0.2- 4.2 GHz LOW NOISE WIDE BAND AMPLIFIER WBA0242A[1]

WBA0242A is a low noise figure, wideband, and high linearity amplifier. The amplifier offers typical 1.20 dB noise figure, 30 dB gain, +/- 0.50 dB exceptional gain flatness, 14.0 dB output P_{1dB}, and 26.0 dBm output IP_3 at the frequency range from 0.20 GHz to 4.2 GHz of FM, VHF, UHF, Cellular, GPS, DCS, PCS, 3G, ISM, and C bands.

WBA0242A is most suitable for cellular base stations, wireless data communications, tower top receiver amplifiers, last-mile wireless communication systems, and wireless measurement applications.

WBA0242A is designed to meet the rugged MIL-STD-202 standard.

Key Features:

Impedance:	50 Ohm
MTBF[2]:	>300,000 hrs (34 years)
Unconditional Stable:	k>1
Low Noise:	1.20 dB
Output IP_3:	26.0 dBm
Gain:	30.0 dB
P_{1dB}:	14.0 dBm
Single power supply:	50 mA @ +5V (50mA @ +7 ~ + 25V for WBA0242B)
Wide Bandwidth:	0.2 ~ 4.2 GHz
Operating Temperature:	-40 ~ +85 ºC
Input & Output Return VSWR:	1.5:1
Small size:	SMA Female, 0.90" x 0.70" x 0.4" (41.9 mm x 17.8 mm x 10.2 mm) gold plated housing.
Built-in Functions:	DC blocks at input and output, temperature compensation circuits, and auto DC bias circuitry.

Absolute Maximum Ratings[3]:

Symbol	Parameters	Units	Absolute Maximum
V_{dd}	DC Power Supply Voltage	V	+6.0 (+25.0 for WBA0242B)
I_{dd}	Drain Current	mA	70
P_{diss}	Total Power Dissipation	mW	400 (1500 for WBA0242B)
$P_{In,Max}$	RF Input Power	dBm	5
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	220

[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 WBA0242A at room temperature

Index	Testing Item	Symbol	Test Constraints	Nom (RT)	Min	Max	Unit
1	Gain	S_{21}	0.2 – 4.2 GHz	30	28.5	31.5	dB
2	Gain Variation	ΔG	0.2 – 4.2 GHz	+/- 0.5		+/-0.75	dB
3	Input VSWR	SWR_1	0.2 – 4.2 GHz	1.5:1		1.8:1	
4	Output VSWR	SWR_2	0.2 – 4.2 GHz	1.5:1		1.8:1	
5	Reverse Isolation	S_{12}	0.2 – 4.2 GHz	42			dB
6	Noise figure	NF	0.2 – 4.2 GHz	1.20		1.40	dB
7	Output Power 1dB compression Point	P_{1dB}	0.2 – 4.2 GHz	14	12		dBm
8	Output-Third-Order Interception point	IP_3	Two-Tone, P_{out} +0 dBm each, 1 MHz separation	26	24		dBm
9	Current Consumption	I_{dd}	V_{dd}= +5 V	50			mA
10	Power Supply Voltage	V_{dd}	WBA0242A	+5	+4.7	+5.3	V
			WBA0242B		+7.0	+25V	
11	Thermal Resistance	$R_{th,c}$	Junction to case			220	$^oC/W$
12	Operating Temperature	T_o			-40	+85	^oC
13	Maximum Average RF Input Power	$P_{IN, MAX}$	0.2 – 4.2 GHz			5	dBm

b) Passband Frequency Response

As shown in **Figure 1**, the typical gain of the WBA0242A is 30.0 dB across the frequency range of 0.20 to 4.2 GHz. The amplifier provides excellent gain flatness across the passband. The typical input and output VSWR are 1.5:1 across the frequency range of 0.20 to 4.2 GHz, as shown in **Figure 2**.

Figure 3 illustrates the noise figure performance of WBA0242A. The noise figure is 1.20 dB across the frequency range of 0.20 to 4.2 GHz at room temperature. At 85 ^{0}C, WBA0242A only has 0.20 dB noise increases. At –40 ^{0}C, WBA0242A offers approximately 0.20 dB less noise figure than that at room temperature.

