Abstracts

Theory of Optically Controlled Millimeter-Wave Phase Shifters

A.M. Vaucher, C.D. Striffler and C.H. Lee. "Theory of Optically Controlled Millimeter-Wave Phase Shifters." 1983 Transactions on Microwave Theory and Techniques 31.2 (Feb. 1983 [T-MTT] (Special Issue on Millimeter-Waves)): 209-216.

In this paper we analyze the millimeter-wave propagation characteristics of a dielectric wavegaide containing a plasma-dominated region. Such a device presents a new method for controlfirrg millimeter-wave propagation in semiconductor waveguides via either optical or electronic means resulting in ultrafast switching and gating. We have calculated the phase shift and attenuation resulting from the presence of the plasma. Higher order modes, both TE and TM, as well as millimeter-wave frequency variation, are studied in both Si and GaAs dielectric wavegnides. We have also formulated a surface plasma model that is a good approximation to the more elaborate volume plasma model. Phase shifts are predicted to he as high as 1400°/cm for modes operating near cutoff. These modes suffer very little attenuation when the plasma region contains a sufficiently high carrier density.

❑ Return to main document.