

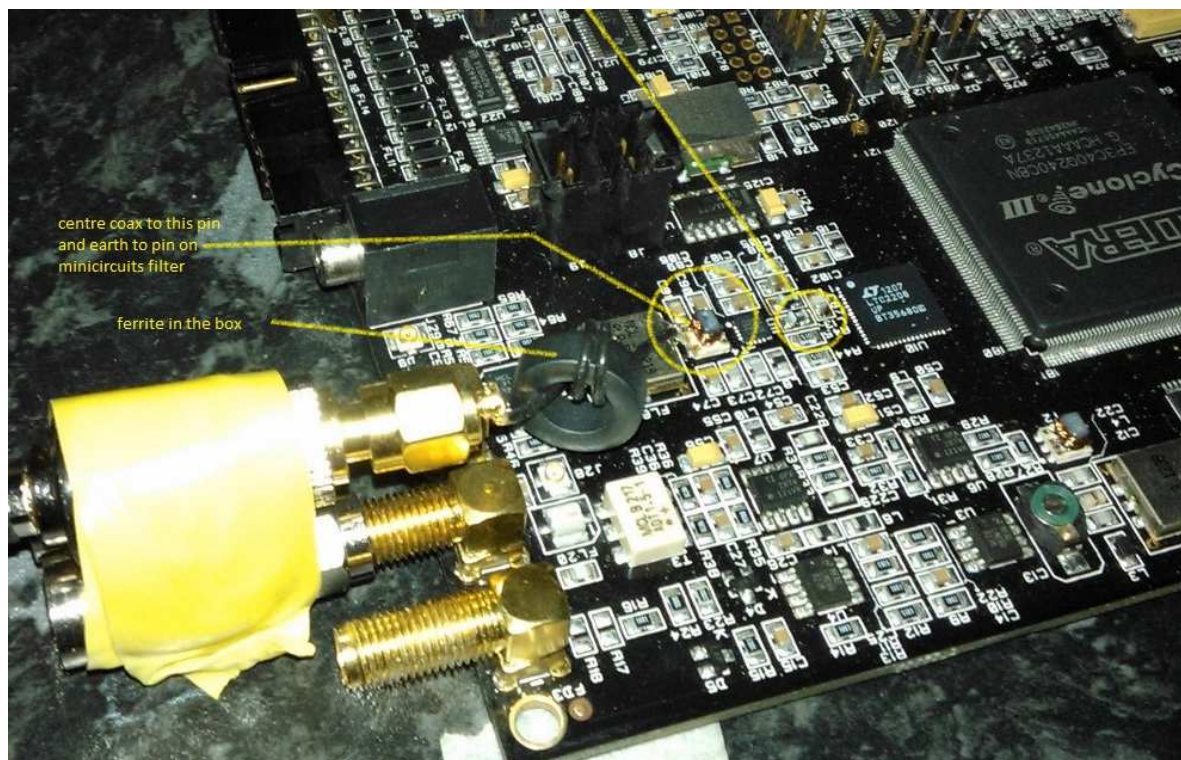
Update on Hermes 144MHz

26.11.13

RX testing

Modification

Injected 144MHz into transformer via 50ohm coax with a ferrite "balun" to provide some HF impedance on ground. Modified the anti-alias filter by changing 47n for 56n and 100pF for a 12pF. This provides LPF characteristic with a peak around 130MHz – in an attempt to provide some rejection of the aliased noise. Ideally a bandpass filter could be used – but there is not space to easily put this onto the Hermes board. 10pF may have been better.



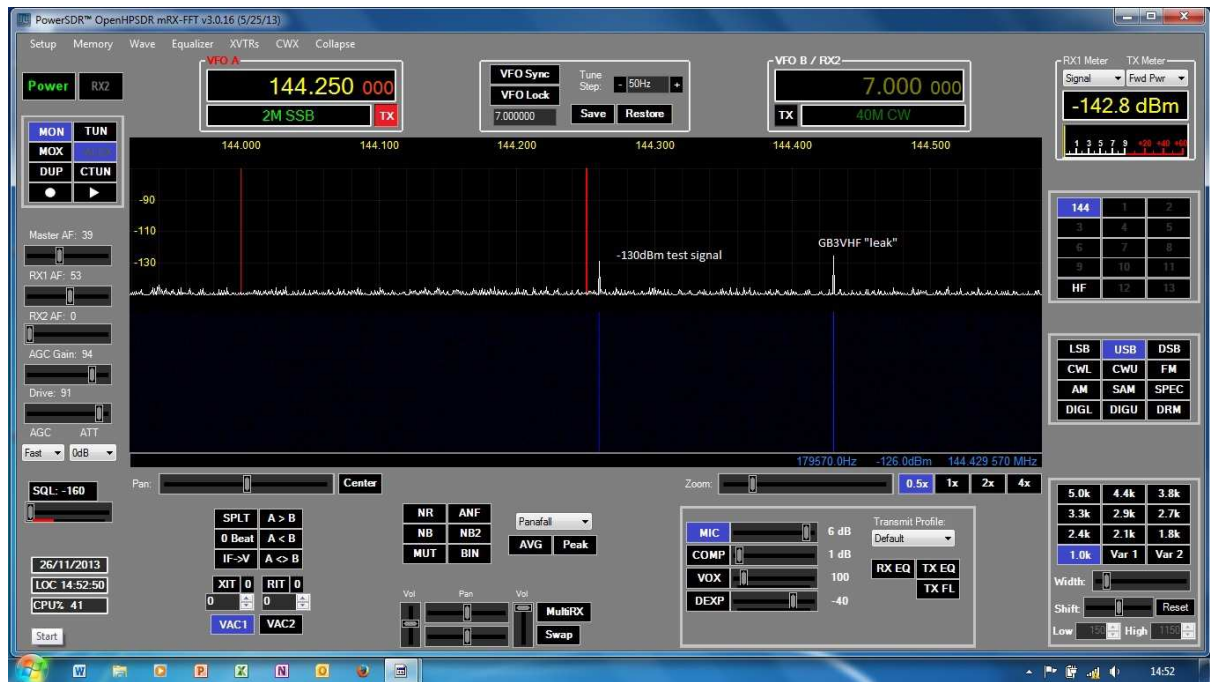
Results

Measured noise figure by assuming 50ohm load creates -174.0dBm/Hz. Noise power measured with Hermes, and calibrated gain against injected test signal from sig gen. Not a great way.

