

Recent RF and Microwave Mixer and Power Sensor Measurements at the National Physical Laboratory

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Abstract

The RF and Microwave Attenuation Section at NPL makes considerable use of mixers and power sensors in the National Standard measurement systems. Knowledge of the linearity of these key components is vital to assessing the uncertainty of these systems.

Linearity may be considered as a measure of the invariance of output and input >step level changes= with absolute input power. Linearity measurement systems commonly introduce an input level change with a repeatable attenuator and measure the change in output signal as the mean input power is altered. The invariance of the measured output step does not, in itself, confirm linear operation of the device under test, or its suitability for use in National Standards Level measurement systems.

Until recently, the techniques used at NPL to characterise linearity were limited by the calibration of the detector. This paper discusses recent developments in the facilities developed to support the Attenuation Measurement Programme. One of the key components of the systems is the repeatable attenuator. Various devices have been investigated for their suitability and the latest results will be presented. These systems, together with their capabilities will be presented together with recent device measurements.

While these systems have been developed to meet the specific needs of the NPL, with minimal alteration the systems can be applied to more general device measurement. The extension of these systems to measure other devices, such as receivers and spectrum analysers will be discussed.