Wan7com, Inc.

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2.2 – 2.5 GHz 4.0 WATTS LOW NOISE POWER AMPLIFIER WBPA2225A[1]

WBPA2225A is a low noise figure, high power, and high linearity connectorized amplifier with unconditional stable design. The amplifier offers typical 1.50 dB noise figure, 23 dB gain, 36.0 dBm $P_{1dB,}$ and 49.0 dBm output IP_3 at the frequency range from 2.2 GHz to 2.5 GHz. WBPA2225A is most suitable for cellular base stations, wireless data communications, tower top amplifiers, last-mile wireless communication systems, and wireless measurement applications.

Additional heat sink required for the normal continuous operation!

Key Features:

Impedance:	50 Ohm
Output Protection:	Protection up to load VSWR of ∞:1
MTBF[2]:	>300,000 hrs (34 Years)
Low Noise:	1.50 dB
Output IP_3:	49.0 dBm
Gain:	23.0 dB
P_{1dB}:	36.0 dBm
Single Power Supply:	1.05 A @ +10.0V
Frequency Range:	2.2 ~ 2.5 GHz
Operating Temperature:	-40 ~ +65 ºC
Input VSWR:	1.5:1
Output VSWR:	1.5:1
RF IN/OUT:	SMA Female
Built-In Functions:	DC blocks at input and output, DC-DC converter, sequencing biases, temperature compensation circuits, Output Protection, and auto DC biases.

Absolute Maximum Ratings[3]:

Symbol	Parameters	Units	Absolute Maximum
V_{dd}	DC Power Supply Voltage	V	12.0
I_{dd}	Drain Current	A	1.15
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	°C/W	9

[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 WBPA2225A at room temperature

Index	Testing Item	Symbol	Test Constraints	Nom (RT)	Min	Max	Unit
1	Gain	S_{21}	2.2 – 2.5 GHz	23	22	25	dB
2	Gain Variation	ΔG	2.2 – 2.5 GHz	+/- 0.10		+/- 0.25	dB
3	Input VSWR	SWR_1	2.2 – 2.5 GHz	1.5:1		2:1	
4	Output VSWR	SWR_2	2.2 – 2.5 GHz	1.5:1		2:1	
5	Reverse Isolation	S_{12}	2.2 – 2.5 GHz	43	40		dB
6	Noise figure	NF	2.2 – 2.5 GHz	1.50		2.0	dB
7	Output Power 1dB compression Point	P_{1dB}	2.2 – 2.5 GHz	36.0	35.0		dBm
8	Output-Third-Order Interception point	IP_3	Two-Tone, P_{out} = +24 dBm each, 1 MHz separation	49.0	46.0		dBm
9	Current Consumption	I_{dd}	V_{dd}= +10 V	1.05		1.1	A
10	Power Supply Voltage	V_{dd}		+10	+9	+11	V
11	Thermal Resistance	$R_{th,c}$	Junction to case			9	$^oC/W$
12	Operating Case Temperature	T_o			-40	+65	^oC
13	Maximum Average RF Input Power	$P_{IN, MAX}$	2.2 – 2.5 GHz			20	dBm

b) Passband Frequency Response

As shown in **Figure 1**, the typical gain of WBPA2225A is 23.0 dB across 2.2 to 2.5 GHz. The typical input and output return losses are 20 dB across the frequency of 2.2 to 2.5 GHz.

Figure 2 shows the measured P_{1dB} and IP_3 of WBPA2225A. The typical P_{1dB} and IP_3 are 36.0 dBm and 49.0 dBm in the frequency range of 2.2 to 2.5 GHz, respectively.

Figure 3 illustrates the measured noise figure performance at full temperature. The noise figure is 1.50 dB across the frequency range of 2.2 to 2.5 GHz at room temperature. At 65 ^{0}C, WBPA2225A only has 0.30 dB noise increases. At –40 ^{0}C, WBPA2225A offers approximately 0.25 dB less noise figure than that at room temperature.

Figure 4 demonstrates the stability factor ***k*** of the amplifier. It is greater than 1.0 in full frequency band and the amplifier is unconditional stable.

Figure 5 is the frequency response of WBPA2225A in the extended frequencies.

Figure 6 shows the internal block diagram of WBPA2225A. It is a two-stage amplifier with DC-DC converter, auto bias, and output load protection built-in.

Figure 7 shows the mechanical outline and recommended motherboard layout of WBPA2225A. It is the standard WP-6 connectorized compact housing.

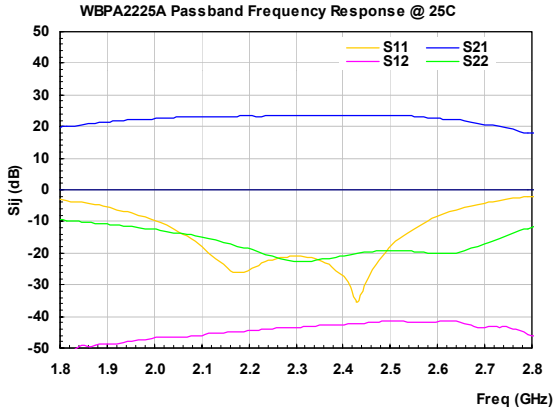

FIG. 1 Typical small signal performance.

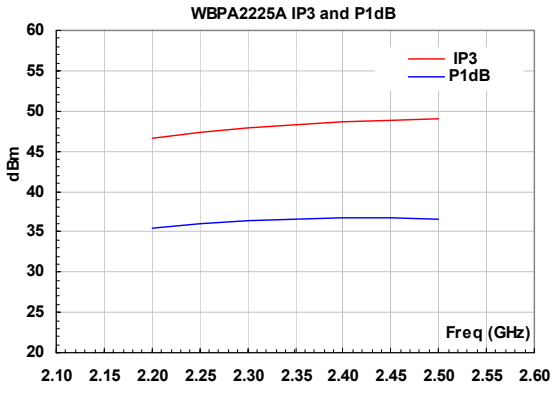

FIG. 2 Typical P_{1dB} and IP_3 at room temperature.

