2.4 – 2.6 GHz 3.0 WATTS LOW NOISE POWER AMPLIFIER WBPA2426A[1]

WBPA2426A 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, 21 dB gain, 35.0 dBm P_{1dB}, and 49.0 dBm output IP_3 at the frequency range from 2.4 GHz to 2.6 GHz band. WBPA2426A 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
MTBF[2]:	>300,000 hrs (34 Years)
Low Noise:	1.50 dB
Output IP_3:	49.0 dBm
Gain:	21.0 dB
P_{1dB}:	35.0 dBm
Single Power Supply:	1.10 A @ +10.0V
Frequency Range:	2.4 ~ 2.6 GHz
Operating Temperature:	-40 ~ +85 ºC
VSWR:	1.25:1
RF IN/OUT:	SMA Female
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	12.0
I_{dd}	Drain Current	mA	1250
P_{diss}	Total Power Dissipation	W	12
$P_{In,Max}$	RF Input Power	dBm	25
T_{ch}	Channel Temperature	°C	150
T_{STG}	Storage Temperature	°C	-55 ~ 125
$T_{O,MAX}$	Maximum Operating Temperature	°C	-40 ~ 85
$R_{th,c}$	Thermal Resistance	°C/W	7

[1] Specifications are subject to change without notice.
[2] MTBF: Mean Time Between Failure, Per TR-NWT-000332, ISSUE 3, SEPTEMBER, 1990, T=40°C
[3] Operation of this device above any one of these parameters may cause permanent damage.

Specifications:

a) Table 1 Summary of the electrical specifications WBPA2426A at room temperature

Index	Testing Item	Symbol	Test Constraints	Nom (RT)	Min	Max	Unit
1	Gain	S_{21}	2.4 – 2.6 GHz	21	20	22	dB
2	Gain Variation	ΔG	2.4 – 2.6 GHz	+/- 0.10		+/- 0.25	dB
3	Input VSWR	$VSWR_1$	2.4 – 2.6 GHz	1.22		1.30	
4	Output VSWR	$VSWR_2$	2.4 – 2.6 GHz	1.22		1.30	
5	Reverse Isolation	S_{12}	2.4 – 2.6 GHz	43	40		dB
6	Noise figure	NF	2.4 – 2.6 GHz	1.40		1.80	dB
7	Output Power 1dB compression Point	P_{1dB}	2.4 – 2.6 GHz	35.0	34.0	36.0	dBm
8	Output-Third-Order Interception point	IP_3	Two-Tone, P_{out} = +24 dBm each, 1 MHz separation	49.0	48.0		dBm
9	Current Consumption	I_{dd}	V_{dd}= +10 V	1100		1200	mA
10	Power Supply Voltage	V_{dd}		+10	+9	+11	V
11	Thermal Resistance	$R_{th,c}$	Junction to case			7	$^oC/W$
12	Operating Temperature	T_o			-40	+85	^oC
13	Maximum Average RF Input Power	$P_{IN, MAX}$	2.4 – 2.6 GHz			25	dBm

b) Passband Frequency Response

As shown in **Figure 1**, the typical gain of the WBPA2426A is 21.0 dB across 2.2 GHz to 2.6 GHz. The typical input and output return losses are 20 dB across the frequency of 2.2 GHz to 2.6 GHz.

Figure 2 shows the measured P_{1dB} and IP_3 of the WBPA2426A. The typical P_{1dB} and IP_3 are 35.0 dBm and 49.0 dBm in the frequency range of 2.2 to 2.6 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 2.6 GHz at room temperature. At 85 ^{0}C, WBPA2426A only has 0.35 dB noise increases. At –40 ^{0}C, WBPA2426A 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 WBPA2426A in the extended frequencies. The amplifier works from 2.3 to 2.7 GHz.

Figure 6 shows the mechanical outline and recommended motherboard layout of WBPA2426A. It is a standard WP-6 connectorized housing.

