CORNERSTONE STANDARD COMPONENTS LIBRARY

(On SOI Platforms)

Preface

In this document, we summarise the up-to-date designs and their measurement results of our CORNERSTONE standard components on SOI platforms, at the same time we are optimising the current designs, adding in new designs, and gathering more measurement results. Most of the dimensions are given in this document, whilst a few of them are not. Thus, please use this document together with our up-to-date GDS library which can be downloaded at https://www.cornerstone.sotonfab.co.uk/mpw-design-rules/process-design-kit-pdk.

CORNERSTONE provides an MPW service on three SOI platforms, 220 nm, 340 nm and 500 nm, based on which we provide our standard components. On the 220 nm and 340 nm platforms, we have two waveguide etching depths in addition to a grating etch and we provide standard components working at 1550 nm and 1310 nm. On the 500 nm platform, we have only one waveguide etching depth in addition to a grating etch and we provide standard components working at 1550 nm only. Currently, all of the components are based on TE mode.

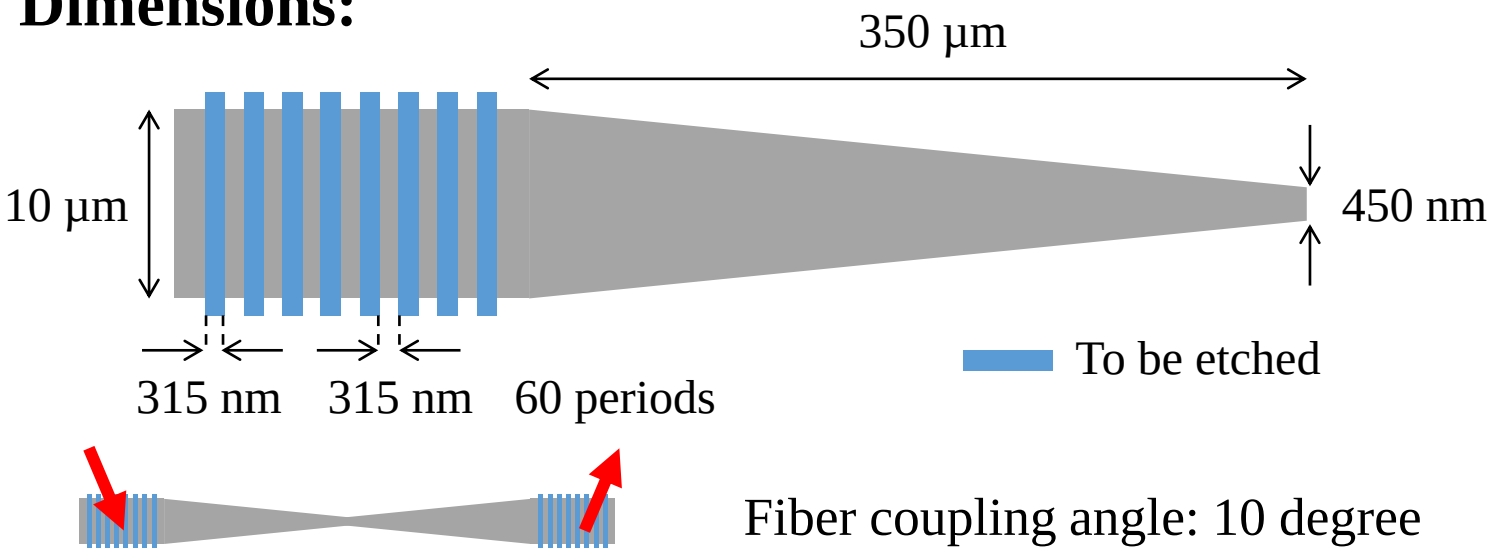
List of Contents

- **Wavelength: 1550 nm**
- **Platform: 220 nm SOI**

SOI220nm_1550nm_TE_RIB_Grating_Coupler

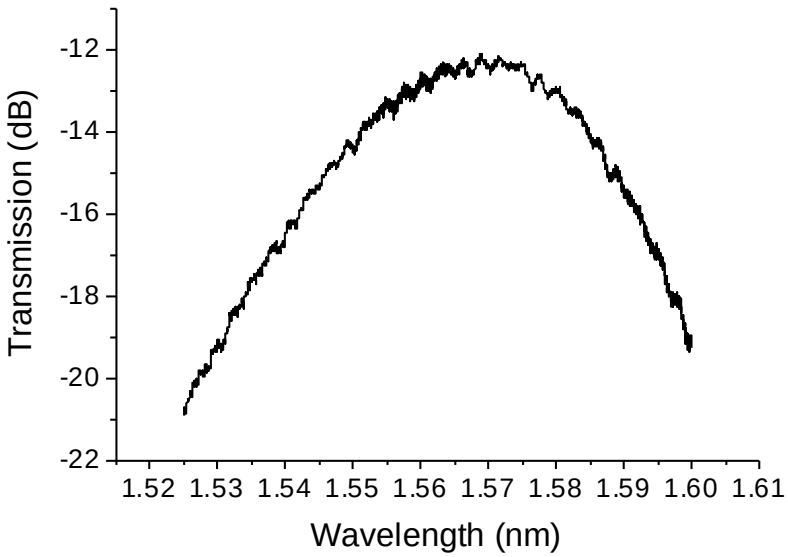
Platform:	220 nm SOI (2 um BOX layer)
Wavelength:	1550 nm
Etching depth:	70 nm (Grating etch depth)
Polarization:	TE
Cell name in GDS lib:	SOI220nm_1550nm_TE_RIB_Grating_Coupler

Dimensions:



Fiber coupling angle: 10 degree

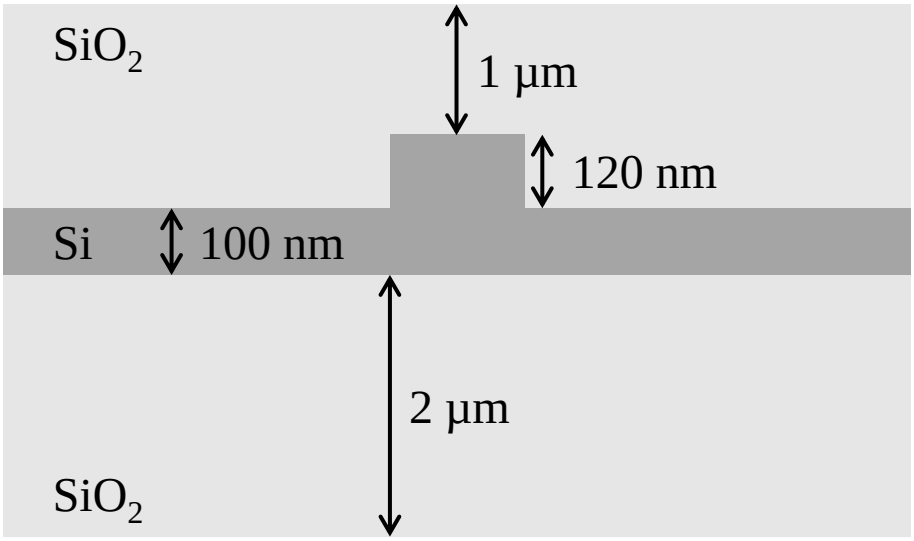
Measured transmission spectrum



Summarized performance:

- Coupling efficiency: 5.5-6.5 dB
- 1 dB bandwidth: > 35 nm
- Center wavelength: 1550-1580 nm

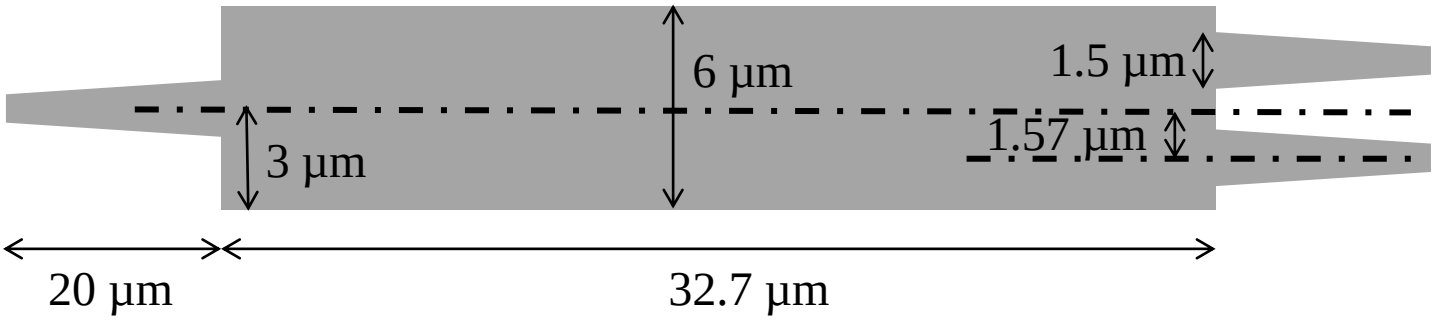
- Wavelength: 1550 nm
- Platform: 220 nm SOI
- **RIB**



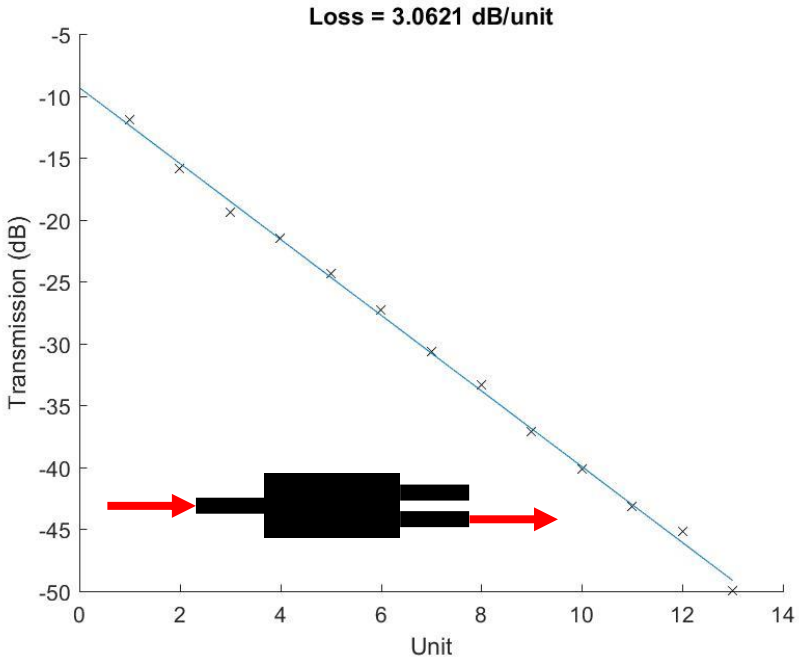
SOI220nm_1550nm_TE_RIB_2x1_MMI

Platform:	220 nm SOI (2 um BOX layer)
Wavelength:	1550 nm
Etching depth:	120 nm (Rib design)
Polarization:	TE
Cell name in GDS lib:	SOI220nm_1550nm_TE_RIB_2x1_MMI

Dimensions:



Measurement results:

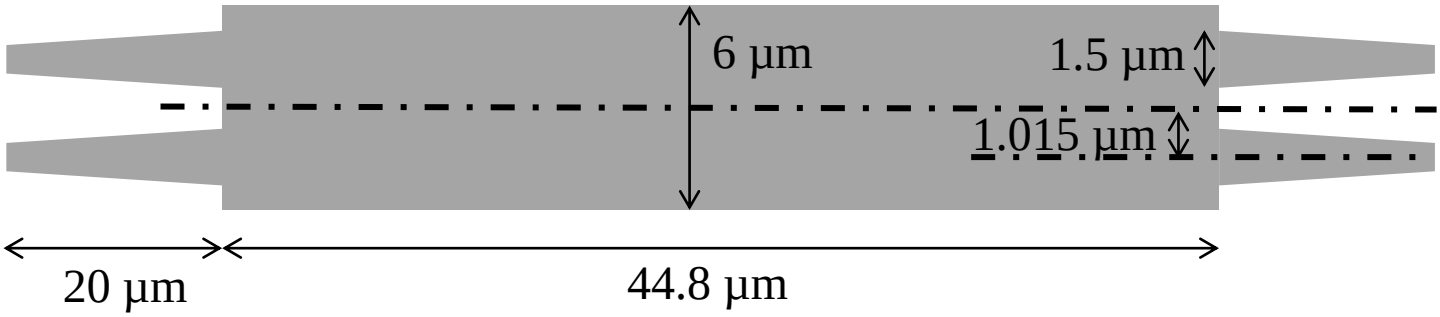


Transmission includes the measurement system loss, grating coupler loss and waveguide loss, as well as the measured device loss

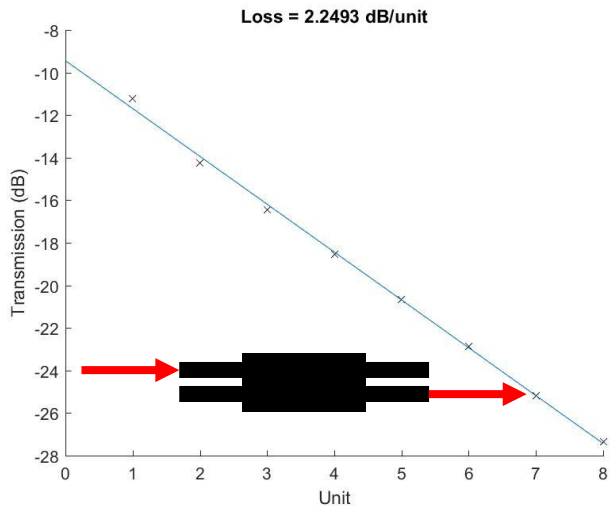
SOI220nm_1550nm_TE_RIB_2x2_MMI

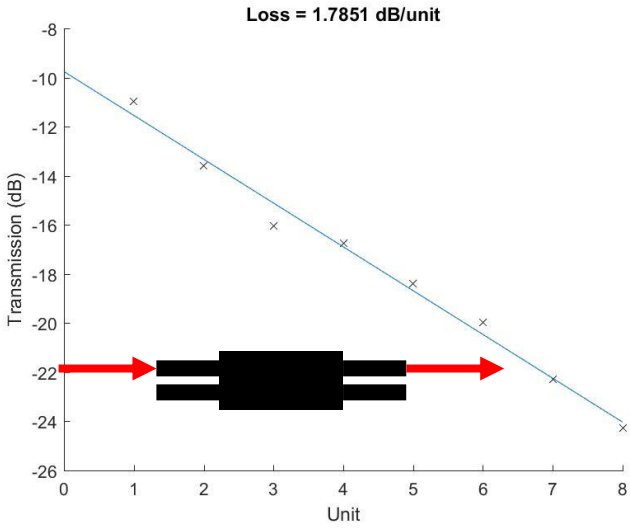
Platform:	220 nm SOI (2 um BOX layer)
Wavelength:	1550 nm
Etching depth:	120 nm (Rib design)
Polarization:	TE
Cell name in GDS lib:	SOI220nm_1550nm_TE_RIB_2x2_MMI

Dimensions:



Measurement results:





Transmission includes the measurement system loss, grating coupler loss and waveguide loss, as well as the measured device loss

SOI220nm_1550nm_TE_RIB_90_Degree_Bend

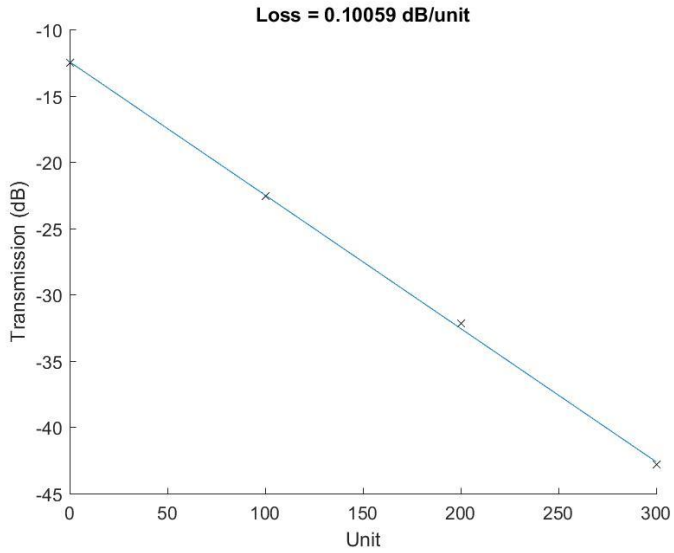
Platform:	220 nm SOI (2 um BOX layer)
Wavelength:	1550 nm
Etching depth:	120 nm (Rib design)
Polarization:	TE
Cell name in GDS lib:	SOI220nm_1550nm_TE_RIB_90_Degree_Bend (Waveguide Width (W): 450 nm, Bend Radius (R): 25 um)

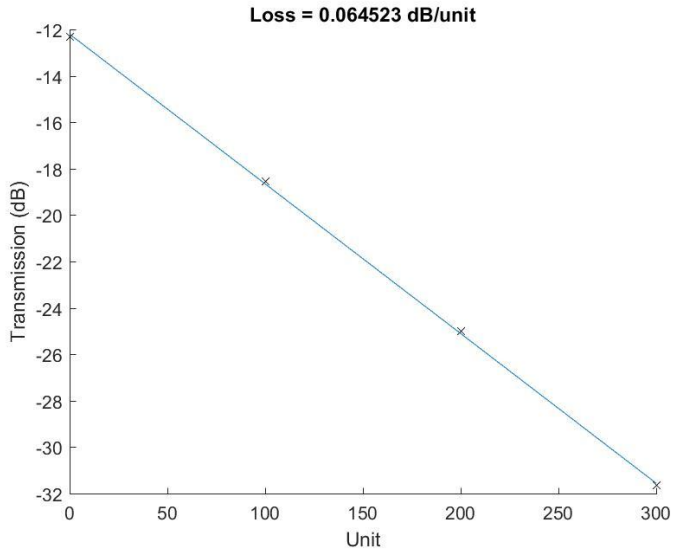
Measurement results on varied dimensions:

(Unit: 90° bend)

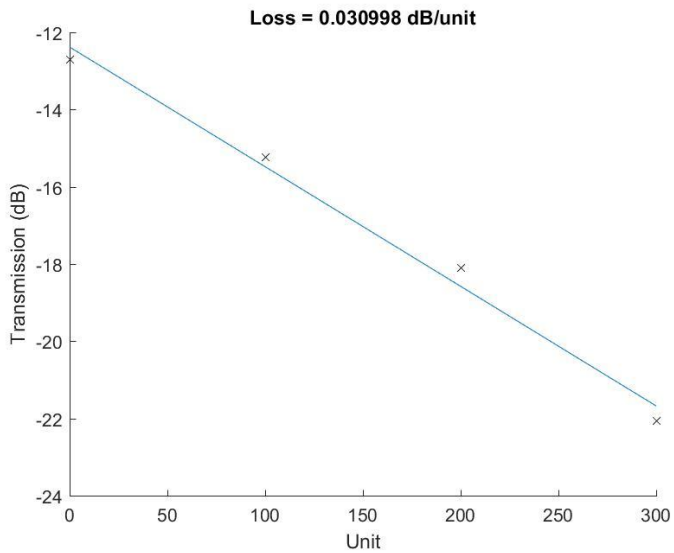
W: 450 nm | **W: 600 nm**

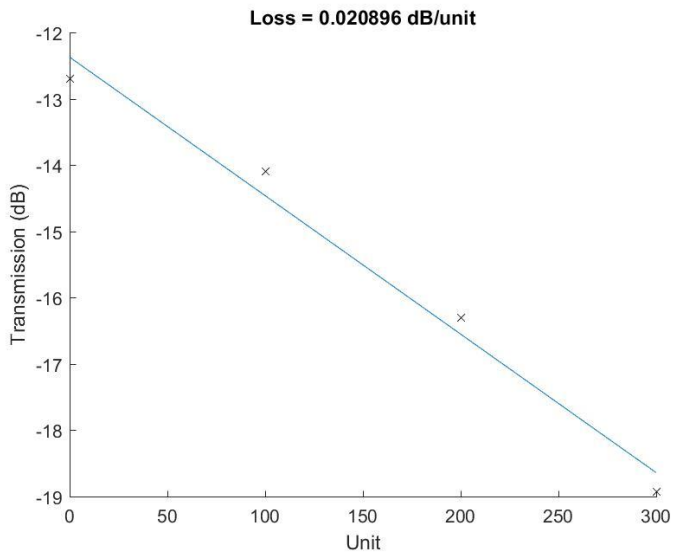
R: 10 µm





R: 25 µm





Transmission includes the measurement system loss, grating coupler loss and waveguide loss, as well as the measured device loss

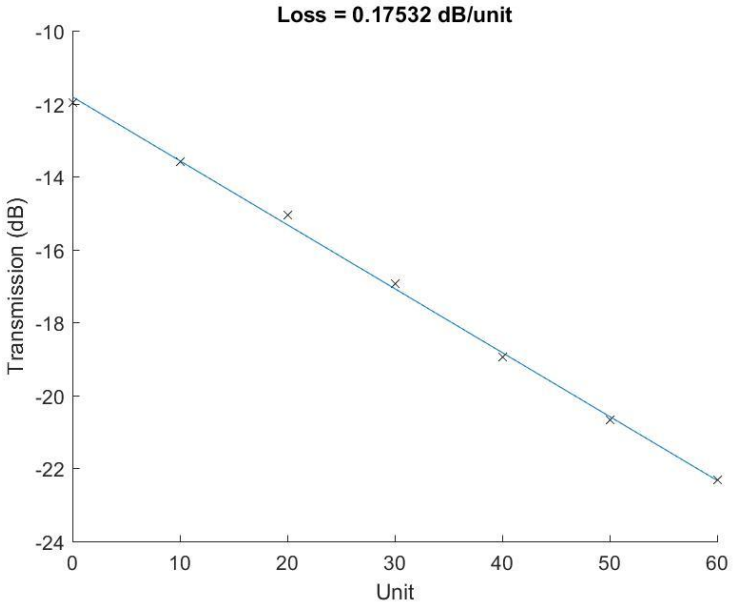
SOI220nm_1550nm_TE_RIB_Waveguide_Crossing

Platform:	220 nm SOI (2 um BOX layer)
Wavelength:	1550 nm
Etching depth:	120 nm (Rib design)
Polarization:	TE
Cell name in GDS lib:	SOI220nm_1550nm_TE_RIB_Waveguide_Crossing

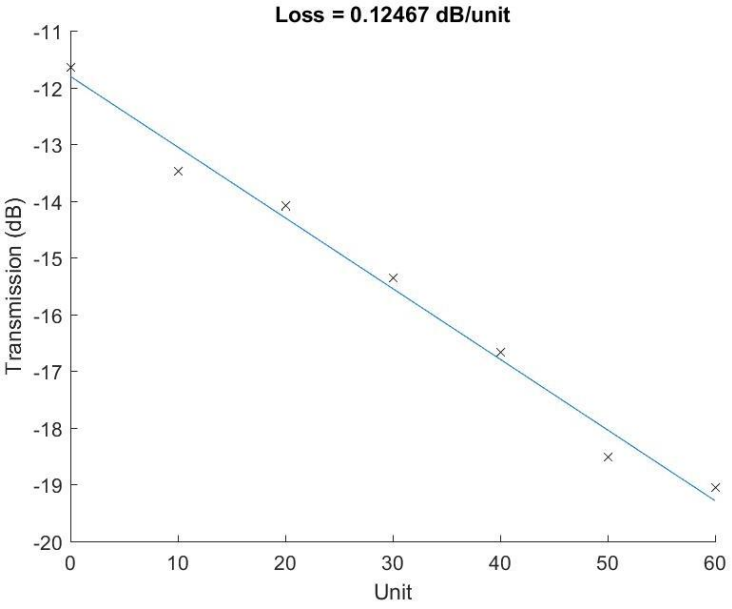
Dimensions: See the drawing in GDS library

Measurement results on different waveguide width (W):

W: 400 nm



W: 450 nm

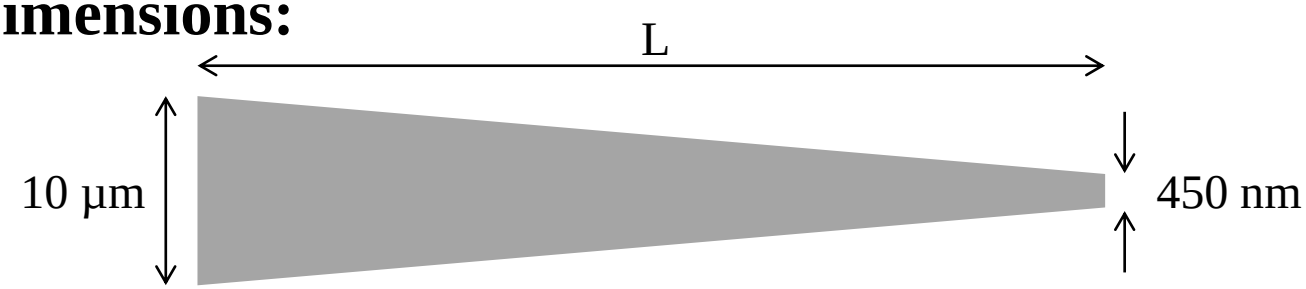


Transmission includes the measurement system loss, grating coupler loss and waveguide loss, as well as the measured device loss

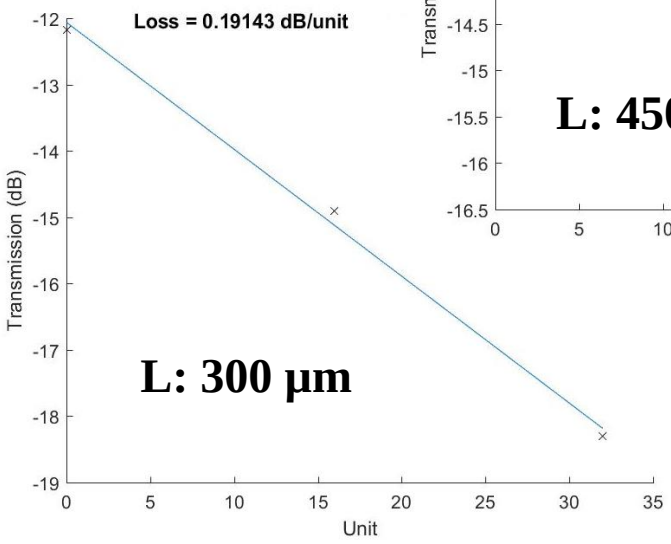
SOI220nm_1550nm_TE_RIB_MM to SM_TAPER

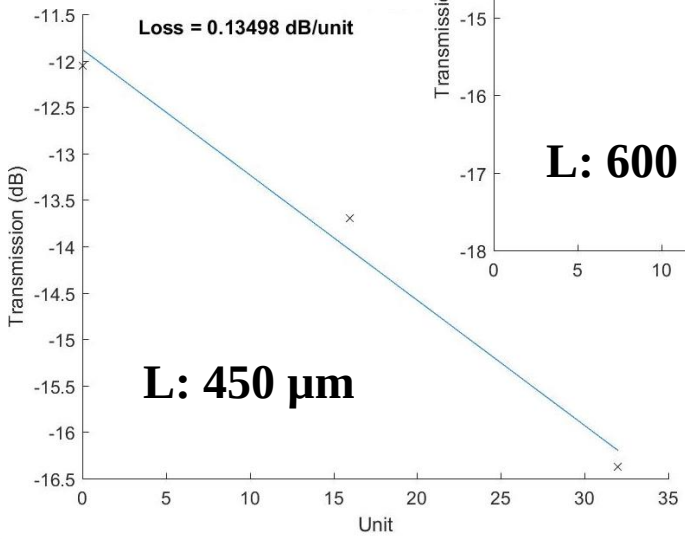
Platform:	220 nm SOI (2 um BOX layer)
Wavelength:	1550 nm
Etching depth:	120 nm (Rib design)
Polarization:	TE
Cell name in GDS lib:	Not in GDS library as an individual component. Used together with grating couplers.

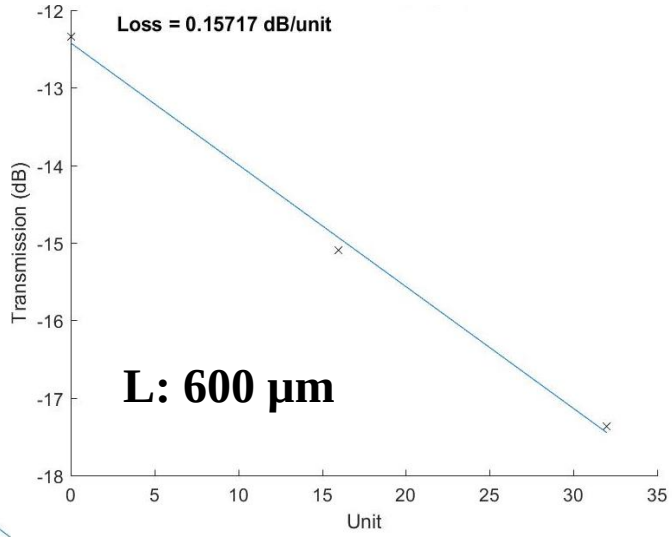
Dimensions:



Measurement results on different taper length (L):





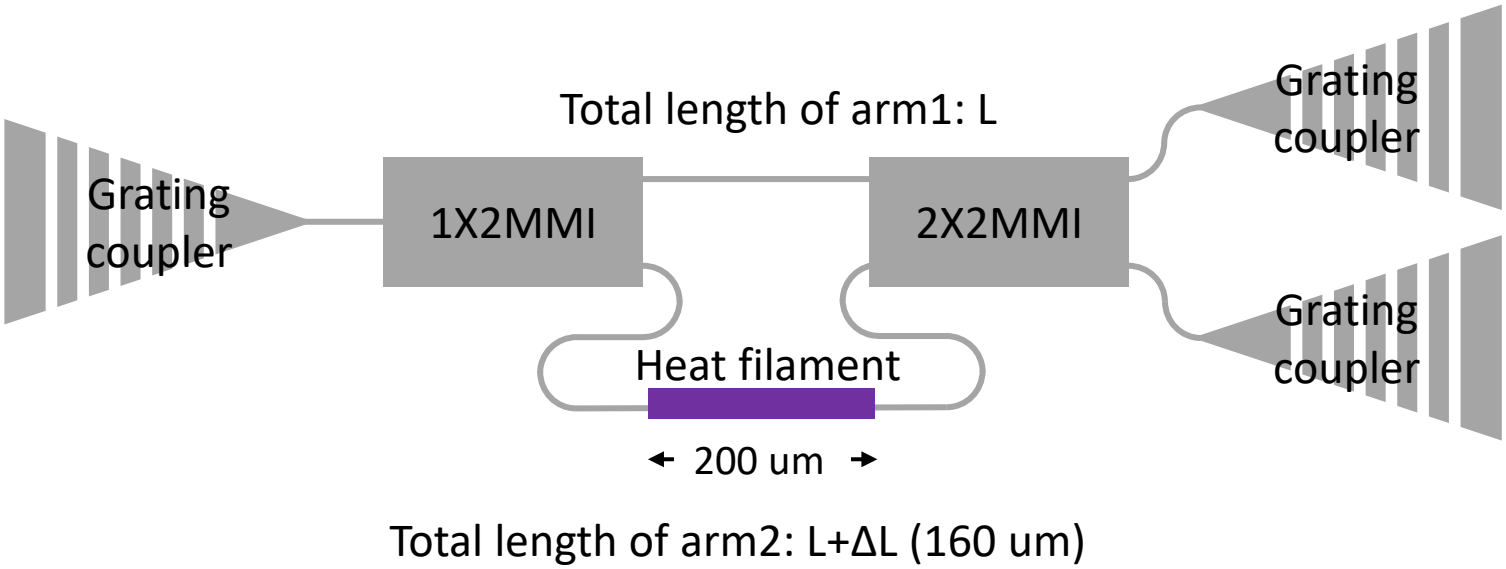


Transmission includes the measurement system loss, grating coupler loss and waveguide loss, as well as the measured device loss

SOI220nm_1550nm_TE_RIB_MZI

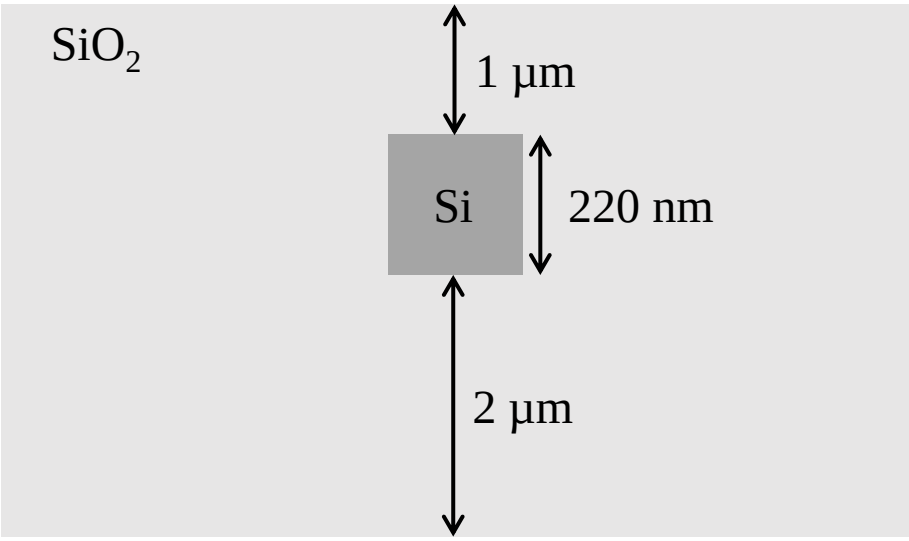
Platform:	220 nm SOI (2 um BOX layer)
Wavelength:	1550 nm
Etching depth:	70 nm (Grating) & 120 nm (Rib design)
Polarization:	TE
Cell name in GDS lib:	SOI220nm_1550nm_TE_RIB_MZI

Diagram:



Total length of arm2: L+ΔL (160 um)

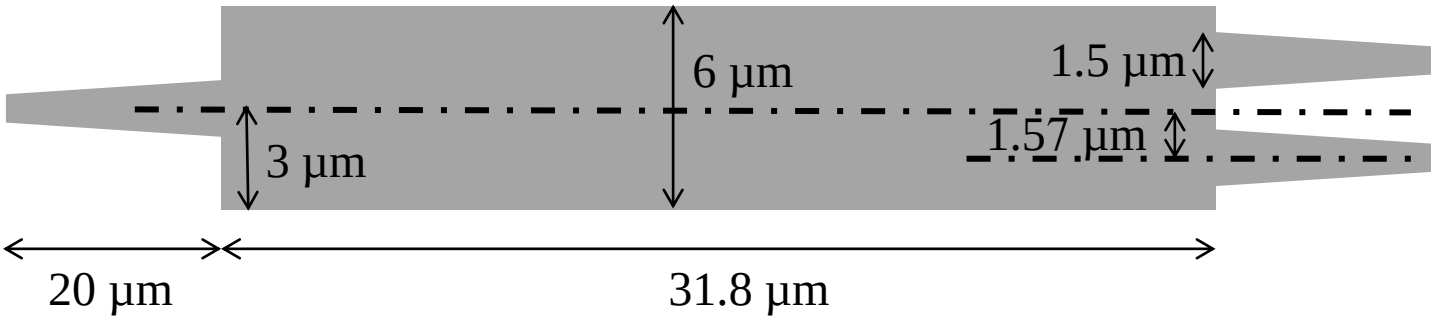
- Wavelength: 1550 nm
- Platform: 220 nm SOI
- **STRIP**



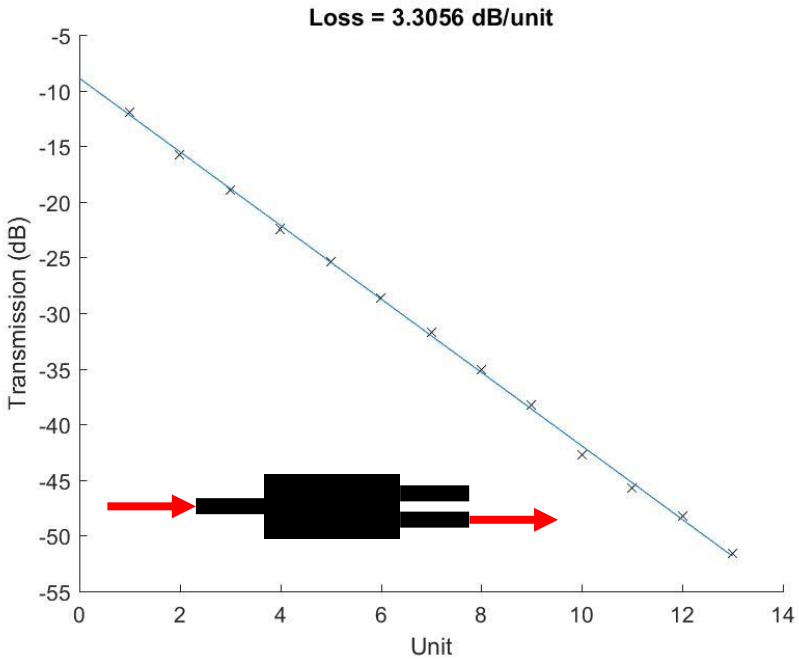
SOI220nm_1550nm_TE_STRIP_2x1_MMI

Platform:	220 nm SOI (2 um BOX layer)
Wavelength:	1550 nm
Etching depth:	220 nm (Strip design)
Polarization:	TE
Cell name in GDS lib:	SOI220nm_1550nm_TE_STRIP_2x1_MMI

