

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/design-rules/>

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.

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Engineering and
Physical Sciences
Research Council

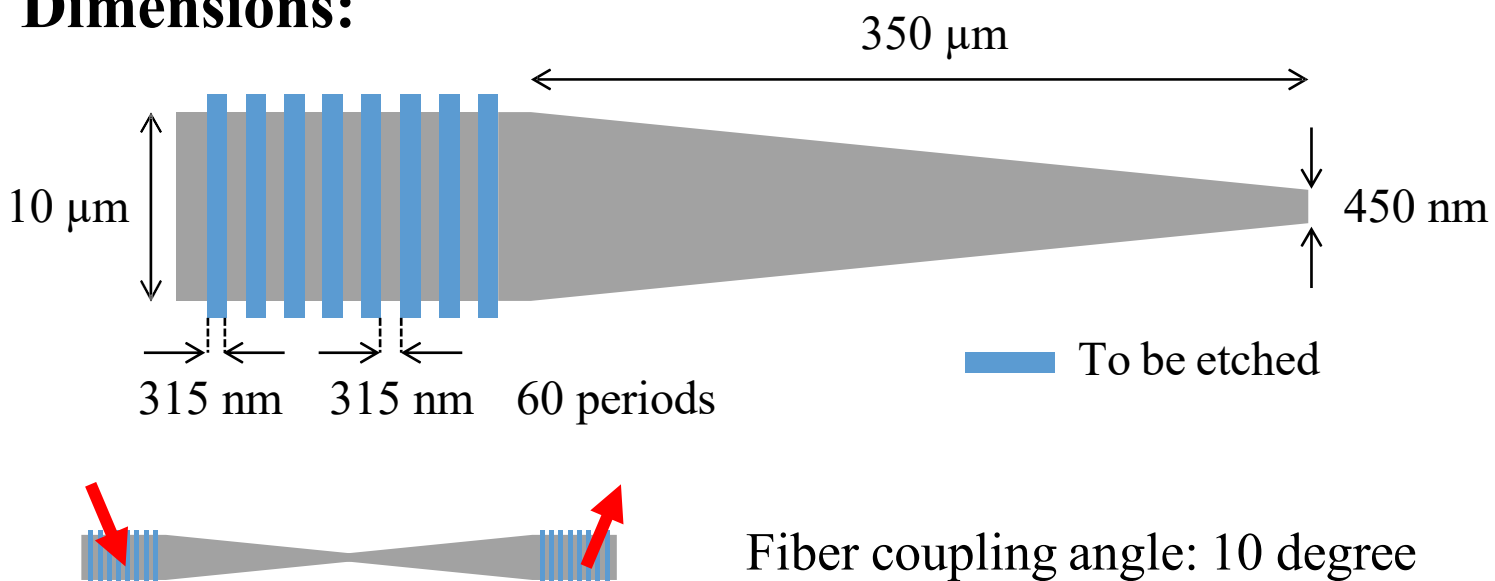
- [SOI220_oband_TE_STRIP_2x2_MMI](#)
- [SOI220_oband_TE_STRIP_1x2_Ysplitter](#)
- [SOI220_oband_TE_STRIP_90_Degree_Bend](#)
- [SOI220_oband_TE_STRIP_Waveguide_Crossing](#)

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

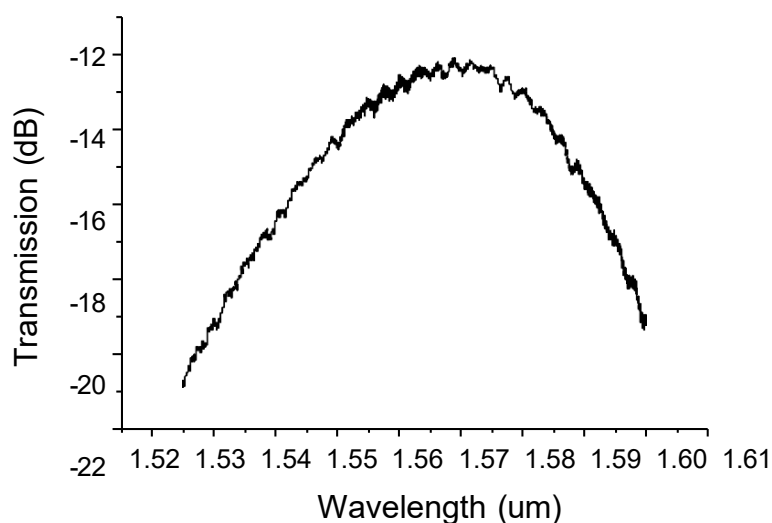
SOI220_cband_TE_RIB_Grating_Coupler

Platform:	220 nm SOI (2 μm BOX layer)
Wavelength:	1550 nm
Etching depth:	70 nm (Grating etch depth)
Polarization:	TE
Cell name in GDS lib:	SOI220_cband_TE_RIB_Grating_Coupler

Dimensions:



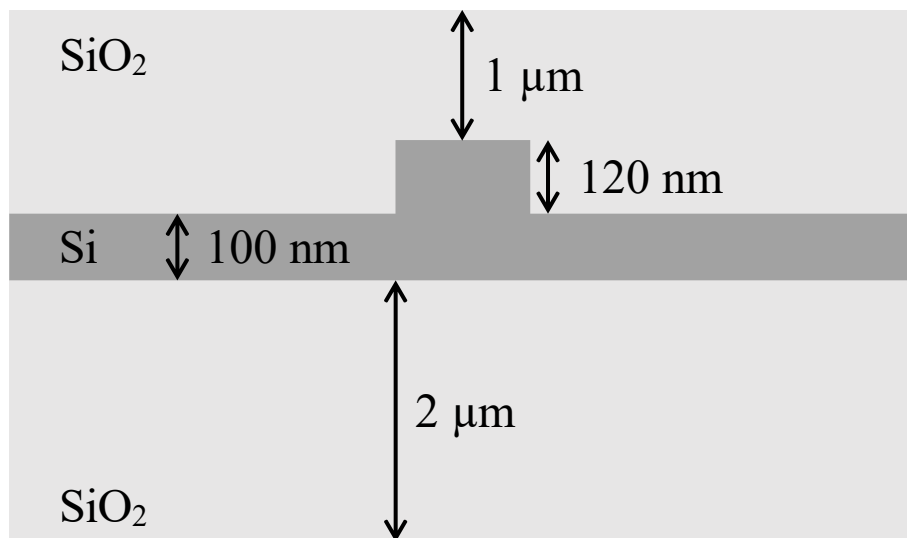
Measured transmission spectrum



Summarized performance:

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

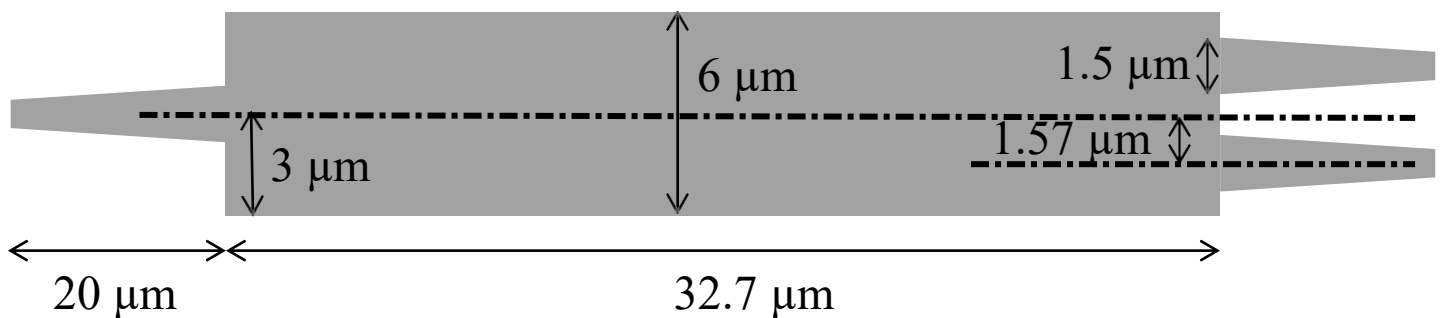
- Wavelength: 1550 nm
- Platform: 220 nm SOI
- **RIB**



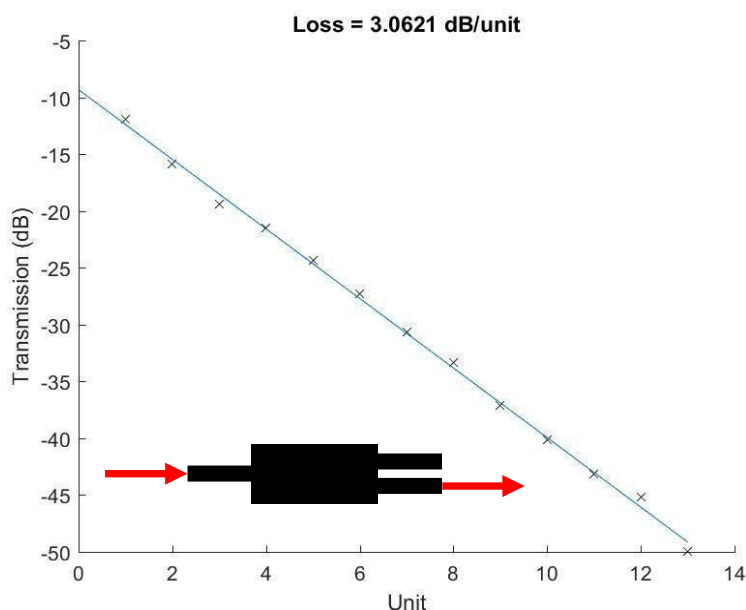
SOI220_cband_TE_RIB_1x2_MMI

Platform:	220 nm SOI (2 μm BOX layer)
Wavelength:	1550 nm
Etching depth:	120 nm (Rib design)
Polarization:	TE
Cell name in GDS lib:	SOI220_cband_TE_RIB_1x2_MMI

Dimensions:



Measurement results:

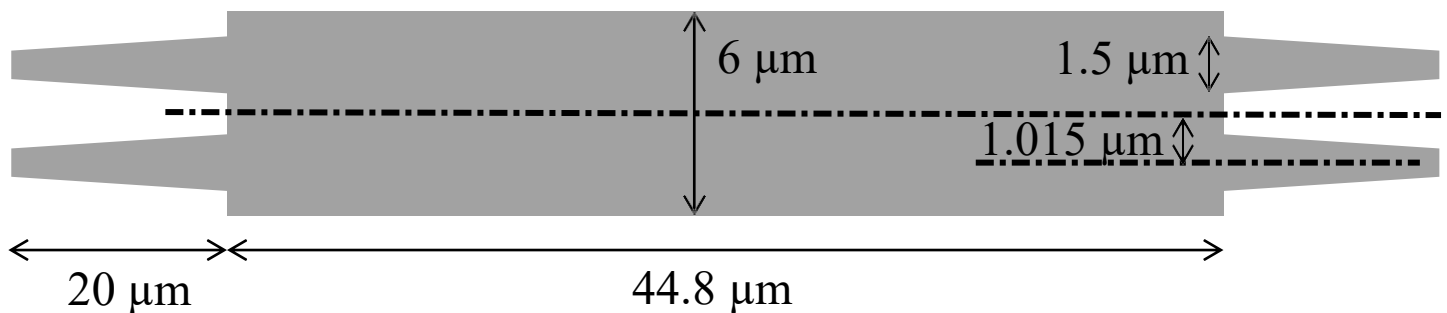


Transmission includes the measurement system loss, grating coupler loss and waveguide loss, as well as the measured device loss

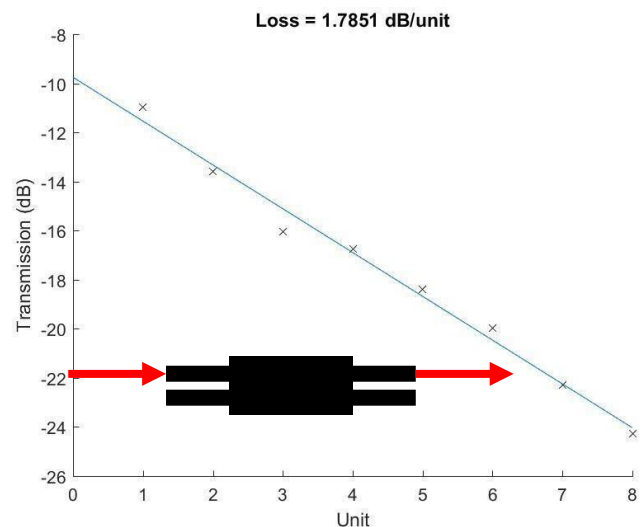
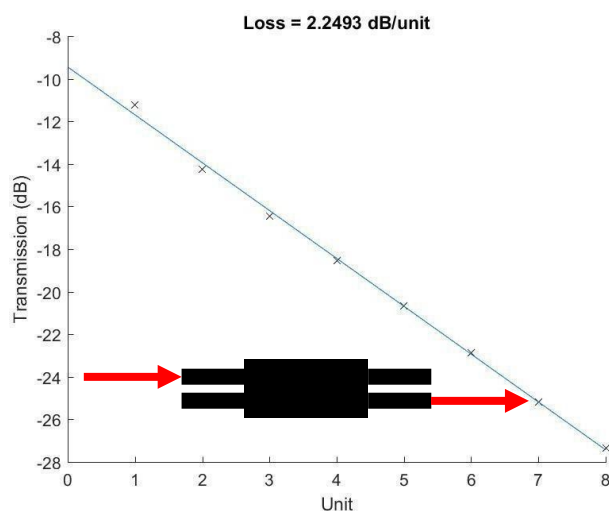
SOI220_cband_TE_RIB_2x2_MMI

