S-Band Low Noise Preamplifier Tandberg LNA2420

Rev 1.1
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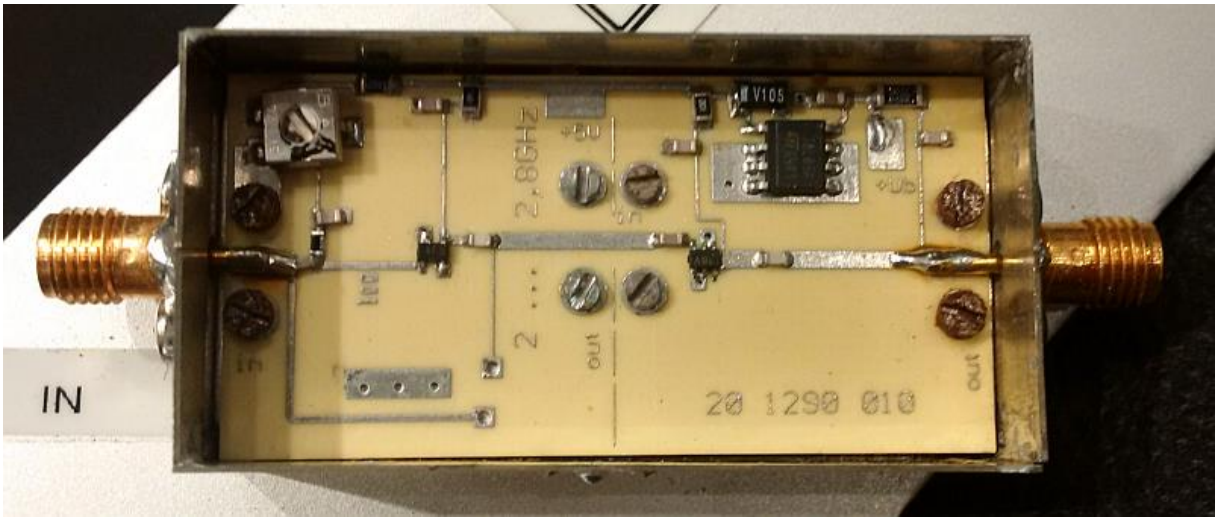
Hello,

While working on another S-Band LNA project I needed to take a break and characterized a surplus S-Band LNA which I intend to use with my recently built short helical omni antenna. The LNA is from Tandberg Television Ltd. and the device name is LNA2420.

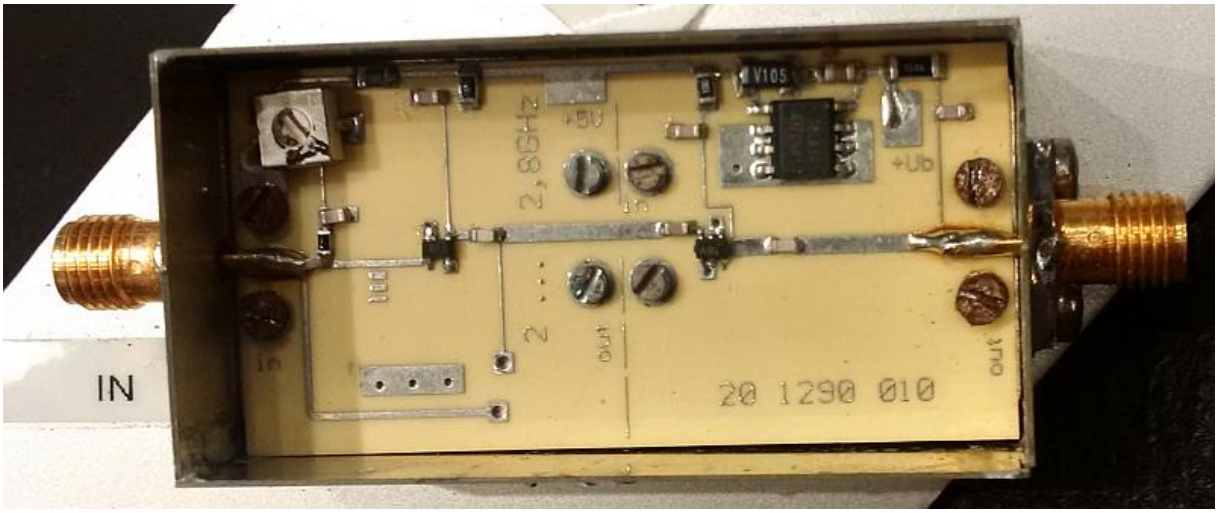
The LNA is operating with a supply voltage of 12V and has a current consumption of 90mA. The voltage is supplied using a phantom feed via the output coaxial connector. Tandberg is giving the following specifications:

Frequency Range:	2000 … 2700 MHz
Gain:	>21 dB
Noise Figure:	0.6dB typ.
OIP3:	+35dBm
Supply voltage:	+12V
Supply current:	250mA typ.

Here are some pictures of the device:

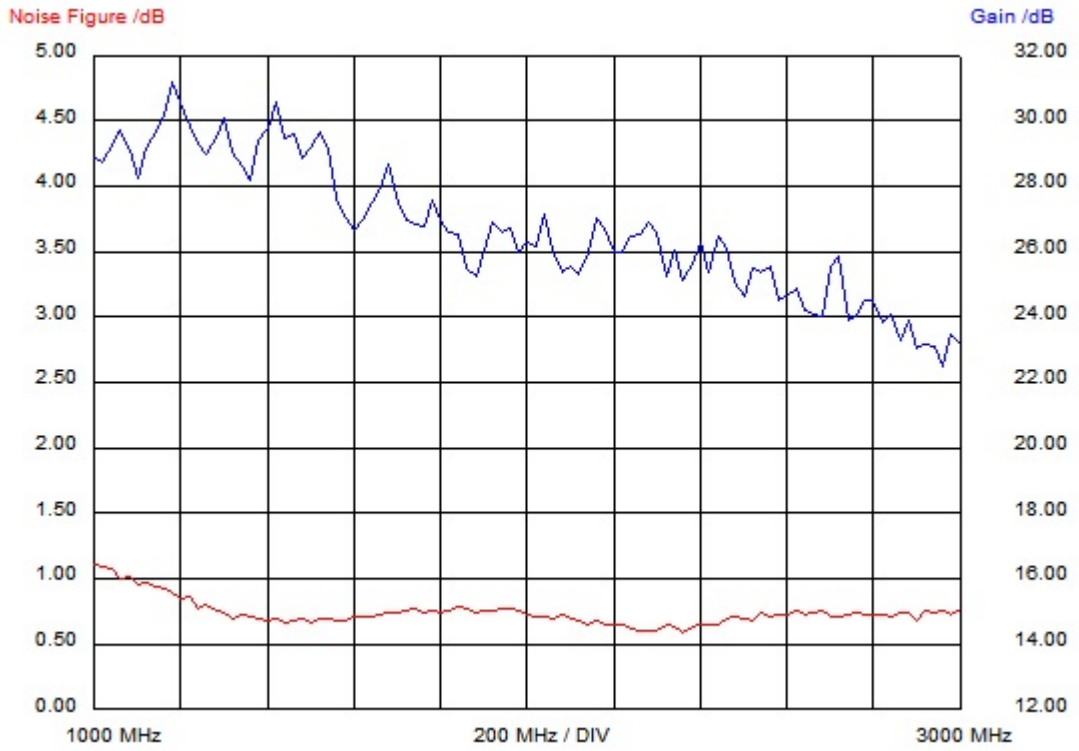


On the PCB the following number is printed 20 1290 010 and a frequency range 2 … 2,8 GHz.



The tin-plated cabinet has an interesting lid. It is comprised of 2 lids which are soldered together and there is an embedded metal netting to guarantee a proper contact between the lid and the encasing.

