, high power, and high linearity amplifier with unconditional stable design. The amplifier offers typical 1.70 dB noise figure, 36.0 dBm output P_{1dB}, and 51.0 dBm output IP_3 at the frequency range from 1.50 GHz to 1.70 GHz. WBPA1517A is most suitable for L band communication systems and wireless measurement applications.

Additional heat sink required for the normal continuous operation!

Key Features:

Impedance:	50 Ohm
Unconditional Stability:	k>1
Low Noise:	1.70 dB @ room temperature
Output IP_3:	51.0 dBm typical
Gain:	27.0 dB
P_{1dB}:	**36.0 dBm**
Single Power Supply:	1.15 A @ +10V
Frequency Range:	1.50 ~ 1.70 GHz
Operating Temperature:	-40 ~ +85 ºC
Return Losses:	>14 dB
Built-in Functions:	DC-DC converter, sequencing DC biases, temperature compensation circuitry, auto-DC biases circuitry, etc.

Absolute Maximum Ratings[2]:

Symbol	Parameters	Units	Absolute Maximum
V_{dd}	DC Power Supply Voltage	V	12.0
I_{dd}	DC Bias Current	A	1.2
P_{diss}	Total Power Dissipation	W	12
$P_{In,Max}$	RF Input Power	dBm	20
T_{ch}	Channel Temperature	°C	150
T_{STG}	Storage Temperature	°C	-55 ~ 125
$T_{O,MAX}$	Maximum Operating Case Temperature	°C	-40 ~ 85
$R_{th,c}$	Thermal Resistance[3]	°C/W	9

[1] Specifications are subject to change without notice.
[2] Operation of this device above any one of these parameters may cause permanent damage.
[3] Channel-to-case

Specifications:

Table 1 Summary of the electrical specifications WBPA1517A at room temperature

Index	Testing Item	Symbol	Test Constraints	Nom (RT)	Min	Max	Unit
1	Gain	S_{21}	1.50 – 1.70 GHz	27.5	26.5	28.5	dB
2	Gain Variation	ΔG	1.50 – 1.70 GHz	+/-0.30		+/-0.50	dB
3	Input Return Loss	S_{11}	1.50 – 1.70 GHz	18	14		dB
4	Output Return Loss	S_{22}	1.50 – 1.70 GHz	20	16		dB
5	Reverse Isolation	S_{12}	1.50 – 1.70 GHz	48	45		dB
6	Noise figure	NF	1.50 – 1.70 GHz	1.7		2.0	dB
7	Output 1 dB Power Compression Point	P_{1dB}	1.50 – 1.70 GHz	36	35		dBm
8	Output-Third-Order Interception point	IP_3	Two-Tone, +24 dBm each, 1 MHz separation	51	49		dBm
9	Current Consumption	I_{dd}	V_{dd}= +10 V	1.15	1.10	1.20	A
10	Power Supply Voltage	V_{dd}		+10	+9.0	+11.0	V
11	Operating Temperature	T_o			-40	+85	^oC
12	Maximum Average RF Input Power	$P_{IN, MAX}$	1.50 – 1.70 GHz			15	dBm

a) Passband Frequency Response

As shown in **Figure 1**, the typical gain of the WBPA1517A is 27.5 dB across 1.5 GHz to 1.7 GHz. The typical input and output return losses are 18 dB and 20 dB across the frequency of 1.5 GHz to 1.7 GHz, respectively.

Figure 2 shows the measured P_{1dB} and IP_3 of the WBPA1517A. The typical P_{1dB} is 36.0 dBm. The IP_3 is 51.0 dBm with total output power of 27 dBm and 49.0 dBm with the total output power of 30.0 dBm in the frequency range of 1.5 GHz to 1.7 GHz, respectively.

Figure 3 illustrates the measured noise figure performance at full temperature. The noise figure is 1.70 dB across the frequency range of 1.5 GHz to 1.7 GHz at room temperature. At 85 ^{0}C, WBPA1517A only has 0.30 dB noise increases. At –40 ^{0}C, WBPA1517A offers approximately 0.25 dB less noise figure than that at room temperature.

Figure 4 demonstrates the stability factor ***k*** of the amplifier. The amplifier is unconditional stable since ***k*** is great than 1.

Figure 5 shows the mechanical outline of WBPA1517A. It is a WanTcom's standard WP-6 connectorized housing.

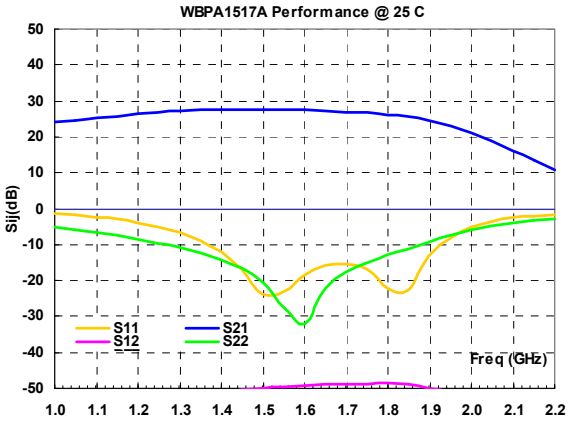

FIG. 1 Small signal performance.