Platform:	220 nm SOI (2 μm BOX layer)
Wavelength:	1550 nm
Etching depth:	120 nm (Rib design)
Polarization:	TE
Cell name in GDS lib:	SOI220_cband_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

SOI220_cband_TE_RIB_90_Degree_Bend

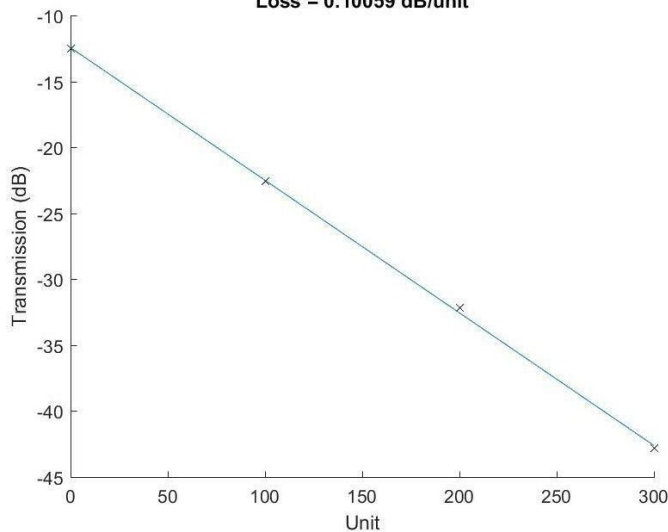
Platform:	220 nm SOI (2 um BOX layer)
Wavelength:	1550 nm
Etching depth:	120 nm (Rib design)
Polarization:	TE
Cell name in GDS lib:	SOI220_cband_TE_RIB_90_Degree_Bend (Waveguide Width (W): 450 nm, Bend Radius (R): 25 um)

Measurement results on varied dimensions:

(Unit: 90° bend)

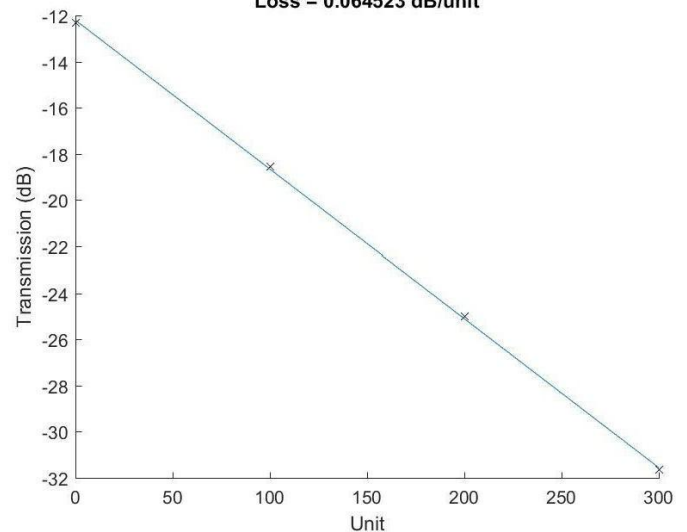
W: 450 nm

Loss = 0.10059 dB/unit

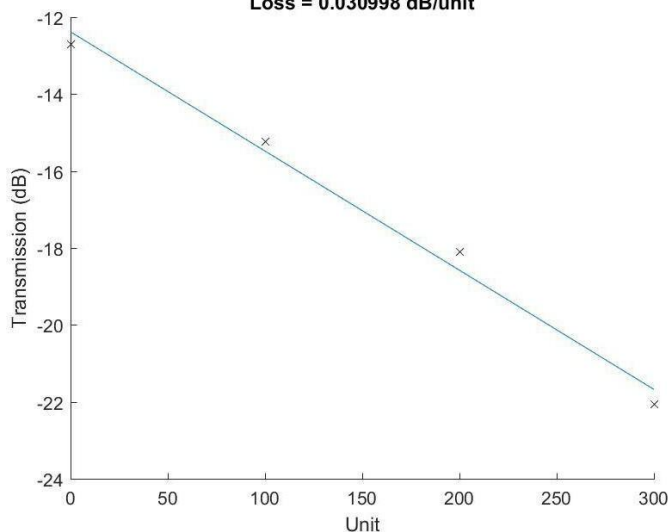


W: 600 nm

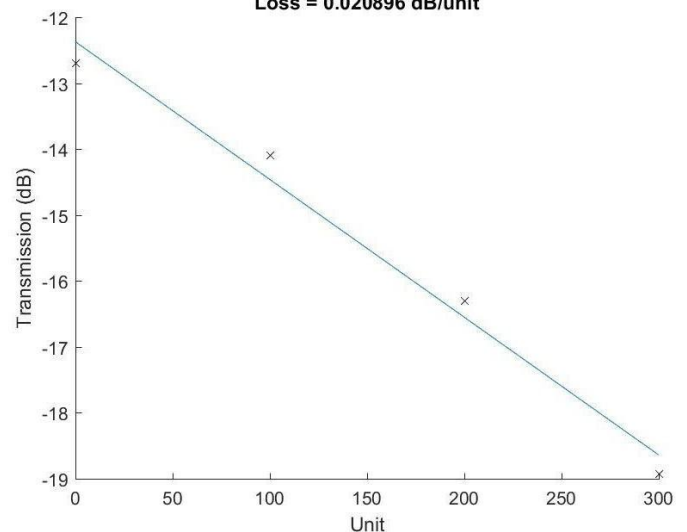
Loss = 0.064523 dB/unit



Loss = 0.030998 dB/unit



Loss = 0.020896 dB/unit



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

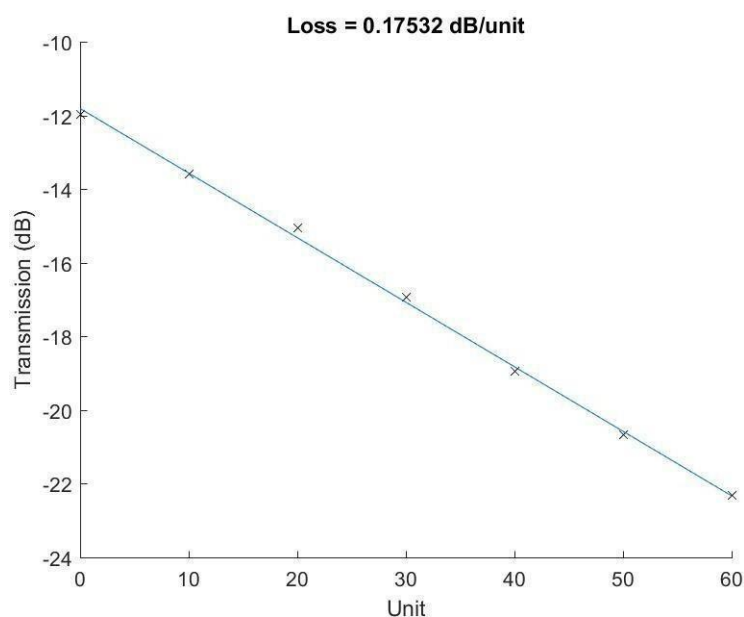
SOI220_cband_TE_RIB_Waveguide_Crossing

Platform:	220 nm SOI (2 um BOX layer)
Wavelength:	1550 nm
Etching depth:	120 nm (Rib design)
Polarization:	TE
Cell name in GDS lib:	SOI220_cband_TE_RIB_Waveguide_Crossing

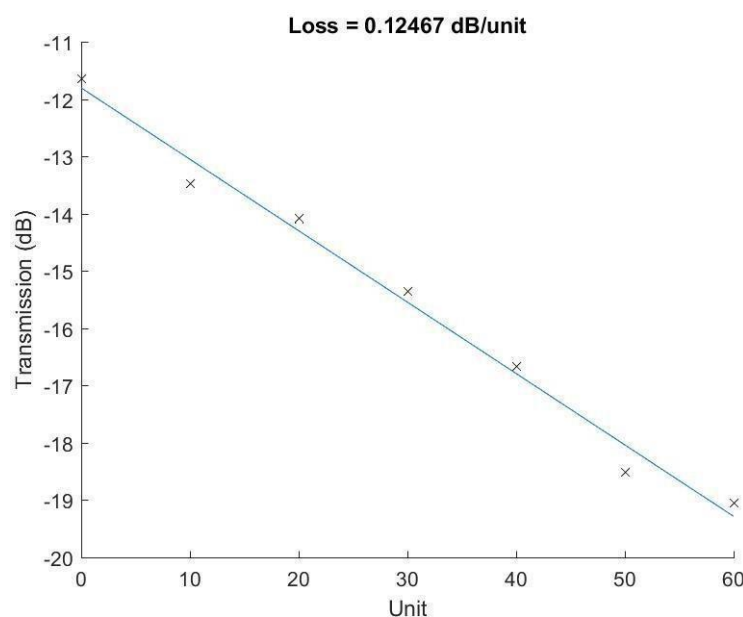
Dimensions: See the drawing in GDS library

Measurement results on different waveguide width (W):

W: 400 nm



W: 450 nm

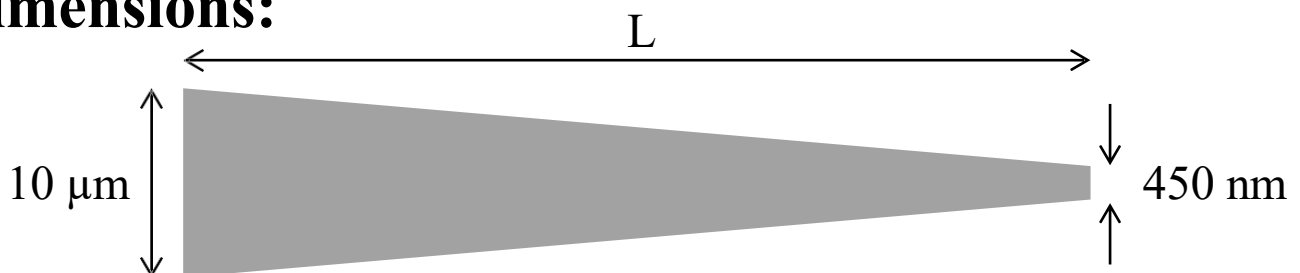


Transmission includes the measurement system loss, grating coupler loss and waveguide loss, as well as the measured device loss

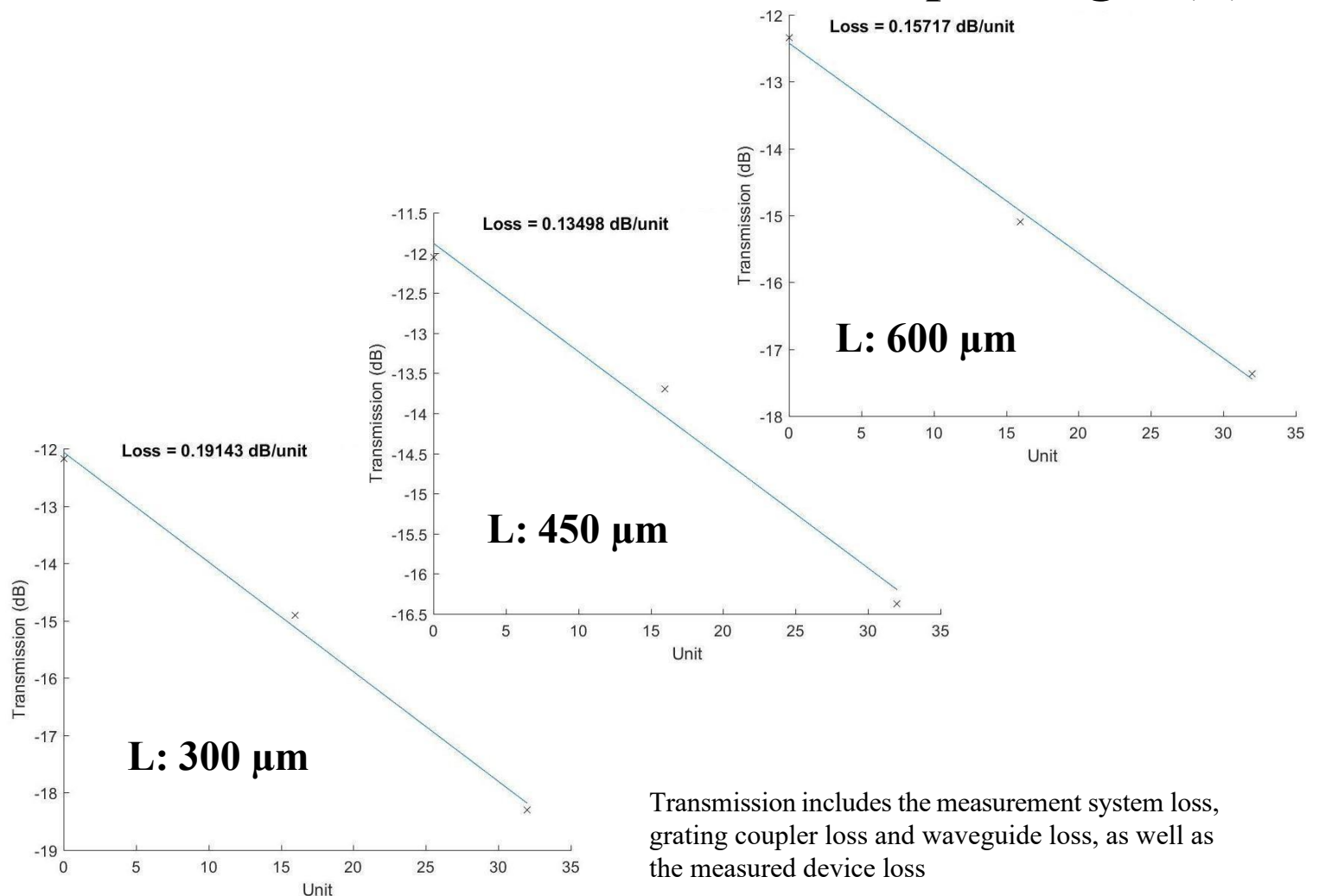
SOI220_cband_TE_RIB_MM to SM_TAPER

Platform:	220 nm SOI (2 um BOX layer)
Wavelength:	1550 nm
Etching depth:	120 nm (Rib design)
Polarization:	TE
Cell name in GDS lib:	SOI220_cband_TE_strip_MM2SM

