200-500 MHz LOW NOISE AMPLIFIER WLA02-3535A[1]

WLA02-3535A is a low noise figure, wideband, and high linear amplifier. The amplifier offers typical 0.60 dB noise figure, 35.0 dB gain, and 35 dBm output IP_3 at the frequency range from 0.2 GHz to 0.50 GHz of VHF and UHF bands.

WLA02-3535A is most suitable for cellular base stations, wireless data communications, tower top receiver amplifiers, last-mile wireless communication systems, and wireless measurement applications.

WLA02-3535A is designed to meet the rugged standards of MIL-STD-202, and MIL-STD-883.

Key Features:

Impedance:	50 Ohm
MTBF[2]:	>300,000 hrs (34Years)
Unconditional Stable:	k>1
Low Noise:	0.60 dB
Output IP_3:	35.0 dBm
Gain:	35.0 dB
P_{1dB}:	15.0 dBm
Single power supply:	100 mA @ +7V ~ +35V
Frequency Range:	0.2 ~ 0.50 GHz
Operating Temperature:	-40 ~ +85 ºC
Return Losses:	20.0 dB
Built-in Functions:	DC blocks at input and output, temperature compensation circuits, and auto DC biases.

Absolute Maximum Ratings[3]:

Symbol	Parameters	Units	Absolute Maximum
V_{dd}	DC Power Supply Voltage	V	+35 V[4]
I_{dd}	Drain Current	mA	110
P_{diss}	Total Power Dissipation	W	3.0
$P_{In,Max}$	RF Input Power	dBm	10
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℃
[3] Operation of this device above any one of these parameters may cause permanent damage.
[4] Additional heat sink required.

Specifications:

a) Table 1 Summary of the electrical specifications WLA02-3535A at room temperature

Index	Testing Item	Symbol	Test Constraints	Nom (RT)	Min	Max	Unit
1	Gain	S_{21}	0.2 – 0.5 GHz	35			dB
2	Gain Variation	ΔG	0.2 – 0.5 GHz	+/- 0.2		+/- 0.25	dB
3	Input Return Loss	S_{11}	0.2 – 0.5 GHz	22	20		dB
4	Output Return Loss	S_{22}	0.2 – 0.5 GHz	22	20		dB
5	Reverse Isolation	S_{12}	0.2 – 0.5 GHz		40		dB
6	Noise figure	NF	0.2 – 0.5 GHz	0.60		0.75	dB
7	Output Power 1dB compression Point	P_{1dB}	0.2 – 0.5 GHz	16	15		dBm
8	Output-Third-Order Interception point	IP_3	Two-Tone, P_{out}=+0 dBm each, 1 MHz separation	35	33		dBm
9	Current Consumption	I_{dd}	V_{dd}= +7V ~ +35V	100			mA
10	Power Supply Voltage	V_{dd}			+7	+35	V
11	Thermal Resistance	$R_{th,c}$	Junction to case			215	^{o}C/W
12	Operating Temperature	T_o			-40	+85	^{o}C
13	Maximum Average RF Input Power	$P_{IN, MAX}$	0.2 – 0.5 GHz			10	dBm

b) Passband Frequency Response

As shown in **Figure 1**, the typical gain of the WLA02-3535A is 35.0 dB across 0.2 GHz to 0.50 GHz. The typical input and output return losses are 20 dB or better across the frequency of 0.2 GHz to 0.50 GHz.

Figure 2 shows P_{1dB} and IP_3 of the WLA02-3535A. The typical P_{1dB} and IP_3 are 15.0 dBm minimum and 35.0 dBm in the frequency range of 0.2 GHz to 0.50 GHz, respectively.

Figure 3 illustrates the noise figure performance. The noise figure is 0.60 dB across the frequency range of 0.2 GHz to 0.50 GHz. At 85 ^{0}C, WLA02-3535A only has 0.25 dB noise increases. At –40 ^{0}C, WLA02-3535A offers approximately 0.20 dB less noise figure than that at room temperature.

Figure 4 is the plot of the stability factor *k* of WLA02-3535A. The amplifier is unconditional stable at room temperature due to *k* is great than 1 at all frequency ranges.

Figure 5 demonstrates the small signal performance of WLA02-3535A at the extended frequency range. The LNA works up to 1.60 GHz.

Figure 6 shows the internal block diagram of WLA02-3535A.

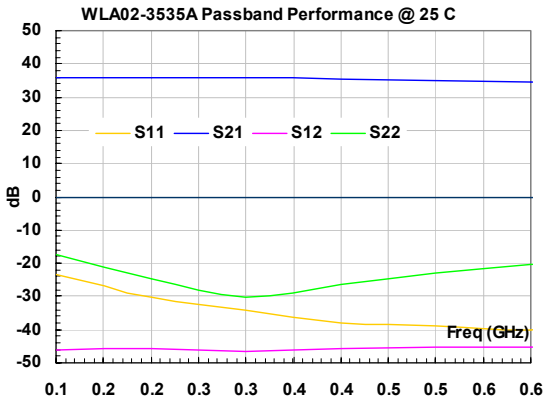

FIG. 1 Typical small signal performance.