I measured gain and noise figure in the frequency range 1000 … 3000 MHz:



Here is table of the measured values:

Frequency	Gain	Nf	Temp
1000 MHz	28.88 dB	1.11 dB	84.5 K
1020 MHz	28.76 dB	1.09 dB	82.8 K
1040 MHz	29.20 dB	1.08 dB	81.9 K
1060 MHz	29.74 dB	1.00 dB	75.3 K
1080 MHz	29.13 dB	1.01 dB	76.3 K
1100 MHz	28.25 dB	0.96 dB	71.3 K
1120 MHz	29.18 dB	0.96 dB	71.9 K
1140 MHz	29.66 dB	0.94 dB	70.5 K
1160 MHz	30.12 dB	0.92 dB	68.8 K
1180 MHz	31.17 dB	0.89 dB	66.3 K
1200 MHz	30.55 dB	0.84 dB	62.1 K
1220 MHz	29.85 dB	0.85 dB	62.9 K
1240 MHz	29.26 dB	0.78 dB	56.7 K
1260 MHz	29.00 dB	0.80 dB	58.3 K
1280 MHz	29.45 dB	0.76 dB	55.3 K
1300 MHz	30.07 dB	0.73 dB	53.2 K
1320 MHz	29.04 dB	0.70 dB	50.4 K
1340 MHz	28.62 dB	0.72 dB	52.3 K
1360 MHz	28.20 dB	0.71 dB	51.2 K
1380 MHz	29.43 dB	0.69 dB	50.2 K
1400 MHz	29.77 dB	0.68 dB	48.8 K
1420 MHz	30.57 dB	0.70 dB	50.4 K
1440 MHz	29.47 dB	0.67 dB	48.2 K
1460 MHz	29.60 dB	0.67 dB	48.7 K
1480 MHz	28.86 dB	0.69 dB	50 K
1500 MHz	29.17 dB	0.66 dB	47.5 K
1520 MHz	29.63 dB	0.69 dB	50.1 K
1540 MHz	29.19 dB	0.70 dB	50.4 K
1560 MHz	27.63 dB	0.68 dB	49.3 K
1580 MHz	27.01 dB	0.67 dB	48.4 K