Dimensions:

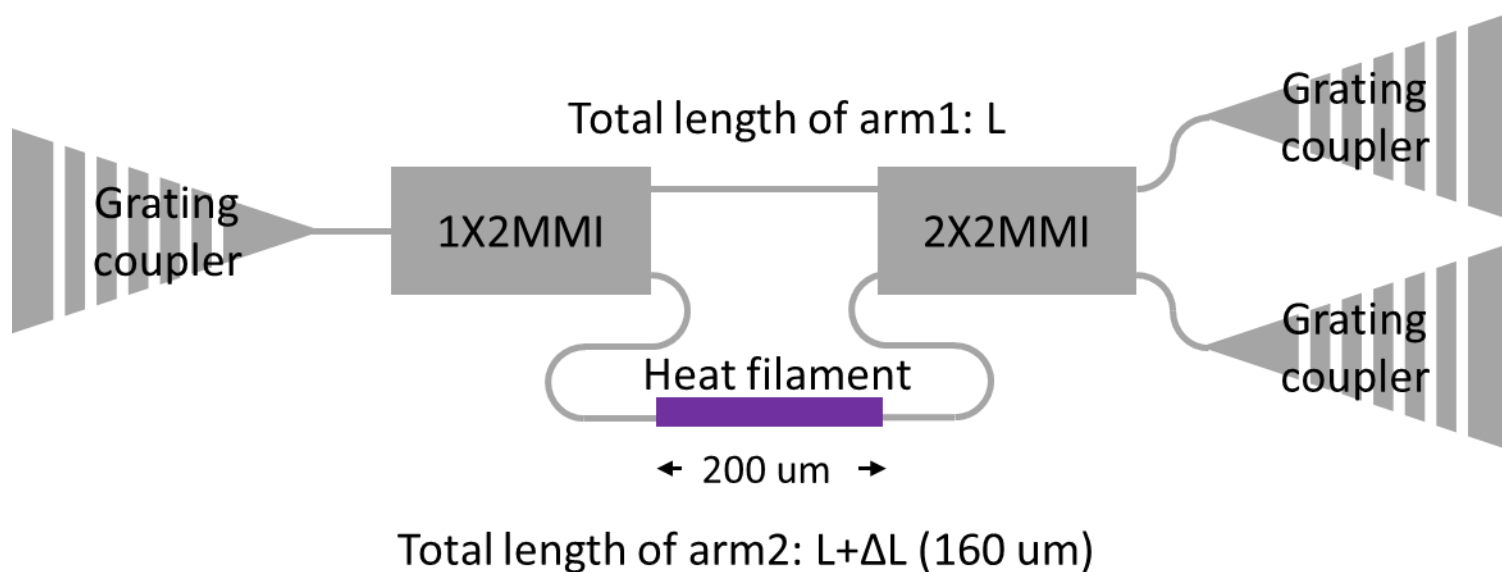


Measurement results on different taper length (L):

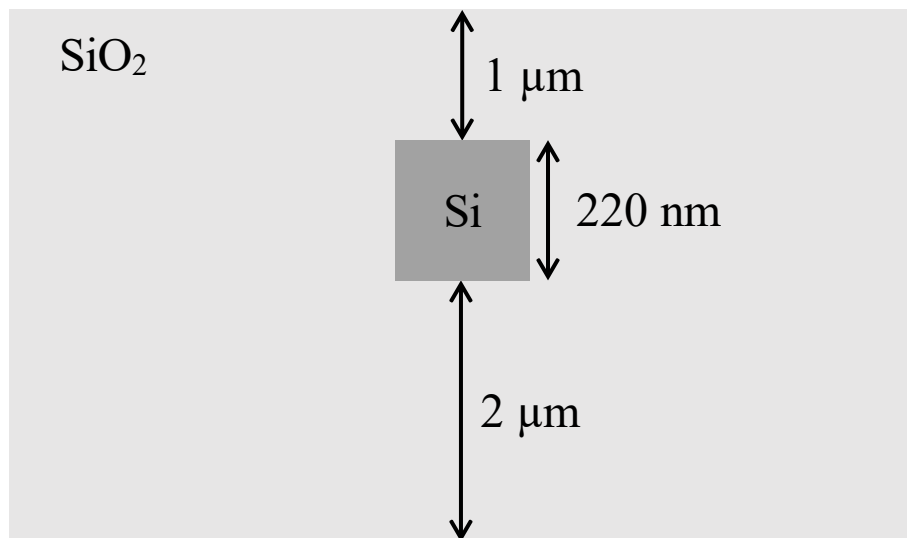


SOI220_cband_TE_RIB_MZI

Platform:	220 nm SOI (2 um BOX layer)
Wavelength:	1550 nm
Etching depth:	120 nm (Rib design)
Polarization:	TE
Cell name in GDS lib:	SOI220_cband_TE_strip_MZI



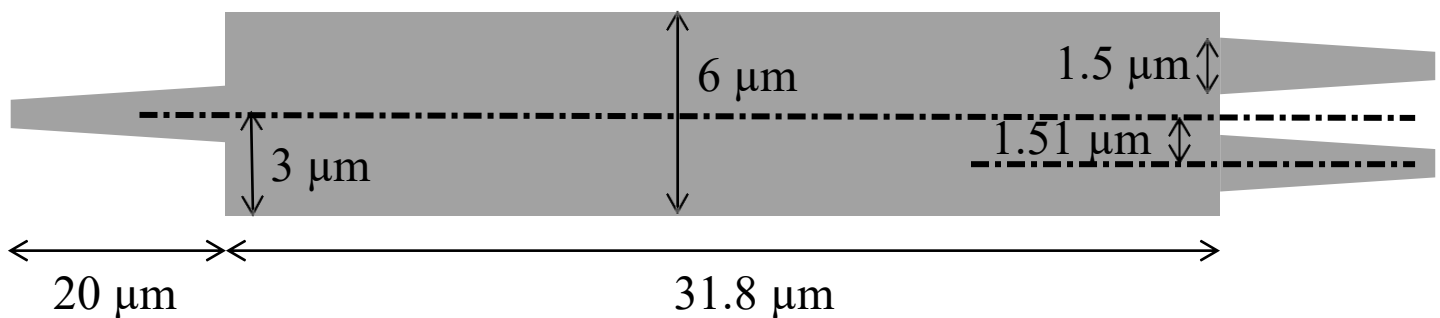
- Wavelength: 1550 nm
- Platform: 220 nm SOI
- **STRIP**



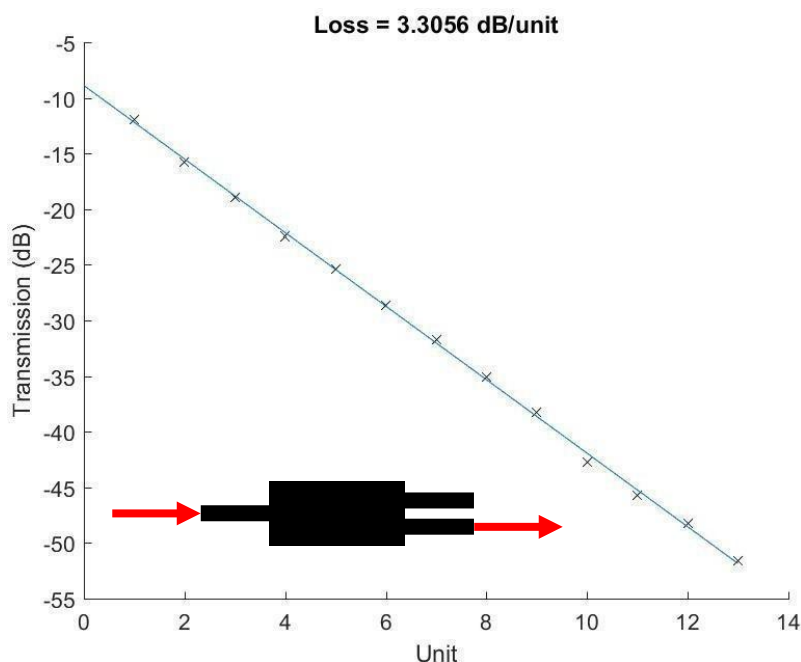
SOI220_cband_TE_STRIP_1x2_MMI

Platform:	220 nm SOI (2 μm BOX layer)
Wavelength:	1550 nm
Etching depth:	220 nm (Strip design)
Polarization:	TE
Cell name in GDS lib:	SOI220_cband_TE_STRIP_1x2_MMI

Dimensions:



Measurement results:

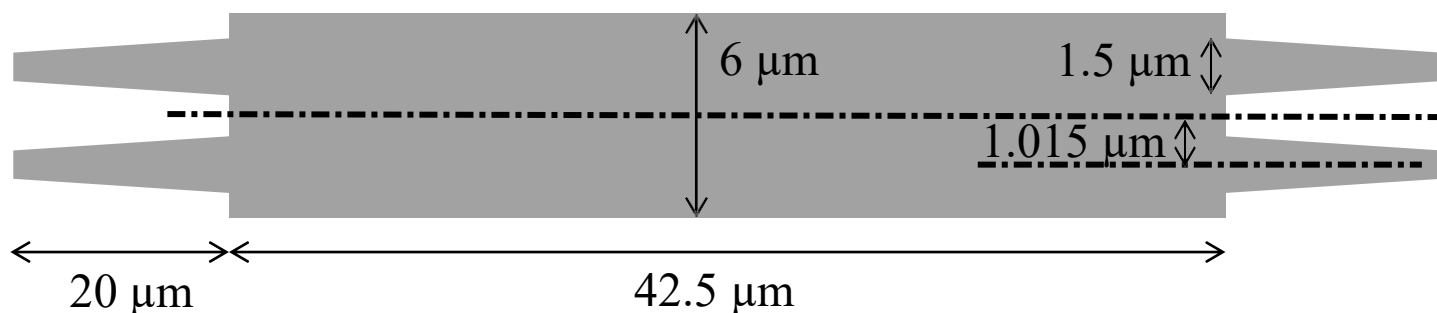


Transmission includes the measurement system loss, grating coupler loss and waveguide loss, as well as the measured device loss

