1420 MHz Low Noise Preamplifier SSB-Electronic SLN-1420

Matthias DD1US, Rev 1.0, January 29th 2020

Hello,

I am planning to conduct some radio astronomical observations of neutral hydrogen from our galaxy at 1420 MHz using my available 2.3m dish.

Recently I was able to acquire a suitable LNA SLN-1420 from SSB-Electronics second hand. There are 2 different versions available: either in a tin-plated cabinet or in a milled aluminum encasing. I was fortunate to get the version in the rugged milled aluminum encasing. Interestingly I found different specifications especially with respect to the noise figure ranging from 0.3dB to 1.0dB. Here are some specifications as provided by the supplier SSB-Electronic.

Data Sheet

SLN 1420 P / Art. No.: 1056

This amplifier series is characterized by a very low noise figure, high amplification and excellent electrical stability. As frequency occupation gets more and more dense, especially by GSM nets, there are increased requirements concerning selectivity and large signal performance of the amplifier. The SLN-series fulfills these requirements with the following specifications:

Two-stage preamplifier, 1. stage low noise HEMT, 2. stage GaAs-Fet driver with a linear output power of > + 10 dBm. For good selectivity adjustable Helix band filters are used. The amplifier is built onto a low-loss ceramic/glas fibre substrate. The SLN 1420 P has a milled aluminium-housing with surface protection. It can be feeded remotely or directly.

A printed measurement report is part of the delivery.

Technical Data

Frequency	1420 MHz
Noise figure, typ.	0,3 dB
Amplification, typ.	30 dB
3 dB BW, typ.	40 MHz
Connection norm	N - socket
Operating voltage	12V -14V
Current consumption, typ	60 mA
Dimensions	80x62x30 mm
Weight	140 g

Do not open the unit. It does not contain any parts needing maintenance. If you need help regarding technical matters, please contact our team:
technik@ssb-electronic.de

Datenblatt

SLN 1420 P / Art. Nr.: 1056

Diese Verstärkerserie zeichnet sich durch eine äußerst niedrige Rauschzahl, hohe Verstärkungswerte und eine hervorragende elektrische Stabilität aus. Die immer dichtere Frequenzbelegung, speziell durch GSM-Netze, stellt erhöhte Anforderungen an die Selektivität und das Großsignalverhalten von Verstärker. Die SLN-Serie erfüllt diese Anforderungen mit folgenden Leistungs-merkmalen:

Zweistufiger Vorverstärker, 1. Stufe low noise HEMT, 2. Stufe GaAs-Fet Treiber mit einer linearen Ausgangsleistung von > + 10 dBm. Zur Selektion werden abstimmbare Helix-Bandfilter eingesetzt. Der Verstärker ist auf einem verlustarmen Keramik/Glasfaser-Substrat aufgebaut. Der SLN 1420 P besitzt ein HF-dichtes gefrästes Aluminium-Gehäuse mit Oberflächenschutz. Der SLN kann fern- oder direktgespeist werden.

Das Messprotokoll wird ausgedruckt und mitgeliefert.