Dimensions:



Measurement results:

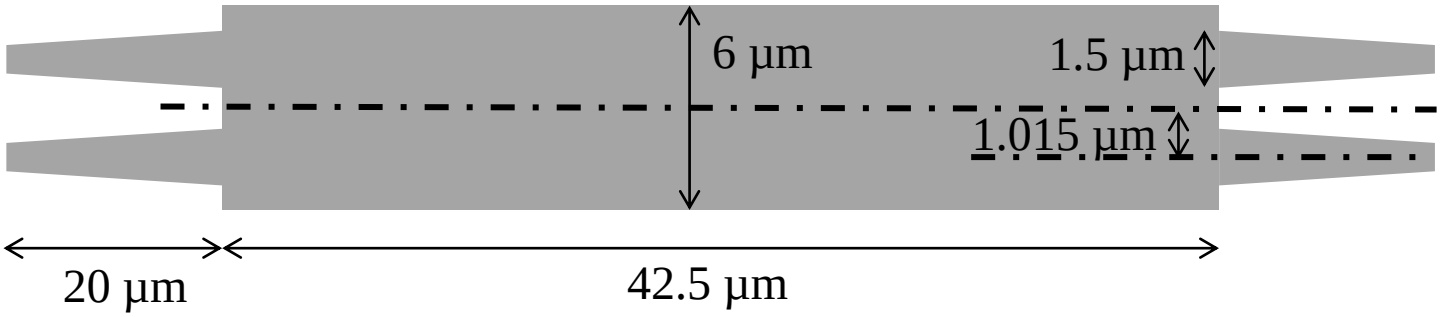


Transmission includes the measurement system loss, grating coupler loss and waveguide loss, as well as the measured device loss

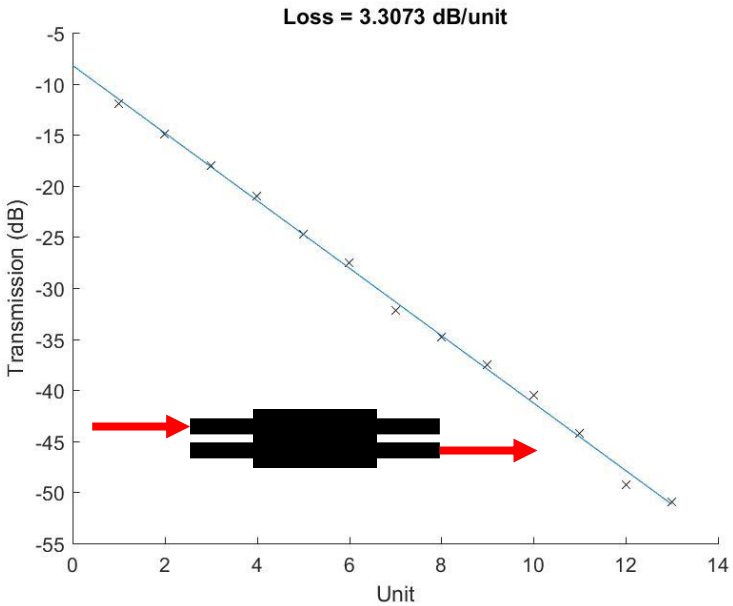
SOI220nm_1550nm_TE_STRIP_2x2_MMI

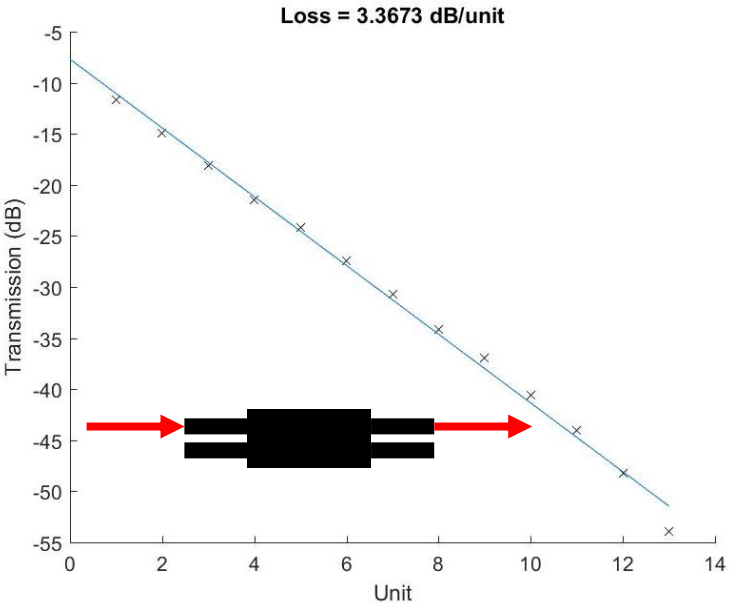
Platform:	220 nm SOI (2 um BOX layer)
Wavelength:	1550 nm
Etching depth:	220 nm (Strip design)
Polarization:	TE
Cell name in GDS lib:	SOI220nm_1550nm_TE_STRIP_2x2_MMI

Dimensions:



Measurement results:



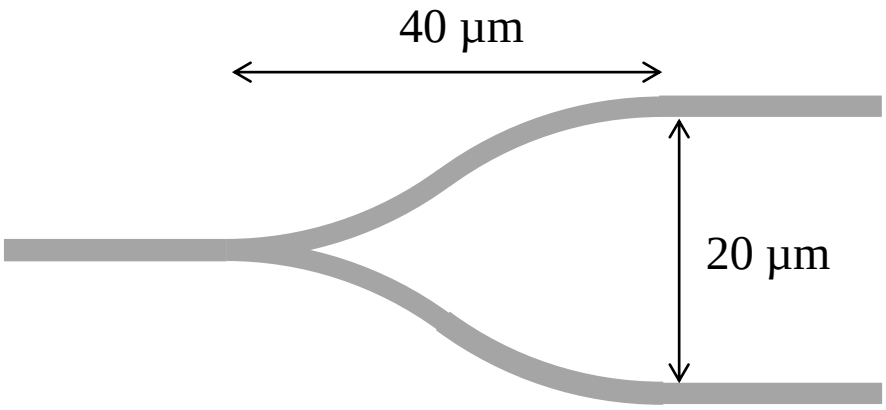


Transmission includes the measurement system loss, grating coupler loss and waveguide loss, as well as the measured device loss

SOI220nm_1550nm_TE_STRIP_2x1_Ysplitter

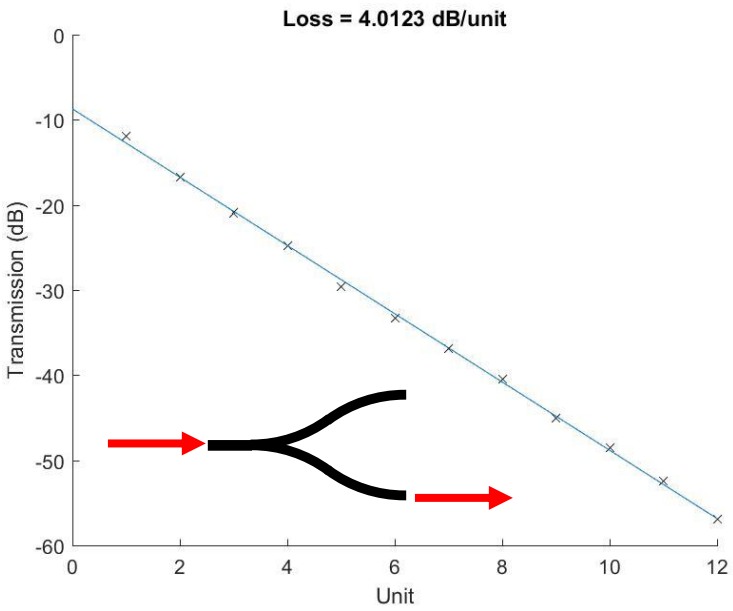
Platform:	220 nm SOI (2 um BOX layer)
Wavelength:	1550 nm
Etching depth:	220 nm (Strip design)
Polarization:	TE
Cell name in GDS lib:	Not in GDS library

Dimensions:

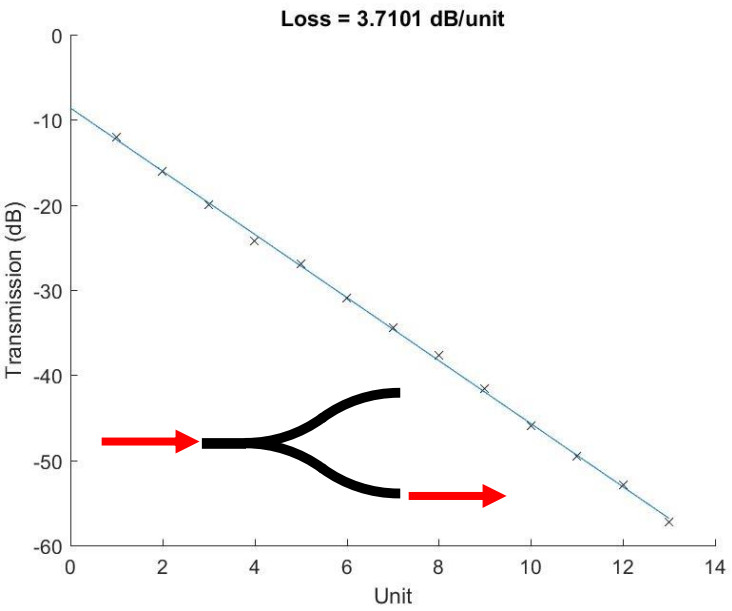


Measurement results:

Waveguide width: 450 nm



Waveguide width: 400 nm



Transmission includes the measurement system loss, grating coupler loss and waveguide loss, as well as the measured device loss

SOI220nm_1550nm_TE_STRIP_90_Degree_Bend

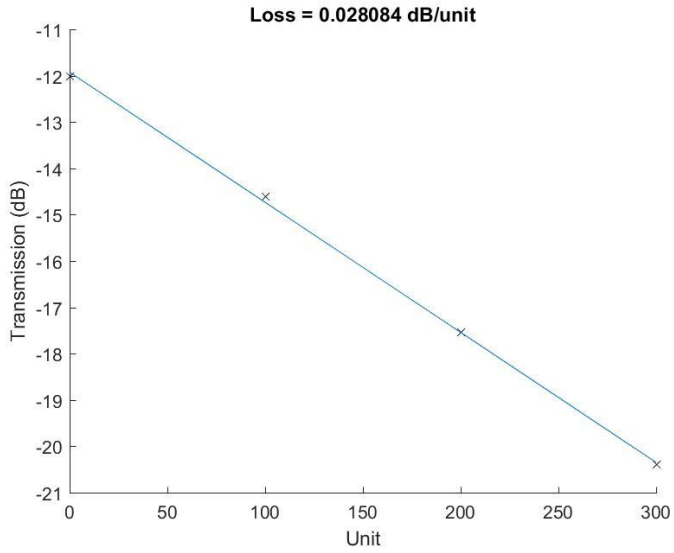
Platform:	220 nm SOI (2 um BOX layer)
Wavelength:	1550 nm
Etching depth:	220 nm (Strip design)
Polarization:	TE
Cell name in GDS lib:	SOI220nm_1550nm_TE_STRIP_90_Degree_Bend (Waveguide Width (W): 450 nm, Bend Radius (R): 5 um)

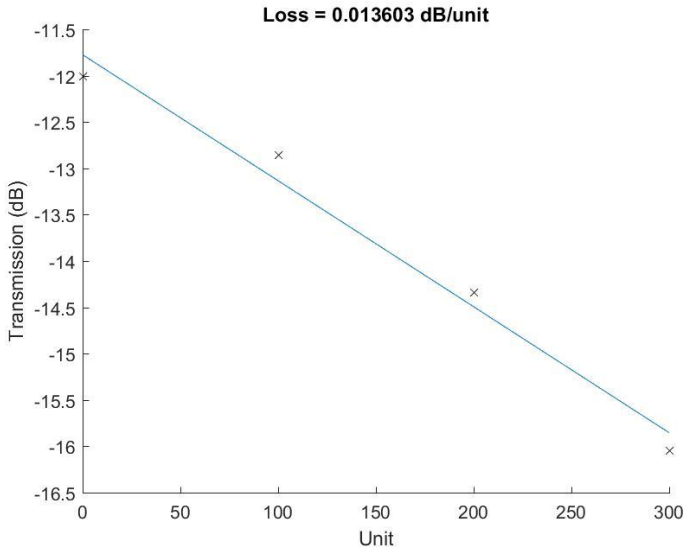
Measurement results on varied dimensions:

(Unit: 90° bend)