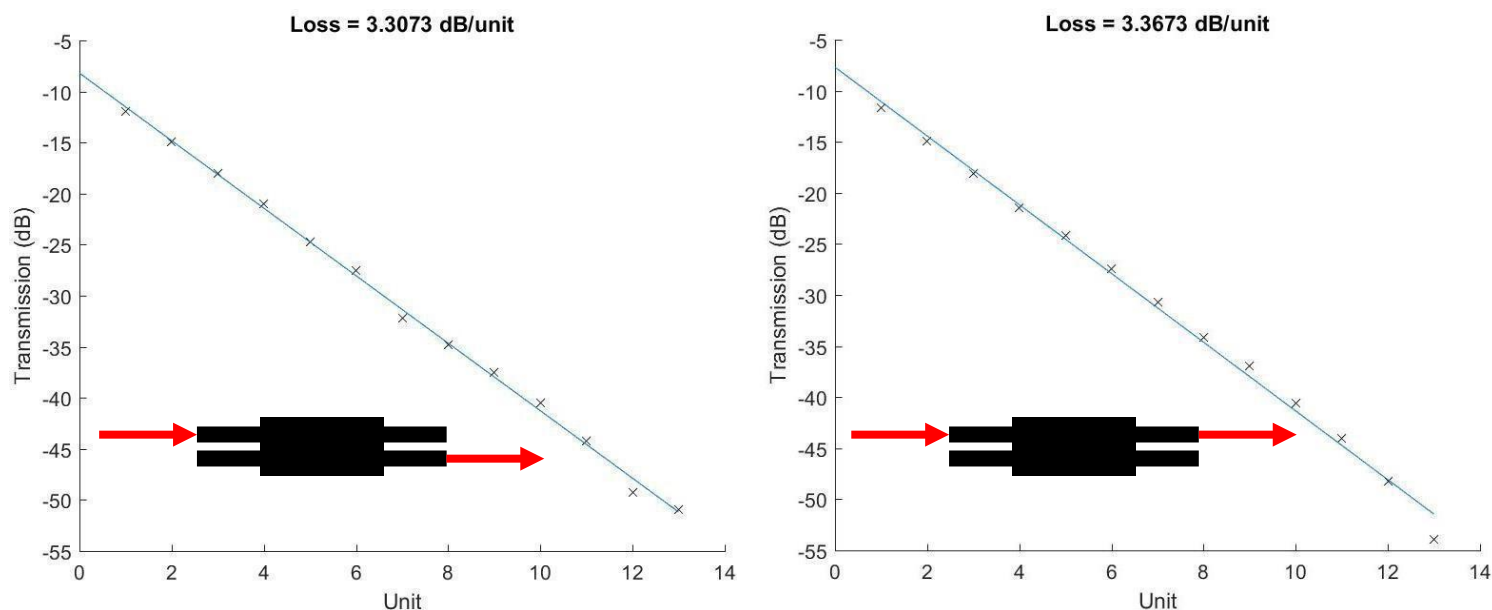
SOI220_cband_TE_STRIP_2x2_MMI

Platform:	220 nm SOI (2 μm BOX layer)
Wavelength:	1550 nm
Etching depth:	220 nm (Strip design)
Polarization:	TE
Cell name in GDS lib:	SOI220_cband_TE_STRIP_2x2_MMI

Dimensions:



Measurement results:

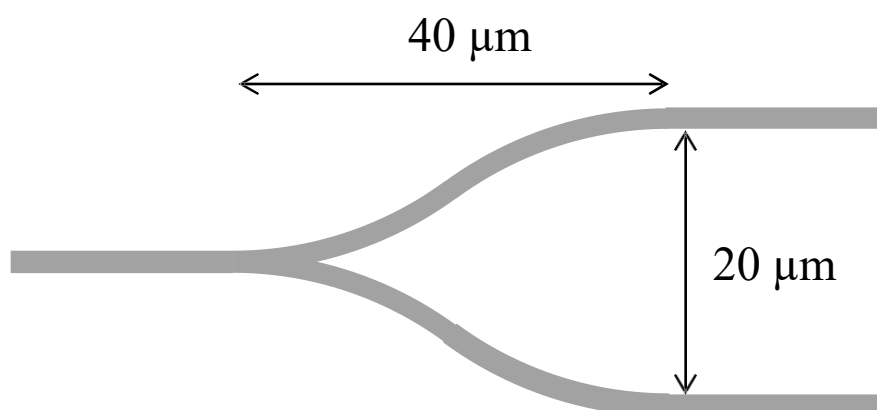


Transmission includes the measurement system loss, grating coupler loss and waveguide loss, as well as the measured device loss

SOI220_cband_TE_STRIP_1x2_Ysplitter

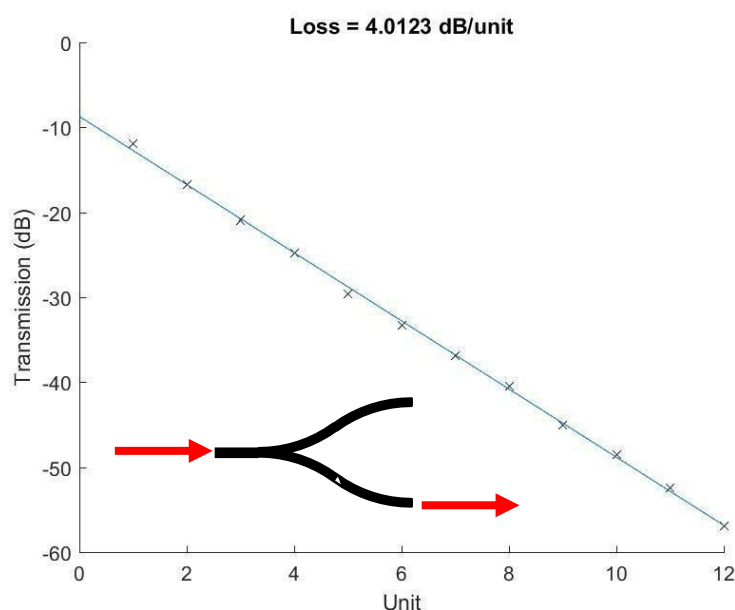
Platform:	220 nm SOI (2 μm BOX layer)
Wavelength:	1550 nm
Etching depth:	220 nm (Strip design)
Polarization:	TE
Cell name in GDS lib:	SOI220_cband_TE_strip_1x2_Ysplitter

Dimensions:

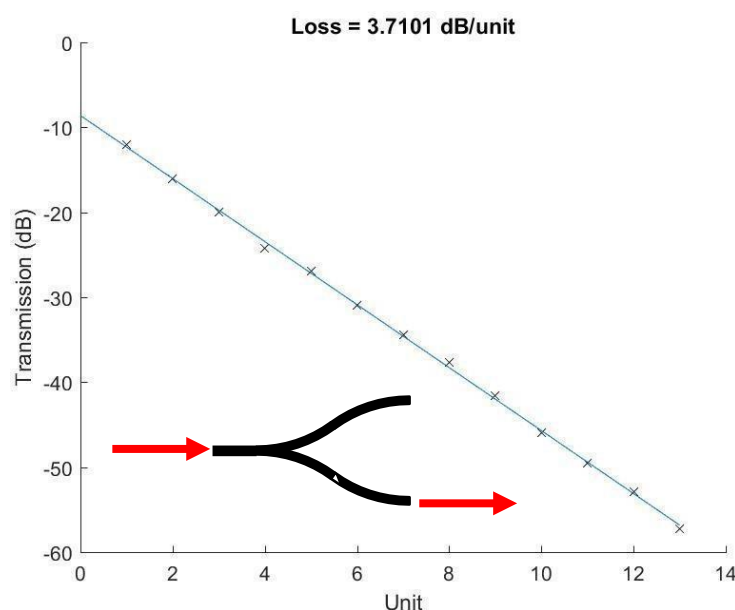


Measurement results:

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

SOI220_cband_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:	SOI220_cband_TE_STRIP_90_Degree_Bend (Waveguide Width (W): 450 nm, Bend Radius (R): 5 um)

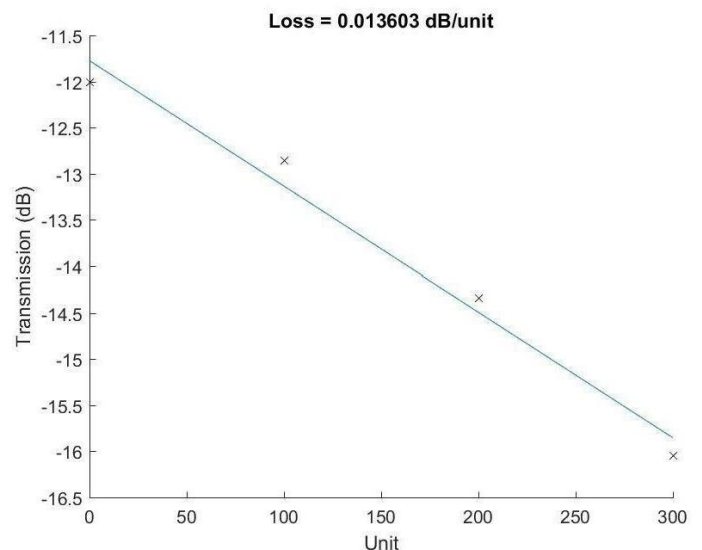
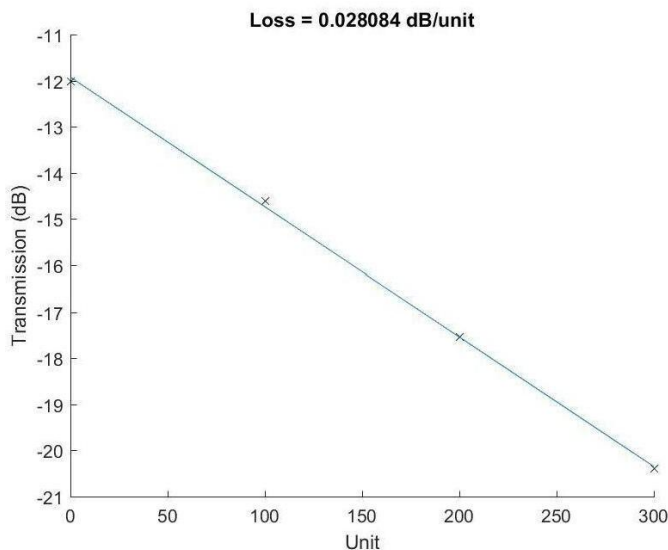
Measurement results on varied dimensions:

(Unit: 90° bend)

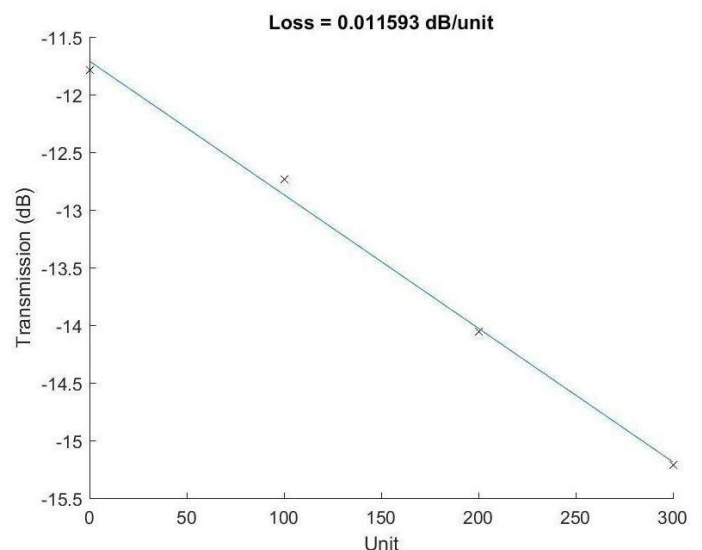
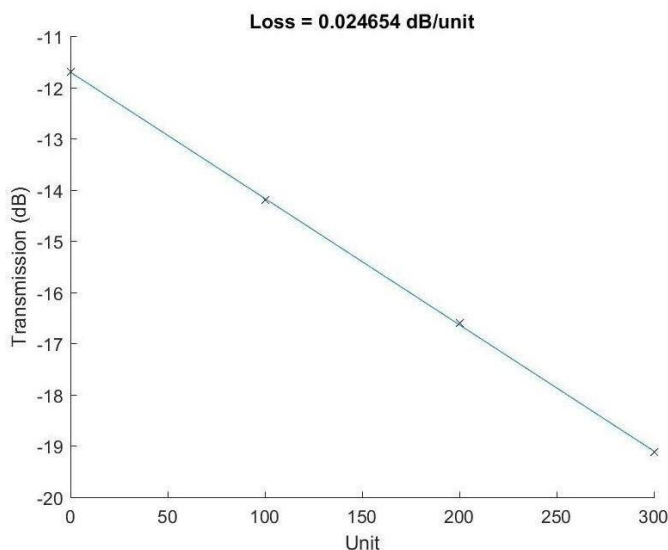
W: 400 nm

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

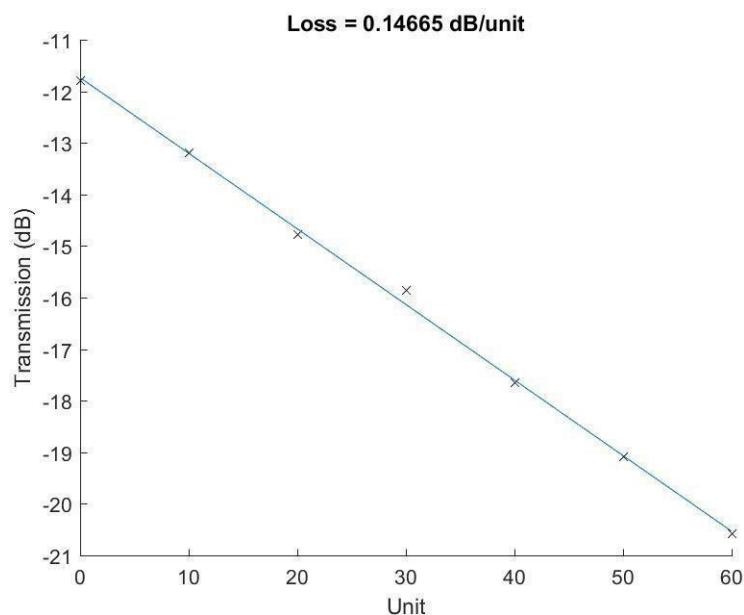
SOI220_cband_TE_STRIP_Waveguide_Crossing

Platform:	220 nm SOI (2 um BOX layer)
Wavelength:	1550 nm
Etching depth:	220 nm (Strip design)
Polarization:	TE
Cell name in GDS lib:	SOI220_cband_TE_STRIP_Waveguide_Crossing