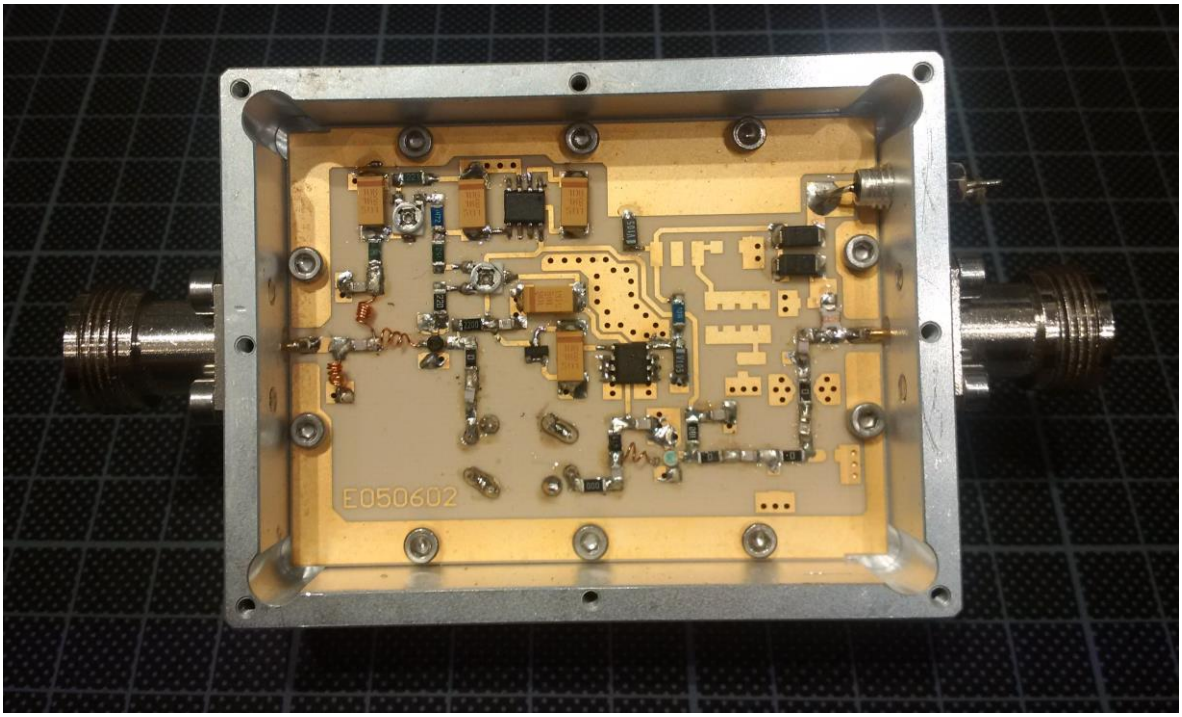
Technische Daten

Frequenz	1420 MHz
Rauschmaß, typ.	1,0 dB
Verstärkung, typ.	28 dB
3 dB BW, typ.	40 MHz
Anschlussnorm	N - Buchse
Betriebsspannung	12V -14V
Stromaufnahme, typ	60 mA
Gehäuseabmessungen	80x62x30 mm
Gewicht	140 g

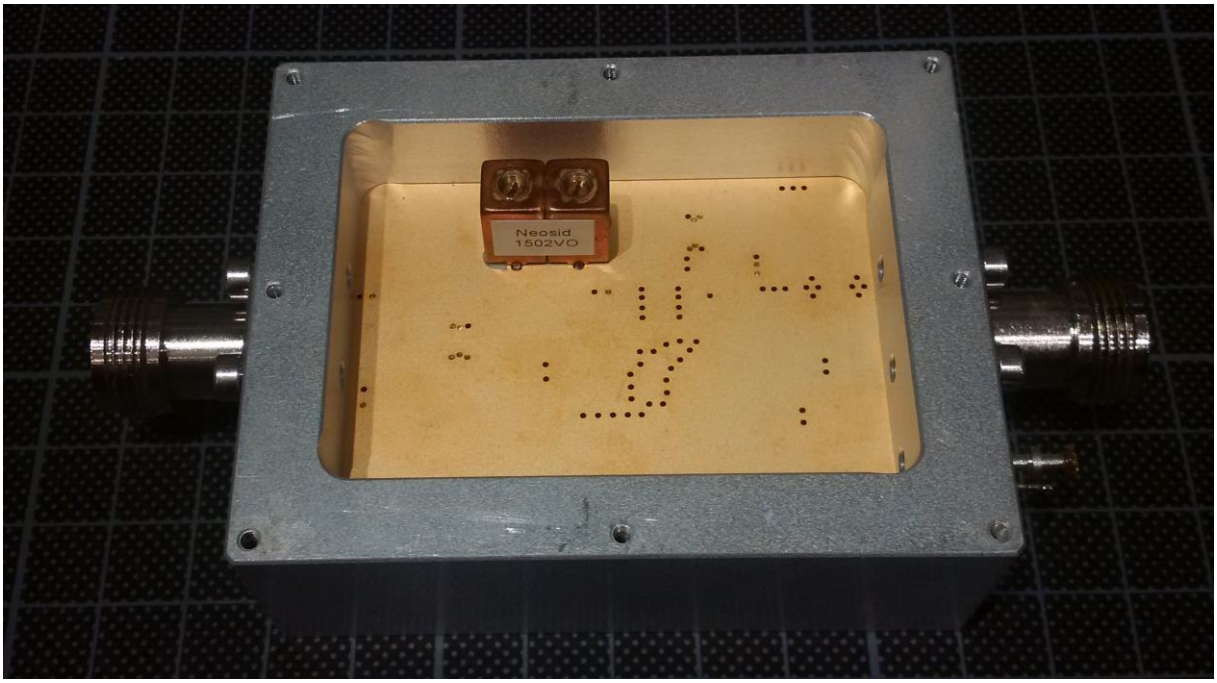
Öffnen Sie das Gerät nicht. Das Gerät enthält keine wartbaren Teile. Wenn Sie bei technischen Fragen Unterstützung benötigen, wenden Sie sich bitte per eMail an: technik@ssb-electronic.de

