

Noise source calibration with a travelling amplifier

Background: The overall uncertainty in Noise Figure measurements is dominated by the uncertainty in the amount of noise generated by the noise source (Excess Noise Ratio ENR and uncertainty of the ENR). For more than 30 years the most accurate noise generators in the market had an uncertainty ± 0.12 dB. Leading brands were: Noise/Com , HP/Agilent, Micronetics.

In 2003 work between INAF-IRA and Uni. Rome Tor Vergata (UTV) reduced the uncertainty to ± 0.06 dB at frequencies up to 26.5 GHz. A theoretical study between INAF-IRA and UTV showed that the uncertainty cannot be less than 0.055 dB. Note that an uncertainty of the ENR of ± 0.055 dB becomes an uncertainty of ≈ 0.09 dB on the noise figure i.e. ≈ 7 K at ambient temperature. In 2004 Agilent offered a very accurate noise generator (± 0.06 dB up to 18 GHz).

Comparison of the most accurate noise sources around the Europe: the comparison of the most accurate noise generators cannot further improve the intrinsic accuracy. But a comparison campaign will reveal if each laboratory is inside or outside the uncertainty boundaries. Measurements closer to the overall mean build trust for that particular noise generator and test system. Conversely measurements far from the mean indicate that corrective action (such re-calibration) may be necessary.

Organisation of the job: each contributing Institute /Laboratory have performed the measurement of a travelling LNA using their own noise source and related instruments. The measurement has been performed in the most accurate and precise way at room temperature for simplicity in this phase of the test programme. Each Institute has sent the data file to INAF-IRA for the comparison. The project is started in July 2009 and finished in September 2010.

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<i>others labs in the future?</i>	