Abstracts

A New Four-Port Automatic Network Analyzer: Part I-- Description and Performance

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A four-port automatic network analyzer based upon a new concept has been tested in the 8-12-GHz range. An essential feature of this analyzer, compared with the six-port systems, is that only one detector is used, and one electronically adjustable reference load is added. In this paper, an electronically adjustable short circuit is used as the reference load. Hence, the analyzer is comparatively simple and compact since only a few components are required. Moreover, the quality of the components can be moderate. A small desk-top computer (HP 85) is satisfactory for handling measurement data, adjusting the short circuit, and presenting the result. A simplified theory required for the calibration and measurement procedure for the determination of the magnitude and the phase of an unknown load is included in this report, and experiments illustrate how the accuracy is improved when the calibration is gradially refined. The expected accuracy of the network analyzer is discussed in some detail. The simple design and the moderate demands on the component quality means that it should be ideal for millimeter-wave frequencies.

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