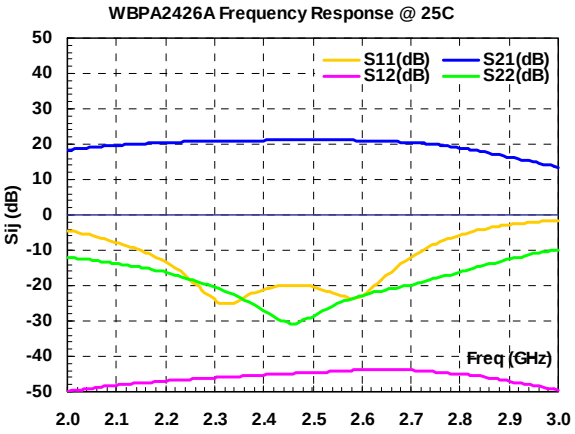

FIG. 1 Small signal performance.

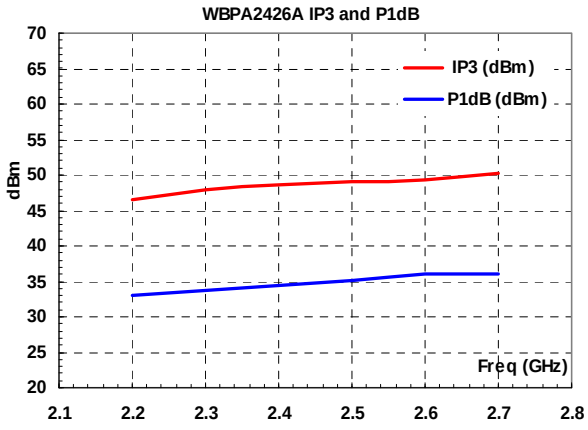

FIG. 2 P_{1dB} and IP_3 at room temperature.

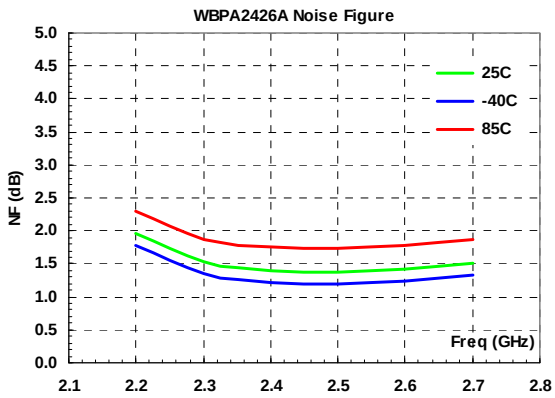

FIG. 3 Noise figure performance at full temperature

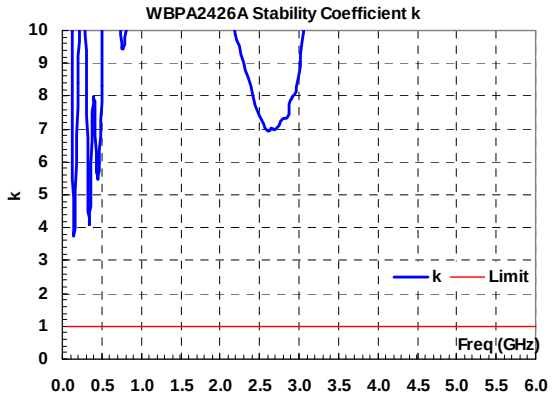

FIG. 4 Stability factor ***k***

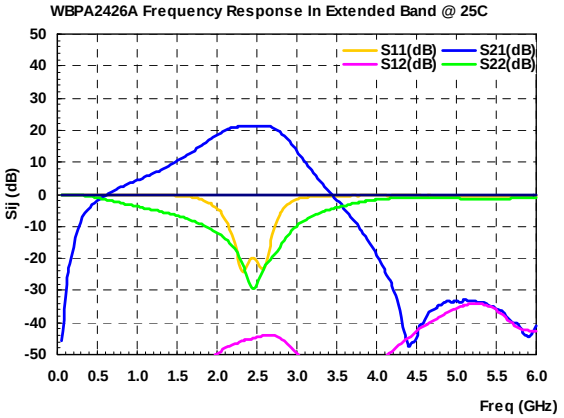

FIG. 5 Frequency response in the extended frequencies

c) WBPA2426A Mechanical Outline: WP-6

UNITS:	INCH
	[mm]
BODY:	Brass
Finish:	Gold Plating
RF Connector:	SMA F Gold
V_{dd} PWR:	Feed through