Frequency	Gain	Nf	Temp
1600 MHz	26.67 dB	0.70 dB	50.6 K
1620 MHz	26.99 dB	0.71 dB	51.4 K
1640 MHz	27.52 dB	0.71 dB	51.8 K
1660 MHz	27.95 dB	0.73 dB	52.8 K
1680 MHz	28.65 dB	0.74 dB	53.6 K
1700 MHz	27.52 dB	0.74 dB	53.6 K
1720 MHz	26.96 dB	0.75 dB	54.6 K
1740 MHz	26.83 dB	0.77 dB	56.2 K
1760 MHz	26.79 dB	0.74 dB	54.1 K
1780 MHz	27.59 dB	0.76 dB	55.6 K
1800 MHz	26.93 dB	0.74 dB	53.6 K
1820 MHz	26.61 dB	0.76 dB	55.6 K
1840 MHz	26.54 dB	0.78 dB	56.9 K
1860 MHz	25.51 dB	0.77 dB	55.9 K
1880 MHz	25.23 dB	0.74 dB	54.2 K
1900 MHz	26.05 dB	0.76 dB	55.2 K
1920 MHz	26.92 dB	0.75 dB	54.8 K
1940 MHz	26.61 dB	0.77 dB	56.5 K
1960 MHz	26.68 dB	0.77 dB	56.3 K
1980 MHz	25.97 dB	0.75 dB	54.8 K
2000 MHz	26.29 dB	0.72 dB	52.3 K
2020 MHz	26.14 dB	0.71 dB	51.7 K
2040 MHz	27.14 dB	0.70 dB	51 K
2060 MHz	26.02 dB	0.69 dB	49.9 K
2080 MHz	25.36 dB	0.72 dB	52.7 K
2100 MHz	25.55 dB	0.69 dB	50 K
2120 MHz	25.33 dB	0.67 dB	48.5 K
2140 MHz	25.99 dB	0.65 dB	46.9 K
2160 MHz	27.01 dB	0.68 dB	49.1 K
2180 MHz	26.70 dB	0.65 dB	46.5 K
2200 MHz	25.99 dB	0.65 dB	47.2 K
2220 MHz	25.96 dB	0.65 dB	46.8 K
2240 MHz	26.45 dB	0.61 dB	44 K
2260 MHz	26.53 dB	0.59 dB	42.4 K
2280 MHz	26.92 dB	0.60 dB	43.2 K
2300 MHz	26.60 dB	0.61 dB	43.6 K
2320 MHz	25.26 dB	0.64 dB	46.1 K
2340 MHz	26.05 dB	0.62 dB	44.8 K
2360 MHz	25.10 dB	0.59 dB	42.3 K
2380 MHz	25.58 dB	0.63 dB	44.9 K
2400 MHz	26.29 dB	0.64 dB	46 K
2420 MHz	25.38 dB	0.65 dB	47.2 K
2440 MHz	26.49 dB	0.64 dB	46.2 K
2460 MHz	26.12 dB	0.69 dB	49.7 K
2480 MHz	25.04 dB	0.70 dB	50.7 K
2500 MHz	24.64 dB	0.69 dB	50.3 K
2520 MHz	25.49 dB	0.68 dB	49.3 K
2540 MHz	25.34 dB	0.74 dB	53.5 K
2560 MHz	25.55 dB	0.71 dB	51.4 K
2580 MHz	24.50 dB	0.72 dB	52.5 K
2600 MHz	24.65 dB	0.73 dB	53 K
2620 MHz	24.86 dB	0.76 dB	55.1 K
2640 MHz	24.20 dB	0.72 dB	52 K
2660 MHz	24.08 dB	0.73 dB	53.4 K
2680 MHz	24.05 dB	0.75 dB	54.4 K
2700 MHz	25.54 dB	0.71 dB	51.7 K
2720 MHz	25.86 dB	0.71 dB	51.2 K
2740 MHz	23.92 dB	0.73 dB	52.7 K
2760 MHz	24.04 dB	0.74 dB	53.5 K
2780 MHz	24.52 dB	0.72 dB	52.4 K
2800 MHz	24.53 dB	0.72 dB	52.4 K

Frequency	Gain	Nf	Temp
2820 MHz	23.83 dB	0.72 dB	52.2 K
2840 MHz	24.07 dB	0.71 dB	51.9 K
2860 MHz	23.26 dB	0.73 dB	53.2 K
2880 MHz	23.91 dB	0.74 dB	54.1 K
2900 MHz	23.03 dB	0.68 dB	49.5 K
2920 MHz	23.13 dB	0.76 dB	55.6 K
2940 MHz	23.07 dB	0.73 dB	53.4 K
2960 MHz	22.51 dB	0.75 dB	54.8 K
2980 MHz	23.45 dB	0.72 dB	52.4 K
3000 MHz	23.19 dB	0.76 dB	55.8 K

The gain drops from about 30dB at 1100 MHZ to 23 dB at 3000 MHz, while the noise figure is rather constant and below 1.0 dB in that same frequency range. In the specified frequency range 2000 … 2700 MHz it is Nevertheless it is higher 3 … 5 dB higher than the specified minimum value of 21dB.

The noise figure is below 0.7 dB between 2100 … 2500 MHz, which matches the target frequency range of my antenna quite well. The minimum noise figure is 0.6dB around the s-band satellite downlink at 2250 MHz. Also, this parameter is quite close to the specified 0.6 dB typ.

I also measured gain and noise figure as a function of the supply voltage and it degrades quickly below 12V. The best results were achieved in the supply voltage range from 12 … 14.5 V.

I always appreciate feedback and will be happy to answer questions.

Please send it to the Email address given below.

Best regards

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