



50 - 200 MHz LOW NOISE POWER AMPLIFIER WCA05300A¹

WCA05300A is a super low noise figure, wideband, and high linearity amplifier with exceptional gain flatness. The amplifier offers typical +/- 0.15 dB gain flatness, 24.0 dB gain, and 0.45 dB noise figure at the frequency range from 50 MHz to 200 MHz. WCA05300B has built-in limiter to protect the amplifier from the input strong interference signal up to 30 dBm.

WCA05300A is most suitable for VHF receivers and test and measurement applications.



Preliminary

Key Features:

Impedance:	75 Ohm
MTBF ² :	>150,000 hrs (17 Years)
Super Low Noise:	0.45 dB (0.60 dB for WCA05300B)
Gain Flatness:	+/- 0.15 dB
Gain:	24.0 dB
Input VSWR:	1.45:1
Output VSWR:	1.45:1
P _{1dB} :	8.0 dBm typical
Single Power Supply:	45 mA, @ +7 ~ +25 V
Frequency Range:	50 ~ 200 MHz
Operating Temperature:	-40 ~ +85 °C
Built-In Functions:	DC blocks at input and output, DC-DC converter, sequencing biases, temperature compensation circuits, and auto DC biases.

Absolute Maximum Ratings³:

Symbol	Parameters	Units	Absolute Maximum
V _{dd}	DC Power Supply Voltage	V	25 V
I _{dd}	Drain Current	mA	50
P _{diss}	Total Power Dissipation	W	1.25
P _{In,Max}	RF Input Power	dBm	5 (30 for WCA05300B)
T _{ch}	Channel Temperature	°C	160
T _{STG}	Storage Temperature	°C	-55 ~ 125
T _{O,MAX}	Maximum Operating Temperature	°C	-40 ~ 85

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 of WCA05300A at room temperature

Index	Testing Item	Symbol	Test Constraints	Nom (RT)	Min	Max	Unit
1	Gain	S_{21}	50 - 200 MHz	24	23.0	25.0	dB
2	Gain Variation	ΔG	50 - 200 MHz	+/- 0.15		+/- 0.2	dB
3	Input Return Loss	S_{11}	50 - 200 MHz	15	14		dB
4	Output Return Loss	S_{22}	50 - 200 MHz	15	14		dB
5	Reverse Isolation	S_{12}	50 - 200 MHz		30		dB
6	Noise figure	NF	50 - 200 MHz	0.45		0.60	dB
			WCA05300B	0.60		0.75	dB
7	Output P_{1dB} compression	P_{1dB}	50 - 200 MHz	8	7		dBm
8	Maximum RF Input Power	$P_{IN,MAX}$	50 - 200 MHz			5	dBm
			WCA05300B			30	dBm
9	Current Consumption	I_{dd}	$V_{dd} = +7 \sim +25$ V	40			mA
10	Power Supply Voltage	V_{dd}			+7	+25	V
11	Operating Temperature	T_o			-40	+85	°C

b) Passband Frequency Response

As shown in **Figure 1**, the typical gain of the WCA05300A is 24.0 dB across 50 MHz to 200 MHz. The amplifier offers exceptional gain flatness with the typical gain variation of +/- 0.15 dB through out the passband. The typical input and output return losses are 15 dB across the frequency from 50 MHz to 200 MHz.

Figure 2 shows the measured P_{1dB} of the WCA05300A. The typical P_{1dB} is from 7.0 dBm to 12.0 dBm in the frequency range of 50 MHz to 200 MHz, respectively.

Figure 3 illustrates the measured noise figure performance at full temperature. The noise figure is typically 0.38 dB to 0.50 dB across the frequency range of 50 MHz to 200 MHz. The higher noise figure at the lower frequency in the passband is due to the transistor internal higher low frequency thermal noise. The noise figure only increase around 0.15 dB at 85 C° and decrease 0.13 dB at -40 C°.