Figure 4 is the plot of the stability factor *k* of WBA0242A. The amplifier is unconditional stable at all temperature ranges since the stability factor *k* is great than 1 at all frequency ranges.

Figure 5 demonstrates P_{1dB} and IP_3 of the WBA0242A. The typical P_{1dB} and IP_3 are 14.0 dBm and 26.0 dBm in the frequency range of 0.20 to 4.2 GHz, respectively.

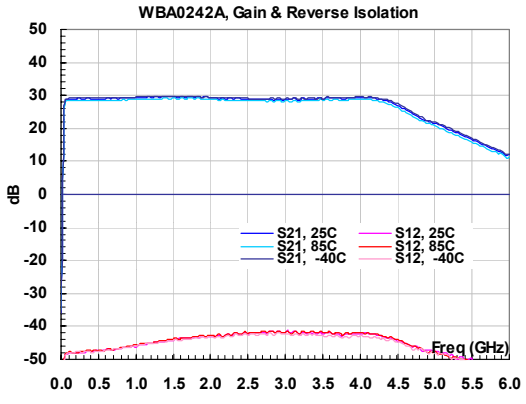

FIG. 1 Gain and reverse isolation.

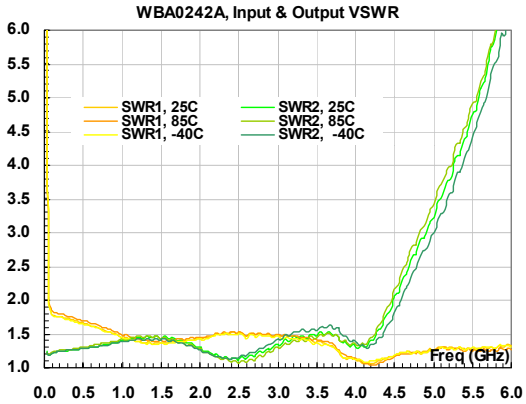

FIG. 2 Input and Output VSWR

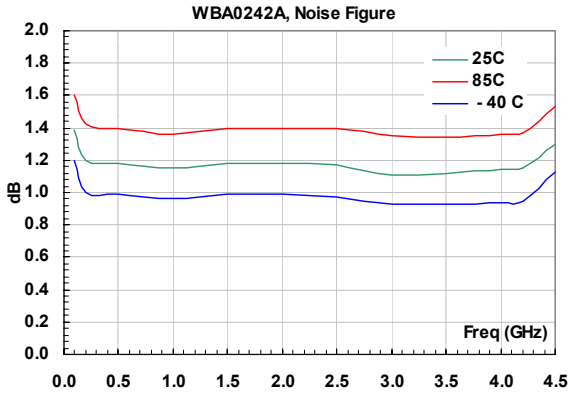

FIG. 3 Noise figure performance

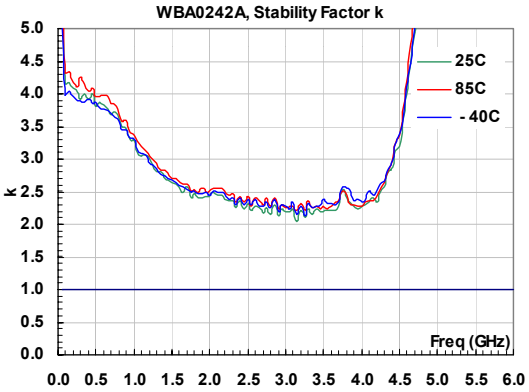

FIG. 4 Stability factor *k* of WBA0242A

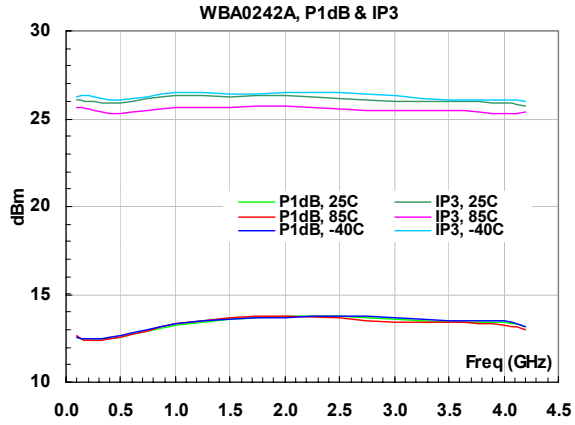

FIG. 5 P_{1dB} and IP_3 at full temperature.