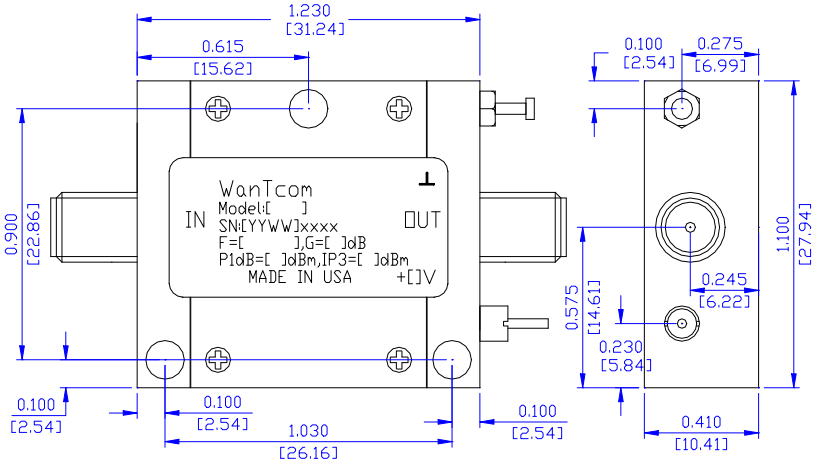

FIG. 6 WBPA2426A outline

Ordering Information

Model Number	WBPA2426A

Small Signal S-Parameters:

