Abstracts

Microstrip Transmission on Semiconductor Dielectrics (Nov. 1965 [T-MTT])

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As a result of both a larger number of microwave functions performed by semiconductor devices and a larger number of functions required in modern systems, it has become highly desirable from both the system and the device standpoint to fabricate multiple microwave semiconductor devices on a common substrate. The use of multiple devices in a single package has system and reliability advantages, but there is also offered the possibility of improved performance of the microwave components. This results from the elimination of packaging of each individual element and the ability to place the package interface in a more advantageous position in the circuit. To effect such an improvement, an efficient means of microwave interconnection must be available. The interconnections must have not only low dissipative losses through the microwave region, but be capable of providing the impedances necessary for transformations by the various microwave functions and for circuit resonating elements. The range of impedance commonly required is of the order of 20 Omega to 80Omega. To be compatible with semiconductor materials and processing, the choice of dielectric material was limited to film dielectrics, possibly SiO/sub 2/, or the use of the semiconductor material itself as a dielectric. For both semi-insulating gallium arsenide and silicon of resistivity greater than 1000 Omega-cm, the loss is sufficiently low to perform efficient interconnection of devices on a common substrate and is considered even suitable for other components such as directional couplers and hybrids where extremely high Q is not required.

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