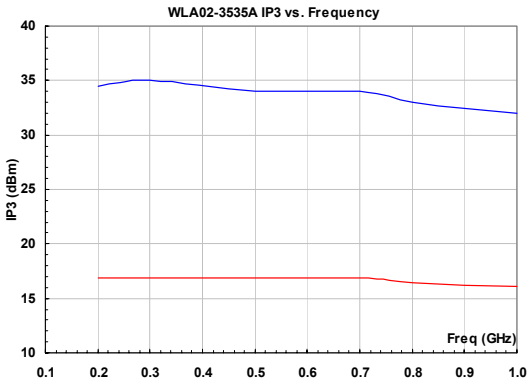

FIG. 2 Typical P_{1dB} and IP_3 at room temperature.

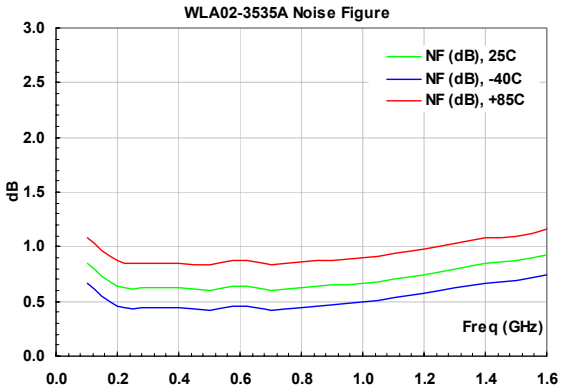

FIG. 3 Noise figure performance

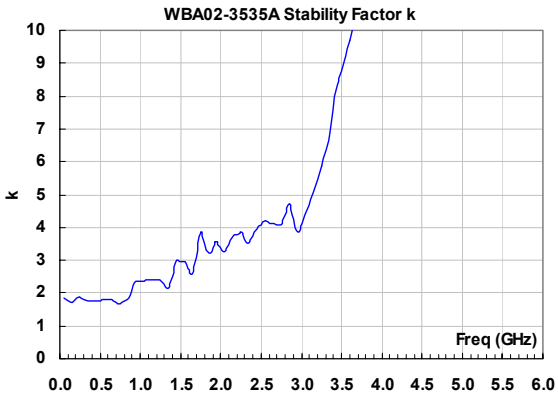

FIG. 4 Stability factor *k* of WLA02-3535A

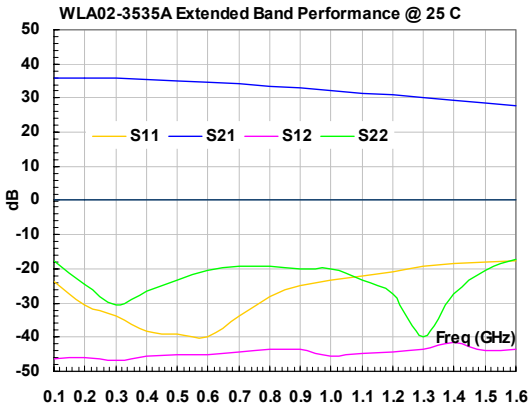

FIG. 5 Extended band performance

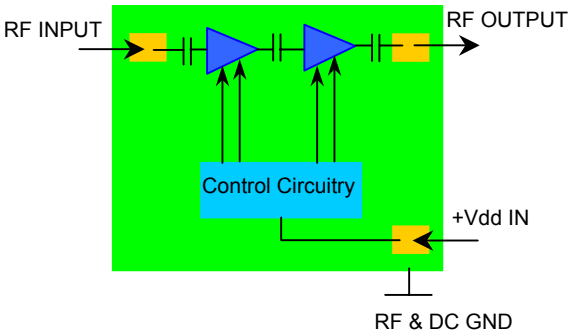

FIG. 6 Block diagram of WLA02-3535A

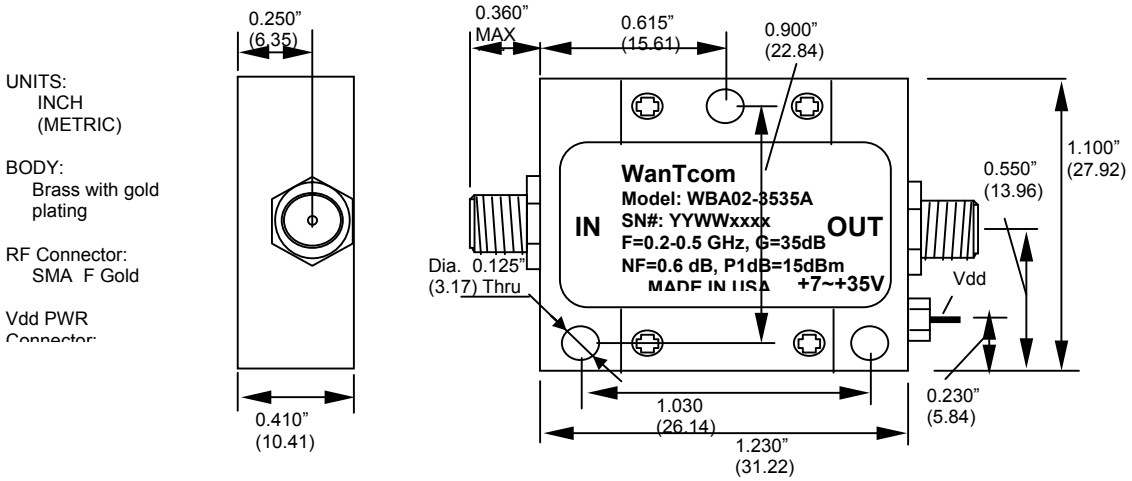

FIG. 7 WLA02-3535A outline

WLA02-3535A Mechanical Outline, WP-6:

Figure 7 shows the mechanical outline of WLA02-3535A. It is a WanTcom's standard WP-6 housing with gold plating. Both RF input and output ports are equipped with SMA female connectors and the DC port connector is an EMI filtered feed thru pin.

Ordering Information

Model Number	WLA02-3535A

Small Signal S-Parameters:

!WLA02-3535A
!s-parameters at Vdd=7~35V, Idd=100mA. Last updated 11/16/02.

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	0.12	77.0	52.45	51.8	0.0043	79.2	0.22	91.5
0.1	0.07	65.5	60.63	6.4	0.0048	25.0	0.13	65.8
0.2	0.03	37.2	62.26	-38.1	0.0051	-2.7	0.06	29.6
0.3	0.02	25.1	61.41	-71.1	0.0047	-12.6	0.03	40.0
0.4	0.01	12.5	59.57	-101.0	0.0052	-46.0	0.05	45.2
0.5	0.00	-90.0	56.91	-129.7	0.0055	-63.2	0.07	22.0
0.6	0.01	129.2	53.90	-157.2	0.0055	-57.9	0.10	-5.7
0.7	0.02	109.1	50.28	175.9	0.0060	-90.4	0.11	-37.8
0.8	0.04	93.6	47.18	149.2	0.0068	-92.8	0.11	-69.8
