

Transverse Electric (TE) and Transverse Magnetic (TM) Modes Dependent Effective Index

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Abstract— In this paper, we propose and demonstrate the effect of effective index on silicon waveguide thickness by using MODE solution. The effect of effective index variations is presented for two different fixed core height of 220nm and 200nm, and with each the core width was from 300nm to 600nm at the steps of 100nm for Transverse Electric (TE) and Transverse Magnetic (TM) MODE. With the simulation results, the thickness of the core width is used for the determination of fundamental or higher order mode design. It is seen that higher effective index can be achieved as the core width and core height increases. The determination of fundamental or higher order mode design can be achieved by analyzing the graphs of effective indices for TE₀, TM₀, TE₁ and TM₁ modes at varying core height and width. Based on the analysis, it is concluded that fundamental order can only be achieved when the silicon core width is kept at a value of approximately 500nm while higher mode order can be achieved if the silicon core width is kept more than 500nm. At a higher order mode, excess noise and losses can be introduced.

Keyword— Effective index, Rib Waveguide and Silicon



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