

Wideband Amplifier MITEQ AMF-3F-01000200-04-13P

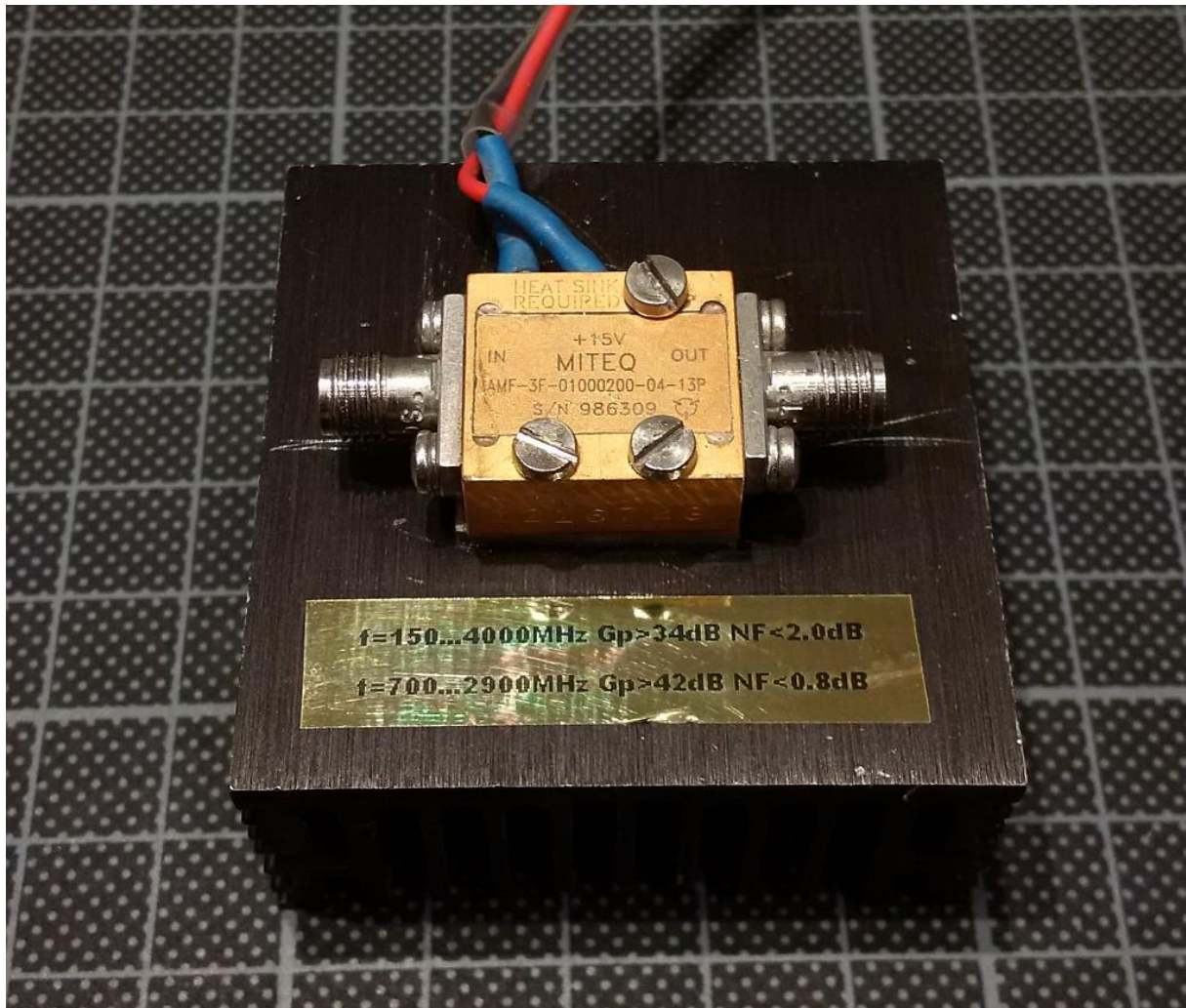
Matthias, DD1US, February 4th 2020

Today I was able to acquire a wide band amplifier from MITEQ with the part number AFM3F-01000200-04-13P.

