

## Grating Coupler - 1550 nm

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### Design Summary

This grating coupler is designed on a silicon nitride (SiN) platform for fiber-to-chip coupling at a 1550 nm operating wavelength, with the design optimized to maximize coupling efficiency. The analytic estimate predicts an efficiency of 30.3%, equivalently an insertion loss of 5.183 dB (the same transmission expressed two ways), across a 40.0 nm bandwidth. The grating employs 28 periods with a period of 1.1155  $\mu\text{m}$  and a 0.55 fill factor on a 1  $\mu\text{m}$  waveguide width, with a 100  $\mu\text{m}$  bend radius, occupying a footprint of 182.234  $\times$  13  $\mu\text{m}$ . It achieves a strong fabrication score of 99.0/100, indicating good manufacturability. These figures are analytic estimates rather than results of a physical simulation.

### Specification

|             |   |
|-------------|---|
| Component   | Grating Coupler   |
| Wavelength  | 1550 nm   |
| Objective   | Maximize Efficiency   |
| Platform    | Silicon Nitride (SiN)   |
| Constraints | fiber-to-chip coupling  |
| Parameters  | n_periods=28, period_um=1.1155, fill_factor=0.55, wg_width_um=1, bend_radius_um=100 |

### Estimated Performance

|                   |          |
|-------------------|----------|
| Efficiency        | 30.3 %   |
| Insertion Loss    | 5.18 dB  |
| Bandwidth         | 40 nm    |
| Fabrication Score | 99 / 100 |

### Layout

|           |                                   |
|-----------|-----------------------------------|
| Footprint | 182.234 $\times$ 13 $\mu\text{m}$ |
| Layers    | 3                                 |