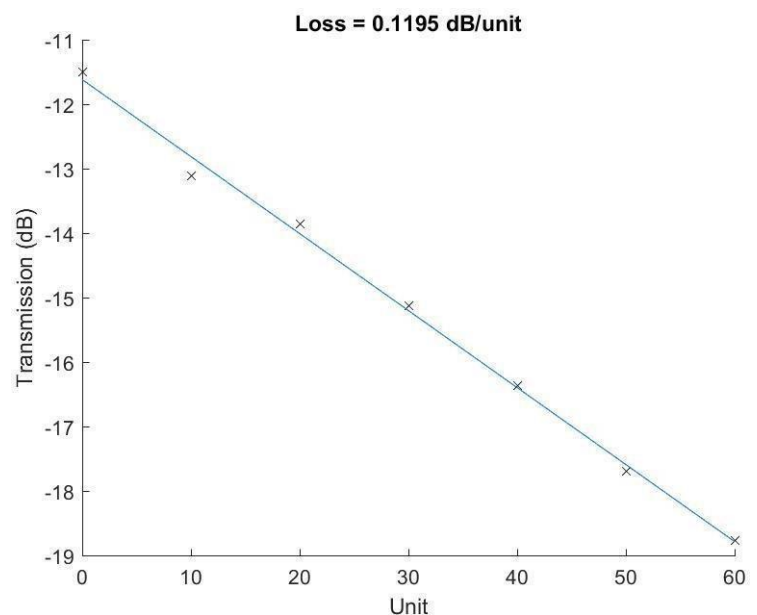
Dimensions: See the drawing in GDS library

Measurement results on different waveguide width (W):

W: 400 nm



W: 450 nm

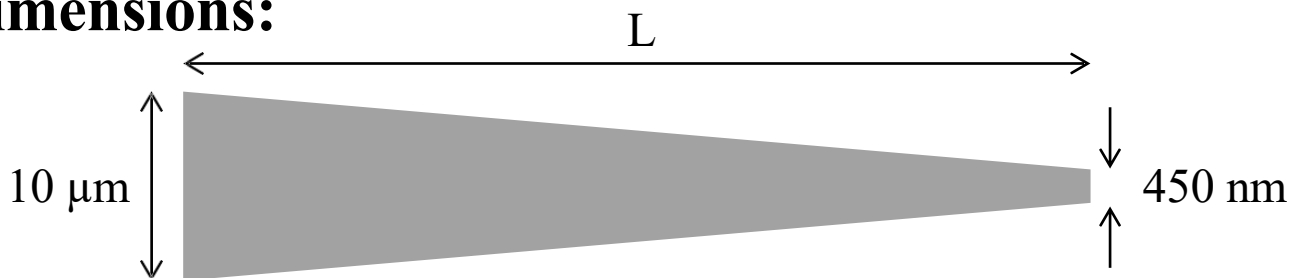


Transmission includes the measurement system loss, grating coupler loss and waveguide loss, as well as the measured device loss

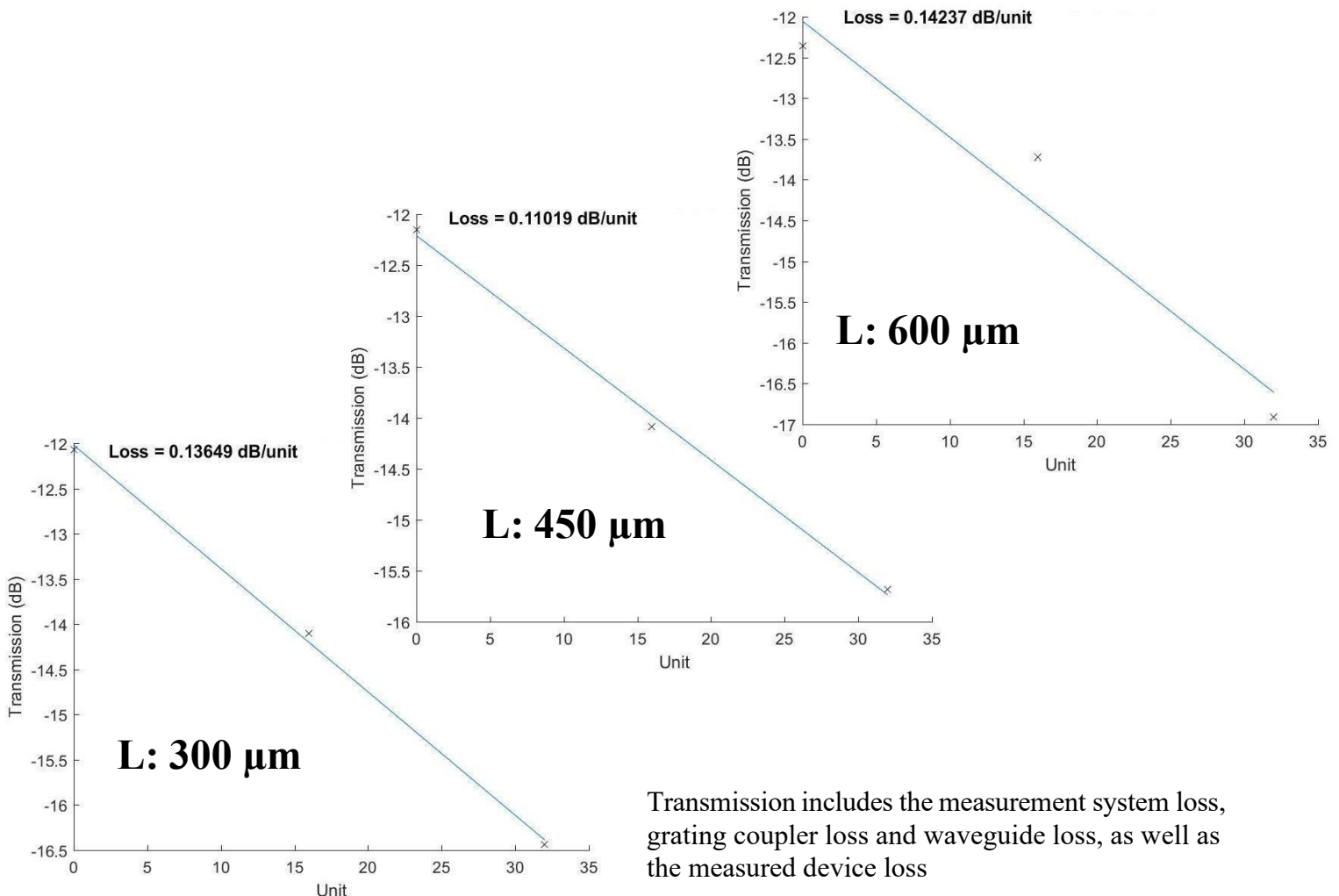
SOI220_cband_TE_STRIP_MM to SM_TAPER

Platform:	220 nm SOI (2 μm BOX layer)
Wavelength:	1550 nm
Etching depth:	220 nm (Strip design)
Polarization:	TE
Cell name in GDS lib:	SOI220_cband_TE_MM2SM_taper

Dimensions:



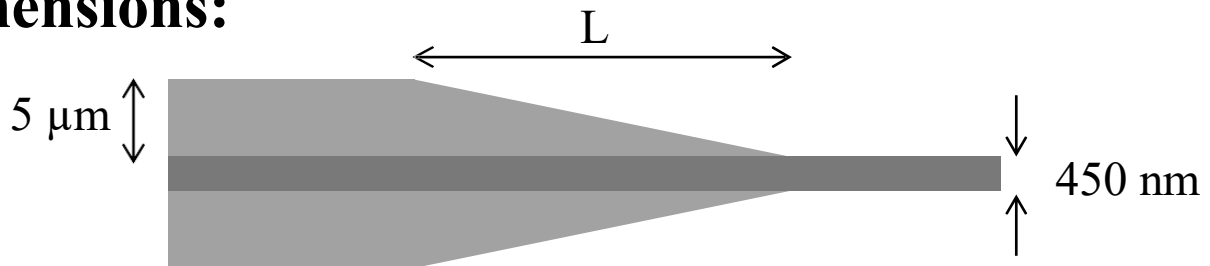
Measurement results on different taper length (L):



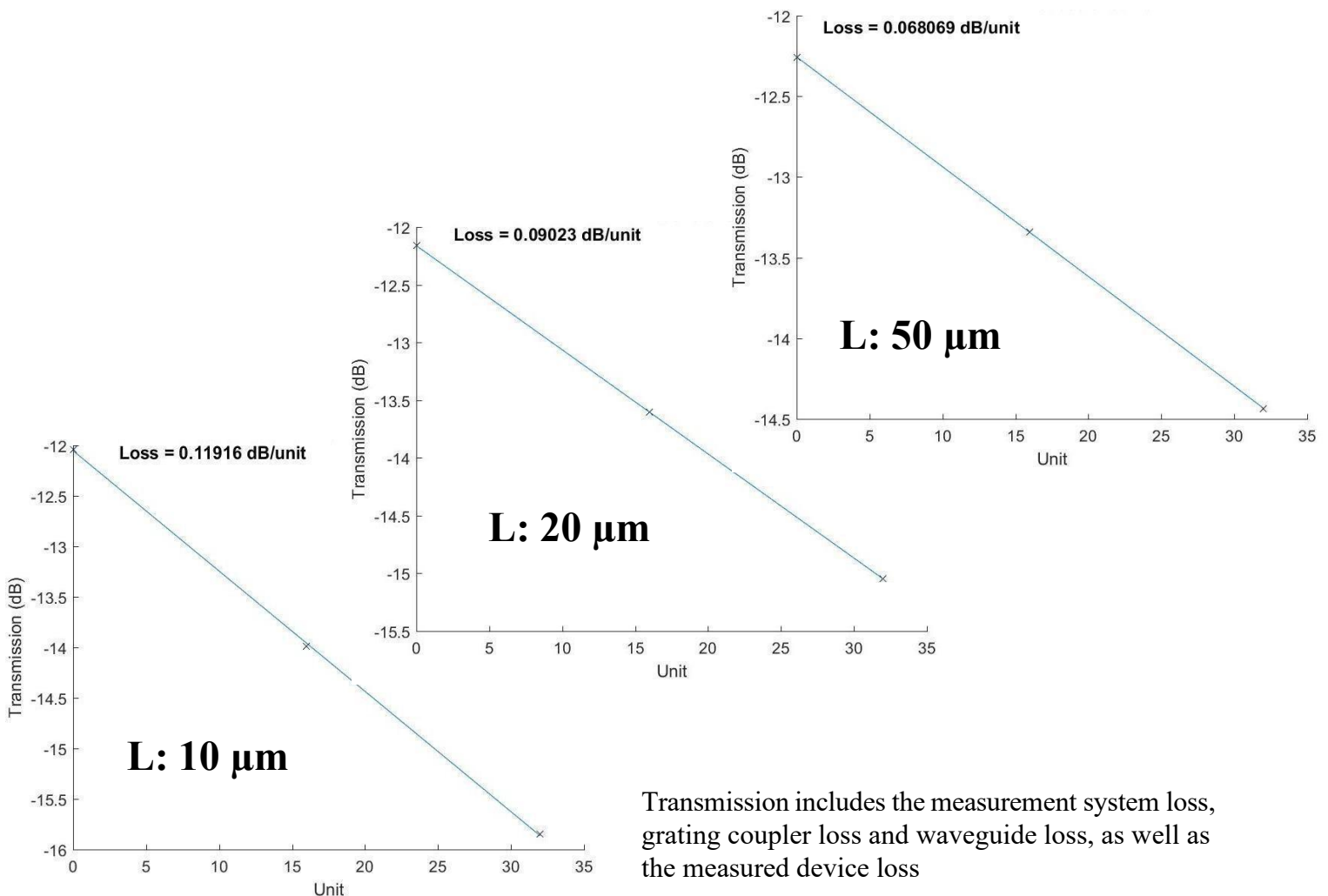
SOI220_cband_TE_STRIP_RIB to STRIP_TAPER

Platform:	220 nm SOI (2 μm BOX layer)
Wavelength:	1550 nm
Etching depth:	120nm and 220 nm
Polarization:	TE
Cell name in GDS lib:	SOI220_cband_TE_rib2strip_taper

Dimensions:

