Wan7com, Inc.

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0.4 – 2.7 GHz 2 WATTS LOW NOISE POWER AMPLIFIER WBPA0527A[1]

WBPA0527A is a low noise figure, wideband, and high linearity class A power amplifiers with unconditional stable design. The amplifier offers typical 2.2 dB noise figure, 33.0 dBm output P_{1dB}, 36.0 dB gain, and 45 dBm output IP_3 at the frequency range from 0.4 GHz to 2.7 GHz.

WBPA0527A is most suitable for cellular base stations, wireless data communications, tower top amplifiers, cellular micro-cells, last-mile wireless communication systems, MMDS, WLL, and wireless measurement applications.

WBPA0527A is designed to meet the rugged standards of MIL-STD-202 and MIL-STD-810F.

Key Features:

Additional heat sink required!

Preliminary

Impedance:	50 Ohm
MTBF[2]:	>150,000 hrs (17 Years)
Unconditional Stable:	k>1
Built-In Output Load Protection:	up to 10:1 VSWR
Low Noise:	2.2 dB
Output IP_3:	45 dBm typical
Gain:	36 dB
Input VSWR:	1.8:1
Output VSWR:	1.8:1
P_{1dB}:	33 dBm typical
Single Power Supply:	620 mA, @ +12V
Frequency Range:	0.4 ~ 2.7 GHz
Operating Temperature:	-40 ~ +85 ºC
Built-In Functions:	DC blocks at input and output, DC-DC converter, sequencing biases, temperature compensation circuits, and auto DC biases.

Absolute Maximum Ratings[3]:

Symbol	Parameters	Units	Absolute Maximum
V_{dd}	DC Power Supply Voltage	V	12.5
I_{dd}	DC Current	mA	700
P_{diss}	Total Power Dissipation	W	8.0
$P_{In,Max}$	RF Input Power	dBm	10
T_{ch}	Channel Temperature	°C	175
T_{STG}	Storage Temperature	°C	-55 ~ 125
$T_{O,MAX}$	Maximum Operating Temperature	°C	-40 ~ 65
$R_{th,c}$	Case-Channel Thermal Resistance	°C/W	20

[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 of WBPA0527A at room temperature

Index	Testing Item	Symbol	Test Constraints	Nom	Min	Max	Unit
1	Gain	S_{21}	0.4 – 2.7 GHz	36	34	38	dB
2	Gain Variation	ΔG	0.4 – 2.7 GHz	+/- 0.75		+/- 1.5	dB
3	Input VSWR	SWR_1	0.4 – 2.7 GHz		2:1		
4	Output VSWR	SWR_2	0.4 – 2.7 GHz		2:1		
5	Reverse Isolation	S_{12}	0.4 – 2.7 GHz	70	60		dB
6	Noise figure	NF	0.4 – 2.7 GHz	2.2		2.8	dB
7	Output P_{1dB} compression	P_{1dB}	0.4 – 2.7 GHz	33	31		dBm
8	Output-Third-Order Interception point	$TOIP_3$	Two-Tone, P_{out} = +20 dBm each, 1 MHz separation	45	43		dBm
9	Maximum RF Input Power	$P_{IN,MAX}$	0.4 – 2.7 GHz			10	dBm
10	Maximum Load Mismatch	$SWR_{2,MAX}$	0.4 – 2.7 GHz			10:1	
11	Current Consumption	I_{dd}	V_{dd}= +12 V	620			mA
12	Power Supply Voltage	V_{dd}		+12.0	+11.8	+12.2	V
13	Operating Temperature	T_o			-40	+65	°C

b) Passband Frequency Response

As shown in **Figure 1**, the typical gain of the WBPA0527A is 36.0 dB across 0.40 to 2.7 GHz. The typical input and output VSWR are 1.8:1 across the frequency of 0.40 to 2.7 GHz.

Figure 2 shows the P_{1dB} and IP_3 of the WBPA0527A. The typical P_{1dB} and IP_3 are 33.0 dBm and 45.0 dBm in the frequency range of 0.40 to 2.7 GHz, respectively.

Figure 3 illustrates the noise figure performance. The noise figure is 2.2 dB across the frequency range of 0.40 to 2.7 GHz 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 WBPA0527A in the extended frequencies. The amplifier works from 0.2 to 2.9 GHz.