Figure 4 demonstrates the stability factor k of the amplifier. k is greater than 1.0 at all frequencies and the amplifier is unconditional stable.

Figure 5 shows the frequency response of WCA05300A in the extended frequency band.

Figure 6 shows the mechanical outline of WCA05300A. It is a standard WP-6 connectorized housing.

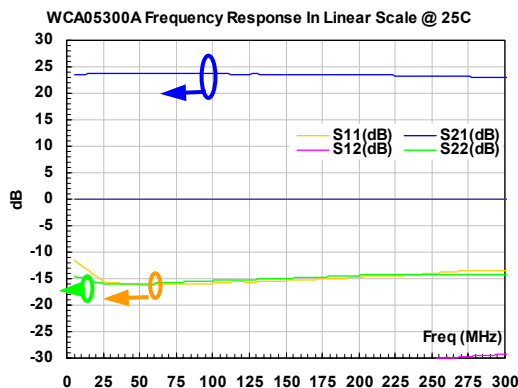


FIG. 1 Typical small signal performance.

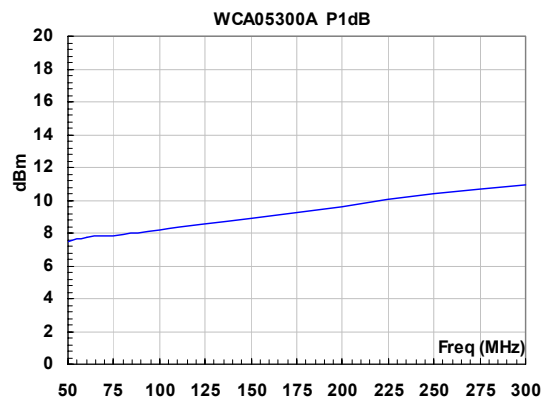


FIG. 2 Typical P_{1dB} at room temperature.

