Abstracts

Extending scattering-parameter approach to characterization of linear time-varying microwave devices

K. Green and R. Sobolewski. "Extending scattering-parameter approach to characterization of linear time-varying microwave devices." 2000 Transactions on Microwave Theory and Techniques 48.10 (Oct. 2000 [T-MTT]): 1725-1731.

In this paper, we apply the theory of linear time-varying differential systems of equations to defining an extension of the standard scattering parameters. This extended parameter S/spl tilde/ (/spl omega/, t) is a function of both time and frequency. With this definition, we can accurately characterize rapidly time and frequency-varying linear lumped causal microwave devices, in particular, photoconductive microwave switches. We discuss the similarities between S/spl tilde/ (/spl omega/,t) and the standard S-parameter approach and describe a measurement technique. We also derive some important properties of the S/spl tilde/ (/spl omega/,t)-parameters and describe conditions under which microwave devices such as photoconductive switches can be analyzed by this technique. To demonstrate the usefulness of S/spl tilde/ (/spl omega/, t), we derive the complete transfer function of the time varying lumped-element model of a photoconductive switch. We also show the limitations of conventional time-invariant assumptions (based on windowing or apodization) to accurately model linear time-varying devices.

❑ Return to main document.