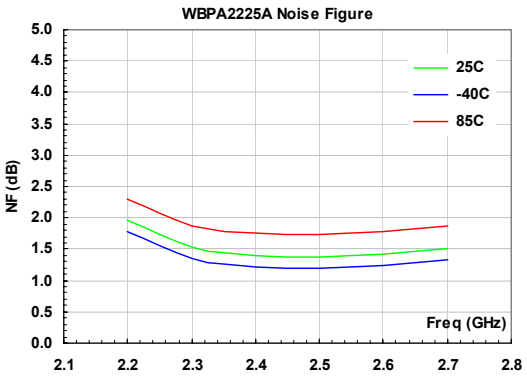

FIG. 3 Noise figure performance at full temperature

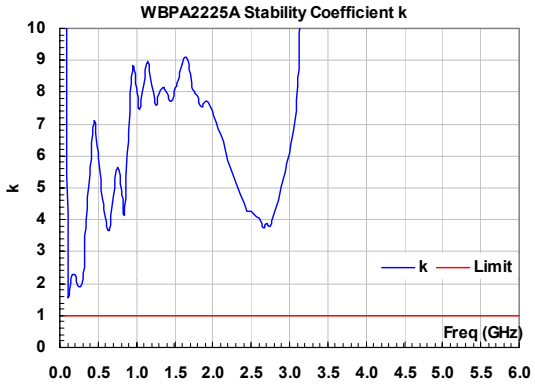

FIG. 4 Stability factor ***k***

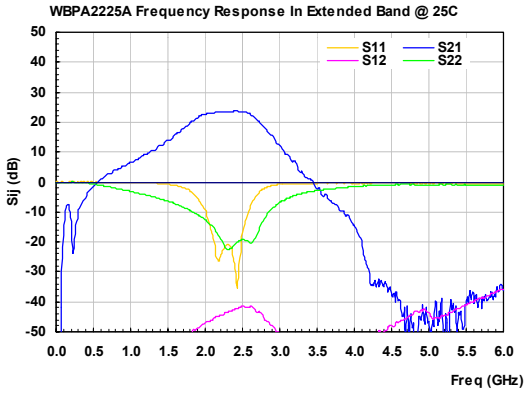

FIG. 5 Frequency response in the extended frequencies

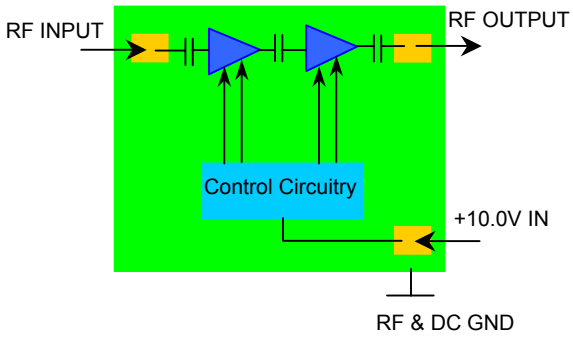

FIG. 6 Block diagram of WBPA2225A

c) WBPA2225A Mechanical Outline: WP-6

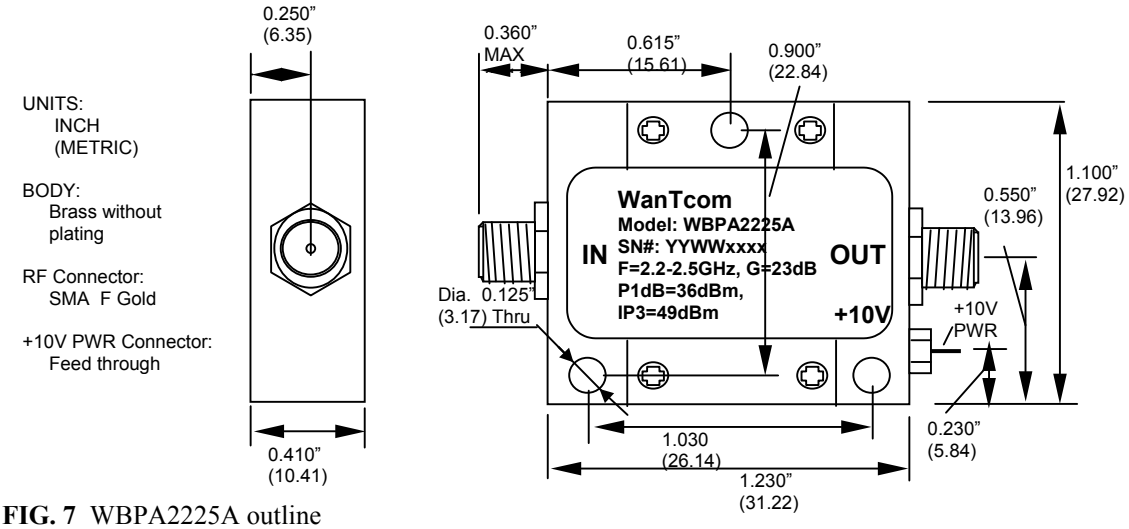

FIG. 7 WBPA2225A outline

Ordering Information

Model Number	WBPA2225A

Small Signal S-Parameters:

! WBPA2225A
! Vdd = +10.0 V, Id = 1.05 A, Last Updat: 7/16/05
Ghz s ma r 50

0.05	0.999	-5.3	0.003	84.5	0.000056	-77.5	0.998	-13.0
0.15	0.999	-15.9	0.419	178.0	0.000057	-48.1	0.986	-37.7
0.25	0.998	-26.3	0.125	151.2	0.000083	-104.1	0.997	-63.3
0.35	0.997	-37.1	0.453	110.9	0.000049	95.4	0.982	-88.4
0.45	0.996	-47.7	0.712	80.6	0.000085	-92.3	0.951	-112.3
0.55	0.996	-58.7	0.971	52.0	0.000139	167.2	0.908	-134.5
0.65	0.996	-69.4	1.188	27.0	0.000215	164.5	0.858	-155.1
0.75	0.993	-80.9	1.425	5.3	0.000298	-172.8	0.808	-174.0
0.85	0.994	-92.5	1.680	-15.1	0.000338	160.8	0.759	168.3
0.95	0.985	-103.4	1.954	-34.1	0.000412	149.1	0.713	151.9
1.05	0.981	-115.6	2.263	-51.9	0.000597	137.9	0.668	136.3
1.15	0.975	-127.1	2.675	-69.6	0.000612	136.2	0.626	121.8
1.25	0.968	-140.0	3.096	-88.2	0.000858	121.8	0.584	107.6
1.35	0.956	-153.4	3.584	-104.9	0.001020	115.8	0.541	94.0
1.45	0.937	-167.2	4.466	-123.2	0.001294	99.6	0.499	80.5
1.55	0.904	177.5	5.403	-144.4	0.001572	94.4	0.454	67.7
1.65	0.850	159.9	6.762	-167.6	0.001857	85.0	0.406	55.1
1.75	0.766	140.3	8.494	167.8	0.002587	70.8	0.357	43.1
1.85	0.624	118.9	10.653	139.1	0.003387	58.7	0.309	31.6
1.95	0.430	94.0	12.664	106.3	0.003914	39.4	0.259	20.7
2.05	0.226	74.7	13.748	72.8	0.004682	21.2	0.206	10.1
2.15	0.066	89.7	14.293	39.4	0.005489	0.2	0.147	2.6
2.25	0.078	150.3	14.492	7.6	0.006227	-22.8	0.091	8.7
2.35	0.077	146.2	14.684	-25.8	0.007030	-46.1	0.082	37.3
2.45	0.039	-101.5	14.758	-60.8	0.007938	-73.5	0.106	45.6
2.55	0.242	-105.2	14.416	-99.6	0.007935	-108.3	0.108	44.0
2.65	0.513	-134.9	12.392	-139.6	0.008084	-146.8	0.105	66.2
2.75	0.714	-165.8	9.281	-177.3	0.006789	179.3	0.192	75.3
2.85	0.834	170.0	6.548	151.7	0.004516	155.1	0.306	60.1
2.95	0.892	148.8	4.586	120.8	0.003253	126.2	0.407	40.0
3.05	0.914	130.7	3.246	95.4	0.002721	106.1	0.489	19.1
3.15	0.933	116.4	2.276	71.0	0.001840	94.2	0.558	-2.7
3.25	0.949	101.3	1.622	46.5	0.001398	61.4	0.615	-24.8
3.35	0.921	88.7	1.203	33.5	0.001280	41.9	0.661	-47.7
3.45	0.949	78.1	1.009	8.6	0.001046	28.2	0.699	-71.4
3.55	0.952	67.2	0.735	-11.0	0.000657	6.6	0.730	-96.3
3.65	0.951	55.3	0.545	-27.7	0.000250	-23.5	0.755	-122.0
3.75	0.962	45.3	0.427	-44.9	0.000308	-54.6	0.781	-148.3
3.85	0.952	34.8	0.321	-69.5	0.000519	175.0	0.802	-174.6
3.95	0.949	25.1	0.225	-104.3	0.001157	142.8	0.825	159.9
4.05	0.950	16.0	0.131	-133.1	0.001825	126.5	0.843	135.1
4.15	0.954	6.0	0.050	-160.5	0.002287	106.7	0.863	111.7
4.25	0.960	-3.1	0.018	-133.2	0.002565	93.5	0.879	90.1
4.35	0.966	-13.1	0.020	-129.5	0.003087	78.4	0.888	70.1
4.45	0.962	-23.0	0.016	-142.0	0.003718	72.1	0.900	51.2
4.95	0.941	-71.3	0.007	-9.4	0.006986	0.0	0.892	-21.6
5.45	0.950	-119.4	0.006	-27.1	0.008461	-19.2	0.899	-80.7
5.95	0.928	-166.3	0.012	-73.8	0.016000	-63.3	0.877	-132.8
6	0.928	-171.5	0.015	-87.8	0.017000	-68.2	0.862	-137.9

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