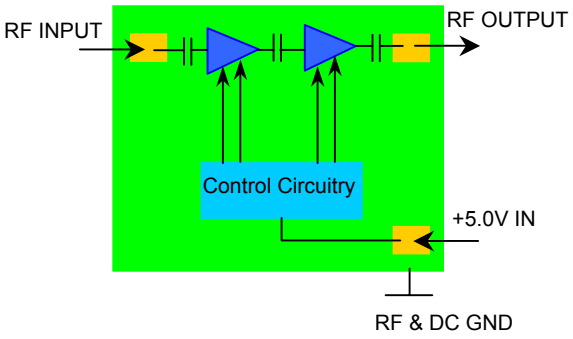

FIG. 6 Block diagram of WBA0242A

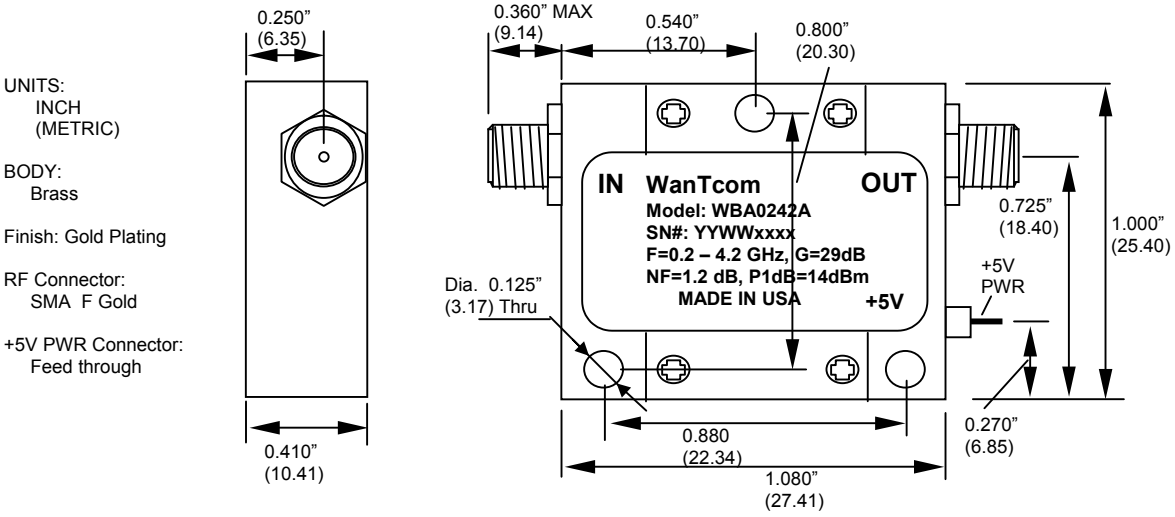

FIG. 7 WBA0242A outline

WBA0242A LNA Mechanical Outline, WP-5:

Figure 7 shows the mechanical outline sample of WBA0242A. It is WanTcom's standard WP-5 housing with gold plating finish.

Ordering Information

Model Number	WBA0242A	WBA0242B
V_{dd}	+5.0V	+7.0 ~ +25.0V

Small Signal S-Parameters:

!WBA0242A, +25C
!s-parameters at Vdd=5V, Idd=50mA. Last updated 12/16/05.
GHZ s MA R 50