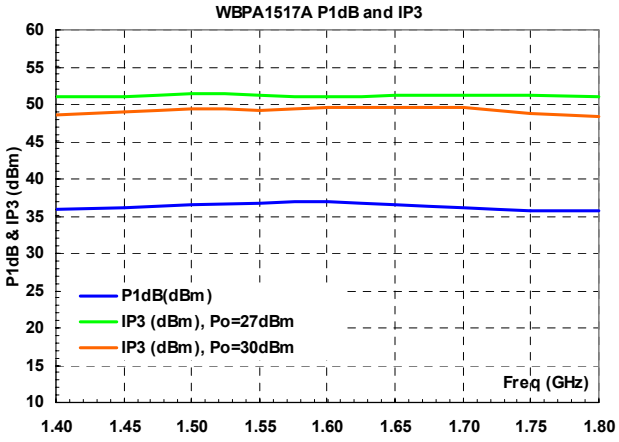

FIG. 2 P_{1dB} and IP_3 at room temperature.

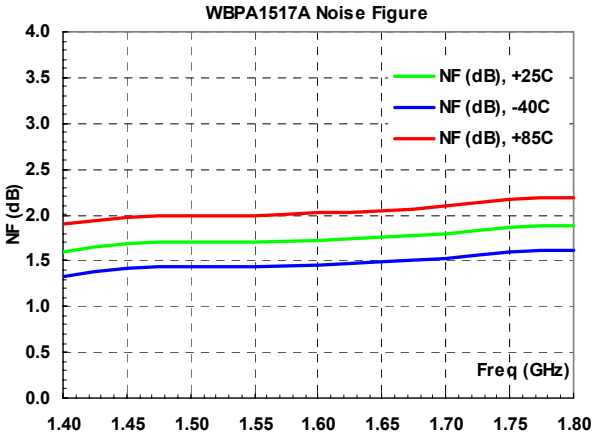

FIG. 3 Noise figure performance at full temperature

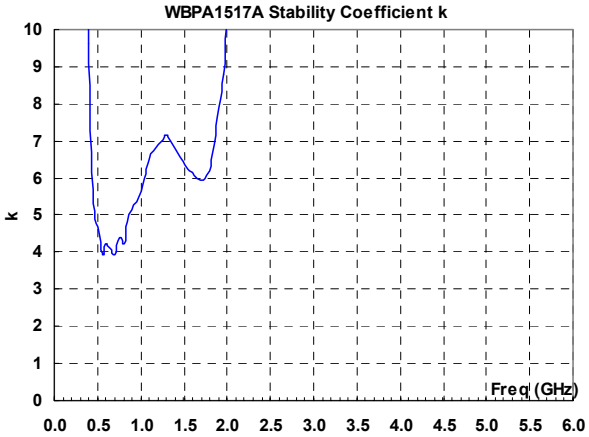

FIG. 4 Stability factor ***k***

b) WBPA1517A Mechanical Outline: WP-6

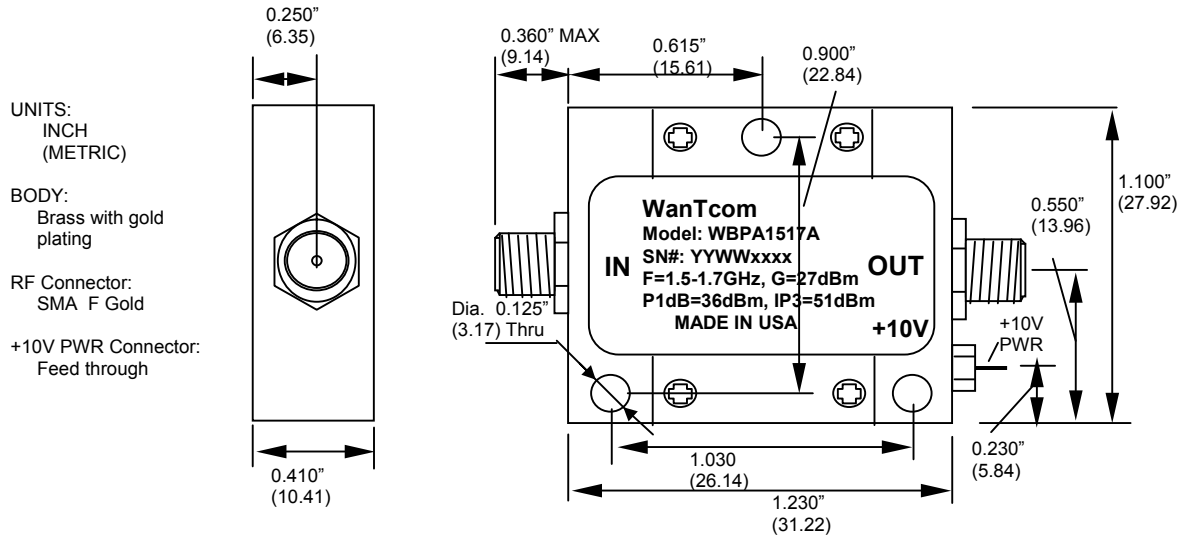

FIG. 5 WP-6 Outline

Ordering Information

Model Number	WBPA1517A

Small Signal S-Parameters:

!WBPA1517A
!s-parameters at V_{dd}=+10V, I_{dd}=1.15A. Last updated 3/10/04.