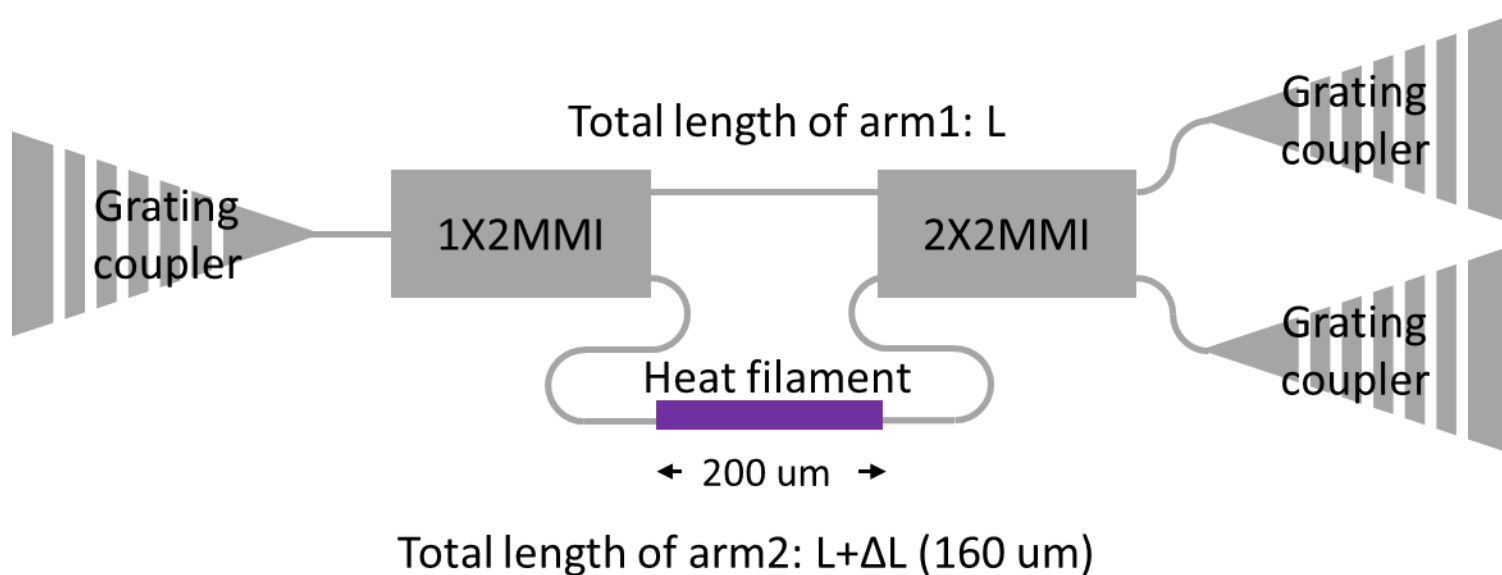


Measurement results on different taper length (L):



SOI220_cband_TE_STRIP_MZI

Platform:	220 nm SOI (2 um BOX layer)
Wavelength:	1550 nm
Etching depth:	220 nm (Strip design)
Polarization:	TE
Cell name in GDS lib:	SOI220_cband_TE_strip_MZI

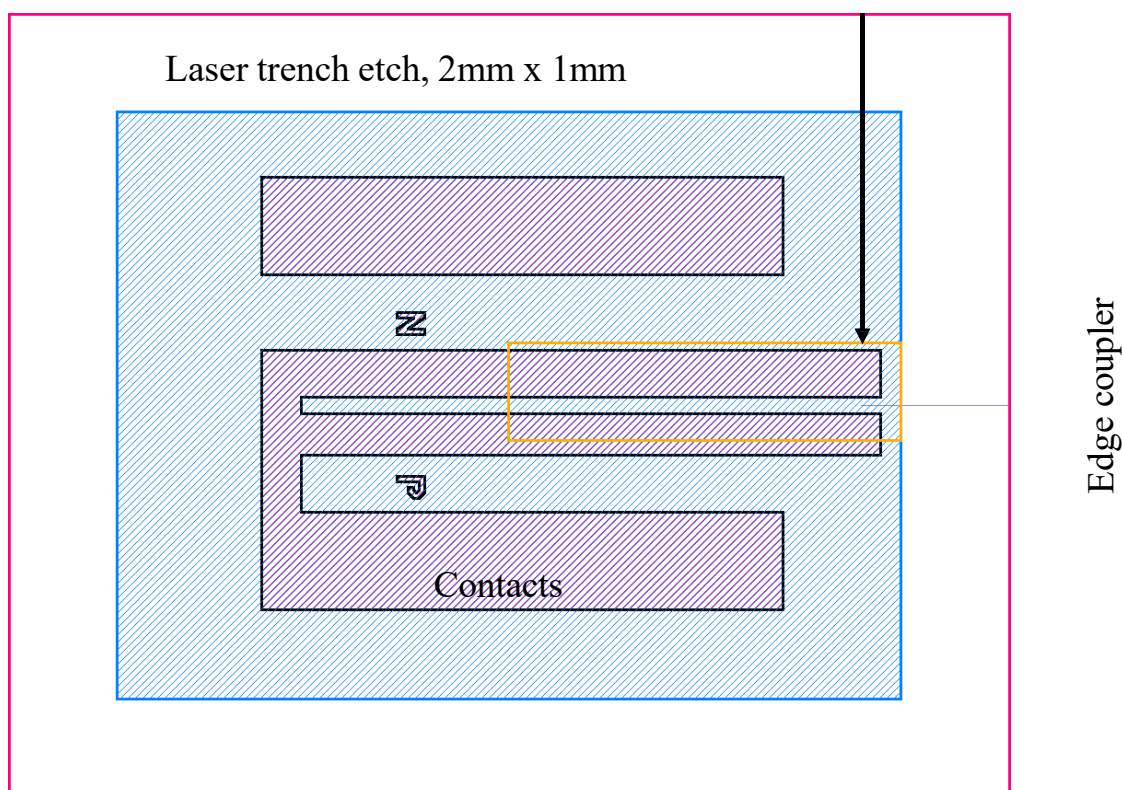


SOI220_DC1550HP01_Integrated

Platform:	220 nm SOI (2 μ m BOX layer)
Wavelength:	1550nm $\pm$ 3nm
Producer	Shijia Photons
Model number	DC1550HP01
Cell name in GDS lib:	Usable as part of Full/Half Design Templates
Optical power	>1 mW total optical power into the edge coupler

Dimensions:

Laser footprint,
1mm x 0.25mm

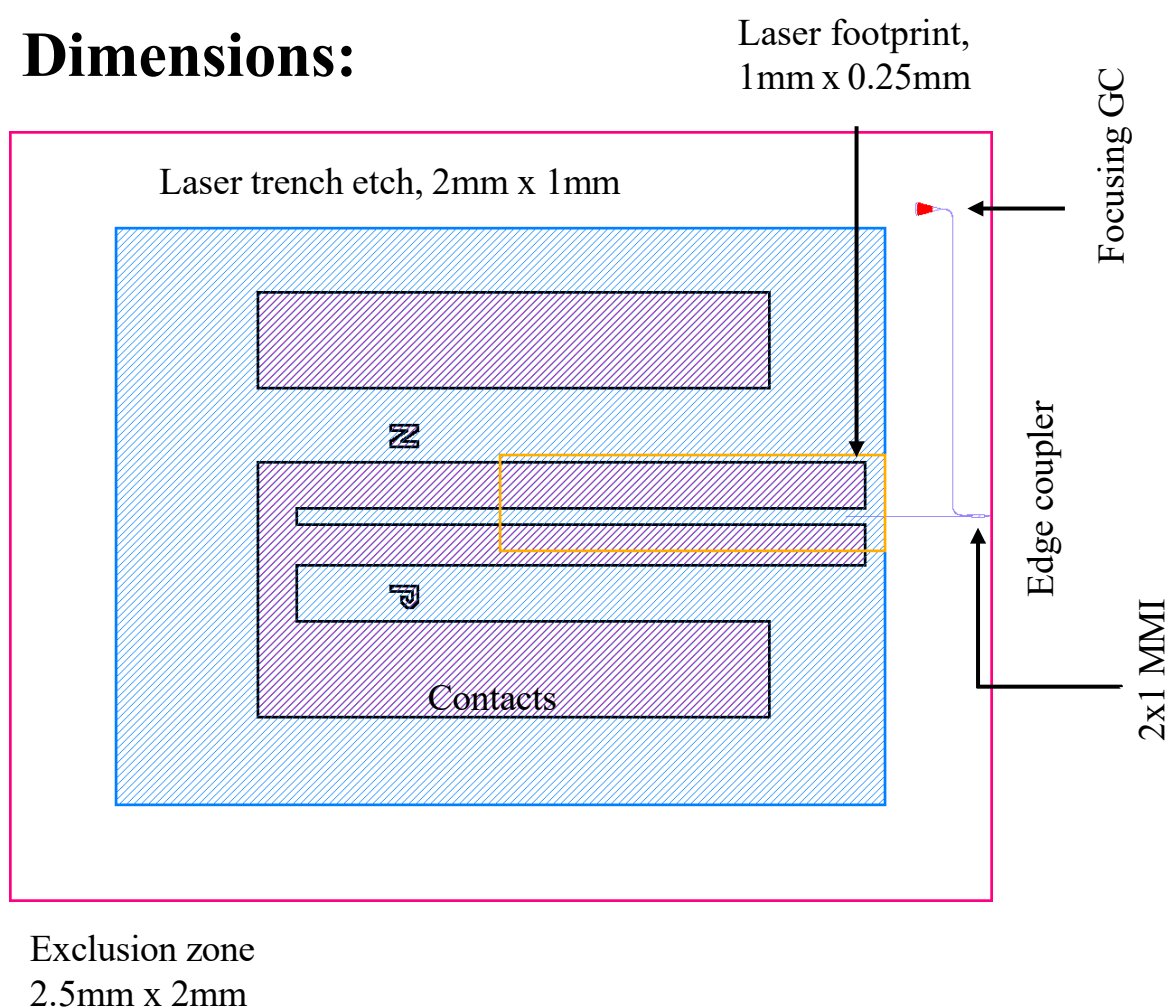


Exclusion zone
2.5mm x 2mm

SOI220_DC1550HP01_Integrated_with_GC

Platform:	220 nm SOI (2 μ m BOX layer)
Wavelength:	1550nm $\pm$ 3nm
Producer	Shijia Photons
Model number	DC1550HP01
Cell name in GDS lib:	Usable as part of Full/Half Design Templates
Optical power	>1 mW total optical power into the edge coupler

Dimensions:

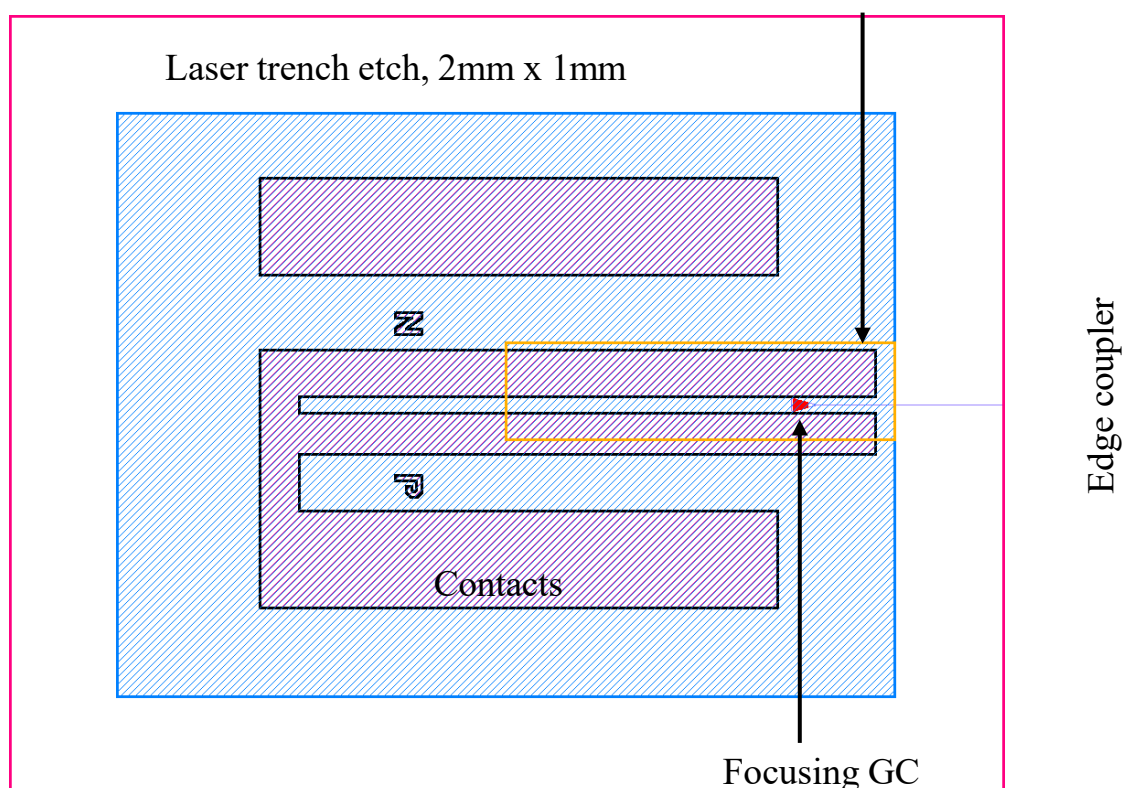


SOI220_DC1550HP01_Integrated_or_GC

Platform:	220 nm SOI (2 um BOX layer)
Wavelength:	1550nm $\pm$ 3nm
Producer	Shijia Photons
Model number	DC1550HP01
Cell name in GDS lib:	Usable as part of Full/Half Design Templates
Optical power	>1 mW total optical power into the edge coupler

Dimensions:

Laser footprint,
1mm x 0.25mm

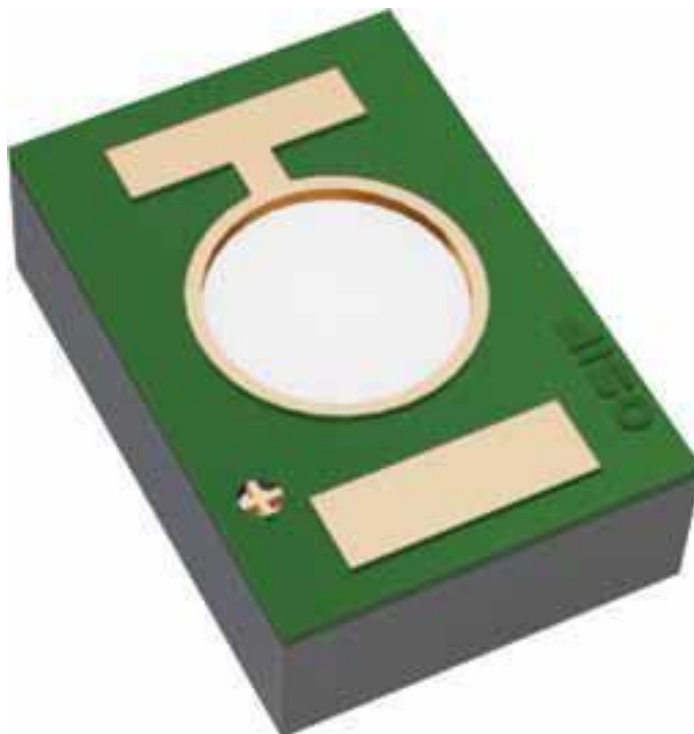


Exclusion zone
2.5mm x 2mm

- Wavelength:
Broadband
- Platform: 220 nm SOI

- **SOI PD**

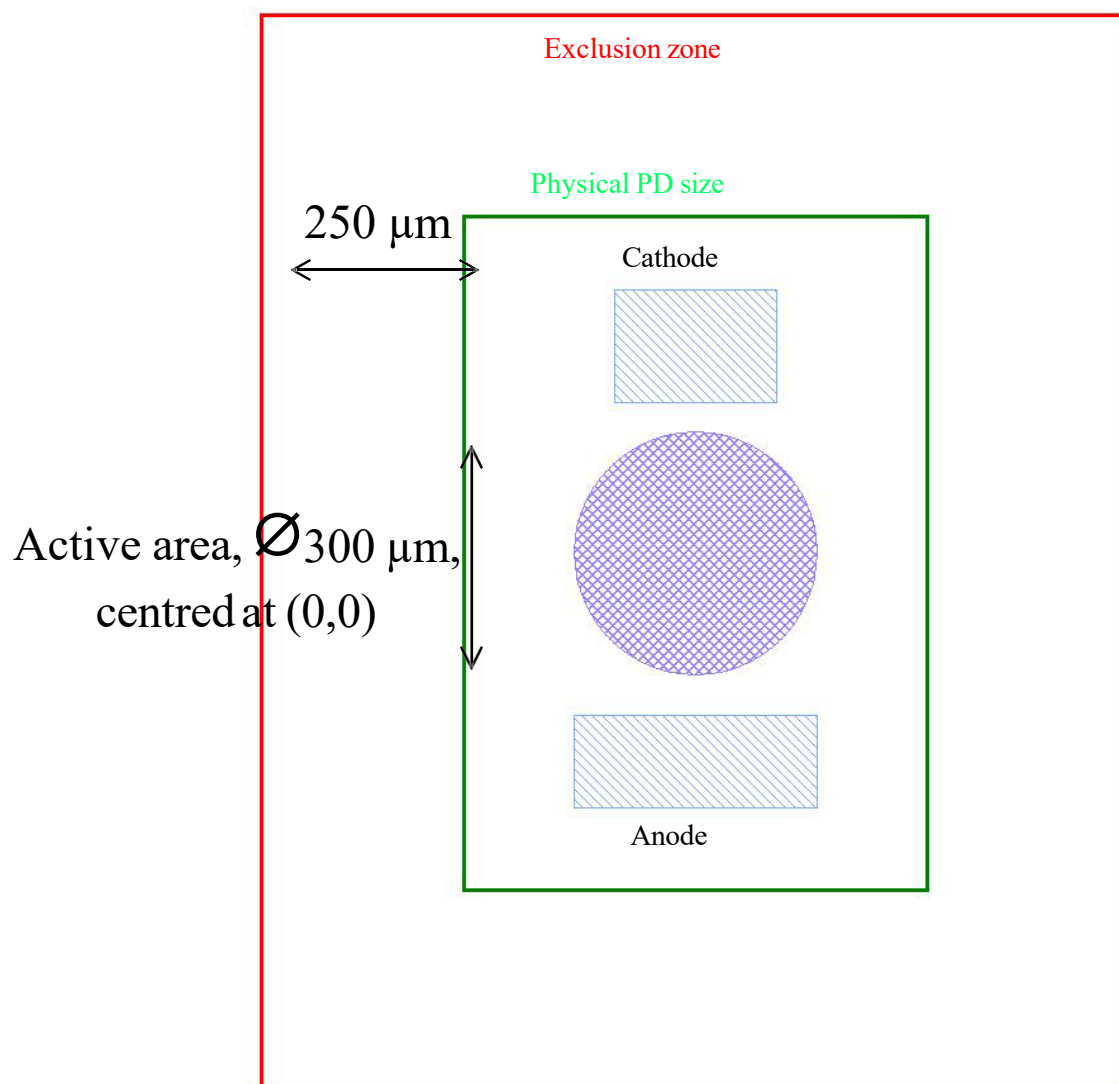
- OSI Optoelectronics
(FCI-InGaAs-300B1)



SOI220_PD_FCI300B1_Plain

Platform:	220 nm SOI (2 μm BOX layer)
Wavelength:	900-1700 nm
Producer	OSI Optoelectronics
Model number	FCI300B1
Cell name in GDS lib:	SOI220_PD_FCI300B1_Plain
Responsivity	>0.5 A/W @ $\lambda=1550\text{nm}$ based on GC performance

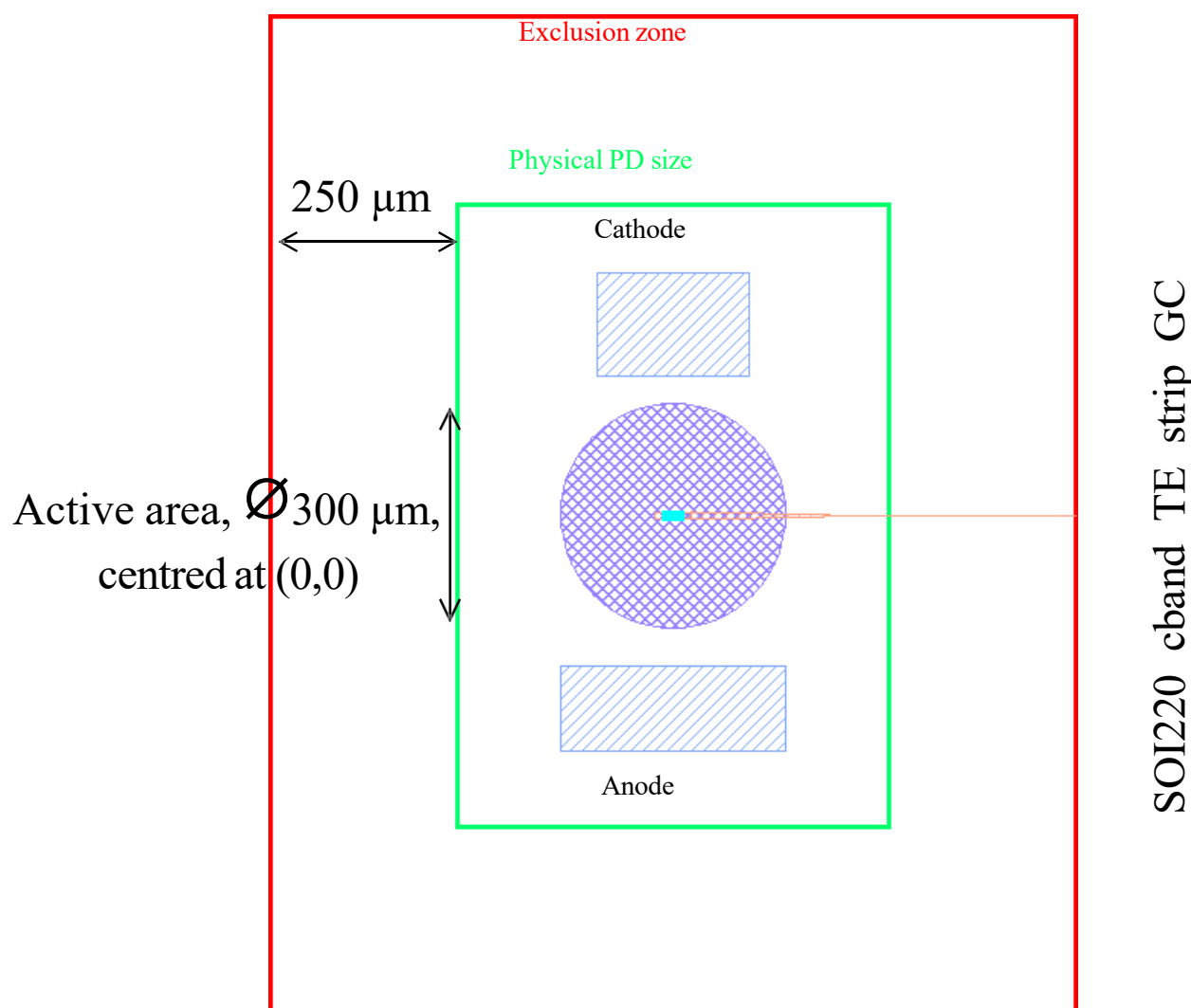
Dimensions:



SOI220_PD_FCI300B1_Integrated

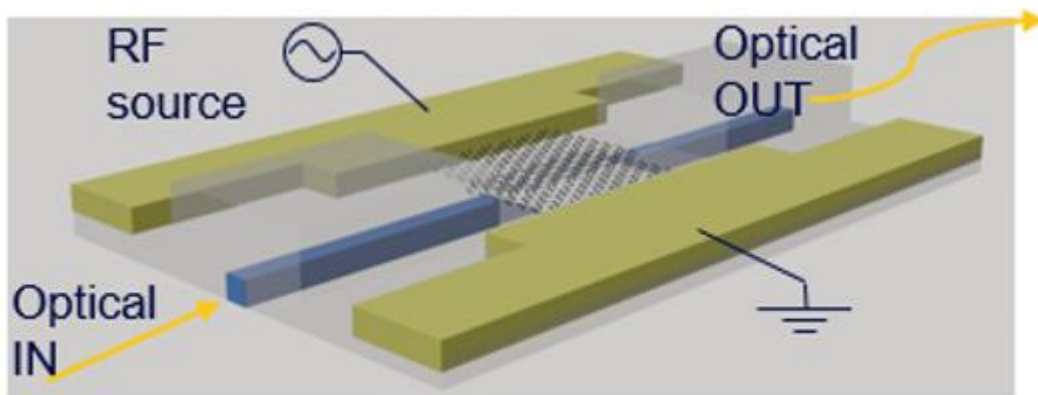
Platform:	220 nm SOI (2 μm BOX layer)
Wavelength:	900-1700 nm
Producer	OSI Optoelectronics
Model number	FCI300B1
Cell name in GDS lib:	SOI220_PD_FCI300B1_Integrated
Responsivity	$>0.5 \text{ A/W}$ @ $\lambda=1550\text{nm}$ based on GC performance

Dimensions:



- Wavelength:
1550 nm
- Platform: 220 nm SOI

• Graphene integration

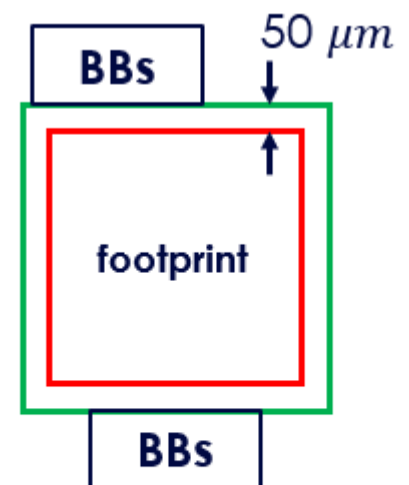
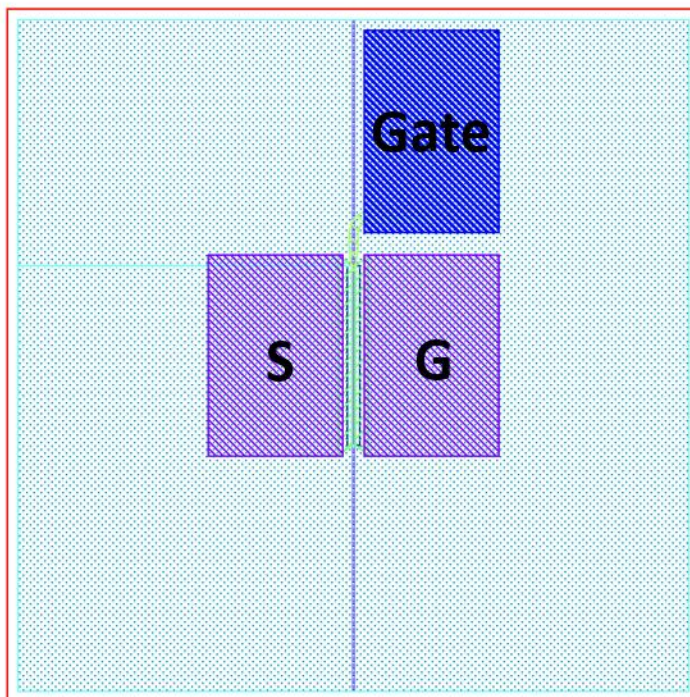


