# Abstracts

## Characteristic impedance and propagation of the first higher order microstrip mode in frequency and time domain

*Shyue-Dar Chen and C.-K.C. Tzuang. "Characteristic impedance and propagation of the first higher order microstrip mode in frequency and time domain." 2002 Transactions on Microwave Theory and Techniques 50.5 (May 2002 [T-MTT]): 1370-1379.*

This paper experimentally and theoretically confirms the validity of the definition proposed by Das (1996) for computing the complex characteristic impedance of the first higher order (EH/sub 1/) microstrip mode. The normalized complex propagation constant and complex characteristic impedance of the microstrip obtained by the rigorous full-wave integral-equation method are also presented. To better understand the circuit behavior of the leaky mode at the respective frequencies, the results are analyzed in both frequency and transformed steepest descent plane. A differential time-domain reflectometry (TDR) experiment shows that the experimental results are in excellent agreement with the time-domain plots obtained theoretically by the inverse discrete Fourier transform of the transmission line modeled by the dispersive characteristic. The propagation characteristics of the echoed signals in the time domain, which are reflected from the open end of the leaky line, are analyzed in detail using the corresponding group velocity of the EH/sub 1/ mode. The time-to-frequency conversion of the measured TDR data reveals that the reflection, leaky, and propagation zones coexist simultaneously for the EH, mode propagation. The conversion also accurately assesses the attenuation constant of the EH, mode if the attenuation is not too high. The Fourier transform of the TDR responses also simultaneously yields the input reflection coefficient (S/sub 11/) and the complex characteristic impedance. The complex characteristic impedance extracted from the TDR responses also agrees closely with the theoretical data.

❑ Return to main document.