On the internet I found only these brief specifications:

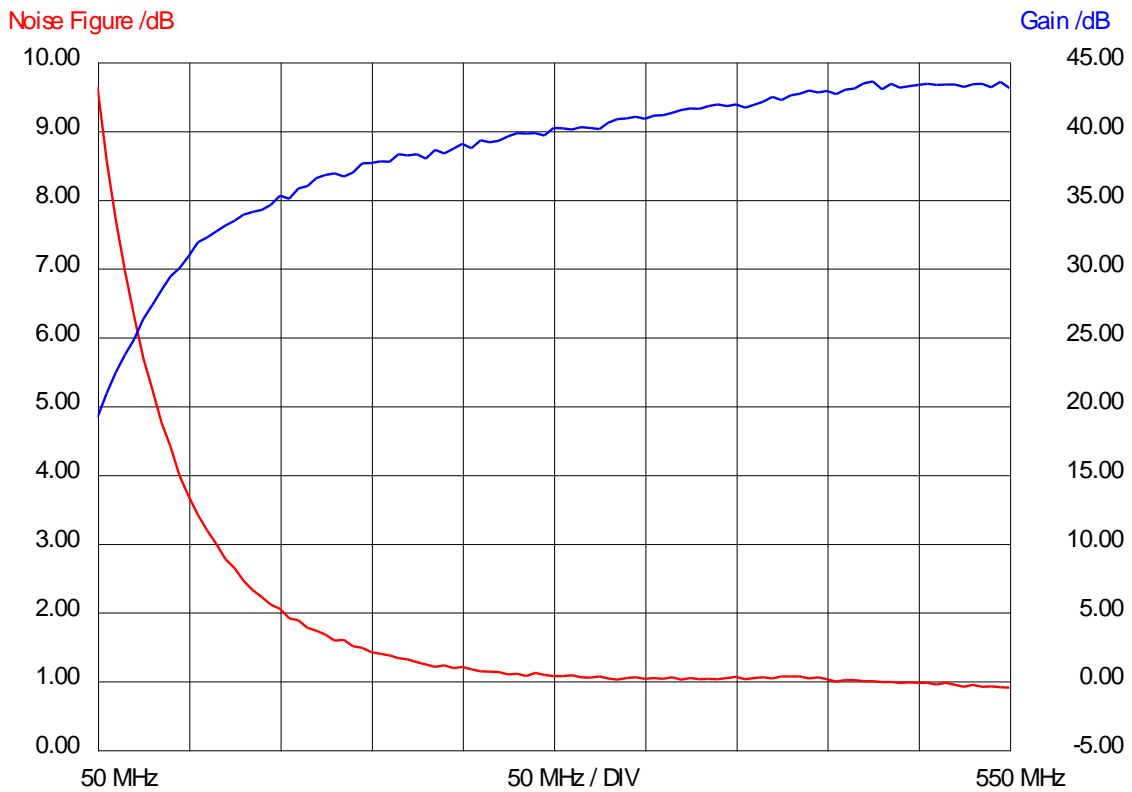
Model:	AMF-3F-01000200-04-13P
Description:	Wideband Amplifier
Frequency Range:	1–2 GHz
Gain:	45 dB (Min.)
Gain Flatness:	±1.5 dB (Max.)
Noise Figure:	0.4 dB (Max.)
VSWR In/Out:	2:1 (Max.)
Output Power:	13 dBm (Min.)
Supply Voltage:	15 V nom.
Supply Current:	180mA nom.

I mounted the amplifier on a small heat sink in order to avoid getting it too warm as this certainly degrades not only the lifetime but also performance, especially the noise figure.