Here are some pictures of the very professionally made device:

Here are some pictures of the inside:

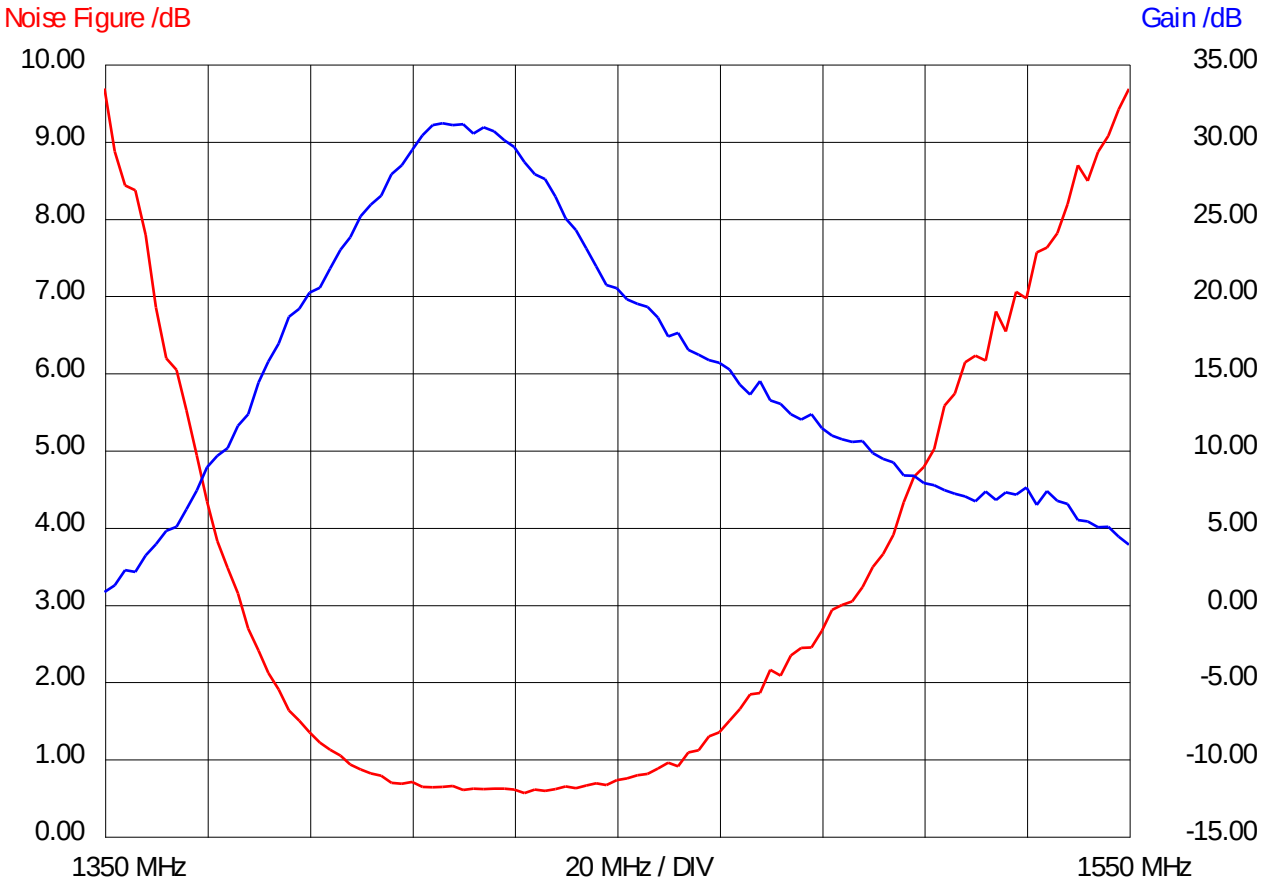


The top side of the gold-plated PCBs contains the 2-stage amplifier, voltage regulator and negative bias generator for the gate bias. The amplifier can be powered either via the dedicated feed-through capacitor or by a phantom feed through the coaxial output pin.



The bottom side only holds the band pass filter with a bandwidth of 40MHz.

I measured gain and noise figure in the frequency range 1350 … 1550 MHz:



The minimum noise figure and maximum gain are nicely centred at 1420 MHz. The noise figure is 0.6dB and the associated gain is 31dB.

Here is table of the measured values:

Frequency	Gain	Nf	Temp
1350 MHz	0.81 dB	9.68 dB	2403.4 K
1352 MHz	1.24 dB	8.86 dB	1942.1 K
1354 MHz	2.23 dB	8.42 dB	1727.5 K
1356 MHz	2.10 dB	8.36 dB	1698.5 K
1358 MHz	3.16 dB	7.79 dB	1451.9 K
1360 MHz	3.90 dB	6.84 dB	1112.1 K
1362 MHz	4.75 dB	6.18 dB	914.6 K
1364 MHz	5.02 dB	6.04 dB	874.4 K
1366 MHz	6.16 dB	5.51 dB	742.2 K
1368 MHz	7.38 dB	4.93 dB	612.4 K
1370 MHz	8.88 dB	4.34 dB	497 K
1372 MHz	9.62 dB	3.82 dB	408.7 K
1374 MHz	10.13 dB	3.47 dB	355 K
1376 MHz	11.57 dB	3.14 dB	308.1 K
1378 MHz	12.31 dB	2.69 dB	248.2 K
1380 MHz	14.36 dB	2.40 dB	214.1 K
1382 MHz	15.74 dB	2.11 dB	181.5 K
1384 MHz	16.90 dB	1.90 dB	158.9 K
