Low Noise Amplifier

Fields: Small Signal amplification and processing

Patented in: U.S.A, Europe& South Africa

The Technology

Conventional narrow-bandwith LNA's can achieve noise figures close to the theoretical minimum noise figure of the HEMT devices that are being used (red curve). The wider the bandwidth, however, the more difficult it becomes to achieve a low noise over the entire bandwidth (purple curve).

The invention is a novel LNA design in which a number of semiconductor devices are used in parallel to achieve a noise figure close to the theoretical minimum over broad bandwidths (black curve).

The novelty lies in the way which the input signal is divided between the parallel stages and the way in which the amplified signals then combine again to achieve maximum signal gain and maximum noise cancellation. This is achieved by decreasing the gain and increasing the time delay for each amplification stage in the optimum way.

The low-noise performance over wide bandwidths has been proved during tests on typical LNA's that are based on this patent. As an example, a low-cost LNA was shown to be able to achieve a low noise figure (0.4 Db) over more than an octave bandwidth (0.8 – 2 GHz) while having a large gain, small input and output reflection and low power consumption.

Market Opportunity

All electronic components create internal 'noise', which is a problem when measuring small signals. The North-West University has developed a novel design of a low noise amplifier (LNA) that dramatically reduces effective internal noise without using cryogenic cooling or expensive components.

The invention outperforms existing pulse/wideband LNA's significantly and has demonstrated superior performance at room temperatures.

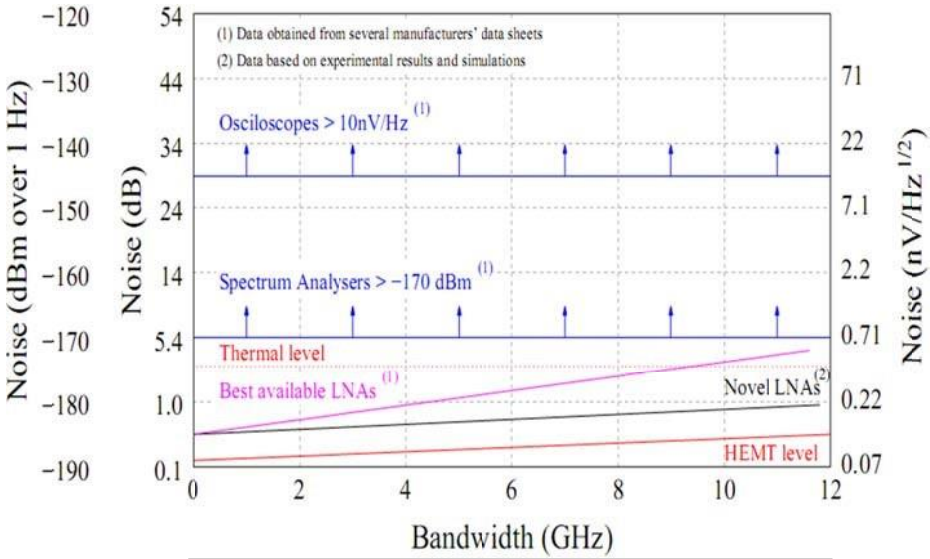
Technology benefits

The invention has been developed for applications in radio astronomy, but can also be used to:

- Enhance the performance of spectrum analysers and oscilloscopes, particularly in detecting and analysing signals below 10 Mv.
- Increase the bandwidth and range for optical fibre communications.
- Reduce the size and cost of antennas for radio telescopes (e.g. SKA) and microwave communication receivers.

Project status

Seeking Industry Partners to license the technology.



LNA Noise performance for different bandwidths

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