Figure 6 shows the internal block diagram of WBPA0527A.

Figure 7 shows the mechanical outline of WBPA0527A. It is a standard WP-9 connectorized housing. For normal operation, an additional heat sink is required to avoid over heat of the power amplifier. The case to air thermal resistance of the heat sink should be better than 3 °C/W. A forced airflow such as a fan will help to reduce the heat sink size.

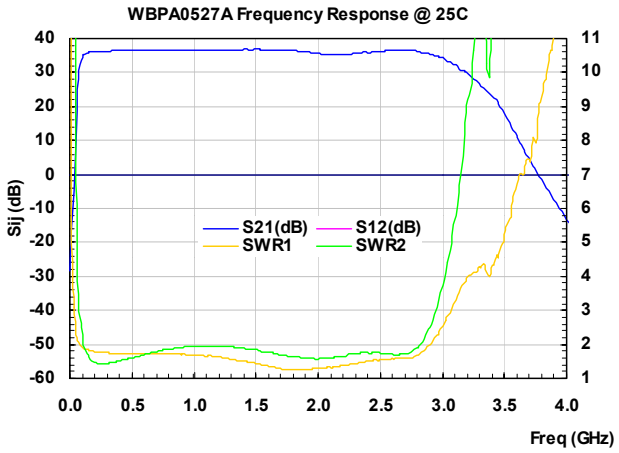

FIG. 1 Small signal performance at full temperature.

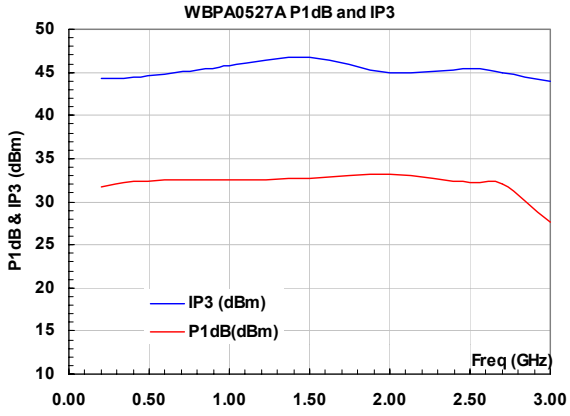

FIG. 2 Typical P_{1dB} and IP_3 at room temperature.