1386 MHz	18.61 dB	1.63 dB	131.6 K
1388 MHz	19.15 dB	1.49 dB	118.9 K
1390 MHz	20.18 dB	1.34 dB	105.2 K
1392 MHz	20.50 dB	1.21 dB	93.2 K
1394 MHz	21.75 dB	1.12 dB	85.1 K
1396 MHz	22.97 dB	1.04 dB	78.4 K
1398 MHz	23.77 dB	0.93 dB	68.9 K
1400 MHz	25.14 dB	0.86 dB	63.7 K
1402 MHz	25.89 dB	0.81 dB	59.6 K
1404 MHz	26.47 dB	0.78 dB	57.1 K
1406 MHz	27.85 dB	0.69 dB	49.9 K
1408 MHz	28.42 dB	0.68 dB	49.1 K
1410 MHz	29.43 dB	0.70 dB	50.6 K
1412 MHz	30.36 dB	0.64 dB	45.7 K
1414 MHz	31.02 dB	0.63 dB	45.1 K
1416 MHz	31.14 dB	0.64 dB	45.9 K
1418 MHz	31.03 dB	0.65 dB	46.5 K
1420 MHz	31.09 dB	0.60 dB	42.7 K
1422 MHz	30.48 dB	0.62 dB	44.2 K
1424 MHz	30.89 dB	0.61 dB	43.7 K
1426 MHz	30.62 dB	0.61 dB	44 K
1428 MHz	30.04 dB	0.61 dB	43.8 K
1430 MHz	29.61 dB	0.60 dB	43 K
1432 MHz	28.64 dB	0.55 dB	39.5 K
1434 MHz	27.85 dB	0.60 dB	43.2 K
1436 MHz	27.55 dB	0.58 dB	41.7 K
1438 MHz	26.41 dB	0.61 dB	43.4 K
1440 MHz	24.99 dB	0.64 dB	46.2 K
1442 MHz	24.24 dB	0.62 dB	44.6 K
1444 MHz	23.04 dB	0.66 dB	47.2 K
1446 MHz	21.90 dB	0.68 dB	49.3 K
1448 MHz	20.67 dB	0.66 dB	47.7 K
1450 MHz	20.48 dB	0.72 dB	52.6 K
1452 MHz	19.74 dB	0.74 dB	54.2 K
1454 MHz	19.45 dB	0.79 dB	57.5 K
1456 MHz	19.26 dB	0.80 dB	58.8 K
1458 MHz	18.56 dB	0.87 dB	64.6 K
1460 MHz	17.34 dB	0.95 dB	71 K
1462 MHz	17.58 dB	0.90 dB	66.8 K
1464 MHz	16.48 dB	1.08 dB	82 K
1466 MHz	16.16 dB	1.11 dB	84.7 K

