Abstracts

Error in Impedance Measurement When the Signal is Introduced Across the Slotted-Line Probe (Comments and Author's Reply)

R.V. Garver and J. Barbero. "Error in Impedance Measurement When the Signal is Introduced Across the Slotted-Line Probe (Comments and Author's Reply)." 1975 Transactions on Microwave Theory and Techniques 23.6 (Jun. 1975 [T-MTT]): 536-537.

In the above short paper,l an attempt was made to calculate the errors in VSWR and phase caused by detector mismatch in a backwards-connected (power into the probe) slotted line. The short paper is wrong. There will be no first-order errors as predicted theoretically in the referenced short paper. The errors encountered in measuring nonlinear devices (diodes) are more complex than those encountered in measuring linear devices. It is very important that the harmonics generated by the diode being measured be absorbed in a matched load and kept out of the detector (especially for high-VSWR diodes). A low-pass filter is commonly used in front of the detector, but (unless it is padded) this filter reflects the harmonic power back into the diode. When the diode being measured does not see a match at the harmonic frequencies, then the harmonic mismatch will interact with the diode to make more efficient or less efficient the conversion to harmonics, depending on the phase relationship between diode and harmonic mismatch. The variable conversion to harmonics will change the impedance of the diode being measured (at the fundamental frequency) as the phase between diode and harmonic mismatch (unpadded low-pass filter) is varied. Therefore, when using a backwards-connected slotted line, it is important to have in front of the detector a low-pass filter that is padded or otherwise matched at the harmonic frequencies as seen from the diode. It is not important for the detector to be matched at the fundamental frequency in a backwards-connected slotted line, as proven in the following discussion.

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