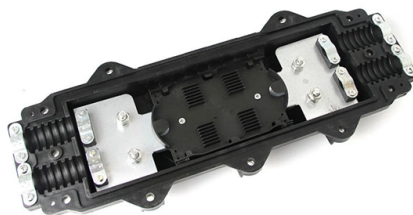


Comparison of Best-Selling Optical Directional Couplers and Power Consumption Performance



AI Overview

Sb₂S₃-based phase change material directional couplers offer the best combination of low power consumption and high performance among current optical coupler technologies.

Overview of Directional Couplers Directional couplers (DCs) are fundamental components in photonic integrated circuits, enabling controlled power transfer between two waveguides through evanescent field coupling. Key performance metrics include coupling ratio, insertion loss, bandwidth, and energy efficiency. Couplers can be implemented using silicon photonics, phase change materials (PCMs), or broadband fabrication-tolerant designs depending on application requirements.

Phase Change Material (PCM) Couplers PCM-based couplers, such as those using Ge₂Sb₂Te₅, Ge₂Sb₂Se₄Te₁, Sb₂Se₃, and Sb₂S₃, are programmable and can achieve multiple coupling ratios without continuous energy input. Once programmed, these devices are passive, significantly reducing power consumption compared to thermo-optic or electro-optic reconfigurable couplers. Among these, Sb₂S₃-based couplers demonstrate:

- Lowest absorption in the telecom wavelength band
- Minimal insertion loss in both amorphous and crystalline states
- Reliable programming of multiple coupling ratios with a dynamic range of ~32 dB

This makes Sb₂S₃ couplers highly efficient for low-power optical interconnects and reconfigurable photonic circuits.

Silicon Photonics Couplers Silicon photonics directional couplers, such as those based on IMEC's iSiPP50G platform, are designed for broadband operation and fabrication tolerance. These couplers maintain a uniform coupling ratio around 1550 nm and are robust against waveguide width variations,...

Article Content

Power Coupling Efficiency for Electro-Optic Directional Coupler Switch

The investigation of coupling between optical waveguides is important for many directional coupler-based devices. Optical directional couplers, made from electro-optic materials, are the basis of

unsupervised_topic_modeling/topics/en/15/50/100/topics at ...

Contribute to annontopicmodel/unsupervised_topic_modeling development by creating an account on GitHub.

Directional coupler and multimode interference devices based on SiN:

Directional coupler (DC) and multimode interference (MMI) devices are widely used components in photonic integrated circuits (PICs). In this study, the structures of DC and MMI

Directional Couplers

Directional couplers are multiple-waveguide couplers used for codirectional coupling. They can be used in many different applications, including power

Efficiency Comparison of Directional Optical Couplers in Thin Glass ...

The efficiency of the designed structures respecting both transmission directions is analyzed with a geometrical optics algorithm. Furthermore, several optimization approaches are applied.

Optical Directional Couplers | Springer Nature Link

The optical directional coupler, analogous to the microwave element 1 of the same name, consists of parallel channel optical waveguides sufficiently closely spaced that energy is transferred from one to

A Review of Optical Coupler Theory, Techniques, and Applications

Highly efficient grating couplers with sub-dB coupling performance have now been demonstrated. In this article, we review the recent advances made to develop grating coupler

Fiber Directional Coupler

A fiber directional coupler is defined as an optical component that splits and combines optical signals by utilizing the interference of evanescent waves from two closely positioned fibers, enabling power

Low-Loss Silicon Directional Coupler with Arbitrary Coupling Ratios for ...

Abstract—We demonstrate a design for a high-performance 2×2 splitter meeting the essential requirements of broadband coupling, support for arbitrary coupling ratio, ultra low-loss, high

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How to create a web form cracker in under 15 minutes. - moimikey/Crackhead

Design and modeling of a fabrication tolerant and broadband directional ...

We present a design for a fabrication tolerant and broadband directional coupler in photonic integrated circuits based on IMEC's iSiPP50G silicon photonics platform. We demonstrate that such a design

Efficiency Comparison of Directional Optical Couplers in Thin Glass ...

Two integrated directional couplers for simultaneous bidirectional data transmission are presented and compared with respect to coupling efficiency. The couplers are manufactured in thin glass sheets by

3 differences between optical couplers and splitters and

Optical couplers can split or combine signals, useful in data centers for managing traffic up to 100 Gbps. Splitters, ideal for telecom, distribute a single signal to up

Behavior Model for Directional Coupler

We present a parameterized model for the directional couplers that accurately incorporates its spectral dispersion. We have verified the model using the Finite Difference Time Domain (FDTD) simulations

Advances in waveguide to waveguide couplers for 3D

These performance metrics will serve as the basis of comparison for these inter-chip couplers and a starting point for future comparisons.

Broadband Silicon Nitride Power Splitter Based on Bent Directional ...

In this work, a silicon nitride bent directional coupler with large bandwidth, large fabrication tolerance, and low thermal sensitivity is proposed and demonstrated through simulation

Broadband and Low-Loss Silicon Photonic Directional

One of the basic components in SiPh is the directional coupler (DC), which plays an important role in signal monitoring with the requirement of low

Low-Loss Silicon Directional Coupler with Arbitrary Coupling Ratios for ...

Low-Loss Silicon Directional Coupler with Arbitrary Coupling Ratios for Broadband Wavelength Operation Based on Bent Waveguides ††thanks: This work was supported by imec's

Simulated Characteristics of a Nonlinear Directional Coupler Based ...

Abstract-This paper presents a nonlinear directional coupler for optical power switching. The theoretical study has been done to study the coupling characteristics of the nonlinear directional coupler.

Robust Characterization of Integrated Photonics Directional Couplers

Our method enables a broadband and precise characterization of the directional couplers' splitting ratio. We experimentally validate this approach, demonstrate its robustness

Tunable optical power splitter based on directional coupler structure ...

Abstract Traditional optical power splitters (OPSs) have fixed power split ratios, and although some can be tuned with an electro-optic polymer, continuous energy supply increases

Design of All-Optical Directional Coupler Using Plasmonic ...

Abstract In this paper, we have proposed, analyzed, and verified the performance of an optimized plasmonic 10-dB directional coupler and a 3-dB directional coupler in 2-D plasmonic waveguides

Directional Coupler

A directional coupler is defined as a device that couples only to waves traveling in a specific direction, allowing for the measurement of forward and reverse power levels in transmission

Impact of Various Parameters on the Performance of Optical Directional ...

This paper presents the impact of optical coupler parameters like length of coupling region, spacing between the coupling region and materials profile on the performance of optical directional coupler

Implementation of all-optical 3-dB and 10-dB directional coupler for ...

The design of an all-optical 3-dB and 10-dB directional coupler that functions as an optical switch if applied a control signal by fusing two photonic crystal waveguides with a coupling

Robust Directional Couplers for State Manipulation in Silicon Photonic ...

Photonic integrated circuits play a central role in current and future applications such as communications, sensing, ranging, and information processing. Photonic quantum computing will

Directional coupler and multimode interference devices based on SiN:

In this study, the structures of DC and MMI devices based on silicon nitride (Si_3N_4) are introduced and simulated, followed by a comprehensive comparison of these two beam splitters

Highly efficient and selective integrated directional couplers for ...

This paper focuses on the design, optimization, and characterizations of a low-loss, compact directional coupler-based duplexer.

Contact Us

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