0.9	0.06	82.1	44.04	123.6	0.0065	-111.2	0.10	-102.8
1	0.07	70.2	40.77	98.4	0.0054	-123.1	0.10	-132.7
1.1	0.08	55.0	37.48	73.8	0.0058	-142.4	0.07	-161.9
1.2	0.09	41.8	34.59	49.6	0.0062	-165.8	0.04	169.6
1.3	0.11	30.3	31.80	25.8	0.0067	-169.1	0.01	-147.3
1.4	0.12	14.9	29.17	2.2	0.0084	165.9	0.04	-94.7
1.5	0.13	-2.6	26.70	-21.4	0.0063	142.7	0.10	-117.2
1.6	0.13	-15.8	24.70	-44.6	0.0068	135.7	0.14	-142.1
1.7	0.13	-30.9	22.57	-66.2	0.0085	113.7	0.18	-169.1
1.8	0.12	-46.4	20.58	-87.2	0.0060	111.0	0.22	162.2
1.9	0.11	-60.0	18.87	-109.4	0.0078	79.8	0.26	136.5
2	0.11	-69.6	17.53	-130.9	0.0074	63.1	0.29	109.5
2.1	0.10	-83.8	16.44	-152.2	0.0086	49.5	0.30	81.8
2.2	0.08	-95.9	15.24	-172.9	0.0080	50.2	0.32	51.8
2.3	0.06	-96.6	14.62	165.0	0.0081	6.5	0.32	22.3
2.4	0.05	-104.0	14.05	142.1	0.0092	19.4	0.33	-9.9
2.5	0.04	-107.6	13.36	121.3	0.0085	-9.8	0.34	-44.1
2.6	0.03	-95.5	12.51	100.6	0.0084	-28.4	0.36	-79.6
2.7	0.03	-93.9	11.49	80.6	0.0092	-57.0	0.38	-115.9
2.8	0.02	-83.5	10.54	57.4	0.0098	-68.4	0.41	-151.5
2.9	0.02	-54.8	9.85	32.7	0.0087	-78.2	0.45	174.2
3	0.04	-41.0	9.20	9.2	0.0110	-111.5	0.48	140.8
3.5	0.09	-69.1	5.67	-105.1	0.0076	-170.0	0.53	-14.7
4	0.23	-117.0	2.97	144.1	0.0080	75.0	0.48	-172.1
4.5	0.32	-171.5	1.23	46.5	0.0052	8.1	0.47	63.5
5	0.44	135.2	0.45	-37.5	0.0051	-33.7	0.36	-28.0
5.5	0.56	76.4	0.09	-24.2	0.0034	165.0	0.20	-105.1
6	0.73	13.6	0.42	-73.0	0.0024	-121.0	0.03	-152.3

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