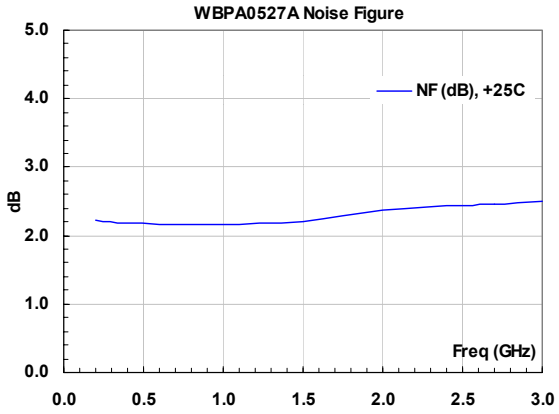

FIG. 3 Noise figure performance at full temperature

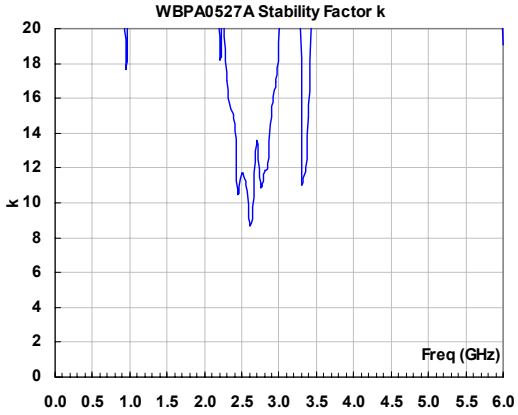

FIG. 4 Stability factor ***k***

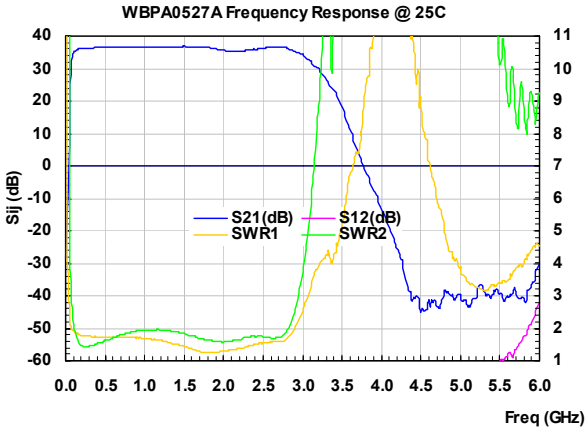

FIG. 5 Frequency response in the extended frequencies

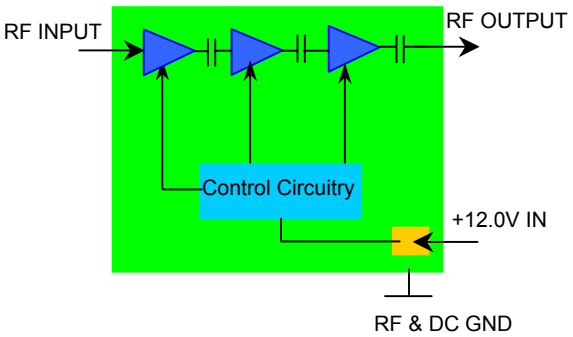

FIG. 6 Block diagram of WBPA0527A

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WBPA0527A Mechanical Outline: WP-9

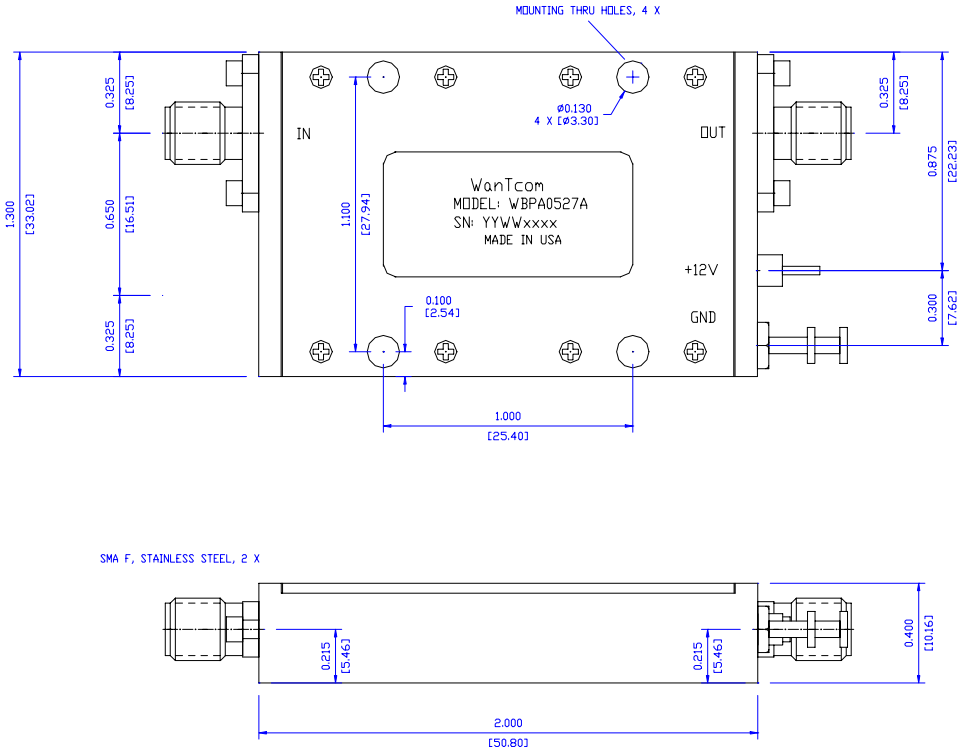

FIG. 7 WP-9 Outline

Ordering Information

Model Number:	WBPA0527A

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Small Signal S-Parameters:

!WBPA0527A
!s-parameters at Vdd=+12V, Idd=620mA. Last updated 08/06/05.

