

Abstracts

Coplanar Waveguide: A Surface Strip Transmission Line Suitable for Nonreciprocal Gyromagnetic Device Applications (Dec. 1969 [T-MTT])

C.P. Wen. "Coplanar Waveguide: A Surface Strip Transmission Line Suitable for Nonreciprocal Gyromagnetic Device Applications (Dec. 1969 [T-MTT])." 1969 Transactions on Microwave Theory and Techniques 17.12 (Dec. 1969 [T-MTT]): 1087-1090.

A coplanar waveguide consists of a strip of thin metallic film on the surface of a dielectric slab with two ground electrodes running adjacent and parallel to the strip. This novel transmission line readily lends itself to nonreciprocal magnetic device applications because of the built-in circularly polarized magnetic vector at the air-dielectric boundary between the conductors. Practical applications of the coplanar waveguide have been experimentally demonstrated by measurements on resonant isolators and differential phase shifters fabricated on low-loss dielectric substrates with high dielectric constants. Calculations have been made for the characteristic impedance, phase velocity, and ripple bound of attenuation of a transmission line whose electrodes are all on one side of a dielectric substrate. These calculations are in good agreement with preliminary experimental results. The coplanar configuration of the transmission system not only permits easy shunt connection of external elements in hybrid integrated circuits, but also adapts well to the fabrication of monolithic integrated systems. Low-loss dielectric substrates with high dielectric constants may be employed to reduce the longitudinal dimension of the integrated circuits because the characteristic impedance of the coplanar waveguide is relatively independent of the substrate thickness; this may be of vital importance for low-frequency integrated microwave systems.

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