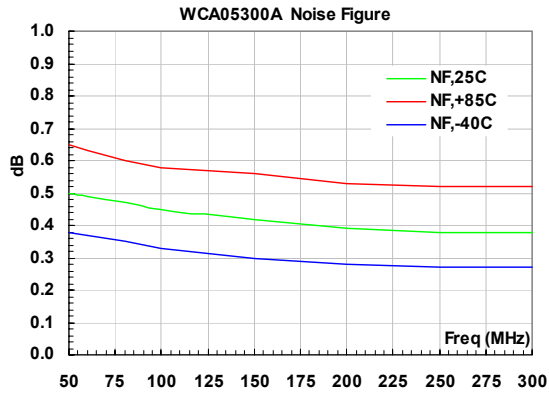


FIG. 3 Noise figure performance at full temperature

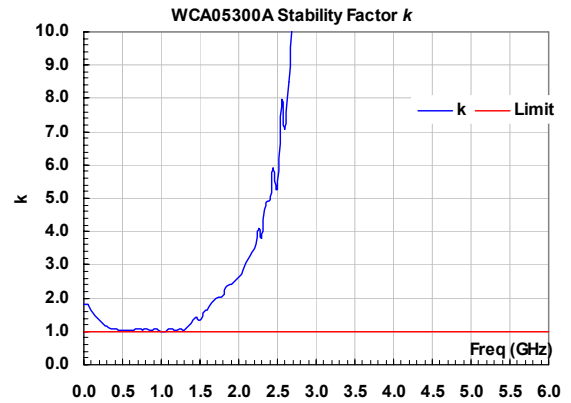


FIG. 4 Stability factor k

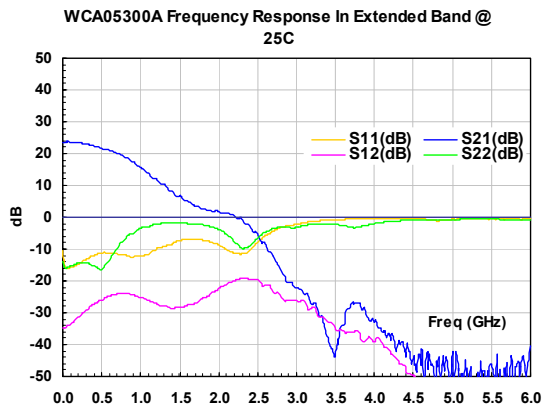


FIG. 5 Frequency response in the extended frequency band

WCA05300A Mechanical Outline: WP-6

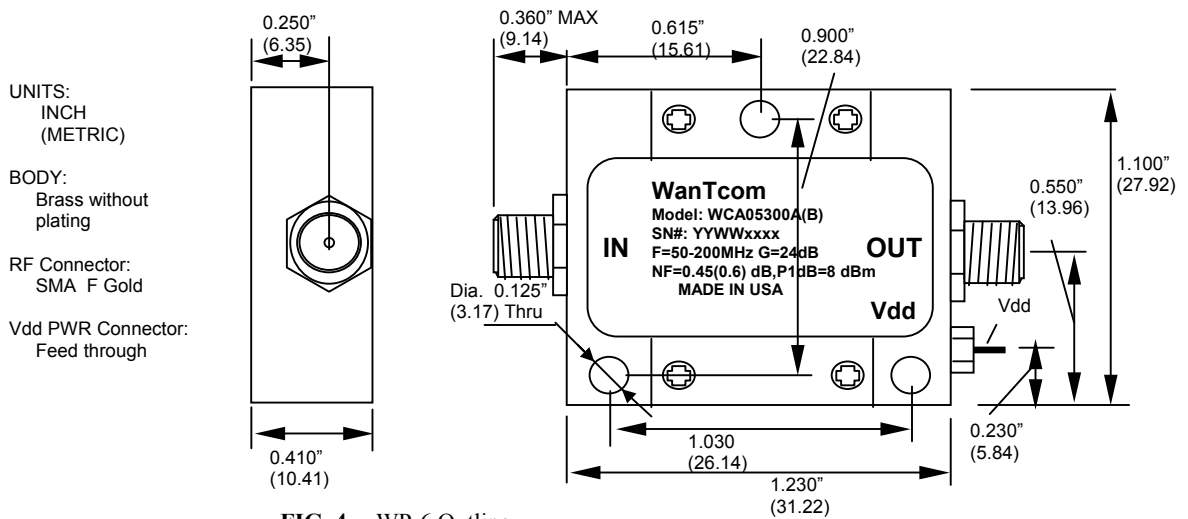


FIG. 4 WP-6 Outline



Ordering Information

Built-in Limiter	No	Yes
Model Number:	WCA05300A	WCA05300B

Small Signal S-Parameters:

! WCA05300A

! Vdd = +7 ~ + 25 V, Id = 45 mA

GHz s m a r 75

0	0.296	34.5	15.037	-142.9	0.0180	47.1	0.201	7.8
0.05	0.156	-20.5	15.287	172.5	0.0190	14.6	0.159	-29.2
0.15	0.170	-66.1	15.112	143.2	0.0240	18.9	0.179	-80.3
0.25	0.199	-96.0	14.572	116.2	0.0310	17.1	0.192	-123.0
0.35	0.231	-119.7	13.712	90.6	0.0390	10.2	0.184	-164.0
0.45	0.262	-143.0	12.697	65.3	0.0460	-0.4	0.158	146.3
0.55	0.278	-166.9	11.693	41.7	0.0540	-12.3	0.179	82.3
0.65	0.268	170.0	10.883	16.5	0.0600	-27.8	0.266	22.1
0.75	0.255	144.8	9.732	-9.8	0.0640	-44.3	0.398	-20.7
0.85	0.241	113.8	8.233	-35.2	0.0630	-60.0	0.525	-52.0
0.95	0.244	73.2	6.629	-58.0	0.0570	-73.3	0.617	-74.4
1.05	0.251	33.0	5.436	-79.8	0.0520	-85.7	0.702	-96.7
1.15	0.294	-2.0	4.190	-98.1	0.0460	-93.0	0.748	-113.1
1.25	0.331	-31.2	3.451	-115.8	0.0410	-98.1	0.795	-129.2
1.35	0.362	-52.8	2.819	-134.2	0.0390	-102.9	0.810	-144.2
1.45	0.412	-69.2	2.154	-147.6	0.0380	-100.2	0.816	-157.8
1.55	0.442	-87.8	1.915	-160.5	0.0390	-101.1	0.806	-171.4
1.65	0.447	-102.9	1.663	-172.7	0.0430	-104.6	0.783	176.3
1.75	0.440	-115.6	1.429	175.9	0.0490	-105.3	0.775	162.3
1.85	0.422	-126.0	1.296	164.7	0.0560	-113.5	0.736	146.3
1.95	0.388	-134.6	1.246	152.8	0.0690	-123.1	0.683	128.1
2.05	0.339	-139.4	1.167	134.2	0.0820	-136.1	0.598	104.6
2.15	0.289	-137.2	1.092	112.7	0.0960	-152.7	0.481	73.7
2.25	0.266	-128.7	0.936	92.1	0.1040	-171.9	0.366	29.1
2.35	0.274	-116.1	0.767	67.1	0.1090	165.2	0.327	-28.3
2.45	0.350	-107.5	0.580	44.2	0.1040	145.1	0.414	-76.3
2.55	0.454	-108.2	0.390	21.5	0.0900	119.5	0.529	-111.2
2.65	0.553	-113.8	0.280	5.1	0.0860	102.4	0.623	-137.5
2.75	0.646	-121.4	0.192	-10.8	0.0660	91.3	0.681	-159.0
2.85	0.722	-131.4	0.114	-20.8	0.0480	81.9	0.698	-178.1
2.95	0.751	-138.7	0.087	-16.7	0.0490	76.3	0.677	168.3
3.05	0.798	-145.1	0.074	-20.7	0.0470	63.6	0.711	157.3
3.15	0.836	-152.5	0.060	-36.0	0.0360	42.6	0.758	141.7
3.25	0.864	-159.2	0.045	-51.3	0.0340	26.6	0.782	124.0
3.35	0.888	-166.2	0.023	-62.9	0.0270	22.2	0.786	104.4
3.45	0.907	-172.7	0.008	-113.0	0.0220	15.1	0.782	83.0
3.55	0.916	-178.8	0.012	112.8	0.0170	16.3	0.760	59.4
3.65	0.931	174.9	0.036	69.4	0.0150	13.9	0.721	34.4
3.75	0.938	169.4	0.044	25.0	0.0160	5.9	0.687	12.1
3.85	0.946	163.7	0.035	-13.8	0.0110	-9.3	0.721	-9.3
3.95	0.956	157.3	0.023	-28.3	0.0130	-14.2	0.767	-33.3
4.05	0.950	151.5	0.018	-42.4	0.0130	-26.2	0.808	-54.0
4.15	0.951	145.3	0.015	-50.0	0.0090	-41.0	0.842	-73.7
4.25	0.955	139.0	0.013	-54.7	0.0066	-51.6	0.868	-90.6
4.35	0.959	132.1	0.011	-42.0	0.0049	-49.6	0.884	-104.9
4.45	0.960	125.7	0.007	-58.3	0.0035	-52.2	0.894	-117.9
4.95	0.908	94.3	0.004	-79.4	0.0014	-47.4	0.923	-165.3
5.45	0.931	45.7	0.003	-111.2	0.0007	56.5	0.932	156.7
5.95	0.944	-10.6	0.003	-164.4	0.0025	94.7	0.909	114.3
6.0	0.930	-16.0	0.009	85.6	0.0029	97.9	0.902	108.5