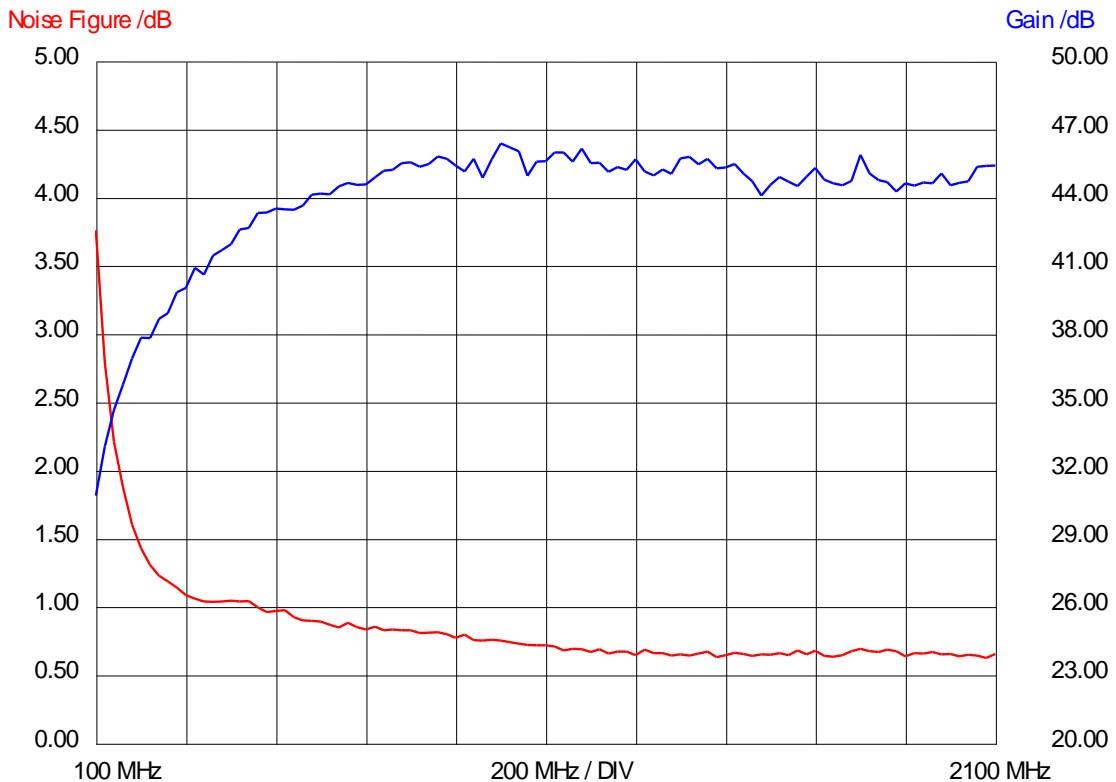
My device has a current consumption of 130mA at a supply voltage of 15V. Reducing the supply voltage to 12V did not degrade the gain and noise figure of the device. I have not yet measured the P1dB.

First, I measured gain (blue) and noise figure (red) of the device in the range from 50 MHz up to 550 MHz at a supply voltage of 15 V.



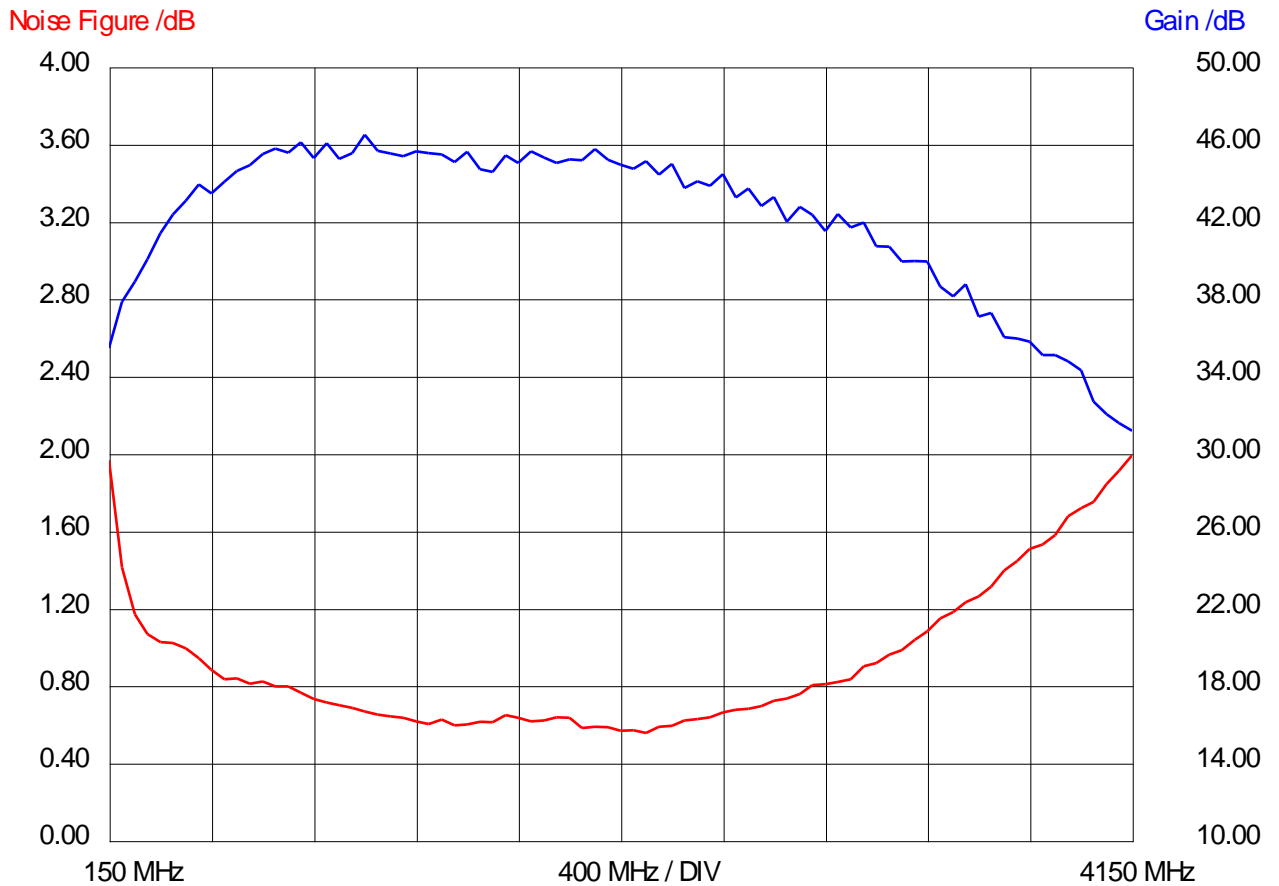
The amplifier has a noise figure below 1dB and a gain of more than 40dB at 250 MHz and higher.