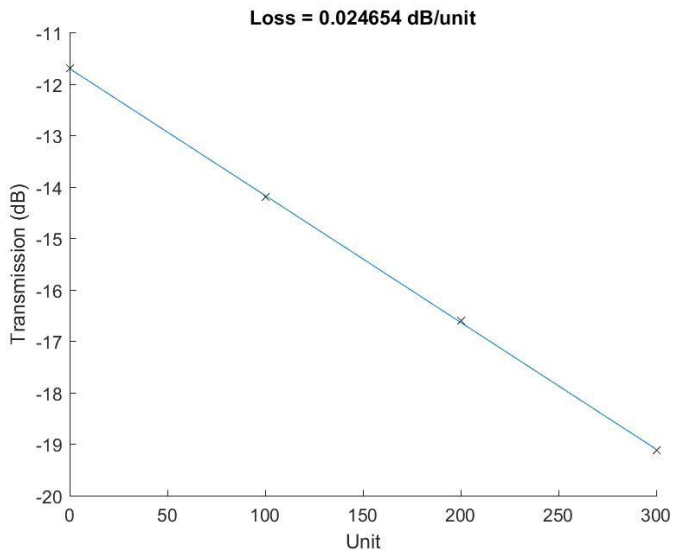
W: 400 nm | **W: 450 nm**

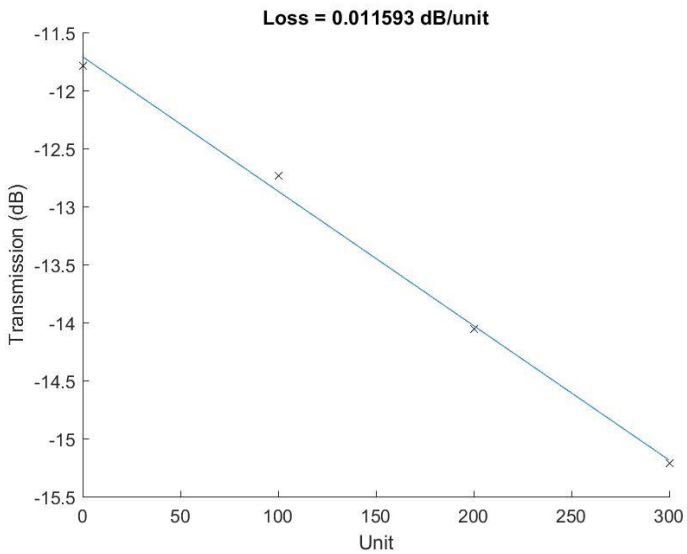
R: 5 µm





R: 10 µm





Transmission includes the measurement system loss, grating coupler loss and waveguide loss, as well as the measured device loss

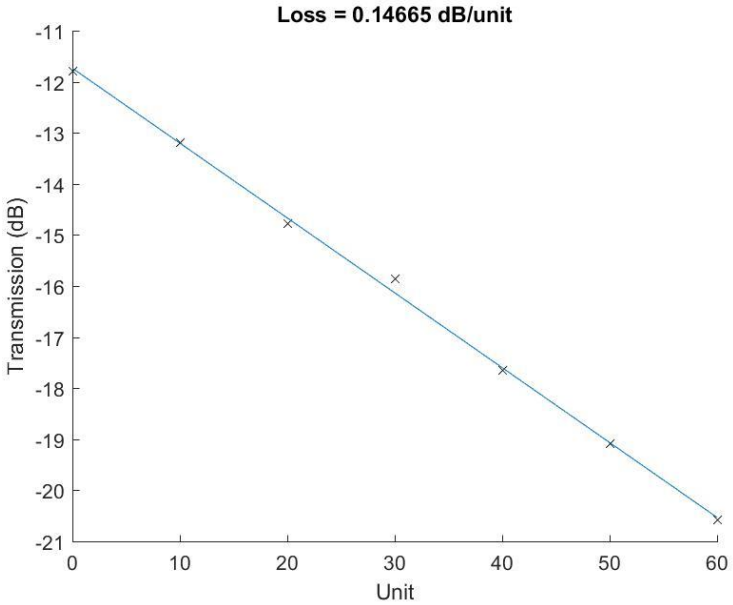
SOI220nm_1550nm_TE_STRIP_Waveguide_Crossing

Platform:	220 nm SOI (2 um BOX layer)
Wavelength:	1550 nm
Etching depth:	220 nm (Strip design)
Polarization:	TE
Cell name in GDS lib:	SOI220nm_1550nm_TE_STRIP_Waveguide_Crossing

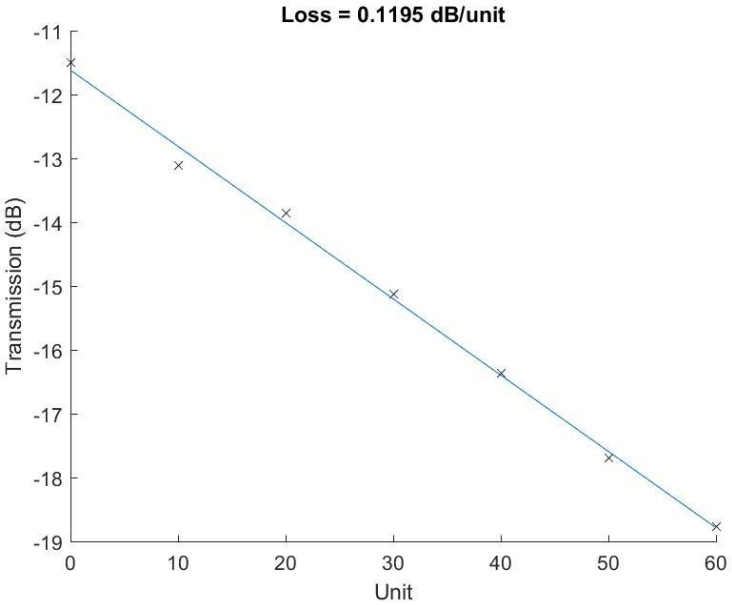
Dimensions: See the drawing in GDS library

Measurement results on different waveguide width (W):

W: 400 nm



W: 450 nm

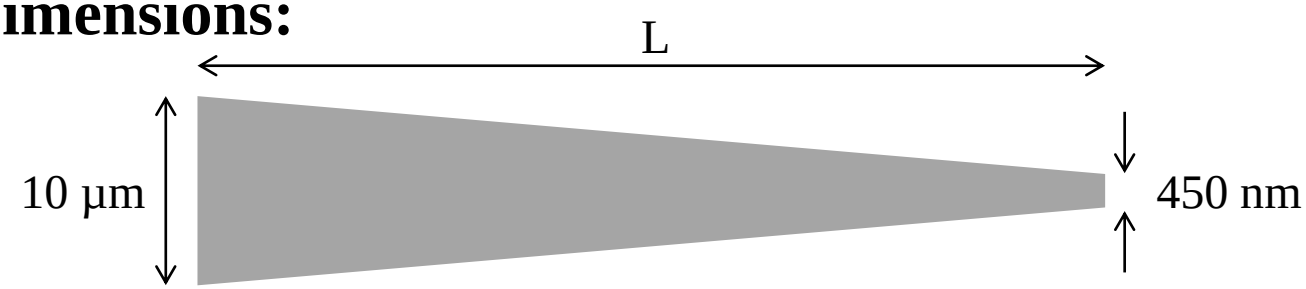


Transmission includes the measurement system loss, grating coupler loss and waveguide loss, as well as the measured device loss

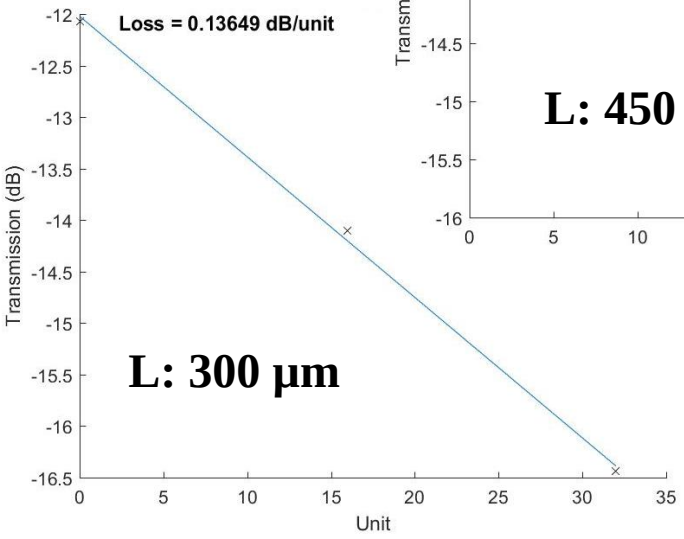
SOI220nm_1550nm_TE_STRIP_MM to SM_TAPER

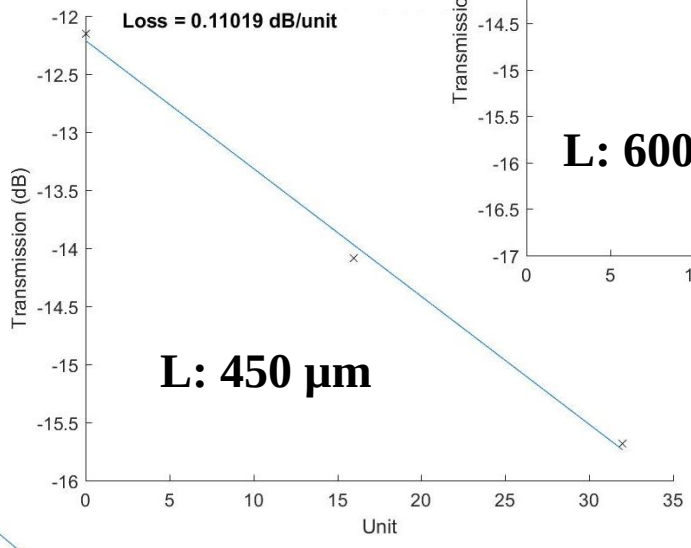
Platform:	220 nm SOI (2 um BOX layer)
Wavelength:	1550 nm
Etching depth:	220 nm (Strip design)
Polarization:	TE
Cell name in GDS lib:	Not in GDS library as an individual component. Used together with grating couplers.

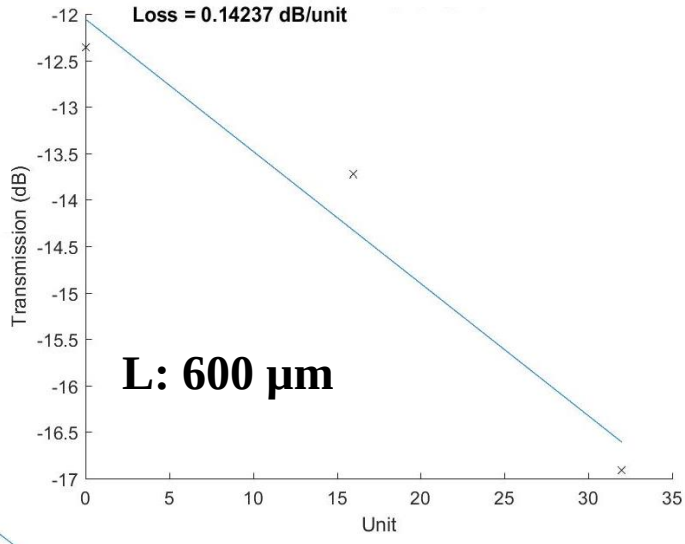
Dimensions:



Measurement results on different taper length (L):





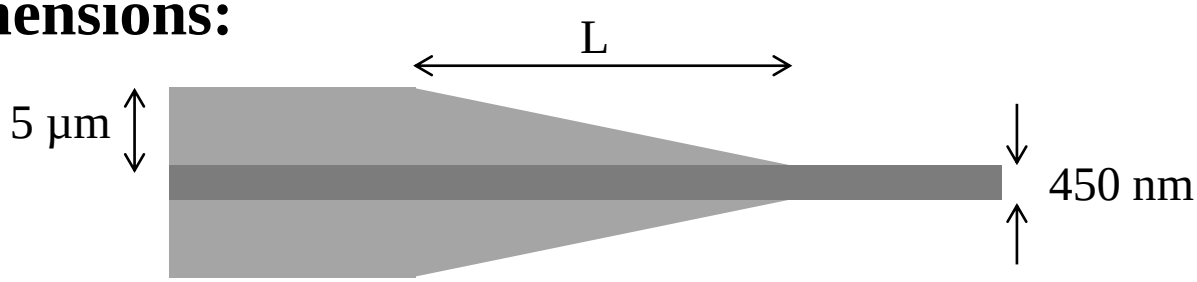


Transmission includes the measurement system loss, grating coupler loss and waveguide loss, as well as the measured device loss