!Freq(GHz)	MAGS11	ANGS11	MAGS21	ANGS21	MAGS12	ANGS12	MAGS22	ANGS22
0.05	0.488	129.1	21.699	90.0	0.003172	99.6	0.090	99.3
0.1	0.286	46.5	27.831	28.0	0.003938	40.9	0.096	20.4
0.2	0.276	4.4	28.301	-2.5	0.003989	18.7	0.106	-21.4
0.3	0.268	-15.7	28.364	-20.0	0.004173	10.3	0.112	-47.3
0.4	0.257	-31.2	28.372	-33.4	0.004211	6.3	0.117	-68.7
0.5	0.247	-44.5	28.385	-45.7	0.004341	4.7	0.124	-88.0
0.6	0.238	-56.2	28.333	-57.5	0.004341	1.9	0.130	-105.3
0.7	0.227	-67.5	28.463	-68.8	0.004529	1.0	0.137	-120.2
0.8	0.214	-78.4	28.550	-79.5	0.004621	-2.4	0.146	-135.4
0.9	0.203	-88.7	28.776	-90.2	0.004832	-4.0	0.157	-149.3
1	0.183	-96.4	29.161	-101.9	0.005075	-7.5	0.166	-165.1
1.1	0.174	-104.0	29.348	-113.4	0.005467	-11.0	0.175	179.3
1.2	0.164	-108.7	29.616	-125.1	0.005491	-14.3	0.183	164.1
1.3	0.156	-116.8	29.906	-136.5	0.005842	-16.7	0.184	148.6
1.4	0.151	-119.9	30.284	-148.3	0.006040	-20.0	0.185	134.3
1.5	0.155	-125.7	30.538	-159.5	0.006128	-23.9	0.180	118.8
1.6	0.157	-130.5	30.307	-170.8	0.006387	-29.1	0.176	104.8
1.7	0.163	-137.4	30.058	177.6	0.006444	-34.0	0.169	89.0
1.8	0.161	-142.1	29.551	166.6	0.006831	-38.9	0.162	73.8
1.9	0.172	-151.9	29.146	154.1	0.007170	-43.3	0.152	56.3
2	0.175	-158.5	28.908	141.9	0.007174	-46.2	0.133	37.4
2.1	0.187	-165.9	28.186	130.5	0.007229	-48.3	0.111	15.7
2.2	0.196	-175.3	28.175	120.1	0.007483	-53.2	0.087	-3.9
2.3	0.204	174.5	28.259	109.1	0.007511	-57.9	0.073	-29.2
2.4	0.204	165.0	28.242	97.7	0.007506	-63.6	0.055	-61.8
2.5	0.204	154.0	27.985	86.4	0.007681	-70.7	0.056	-94.8
2.6	0.190	148.4	27.799	75.9	0.007941	-74.7	0.063	-131.4
2.7	0.197	140.1	27.848	65.4	0.008253	-79.0	0.074	-157.0
2.8	0.198	130.4	27.706	54.2	0.008379	-84.7	0.098	-178.7
2.9	0.201	120.9	27.900	43.0	0.008286	-89.4	0.123	161.7
3	0.198	111.9	27.560	32.5	0.008060	-95.0	0.152	144.6
3.1	0.193	103.4	27.592	21.0	0.007909	-100.0	0.174	125.7
3.2	0.187	94.6	27.905	9.5	0.007904	-104.2	0.186	106.8
3.3	0.179	87.3	27.921	-3.5	0.007857	-111.3	0.190	87.8
3.4	0.173	77.2	28.097	-16.1	0.007829	-115.8	0.188	73.8
3.5	0.160	65.8	28.028	-28.4	0.008048	-122.9	0.192	61.8
3.6	0.152	53.1	28.427	-41.3	0.007903	-127.8	0.197	43.1
3.7	0.141	41.5	28.918	-54.9	0.007530	-132.5	0.194	23.3
3.8	0.088	16.3	28.345	-66.9	0.007415	-133.6	0.170	-4.2
3.9	0.060	28.9	29.205	-80.6	0.007698	-140.6	0.147	-28.4
4	0.053	32.3	29.422	-95.6	0.007730	-147.7	0.139	-62.5
4.1	0.033	39.8	29.246	-111.0	0.007505	-155.9	0.138	-105.8
4.2	0.026	68.9	28.882	-127.8	0.007550	-162.0	0.171	-148.4
4.3	0.052	90.9	27.110	-145.1	0.007064	-170.7	0.221	174.2
4.4	0.068	93.5	25.040	-162.1	0.006574	-176.4	0.281	144.3
4.5	0.083	80.0	22.414	-177.9	0.006306	176.4	0.344	119.2
5	0.118	31.0	11.925	120.1	0.004211	152.8	0.524	28.9
5.5	0.128	-33.5	6.752	65.3	0.002896	135.1	0.651	-36.4
6	0.134	-98.5	3.980	18.5	0.002494	117.2	0.744	-92.5

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