Next, I repeated the measurement in the frequency range 100 MHz up to 2100 MHz keeping the supply voltage at 15 V.



Between 1 and 2 GHz the amplifier has a noise figure below 0.8dB and a gain of more than 45dB.

Finally, I measured gain and noise figure in the frequency range 150 MHz up to 4150 MHz keeping the supply voltage at 15 V.



In the frequency range 150 to 4000 MHz the gain is higher than 34dB and the noise figure is lower than 2.0dB.

In the frequency range 700 to 2900 MHz the gain is higher than 42dB and the noise figure is lower than 0.8dB.

In the frequency range 2000 to 2350 Mhz the gain is about 45dB and the noise figure is approx. 0.6dB.

Here is a table with the measurement results:

Frequency	Gain	NF	Temp	Frequency	Gain	NF	Temp
150 MHz	35.45 dB	1.97 dB	166.1 K	1100 MHz	45.52 dB	0.69 dB	49.6 K
200 MHz	37.85 dB	1.41 dB	111.4 K	1150 MHz	46.49 dB	0.67 dB	48 K
250 MHz	38.89 dB	1.17 dB	89.6 K	1200 MHz	45.65 dB	0.65 dB	46.9 K
300 MHz	40.04 dB	1.07 dB	80.8 K	1250 MHz	45.52 dB	0.64 dB	46.1 K
350 MHz	41.38 dB	1.02 dB	77.2 K	1300 MHz	45.37 dB	0.64 dB	45.7 K
400 MHz	42.36 dB	1.02 dB	76.9 K	1350 MHz	45.63 dB	0.62 dB	44.2 K
450 MHz	43.07 dB	0.99 dB	74.5 K	1400 MHz	45.54 dB	0.60 dB	43.1 K
500 MHz	43.91 dB	0.94 dB	70.3 K	1450 MHz	45.46 dB	0.62 dB	44.9 K
550 MHz	43.46 dB	0.88 dB	65.3 K	1500 MHz	45.07 dB	0.59 dB	42.6
600 MHz	44.05 dB	0.83 dB	61.4 K	1550 MHz	45.60 dB	0.60 dB	42.9 K
650 MHz	44.61 dB	0.84 dB	61.8 K	1600 MHz	44.70 dB	0.61 dB	43.9 K
700 MHz	44.91 dB	0.81 dB	59.4 K	1650 MHz	44.57 dB	0.61 dB	43.8 K
750 MHz	45.48 dB	0.82 dB	60.4 K	1700 MHz	45.42 dB	0.65 dB	46.6 K
800 MHz	45.75 dB	0.80 dB	58.4 K	1750 MHz	45.03 dB	0.63 dB	45.7 K
850 MHz	45.55 dB	0.80 dB	58.3 K	1800 MHz	45.63 dB	0.62 dB	44.3 K
900 MHz	46.09 dB	0.76 dB	55.7 K	1850 MHz	45.30 dB	0.62 dB	44.6 K
950 MHz	45.28 dB	0.73 dB	53.2 K	1900 MHz	45.02 dB	0.64 dB	45.7 K
1000 MHz	46.04 dB	0.71 dB	51.8 K	1950 MHz	45.20 dB	0.63 dB	45.7 K
1050 MHz	45.24 dB	0.70 dB	50.7 K	2000 MHz	45.17 dB	0.58 dB	41.5 K

