

Beam Splitter - 1550 nm

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Design Summary

This beam splitter is designed on a silicon photonics (SOI) platform with the objective of minimizing insertion loss at a 1550 nm operating wavelength. The design achieves an analytically estimated efficiency of 97.2%, equivalent to an insertion loss of 0.123 dB (the same transmission expressed two ways), while providing a balanced 50:50 split ratio over a 90.0 nm bandwidth. The directional coupler geometry uses a 0.5 μm waveguide width, a 0.23 μm gap, an 18.055 μm coupling length, a 10 μm bend radius, and a 2 μm port separation, occupying a compact footprint of 25.5 \times 1.75 μm . With a fabrication score of 94.2/100, the component demonstrates good manufacturability and robust performance against the minimal insertion loss constraint. These results are analytic estimates rather than the output of a 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=18.054999999999996, port_separation_um=2

Estimated Performance

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

Layout

Footprint	25.5 \times 1.75 μm
Layers	2