Abstracts

Microwave Thermal Noise Standards

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Calibrated microwave thermal noise standards usually consist of a matched resistive element thermally isolated by a transmission line. They are used for microwave radiometry, antenna temperature calibrations, loss measurements, low-noise amplifier performance evaluation, and low-level CW signal level calibrations. The formula used to account for the distributed loss and temperature along the transmission line is derived and simplifying approximations and limitations are noted. Exact (hf/kT<<1) and approximate (hf/kT<<1, /spl pound/<<1) solutions for various loss and temperature distributions are tabulated. A FORTRAN computer program is available for a general solution that uses the transmission-line temperature and loss distributions for input data. The single largest source of calibration error is usually the microwave insertion loss measurements. The construction, calibration, and errors are discussed for a field-operational liquid-nitrogen-cooled waveguide noise standard. This standard is precisely calibrated and has a nominal noise temperature of (78.09 ± 0.12 peak)°K.

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