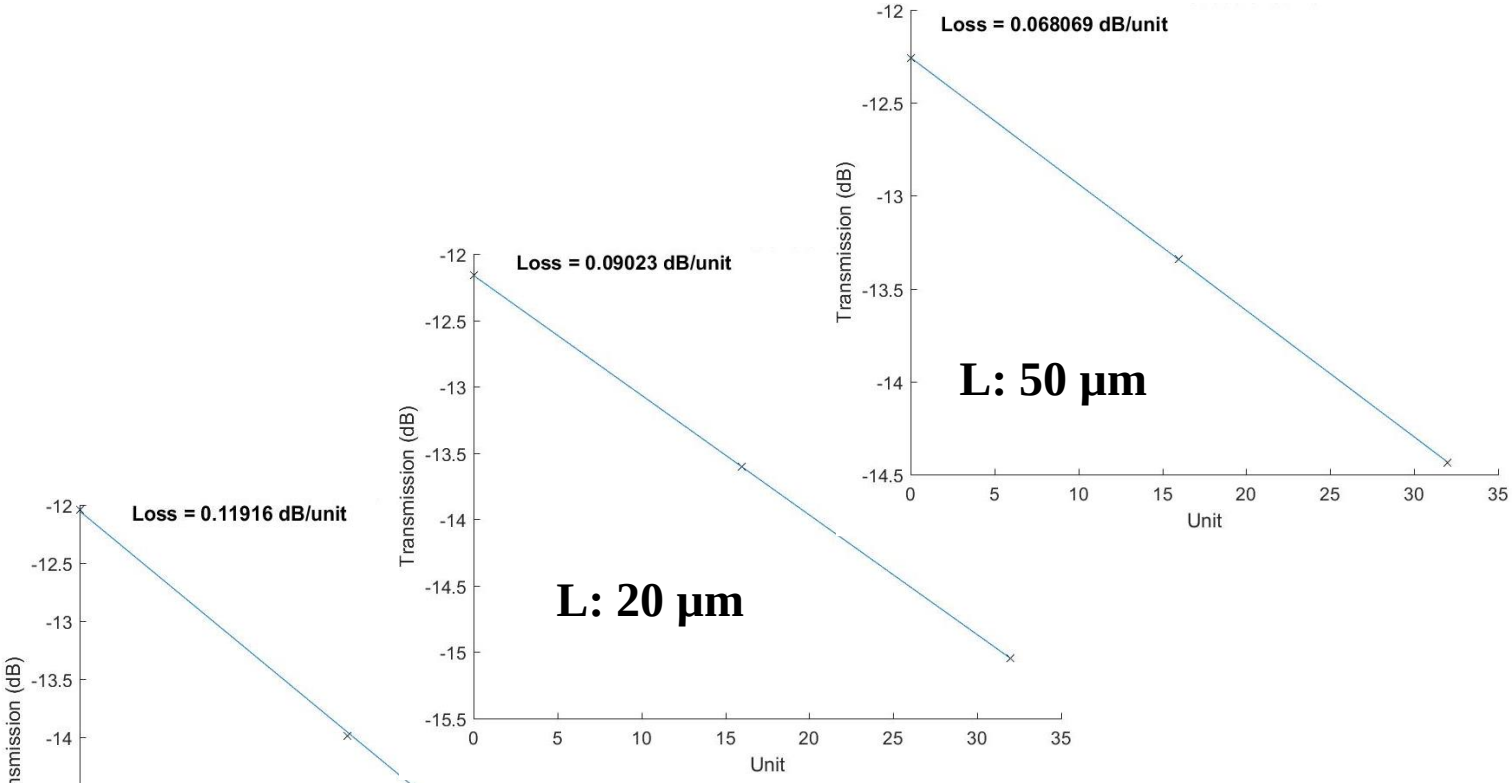
SOI220nm_1550nm_TE_STRIP_RIB to STRIP_TAPER

Platform:	220 nm SOI (2 um BOX layer)
Wavelength:	1550 nm
Etching depth:	120nm and 220 nm
Polarization:	TE
Cell name in GDS lib:	Not in GDS library.

Dimensions:



Measurement results on different taper length (L):

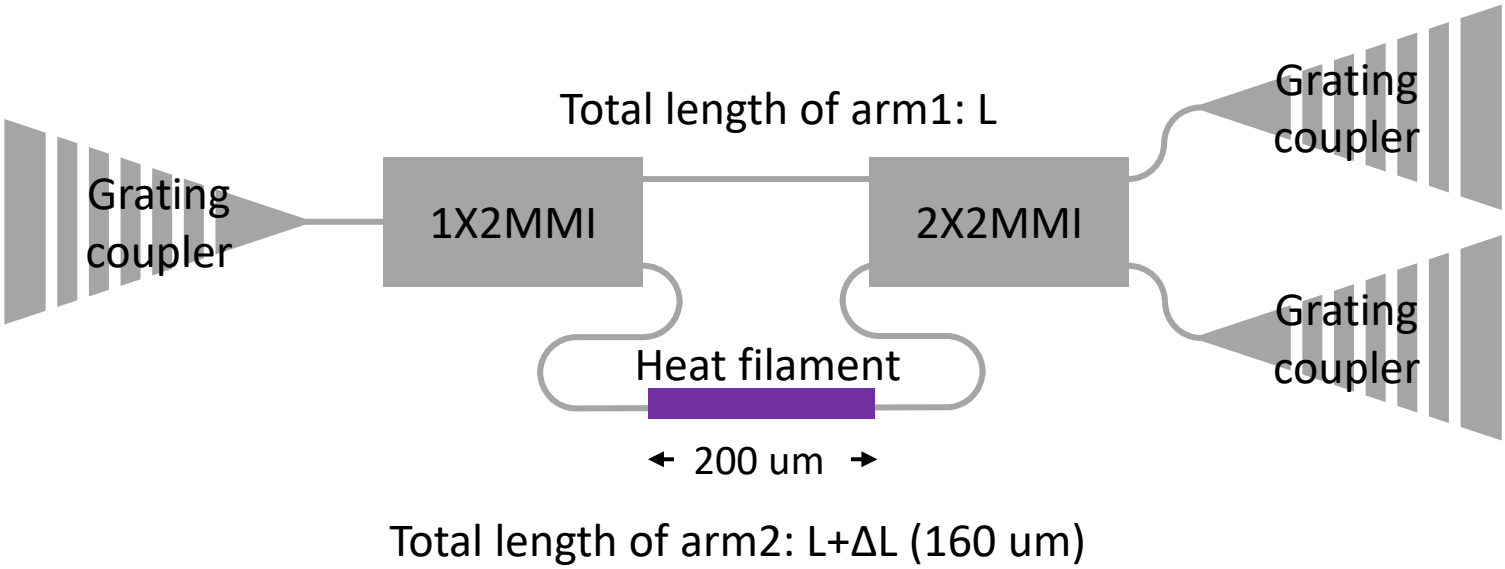


Transmission includes the measurement system loss, grating coupler loss and waveguide loss, as well as the measured device loss

SOI220nm_1550nm_TE_STRIP_MZI

Platform:	220 nm SOI (2 um BOX layer)
Wavelength:	1550 nm
Etching depth:	70 nm (Grating) & 220 nm (Strip design)
Polarization:	TE
Cell name in GDS lib:	SOI220nm_1550nm_TE_STRIP_MZI

Diagram:



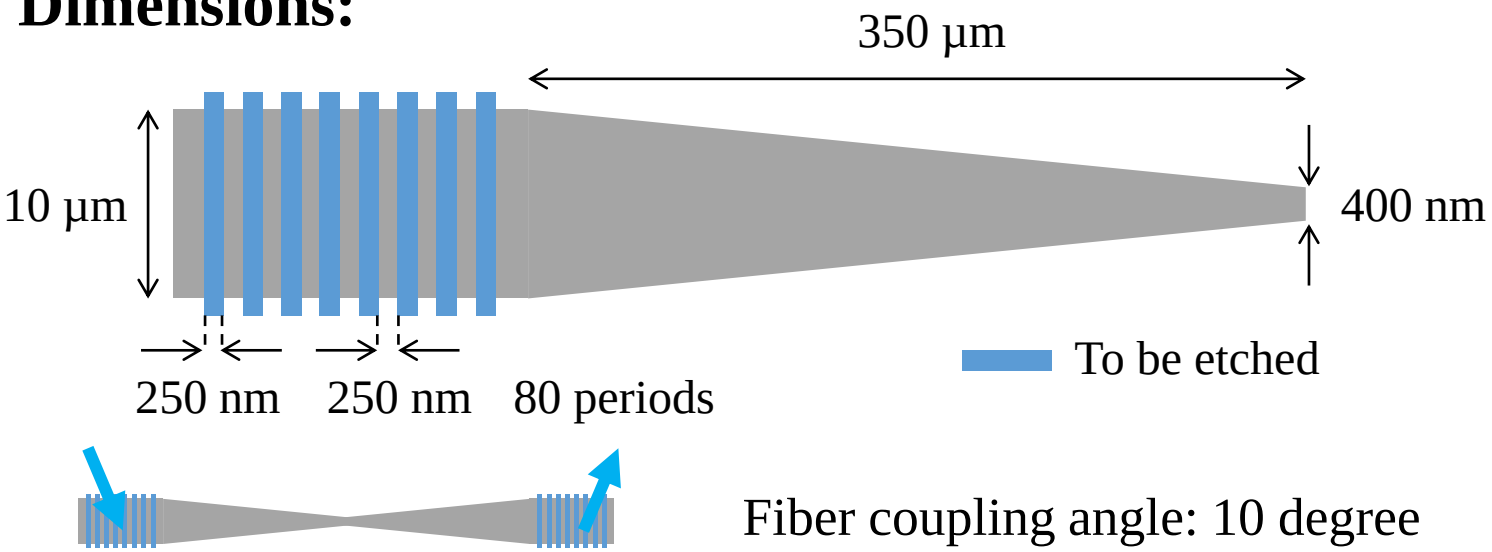
Total length of arm2: L+ΔL (160 um)

- **Wavelength: 1310 nm**
- **Platform: 220 nm SOI**

SOI220nm_1310nm_TE_RIB_Grating_Coupler

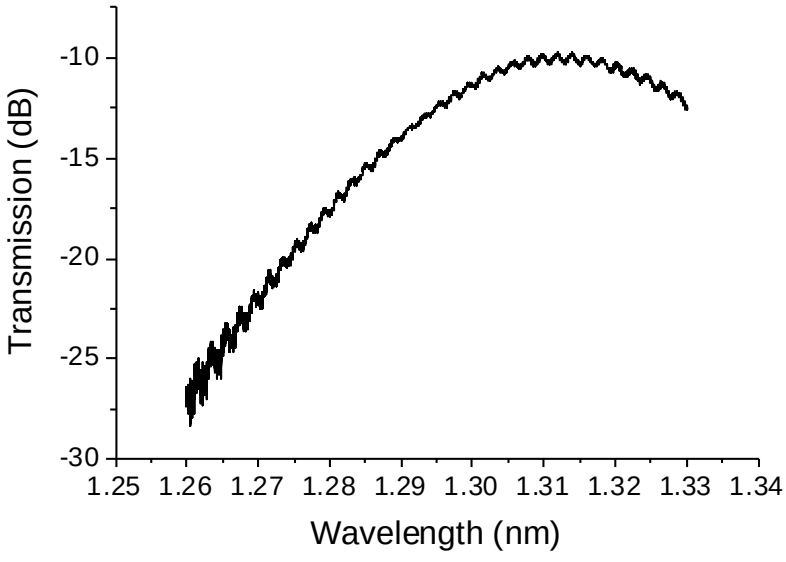
Platform:	220 nm SOI (2 um BOX layer)
Wavelength:	1310 nm
Etching depth:	70 nm (Grating etch depth)
Polarization:	TE
Cell name in GDS lib:	SOI220nm_1310nm_TE_RIB_Grating_Coupler

Dimensions:



