Abstracts

Microstrip Transmission Lines on High Dielectric Constant Substrates for Hybrid Microwave Integrated Circuits

Among the various approaches to the design of microwave integrated circuits, thick film hybrids combine a relative ease of manufacturing with excellent performance at the lower portion of the microwave frequency spectrum where high performance semiconductor devices are now available in a wide variety. When using conventional ceramic substrates for such circuitry, limitations exist in solving the problem of obtaining maximum degree of compactness at very low impedance levels required for optimum power handling capability of active semiconductor devices. One approach to this problem discussed here is the utilization of microstrip transmission line circuits on substrates with very high dielectric constants (/spl epsi//sub r/ = 33). A theoretical analysis of the microstrip transmission line structure, when based on conformal mapping techniques with the usual simplifying assumption of homogeneity throughout the entire field region, is entirely inaccurate when applied to high dielectric constants as considered here. A solution of this problem is presented which applied well known finite difference approximations of Laplace's equation in combination with a successive over-relaxatian program on a digital Computer.

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