

NIST MICROWAVE S-PARAMETER AND POWER MEASUREMENT SERVICES: SYSTEMS, TECHNIQUES AND UNCERTAINTY CONSIDERATIONS

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This talk will describe the Microwave S-parameter and Power measurement services at NIST. These services cover a frequency range of 100 kHz to 110 GHz. The measurement systems as well as the standards used will be discussed. The general techniques for the measurements will be covered and general uncertainty considerations will be described. Future directions for both of the services will also be covered.

The S-parameter services cover a wide variety of connector types including 14 mm, 7 mm, Type N, 3.5 mm, 2.92 mm, 2.4 mm coaxial connectors and the WR 90, WR 62, WR 42, WR 28, WR 22, WR 15 and WR 10 waveguide sizes. The measurements are performed on NIST dual six-port systems or commercial vector network analyzers, these systems are calibrated using multi-line calibration techniques. Comparisons will be shown that detail the differences between the multi-line calibration technique and short, open, load, through technique. Also, the uncertainty sources connected with the air transmission line standards and connectors will be covered.

The Power measurement systems are based on the direct comparison method, using either six-port systems or specialized direct comparison systems. The 7 mm, Type N, 3.5 mm, 2.92 mm, 2.4 mm coaxial connectors and the WR 90, WR 62, WR 42, WR 28, WR 22, WR 15 and WR 10 waveguide sizes are covered. The measurement systems are calibrated with primary bolometric transfer standards that are calibrated in the NIST microcalorimeter. Two types of primary standards are used, thermistor based and thin-film construction. The major sources of uncertainty including the mismatch correction, adapter characterization and power meters will be described.

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2. A - Electromagnetic
Metrology
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4. I - Invited Paper, Program
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5. Special Session - Microwave
Measurements at NIST