Fiber coupling angle: 10 degree

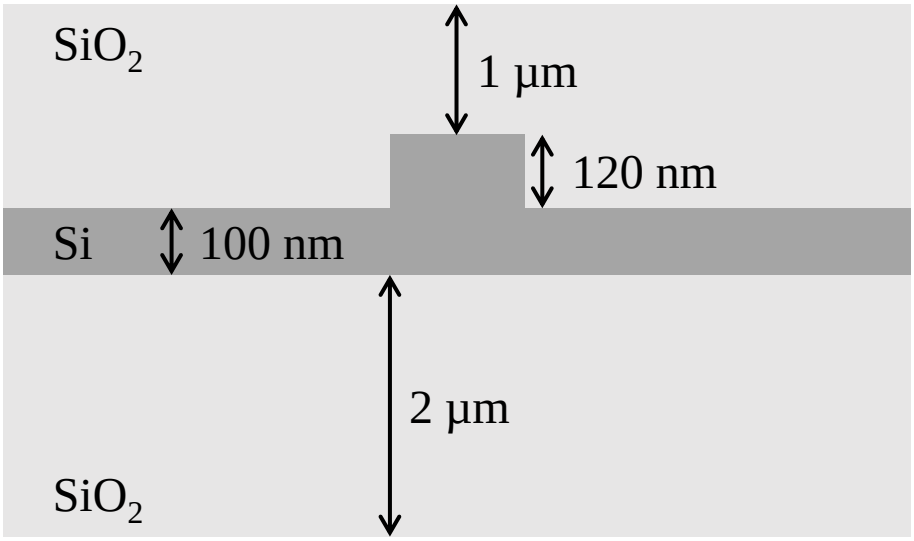
Measured transmission spectrum



Summarized performance:

- Coupling efficiency: 5-6 dB
- 1 dB bandwidth: > 30 nm
- Center wavelength: 1300-1330 nm

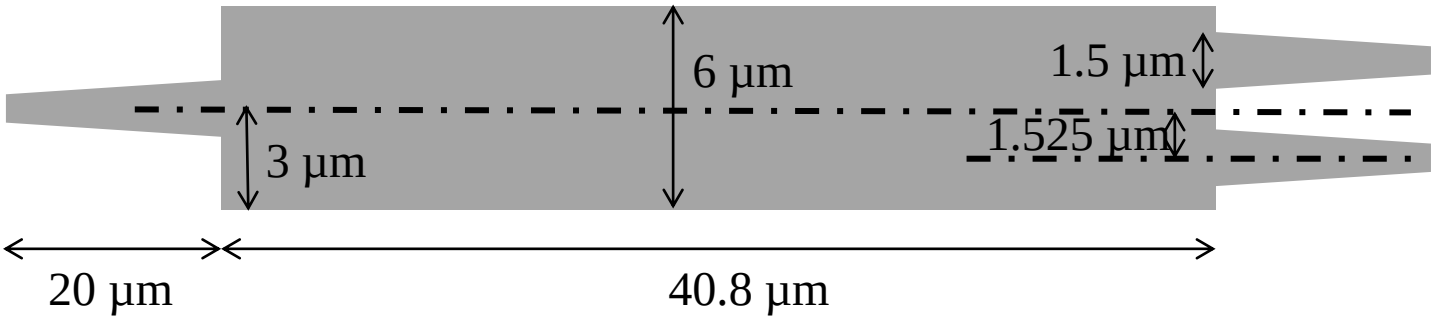
- Wavelength: 1310 nm
- Platform: 220 nm SOI
- **RIB**



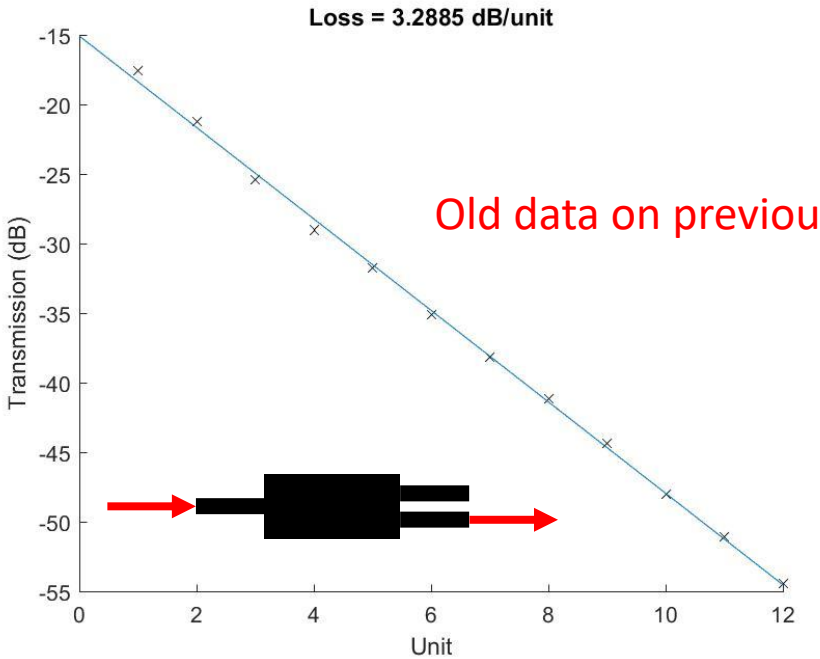
SOI220nm_1310nm_TE_RIB_2x1_MMI

Platform:	220 nm SOI (2 um BOX layer)
Wavelength:	1310 nm
Etching depth:	120 nm (Rib design)
Polarization:	TE
Cell name in GDS lib:	SOI220nm_1310nm_TE_RIB_2x1_MMI

Dimensions:



Measurement results:



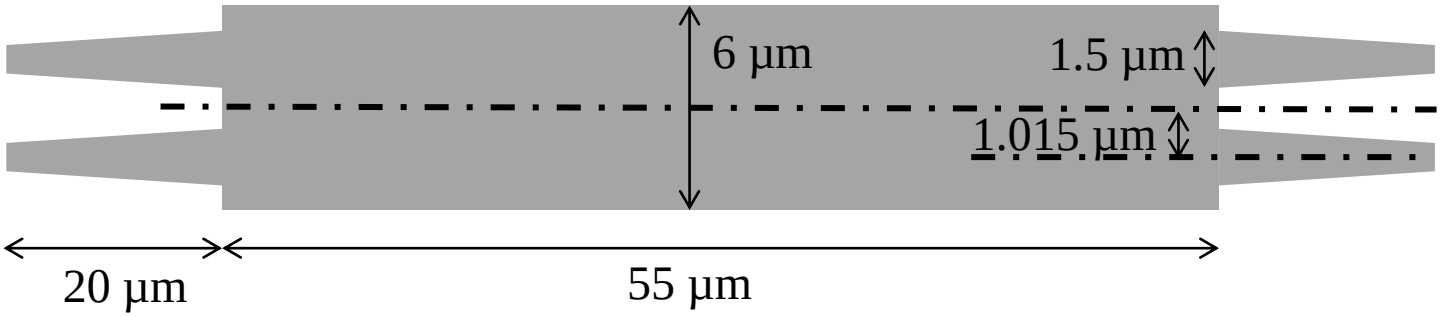
Old data on previous dimension

Transmission includes the measurement system loss, grating coupler loss and waveguide loss, as well as the measured device loss

SOI220nm_1310nm_TE_RIB_2x2_MMI

Platform:	220 nm SOI (2 um BOX layer)
Wavelength:	1550 nm
Etching depth:	120 nm (Rib design)
Polarization:	TE
Cell name in GDS lib:	SOI220nm_1310nm_TE_RIB_2x2_MMI

Dimensions:



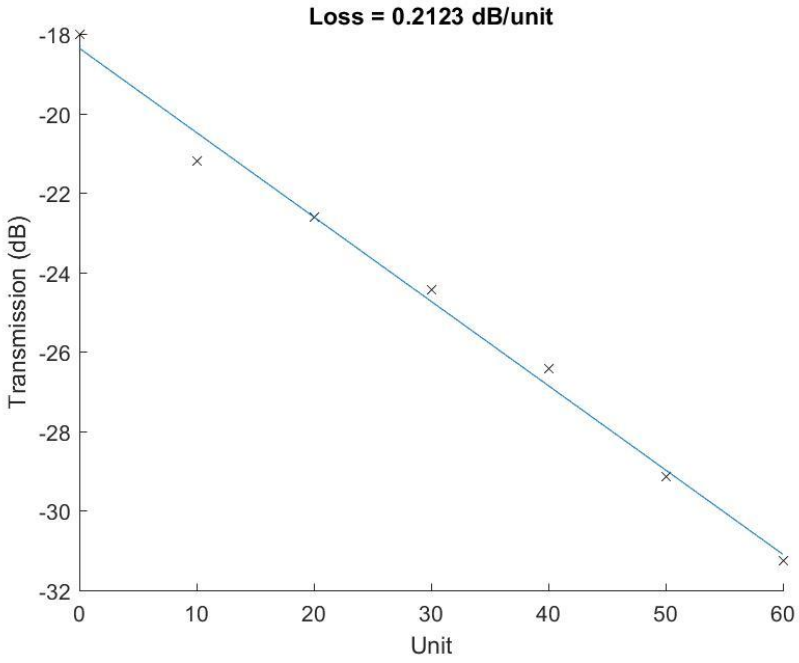
Measurement results:

SOI220nm_1310nm_TE_RIB_Waveguide_Crossing

Platform:	220 nm SOI (2 um BOX layer)
Wavelength:	1310 nm
Etching depth:	120 nm (Rib design)
Polarization:	TE
Cell name in GDS lib:	SOI220nm_1310nm_TE_RIB_Waveguide_Crossing

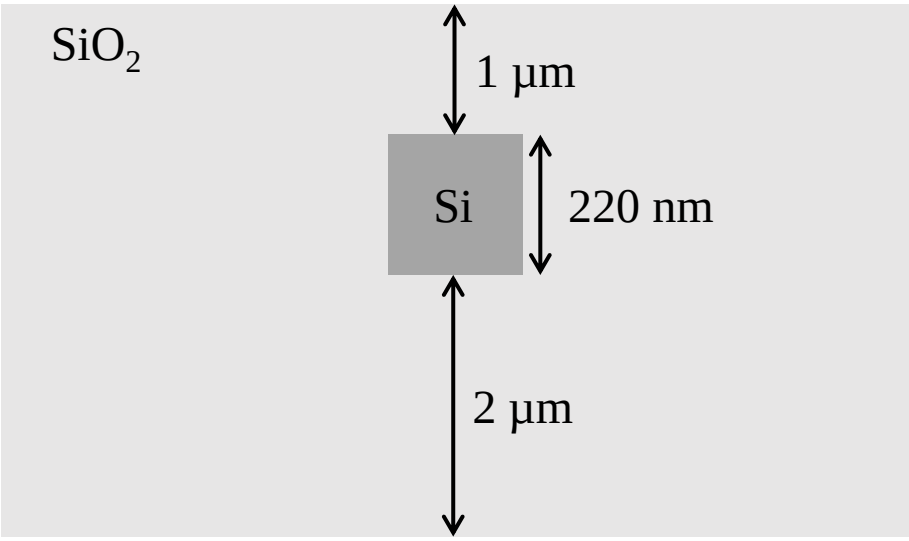
Dimensions: See the drawing in GDS library

Measurement results:



Transmission includes the measurement system loss, grating coupler loss and waveguide loss, as well as the measured device loss

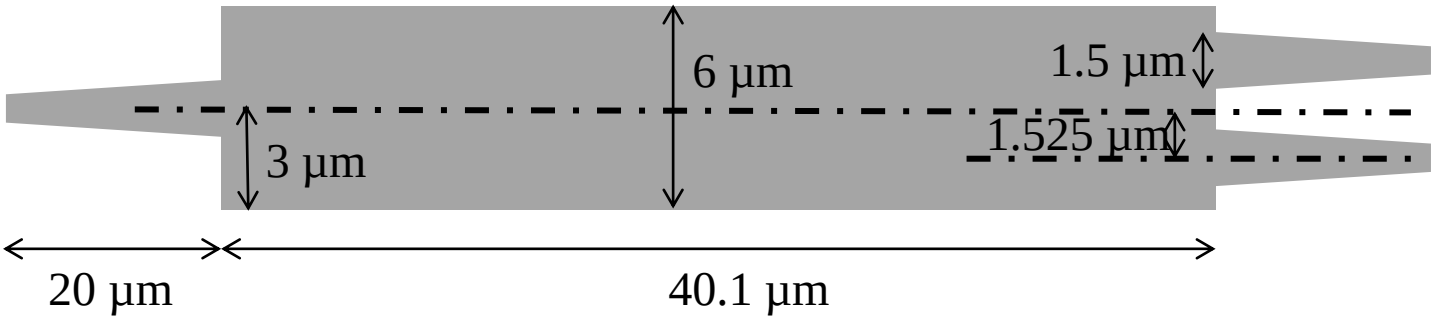
- Wavelength: 1310 nm
- Platform: 220 nm SOI
- **STRIP**



