

## Enabling Communication Systems: Optical Switches for Photonic Integrated Circuits

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**Abstract :** The demand for high-speed communication systems continues to escalate with the exponential growth of data-driven applications. Photonic integrated circuits (PICs) have emerged as compelling contenders to address these escalating demands, offering intrinsic advantages, including high bandwidth, low power consumption, and compatibility with existing semiconductor fabrication technologies. Beginning with an overview of the fundamental principles underlying photonic devices and integration techniques, the research delves into the intricate design considerations for PICs targeting communication applications. This research focuses on developing optical switches, crucial components in optical transistors, which enable efficient routing and control of optical signals within PICs. Through meticulous analysis and experimentation, this research endeavors to propel the advancement of photonic integration technology, charting the path towards realizing high-performance communication systems characterized by elevated speed, efficiency, and reliability, thereby addressing the burgeoning demands of the digital era. Intending to contribute to the seamless integration of data-driven applications into everyday life, this work embraces the era of interconnected devices.

**Keywords :** photonic integrated circuit, frustrated total internal reflection, evanescent wave, optical pumping, optical switch

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