Abstracts

Optoelectronic Approach to On-Chip Device and Circuit Characterization at Microwave and Millimeter-Wave Frequencies

C. Rauscher. "Optoelectronic Approach to On-Chip Device and Circuit Characterization at Microwave and Millimeter-Wave Frequencies." 1991 Transactions on Microwave Theory and Techniques 39.7 (Jul. 1991 [T-MTT]): 1179-1193.

Scattering parameter measurements performed on semiconductor chip devices and circuits critically depend on the predictability of high-frequency connections between chip and pertinent test equipment. This is of particular concern at high microwave frequencies, and even more so at millimeter wavelengths. The technique to be described here solves the problem through chip-level integration of measurement system front end and device or circuit under test. Arrays of high-speed photoconductive circuit elements, in conjunction with special compensation networks, are thereby utilized to implement, on chip, all signal generation and sampling functions needed to efficiently perform time-domain reflectometry. The acquired time-domain information is then converted into equivalent device-under-test scattering parameter responses. The practicability of the approach is experimentally demonstrated with the help of five individual test structures that are realized in monolithic-integrated circuit format on a GaAs substrate and operate over a full, uninterrupted 100 GHz frequency interval.

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