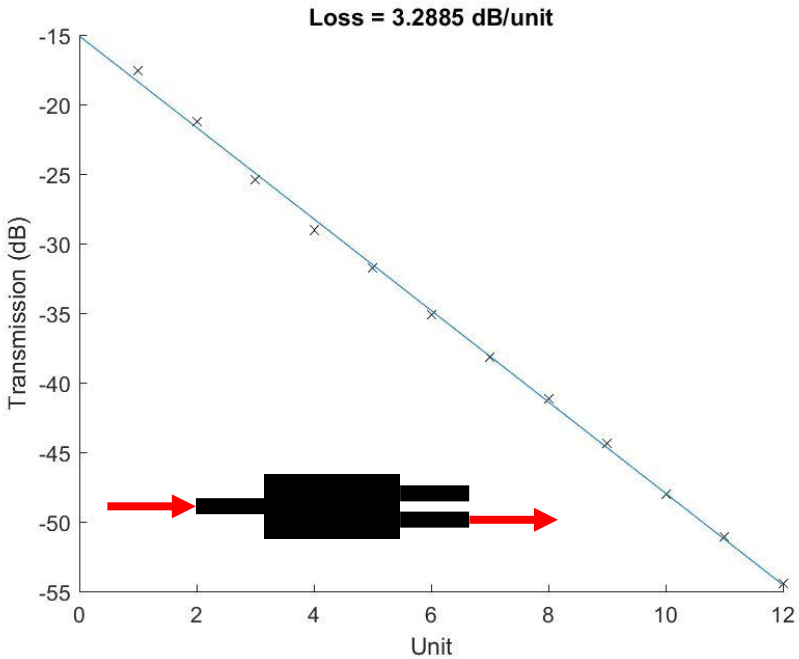
SOI220nm_1310nm_TE_STRIP_2x1_MMI

Platform:	220 nm SOI (2 um BOX layer)
Wavelength:	1310 nm
Etching depth:	220 nm (Strip design)
Polarization:	TE
Cell name in GDS lib:	SOI220nm_1310nm_TE_STRIP_2x1_MMI

Dimensions:



Measurement results:

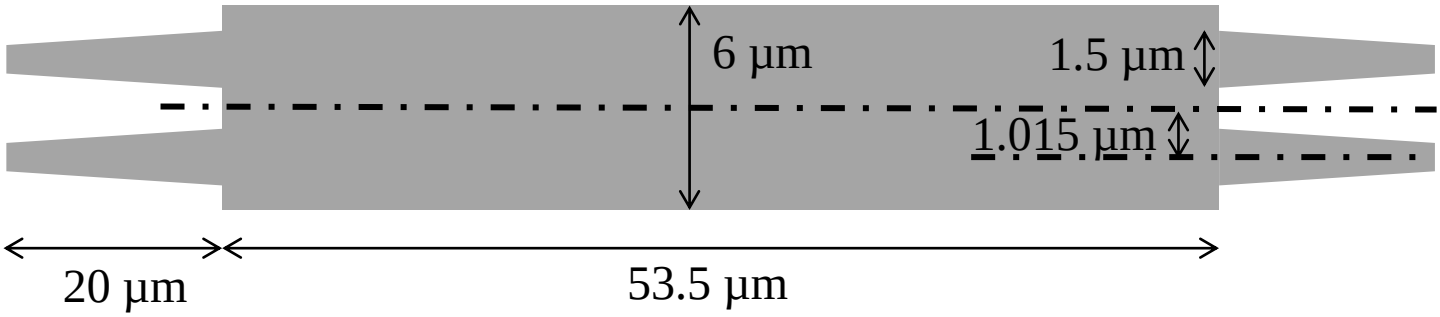


Transmission includes the measurement system loss, grating coupler loss and waveguide loss, as well as the measured device loss

SOI220nm_1310nm_TE_STRIP_2x2_MMI

Platform:	220 nm SOI (2 um BOX layer)
Wavelength:	1310 nm
Etching depth:	220 nm (Strip design)
Polarization:	TE
Cell name in GDS lib:	SOI220nm_1310nm_TE_STRIP_2x2_MMI

Dimensions:

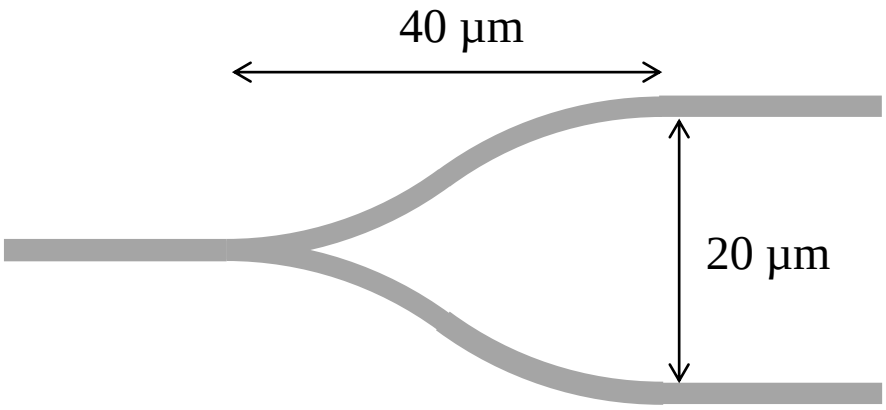


Measurement results:

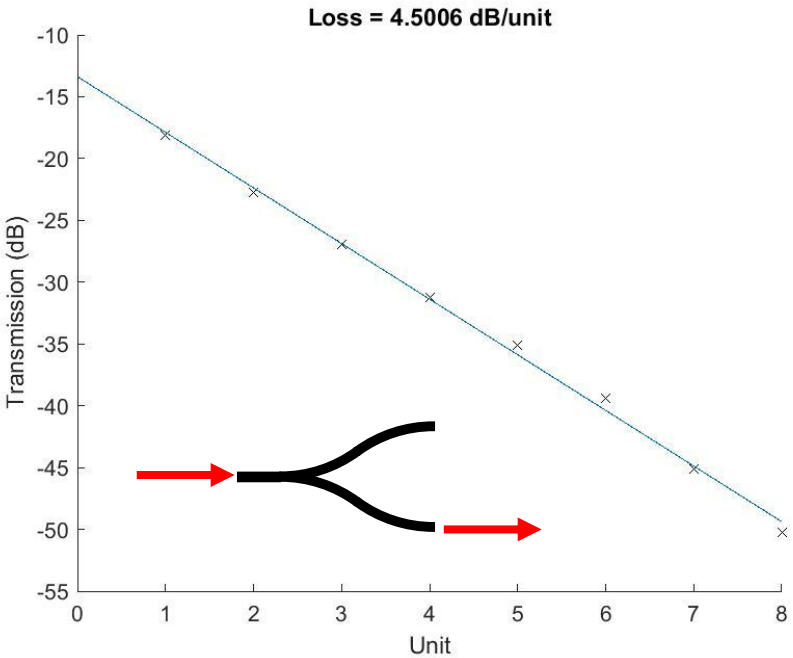
SOI220nm_1310nm_TE_STRIP_2x1_Ysplitter

Platform:	220 nm SOI (2 um BOX layer)
Wavelength:	1310 nm
Etching depth:	220 nm (Strip design)
Polarization:	TE
Cell name in GDS lib:	Not in GDS library

Dimensions:



Measurement results:



Transmission includes the measurement system loss, grating coupler loss and waveguide loss, as well as the measured device loss

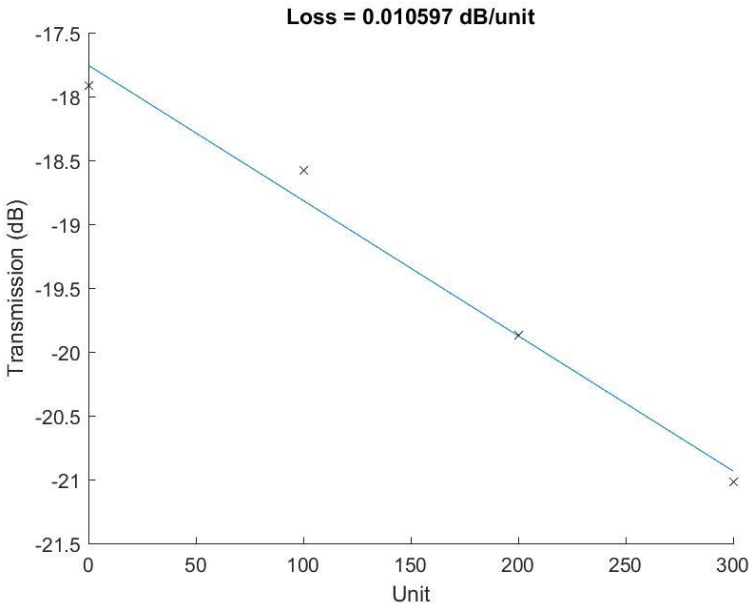
SOI220nm_1310nm_TE_STRIP_90_Degree_Bend

Platform:	220 nm SOI (2 um BOX layer)
Wavelength:	1310 nm
Etching depth:	220 nm (Strip design)
Polarization:	TE
Cell name in GDS lib:	SOI220nm_1310nm_TE_STRIP_90_Degree_Bend (Waveguide Width (W): 400 nm, Bend Radius (R): 5 um)

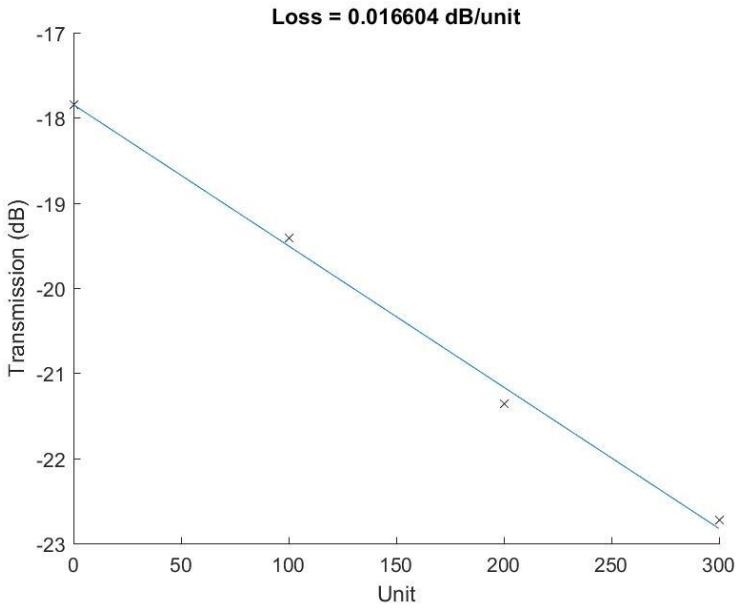
Measurement results on varied dimensions:

(Unit: 90° bend)

R: 5 µm



R: 10 µm



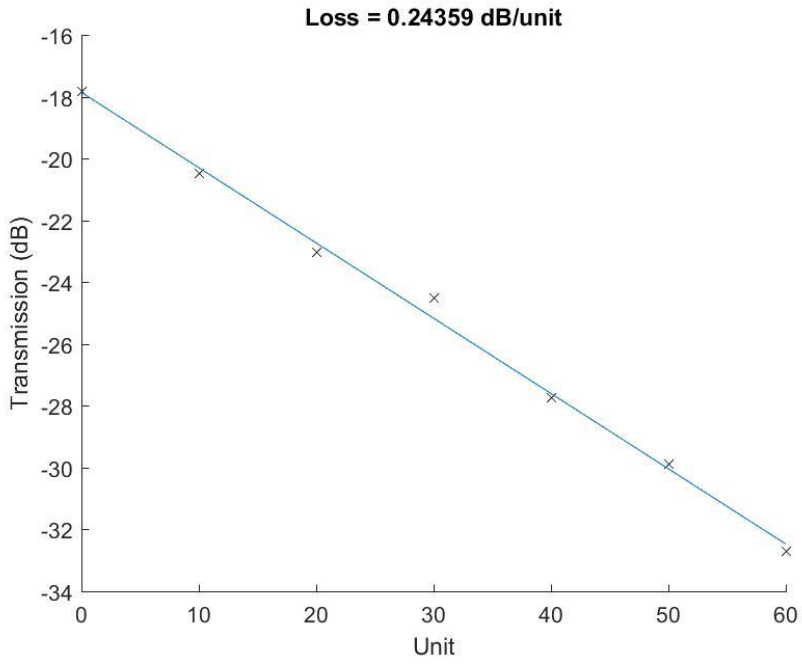
Transmission includes the measurement system loss, grating coupler loss and waveguide loss, as well as the measured device loss

SOI220nm_1310nm_TE_STRIP_Waveguide_Crossing

Platform:	220 nm SOI (2 um BOX layer)
Wavelength:	1310 nm
Etching depth:	220 nm (Strip design)
Polarization:	TE
Cell name in GDS lib:	SOI220nm_1310nm_TE_STRIP_Waveguide_Crossing

Dimensions: See the drawing in GDS library

Measurement results:



Transmission includes the measurement system loss, grating coupler loss and waveguide loss, as well as the measured device loss