	BW /HZ	dbm	in 1 Hz	Nf / dB	xvtr gain / dB
LNA	2.00E+04	-128.6	-171.6	2.4	32
Hermes direct	2.00E+04	-116.8	-159.8	14.2	4.5

The noise figure of the Hermes board was 14.2dB.

The LNA did measure 0.5dB (about four years ago) and has 26dB gain.



Here's a screen shot at 144MHz – the lack of spurs and spuri is very pleasing -

HF Performance

Unfortunately this modification seems to increase the noise at HF – I measured close to 40dB Nf on some bands. The applications note on the LTC6400 recommends some different anti alias filters configuration. One comment is that common mode capacitors to ground help bypass sampler injection currents – these are very short ns transients injected into the signal path within the ADC. It is hard to experiment on the Hermes Board and therefore I am going to defect to the SDR stick from the folks in Arizona. See

Integration as TX/RX

Unfortunately the LNA on the designed board below, that the same design as the LNA which is in a die cast box, the unconditionally stable design, with margin, oscillates – hum. Copper screening has been added and it was quiet on an analyser, but when the whole assembly is put together, I am afraid there are issues... Work in progress.

3IP

The characteristics of an ADC sampling system don't follow (non) linear system assumptions used when calculating 3IP points. Proof of the pudding is going to be trying this in a contest...

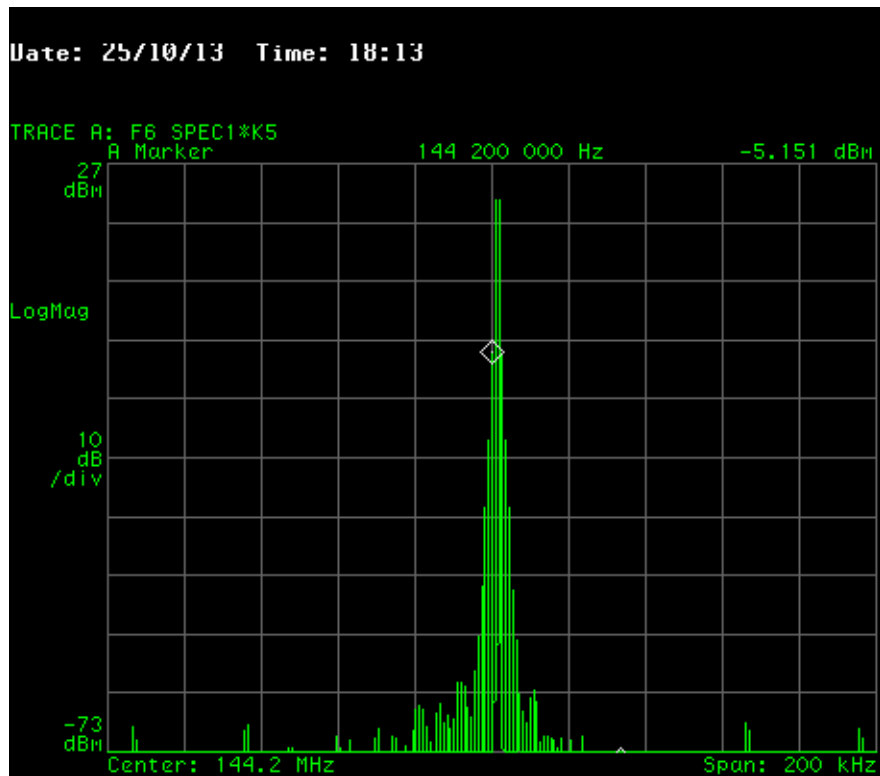
Comment

I did remove the anti-alias filter $47n > 0R$ and no capacitor – it samples 432MHz quite happily....

Next Steps

I have an SDR stick on order – <https://www.iquadlabs.com/productdisplay/udpsdr-hf2> this has a more complicated anti alias filter and perhaps is an easier prospect to give a 144MHz SDR...





500mW PEP – 3rd order -32dB PEP, 9th -72dBc

drive	carrier dBm	IM3 dBm	IM3 dBc dB	PEP dBm	PEP mW
0	6.19	-36.5	42.69	12.2	17
1	9.18	-28.1	37.28	15.2	33
2	10.53	-24.6	35.13	16.5	45
3	12.94	-19.4	32.34	18.9	79
4					4
5	13.98	-17.5	31.48	20.0	100
6	14.85	-15.8	30.65	20.9	122
7	15.85	-14.92	30.77	21.9	154
9	16.39	-13.5	29.89	22.4	174
10	17.08	-12.25	29.33	23.1	204
12	17.7	-11.1	28.8	23.7	236
14	18.28	-10.1	28.38	24.3	269
17	18.8	-10.1	28.9	24.8	303
19	19.34	-8.25	27.59	25.3	344
22	19.8	-7.4	27.2	25.8	382
30	21.02	-5.06	26.08	27.0	506

Drive versus Po and 3IP