Frequency	Gain	Nf	Temp
1468 MHz	15.83 dB	1.29 dB	100.4 K
1470 MHz	15.63 dB	1.34 dB	105.2 K
1472 MHz	15.21 dB	1.49 dB	118.8 K
1474 MHz	14.24 dB	1.64 dB	133.2 K
1476 MHz	13.58 dB	1.84 dB	152.5 K
1478 MHz	14.45 dB	1.85 dB	154.1 K
1480 MHz	13.20 dB	2.15 dB	186 K
1482 MHz	12.98 dB	2.08 dB	178.1 K
1484 MHz	12.31 dB	2.34 dB	206.6 K
1486 MHz	11.96 dB	2.43 dB	217.9 K
1488 MHz	12.31 dB	2.44 dB	219.1 K
1490 MHz	11.42 dB	2.66 dB	244.5 K
1492 MHz	10.93 dB	2.93 dB	279.2 K
1494 MHz	10.70 dB	2.99 dB	287.7 K
1496 MHz	10.51 dB	3.04 dB	294 K
1498 MHz	10.59 dB	3.22 dB	318.8 K
1500 MHz	9.81 dB	3.48 dB	356.9 K
1502 MHz	9.41 dB	3.65 dB	382.6 K
1504 MHz	9.19 dB	3.90 dB	421.8 K
1506 MHz	8.35 dB	4.32 dB	494.2 K
1508 MHz	8.32 dB	4.65 dB	556.4 K
1510 MHz	7.85 dB	4.78 dB	581.2 K
1512 MHz	7.72 dB	5.01 dB	629.7 K
1514 MHz	7.41 dB	5.57 dB	756.3 K
1516 MHz	7.16 dB	5.73 dB	795.2 K
1518 MHz	6.98 dB	6.13 dB	900.5 K
1520 MHz	6.67 dB	6.22 dB	925.3 K
1522 MHz	7.30 dB	6.16 dB	907.9 K
1524 MHz	6.77 dB	6.80 dB	1096.8 K
1526 MHz	7.25 dB	6.53 dB	1015.4 K
1528 MHz	7.11 dB	7.05 dB	1180.6 K
1530 MHz	7.58 dB	6.96 dB	1150.7 K
1532 MHz	6.45 dB	7.56 dB	1362.5 K
1534 MHz	7.33 dB	7.62 dB	1386.8 K
1536 MHz	6.70 dB	7.80 dB	1459.4 K
1538 MHz	6.50 dB	8.18 dB	1618.5 K
1540 MHz	5.44 dB	8.69 dB	1854.3 K
1542 MHz	5.38 dB	8.48 dB	1754.8 K
1544 MHz	4.99 dB	8.86 dB	1940.9 K
1546 MHz	5.01 dB	9.07 dB	2049.5 K
1548 MHz	4.39 dB	9.41 dB	2243 K
1550 MHz	3.88 dB	9.68 dB	2402.4 K

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

Please send it to the Email address given below.

Best regards

Matthias DD1US

Email: DD1US@AMSAT.ORG Homepage: http://www.dd1us.de