An introduction to model NGA, Noise and Gain Analyser.

Measuring the noise figure of a high performance LNA or transverter with accuracy to within a few tenths of 1dB requires a calibrated and stable noise source together with a highly linear display device. Low cost solutions to each of these functions have been hard to come by. RFD noise sources solve the first problem (currently up to 3.5GHz), but what of the display device?

Measuring the noise figure of a receiver with AGC off and using PC soundcard level software, yields impressively accurate results in many instances. However, turning off AGC is not always possible and the limited audio bandwidth of the receiver under test may not take full advantage of the bandwidth of the PC soundcard, limiting the measurement speed. Measuring LNA or transverter noise figure performance independently of an existing receiver, with a 'wide' audio bandwidth, would provide new opportunities.

NGA is a linear dual conversion downconverter, with an input range of 10MHz to 1500MHz and audio output with an upper bandwidth of approximately 70kHz. Unlike other low cost noise figure display devices, the power detection is carried out by your PC soundcard.

The NGA front end first mixer uses a modest gain LNA into a double balanced mixer with low frequency IF output. This produces a spurious free double sideband noise output spectrum about the local oscillator frequency. The system bandwidth at this point is defined by a post mixer low pass roofing filter at around 100kHz, protecting the subsequent IF amplifier and second mixer from overload. The low frequency IF noise spectrum is amplified before final conversion using an active balanced mixer to present an audio spectrum, via a balanced interface, to the PC soundcard line input.

The NGA configuration uses a carefully designed gain distribution to optimize stability and dynamic range. A wide input frequency range is accommodated allowing stand alone LNA measurements in addition to testing at commonly used transverter IF outputs, from 28MHz to 23cm. Limited front end gain before the roofing filter delivers high resilience to incidental local oscillator components that may leak through to the transverter under test output.

NGA principle: