Application Note

Method of Broadband Noise Source Calibration

Introduction

The "Gain Error" method of measuring a receiver's noise figure involves measuring the system noise power output when the input is terminated in 50Ω in the absence of any interfering signals. Then the true noise figure is calculated from the data as explained below. The noise power output of the signal source" is measured in the absence of the receiver in Port 2 and then at the output of the receiver. The "Noise figure" is calculated from this data as follows:

\( NF = 10 \log \left( \frac{P_{in}}{P_{out}} \right) \) (2)

Where:
- \( P_{in} \) is the input power in Port 2
- \( P_{out} \) is the output power at the receiver output

Calibration procedure

A receiver with input impedance 50Ω (source impedance 50Ω), intermediate frequency amplifiers (IF), and output power meter (OXM) has been used for calibration. See figure below.

Equivalent Noise Ratio of noise sources and Noise figure of receiver vs frequency

Futility in measurements

The receiver was calibrated in three independent experiments. Results for NF in noise M and NF for receiver are presented for each of the five different receiver's frequencies. The experimental results are presented in the table below corresponding to M. In the calibration, over 1000ns, the data is averaged along stations of independent measurements.