DsynQ

Engineering Report - AI-Assisted Photonic Design

Beam Splitter · 1550 nm

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Design Summary

This 50:50 beam splitter is designed on a silicon photonics (SOI) platform with the objective of minimizing insertion loss at a 1550 nm operating wavelength. The analytic estimates indicate a transmission efficiency of 97.2%, equivalent to an insertion loss of 0.123 dB (the same transmission expressed two ways), across a 90.0 nm bandwidth. The directional-coupler geometry uses a 0.5 µm waveguide width, a 0.23 µm gap, an 18.4 µm coupling length, and a 10 µm bend radius, yielding a compact footprint of 25.5 × 1.75 µm. With a fabrication score of 94.2/100, the design appears robust and well-suited to standard SOI processes. These figures are analytic estimates rather than the result of a full physical simulation.

Specification

Component	Beam Splitter
Wavelength	1550 nm
Objective	Minimize Insertion Loss
Platform	Silicon Photonics (SOI)
Split Ratio	50:50
Constraints	minimal insertion loss
Parameters	gap_um=0.23, wg_width_um=0.5, bend_radius_um=10, coupling_length_um=18.4

Estimated Performance

Efficiency	97.2 %
Insertion Loss	0.12 dB
Bandwidth	90 nm
Fabrication Score	94 / 100

Layout

Footprint	25.5 × 1.75 µm
Layers	2