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	0.411	-112.6	24.169	-106.6	0.000115	89.8	0.777	-106.5
0.1	0.316	-148.9	41.650	-136.6	0.000091	178.4	0.381	-161.8
0.2	0.280	178.0	60.914	164.4	0.000085	105.3	0.191	177.1
0.3	0.273	157.7	63.349	126.4	0.000106	67.7	0.180	177.0
0.4	0.271	139.9	64.450	94.5	0.000133	56.2	0.203	170.0
0.5	0.268	125.3	65.156	64.7	0.000096	100.8	0.232	159.7
0.6	0.264	110.5	65.433	36.1	0.000230	30.0	0.258	146.7
0.7	0.266	96.5	65.439	7.9	0.000162	25.0	0.282	132.4
0.8	0.265	82.5	65.414	-19.9	0.000257	23.8	0.300	117.0
0.9	0.259	66.2	65.375	-47.3	0.000174	-1.4	0.312	100.9
1	0.256	51.9	65.357	-74.3	0.000222	9.6	0.318	84.7
1.1	0.250	34.5	65.915	-101.6	0.000209	-4.6	0.322	68.1
1.2	0.239	18.0	65.996	-129.3	0.000208	8.3	0.322	50.2
1.3	0.219	1.5	66.387	-156.5	0.000277	-36.7	0.318	31.1
1.4	0.201	-17.0	67.445	175.3	0.000260	-51.4	0.307	10.8
1.5	0.178	-30.4	67.424	146.4	0.000317	-64.7	0.297	-11.6
1.6	0.153	-43.7	66.922	117.2	0.000202	-45.3	0.277	-36.3
1.7	0.125	-49.0	66.302	86.9	0.000179	-21.4	0.257	-62.6
1.8	0.108	-53.6	64.374	56.0	0.000186	-53.7	0.239	-91.6
1.9	0.116	-47.6	61.398	25.7	0.000279	-33.6	0.227	-122.8
2	0.128	-46.6	58.498	-3.6	0.000346	-39.9	0.224	-154.4
2.1	0.137	-55.9	56.489	-31.8	0.000389	-57.5	0.228	174.6
2.2	0.155	-58.9	56.797	-59.8	0.000437	-60.4	0.244	143.3
2.3	0.180	-65.4	58.745	-89.7	0.000452	-57.1	0.264	111.6
2.4	0.200	-76.4	61.142	-122.4	0.000501	-81.9	0.273	78.2
2.5	0.212	-83.0	63.001	-156.6	0.000605	-94.2	0.270	42.2
2.6	0.222	-92.7	64.434	166.4	0.000800	-110.5	0.260	-0.1
2.7	0.229	-96.8	64.330	126.4	0.000508	-154.2	0.261	-48.0
2.8	0.255	-97.6	61.078	82.6	0.000587	-158.9	0.311	-103.2
2.9	0.335	-100.5	55.043	37.8	0.000432	-178.9	0.429	-154.6
3	0.434	-112.0	48.302	-9.5	0.000276	151.1	0.573	161.7
3.1	0.530	-129.7	38.960	-58.0	0.000223	98.7	0.702	124.6
3.2	0.592	-147.1	30.143	-104.9	0.000132	42.8	0.798	93.1
3.3	0.622	-163.3	21.435	-151.6	0.000348	-73.9	0.859	65.2
3.4	0.620	-173.1	13.871	163.3	0.000402	-153.0	0.858	44.0
3.5	0.674	175.0	7.647	114.6	0.000230	171.5	0.905	21.9
3.6	0.740	162.5	3.032	72.9	0.000227	115.3	0.916	2.4
3.7	0.759	149.1	0.958	28.0	0.000091	-27.4	0.923	-15.4
3.8	0.805	137.9	0.459	-54.1	0.000235	-114.4	0.929	-31.8
3.9	0.841	125.2	0.619	-102.2	0.000365	-95.9	0.930	-47.2
4	0.853	111.9	0.737	-119.5	0.000178	-101.8	0.935	-61.9
4.1	0.866	101.1	0.768	-129.0	0.000409	-97.7	0.934	-76.5
4.2	0.865	88.5	0.771	-133.4	0.000057	0.2	0.934	-91.5
4.3	0.846	77.2	0.759	-135.3	0.000398	-137.9	0.936	-105.5
4.4	0.833	65.8	0.755	-136.2	0.000246	-113.7	0.931	-120.7
4.5	0.803	55.5	0.752	-136.6	0.000469	-147.2	0.920	-134.7
5	0.587	14.9	0.742	-136.2	0.000399	-148.0	0.905	166.0
5.5	0.547	-4.9	0.759	-136.7	0.000898	-156.9	0.823	108.9
6	0.638	-38.4	0.741	-138.3	0.007025	117.2	0.812	62.7

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