! WBPA2426A
! Vdd = +10.0 V, Id = 1100 mA, Last Updat: 3/16/04
Ghz s ma r 50

0.05	0.999	-6.1	0.013	-132.8	0.000028	-52.2	0.997	-15.7
0.1	0.999	-10.3	0.040	-159.4	0.000027	55.1	0.992	-26.2
0.2	0.998	-20.4	0.166	160.9	0.000044	-131.1	0.985	-52.7
0.3	0.997	-31.0	0.385	118.1	0.000077	167.8	0.960	-78.1
0.4	0.999	-41.2	0.599	81.3	0.000033	-102.2	0.924	-102.6
0.5	0.998	-51.8	0.780	53.2	0.000081	-137.6	0.876	-125.3
0.6	0.993	-62.3	0.949	28.9	0.000196	-173.2	0.824	-146.3
0.7	0.994	-72.9	1.113	6.9	0.000195	-158.9	0.774	-165.5
0.8	0.994	-83.7	1.282	-12.9	0.000223	179.3	0.726	176.6
0.9	0.990	-94.6	1.457	-31.0	0.000281	163.1	0.683	160.2
1	0.986	-106.0	1.639	-48.4	0.000383	155.7	0.644	144.4
1.1	0.984	-117.4	1.849	-65.2	0.000441	147.8	0.604	129.6
1.2	0.977	-129.5	2.097	-81.7	0.000624	137.7	0.568	115.3
1.3	0.966	-141.6	2.380	-97.8	0.000782	127.2	0.534	101.4
1.4	0.959	-154.5	2.745	-114.6	0.000917	118.9	0.496	87.8
1.5	0.947	-168.1	3.230	-132.0	0.001055	113.0	0.459	74.3
1.6	0.921	177.1	3.866	-150.0	0.001348	97.6	0.420	61.0
1.7	0.885	160.5	4.663	-169.5	0.001753	89.9	0.380	48.0
1.8	0.827	141.9	5.654	169.0	0.002029	81.7	0.338	35.1
1.9	0.732	120.4	6.878	144.8	0.002571	66.8	0.296	22.6
2	0.594	96.1	8.277	117.5	0.003190	50.3	0.251	9.8
2.1	0.410	67.7	9.600	87.7	0.003910	31.7	0.203	-3.4
2.2	0.215	31.7	10.564	56.1	0.004474	11.7	0.152	-15.7
2.3	0.064	-43.6	11.073	24.4	0.004956	-10.3	0.095	-26.1
2.4	0.088	-149.3	11.264	-7.2	0.005435	-31.9	0.044	-18.3
2.5	0.095	-179.9	11.354	-39.7	0.005891	-55.5	0.037	50.3
2.6	0.072	-133.3	11.247	-73.9	0.006384	-83.7	0.072	65.6
2.7	0.253	-115.6	10.545	-111.2	0.006352	-114.8	0.102	66.5
2.8	0.516	-141.7	8.834	-150.2	0.005597	-149.3	0.156	67.1
2.9	0.718	-170.3	6.640	172.9	0.004400	177.8	0.237	54.6
3	0.837	164.7	4.673	141.4	0.003323	150.5	0.320	35.4
3.1	0.889	143.8	3.206	114.3	0.002482	124.0	0.395	14.1
3.2	0.910	126.3	2.198	90.1	0.001900	100.7	0.459	-8.1
3.3	0.922	110.7	1.529	68.3	0.001327	76.7	0.516	-31.0
3.4	0.910	97.0	1.077	49.7	0.001115	55.9	0.565	-54.6
3.5	0.916	86.1	0.791	30.4	0.000593	33.4	0.613	-79.5
3.6	0.941	74.1	0.567	7.8	0.000378	-6.2	0.659	-105.5
3.7	0.946	62.0	0.398	-14.3	0.000069	80.8	0.704	-132.5
3.8	0.945	49.7	0.278	-36.4	0.000515	168.7	0.746	-159.9
3.9	0.949	39.0	0.192	-57.9	0.001113	137.6	0.785	172.7
4	0.948	28.6	0.131	-79.2	0.002023	124.5	0.818	146.2
4.1	0.954	17.3	0.088	-97.4	0.002591	107.7	0.841	120.9
4.2	0.950	6.5	0.060	-112.3	0.003667	91.0	0.862	97.3
4.3	0.952	-3.2	0.040	-125.3	0.004748	73.1	0.873	75.7
4.4	0.956	-13.6	0.027	-127.2	0.005889	61.1	0.882	55.8
4.5	0.951	-24.5	0.021	-119.2	0.007177	46.6	0.886	37.5
5	0.942	-74.5	0.035	-92.9	0.017000	-38.8	0.865	-36.2
5.5	0.944	-127.2	0.044	-136.4	0.016000	-143.8	0.831	-87.3
6	0.922	-177.9	0.034	-149.2	0.007389	-171.2	0.897	-134.4

Application Notes:

A. SMA Torque Wrench Selection

Always use a torque wrench with 5 ~ 6 inch-lb coupling torque setting for mating the SMA cables to the amplifier. Never use torque more than 8 inch-lb wrench for tightening the mating cable to the connector. Otherwise, the permanent damage will occur to the SMA connectors of the amplifier. 8710-1582 (5 inch-lb) is one of the good torque wrench choice from Agilent Technology.

B. DC Power Line Connection

Strip the insulation layer at the end of DC power supply wire. The stripped distance should be in the range of 0.100" to 0.200". The 24 ~ 26 American Wire Gauge wire is suitable. Wound the stripped terminal wire about 1 to 2 turns on the DC feed thru center pin. Solder the wounded wire and the center pin together. Clean the soldering area by Q-tip with alcohol to remove the flux and residue.

Repeat the process to solder the DC return wire on the ground turret.

C. Mounting the Amplifier

Use three pieces of #4-40 with longer than 9/16" screws for mounting the amplifier on a metal-based chase. Flat and spring washers are needed to prevent the screw loosening during the shock and vibration. Always use the appropriate torque setting of the power screwdriver to mount them.

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