Abstracts

Transmission-Line Properties of a Strip on a Dielectric Sheet on a Plane

H.A. Wheeler. "Transmission-Line Properties of a Strip on a Dielectric Sheet on a Plane." 1977 Transactions on Microwave Theory and Techniques 25.8 (Aug. 1977 [T-MTT]): 631-647.

The subject is a strip Iine formed of a strip and a parallel ground plane separated by a dielectric sheet (commonly termed "microstrip"). Building on the author's earlier papers all the significant properties are formulated in explicit form for practical applications. This may mean synthesis and/or analysis. Each formula is a close approximation for all shape ratios, obtained by a gradual transition between theoretical forms for the extremes of narrow and wide strips. The effect of thickness is formulated to a second-order approximation. Then the result is subjected to numerical differentiation for simple evaluation of the magnetic-loss power factor from the skin depth. The transition formulas are tested against derived formulas for overlapping narrow and wide ranges of shape. Some of these formulas are restated from the earlier derivations and others are derived herein. The latter include the second-order approximation for a narrow thin strip, and a close approximation for a narrow or wide square cross section in comparison with a circular cross section. Graphs are given for practical purposes, showing the wave resistance and magnetic loss for a wide range of shape and dielectric. For numerical reading, the formulas are suited for programming on a digital pocket calculator.

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