Frequency	Gain	NF	Temp	Frequency	Gain	NF	Temp
2050 MHz	45.74 dB	0.59 dB	42 K	3150 MHz	40.72 dB	0.92 dB	68.1 K
2100 MHz	45.19 dB	0.58 dB	41.8 K	3200 MHz	40.70 dB	0.96 dB	71.8 K
2150 MHz	44.93 dB	0.57 dB	40.4 K	3250 MHz	39.94 dB	0.98 dB	73.8 K
2200 MHz	44.73 dB	0.57 dB	40.6 K	3300 MHz	39.95 dB	1.04 dB	78.3 K
2250 MHz	45.11 dB	0.56 dB	39.6 K	3350 MHz	39.94 dB	1.08 dB	82 K
2300 MHz	44.43 dB	0.59 dB	42 K	3400 MHz	38.63 dB	1.15 dB	87.8 K
2350 MHz	44.97 dB	0.59 dB	42.4 K	3450 MHz	38.11 dB	1.18 dB	90.6 K
2400 MHz	43.72 dB	0.62 dB	44.5 K	3500 MHz	38.76 dB	1.23 dB	95 K
2450 MHz	44.07 dB	0.63 dB	45 K	3550 MHz	37.09 dB	1.26 dB	97.8 K
2500 MHz	43.85 dB	0.64 dB	45.8 K	3600 MHz	37.27 dB	1.31 dB	102.4 K
2550 MHz	44.45 dB	0.66 dB	47.8 K	3650 MHz	36.01 dB	1.39 dB	109.8 K
2600 MHz	43.24 dB	0.68 dB	48.9 K	3700 MHz	35.96 dB	1.44 dB	114.4 K
2650 MHz	43.70 dB	0.68 dB	49.1 K	3750 MHz	35.78 dB	1.51 dB	120.3 K
2700 MHz	42.80 dB	0.70 dB	50.4 K	3800 MHz	35.09 dB	1.53 dB	122.5 K
2750 MHz	43.25 dB	0.72 dB	52.4 K	3850 MHz	35.08 dB	1.58 dB	127.1 K
2800 MHz	42.00 dB	0.73 dB	53.4 K	3900 MHz	34.77 dB	1.68 dB	136.6 K
2850 MHz	42.74 dB	0.76 dB	55.3 K	3950 MHz	34.31 dB	1.72 dB	140.7 K
2900 MHz	42.33 dB	0.80 dB	58.8 K	4000 MHz	32.69 dB	1.75 dB	143.9 K
2950 MHz	41.49 dB	0.81 dB	59.2 K	4050 MHz	32.03 dB	1.84 dB	153.2 K
3000 MHz	42.37 dB	0.82 dB	60.3 K	4100 MHz	31.58 dB	1.91 dB	160.4 K
3050 MHz	41.69 dB	0.83 dB	61.4 K	4150 MHz	31.19 dB	1.99 dB	168.6 K
3100 MHz	41.95 dB	0.90 dB	66.8 K				

I also evaluated the supply voltage dependency of gain and noise figure. I measured those parameters at the frequency 2350MHz in the voltage range 9V up to 16V:

Supply voltage /V	Supply current /mA	Gain /dB	Noise figure /dB
9	89	21.9	0.71
10	99	41.6	0.75
11	107	43.8	0.70
12	114	44.9	0.65
13	120	45.0	0.61
14	127	45.0	0.60
15	130	45.0	0.60
16	130	44.9	0.60

The amplifier works well in the supply voltage range between 11 and 16V, with the optimum performance in the range 13 to 15V. However, the specified maximum noise figure of 0.4dB is not reached. As a bonus the specified frequency range 1-2 GHz can be extended up 2.4 GHz without compromising any parameters.

I am always grateful to get feedback and will be happy to answer questions.

Please direct them to the Email address which you will find below.

Best regards

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