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	0.787	-18.8	0.221	-121.1	0.0000	62.3	0.996	-15.6
0.1	0.803	-29.4	0.438	148.2	0.0000	-153.1	0.988	-25.9
0.2	0.883	-59.9	1.121	130.1	0.0000	-57.5	0.990	-51.2
0.3	0.912	-90.5	2.313	100.4	0.0001	-151.8	0.974	-76.5
0.4	0.944	-116.8	4.328	64.3	0.0001	-173.6	0.954	-101.6
0.5	0.957	-141.5	6.675	27.4	0.0003	168.9	0.907	-125.5
0.6	0.951	-163.6	8.586	-8.1	0.0004	146.6	0.849	-148.0
0.7	0.945	176.0	10.276	-40.8	0.0005	135.7	0.782	-168.8
0.8	0.928	156.4	12.059	-71.3	0.0007	122.8	0.709	171.5
0.9	0.895	136.6	13.957	-100.4	0.0008	110.9	0.632	153.1
1	0.844	116.8	16.018	-129.5	0.0011	92.1	0.551	135.4
1.1	0.760	95.8	18.285	-159.9	0.0014	78.6	0.463	119.1
1.2	0.634	73.4	20.802	167.7	0.0018	66.2	0.375	104.0
1.3	0.461	49.7	22.906	133.3	0.0022	42.4	0.289	89.8
1.4	0.247	28.7	24.072	96.6	0.0028	20.9	0.196	76.0
1.5	0.064	46.0	24.263	59.0	0.0032	-5.9	0.094	63.9
1.6	0.122	118.2	23.503	20.7	0.0034	-35.8	0.025	-180.0
1.7	0.169	101.7	22.277	-19.0	0.0036	-67.8	0.130	-165.8
1.8	0.076	92.7	20.427	-62.3	0.0037	-106.3	0.230	-175.9
1.9	0.219	-168.6	16.694	-110.0	0.0032	-153.2	0.343	175.6
2	0.542	157.9	11.198	-157.8	0.0023	156.3	0.499	161.2
2.1	0.737	127.2	6.337	161.6	0.0014	118.1	0.633	142.4
2.2	0.828	104.2	3.408	131.2	0.0010	85.9	0.722	124.6
2.3	0.873	86.2	1.852	107.7	0.0006	61.7	0.782	109.0
2.4	0.901	70.8	1.022	87.2	0.0006	55.6	0.823	94.9
2.5	0.913	57.5	0.590	68.8	0.0006	63.0	0.853	82.0
2.6	0.926	44.8	0.338	52.3	0.0006	60.4	0.876	69.9
2.7	0.927	33.2	0.183	36.4	0.0007	50.3	0.892	58.7
2.8	0.934	22.3	0.092	10.5	0.0009	60.1	0.905	47.9
2.9	0.939	11.7	0.052	-29.0	0.0010	45.1	0.916	37.2
3	0.943	1.2	0.040	-75.9	0.0011	40.4	0.923	27.2
3.1	0.942	-8.6	0.043	-108.1	0.0014	33.6	0.931	17.6
3.2	0.941	-18.0	0.043	-124.2	0.0015	25.2	0.936	7.9
3.3	0.945	-27.6	0.044	-132.1	0.0017	18.6	0.938	-1.7
3.4	0.949	-37.5	0.043	-131.8	0.0018	9.9	0.936	-10.8
3.5	0.942	-46.8	0.042	-134.9	0.0019	3.0	0.935	-19.7
3.6	0.948	-55.9	0.046	-138.2	0.0020	-1.9	0.934	-28.7
3.7	0.943	-64.8	0.046	-139.7	0.0023	-5.2	0.934	-37.3
3.8	0.950	-74.1	0.045	-135.8	0.0024	-14.0	0.934	-45.9
3.9	0.956	-82.9	0.042	-136.0	0.0026	-18.9	0.933	-54.6
4	0.945	-91.8	0.045	-138.7	0.0030	-23.8	0.935	-63.0
4.1	0.950	-100.9	0.044	-135.8	0.0034	-25.4	0.934	-71.4
4.2	0.948	-109.8	0.045	-130.1	0.0036	-36.0	0.932	-80.0
4.3	0.945	-118.8	0.045	-130.3	0.0040	-42.9	0.931	-88.6
4.4	0.946	-127.9	0.046	-131.2	0.0046	-54.1	0.930	-97.0
4.5	0.943	-136.6	0.048	-128.1	0.0050	-62.7	0.922	-105.6
5	0.931	178.9	0.051	-130.7	0.0043	-100.2	0.924	-145.6
5.5	0.918	134.3	0.058	-138.7	0.0060	-126.5	0.920	171.8
6	0.834	90.4	0.051	-151.0	0.0098	-158.0	0.900	128.4

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