SOI220_cband_TE_strip_SLG_Bolometer_metallic

Platform:	220 nm SOI (2 μm BOX layer)
Wavelength:	1550 nm
Etching depth:	220 nm (Strip design)
Cell name in GDS lib:	SOI220_cband_TE_strip_SLG_Bolometer_metallic
Responsivity	0.1 A/W for 0 dBm (Power dependent)
Bandwidth	> 67 GHz

Dimensions:

Detector footprint,
310 μm x 310 μm

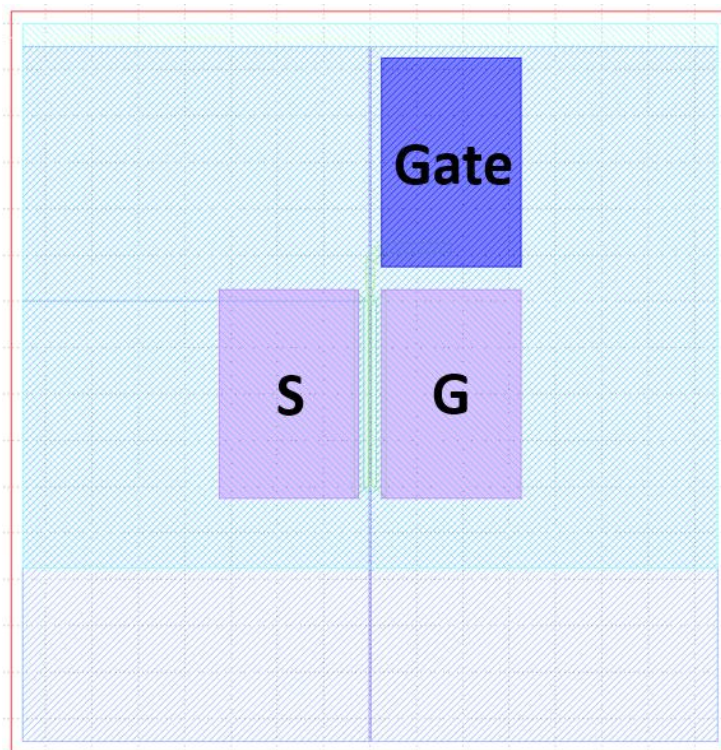


Notice: Please place all Building Blocks (BBs) at least **50 μm** away from the **footprint** boundary.

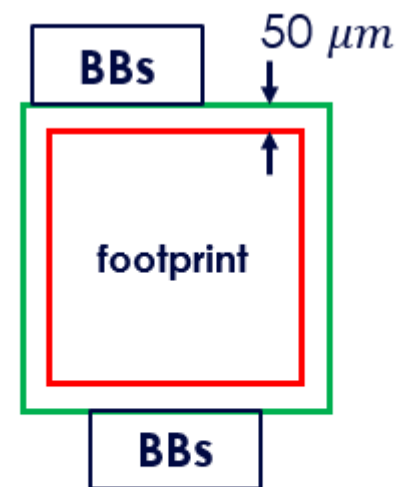
SOI220_cband_TE_strip_SLG_Bolometer

Platform:	220 nm SOI (2 μm BOX layer)
Wavelength:	1550 nm
Etching depth:	220 nm (Strip design)
Cell name in GDS lib:	SOI220_cband_TE_strip_SLG_Bolometer
Responsivity	0.1 A/W for 0 dBm (Power dependent)
Bandwidth	> 67 GHz

Dimensions:



Detector footprint,
310 μm x 320 μm

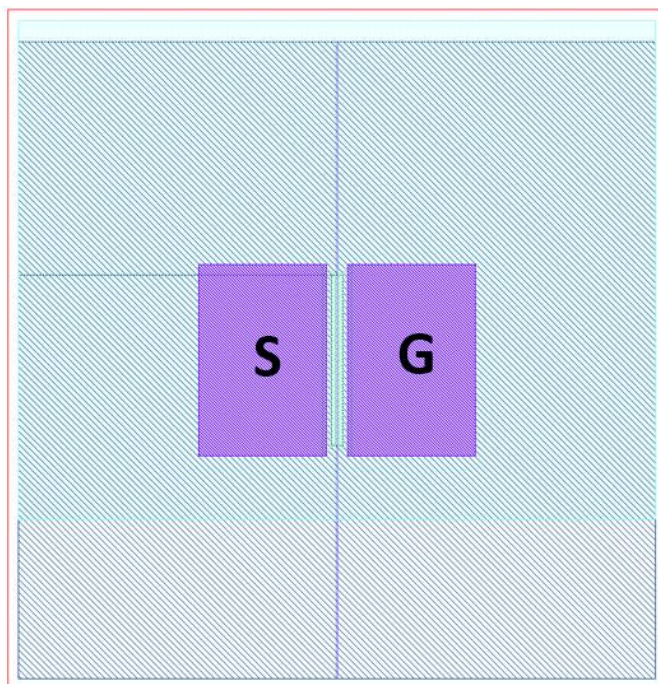


Notice: Please place all Building Blocks (BBs) at least **50 μm** away from the **footprint** boundary.

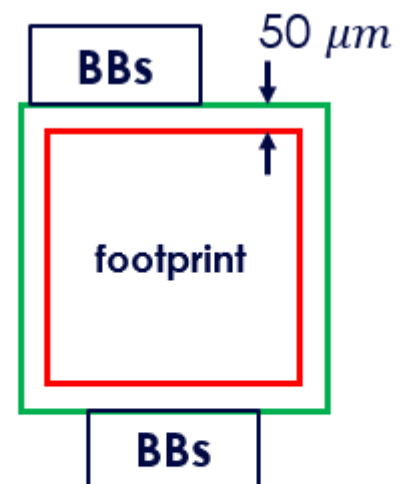
SOI220_cband_TE_strip_SLG_Bolometer_no_gate

Platform:	220 nm SOI (2 μm BOX layer)
Wavelength:	1550 nm
Etching depth:	220 nm (Strip design)
Cell name in GDS lib:	SOI220_cband_TE_strip_SLG_Bolometer
Responsivity	0.1 A/W for 0 dBm (Power dependent)
Bandwidth	> 67 GHz

Dimensions:



Detector footprint,
310 μm x 320 μm



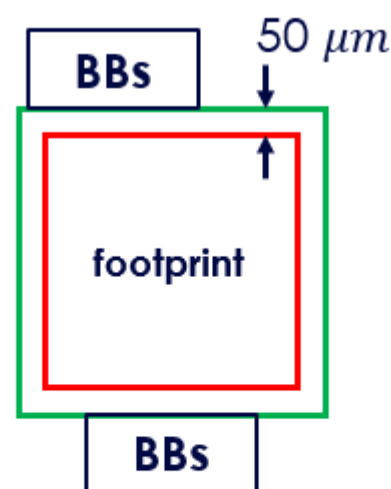
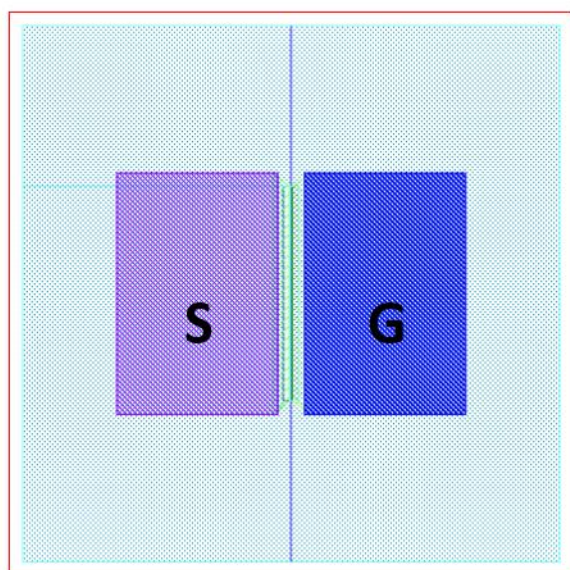
Notice: Please place all Building Blocks (BBs) at least **50 μm** away from the **footprint** boundary.

SOI220_cband_TE_strip_SLG_EAM

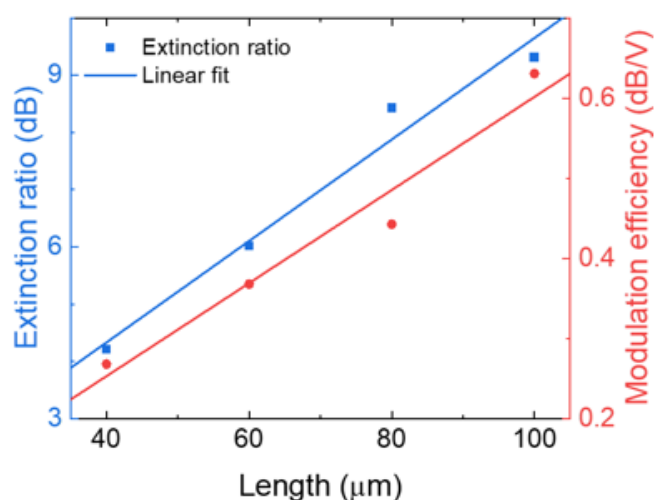
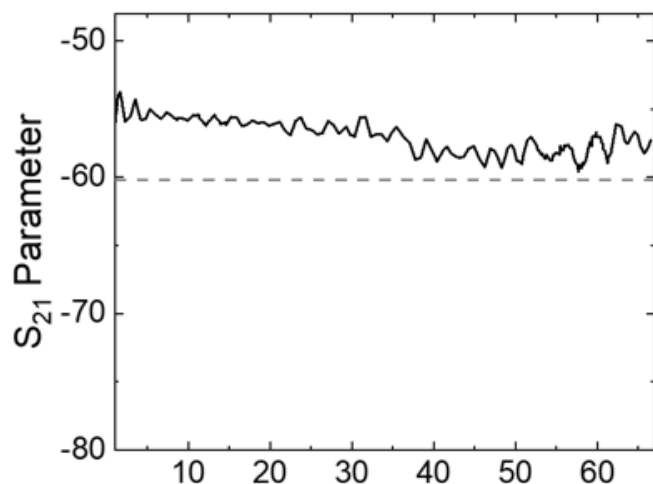
Platform:	220 nm SOI (2 μm BOX layer)
Wavelength:	1550 nm
Etching depth:	220 nm (Strip design)
Cell name in GDS lib:	SOI220_cband_TE_strip_SLG_EAM
Bandwidth	> 50 GHz

Dimensions:

Detector footprint,
210 μm x 210 μm



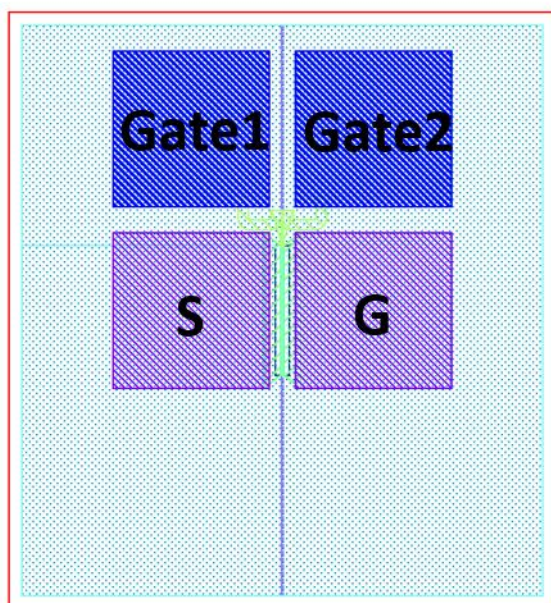
Notice: Please place all Building Blocks (BBs) at least **50 μm** away from the **footprint** boundary.



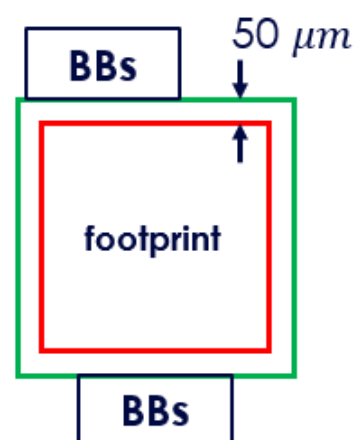
SOI220_cband_TE_strip_SLG_PTE

Platform:	220 nm SOI (2 μm BOX layer)
Wavelength:	1550 nm
Etching depth:	220 nm (Strip design)
Cell name in GDS lib:	SOI220_cband_TE_strip_SLG_PTE
Responsivity	3.5 V/W
Bandwidth	> 50 GHz

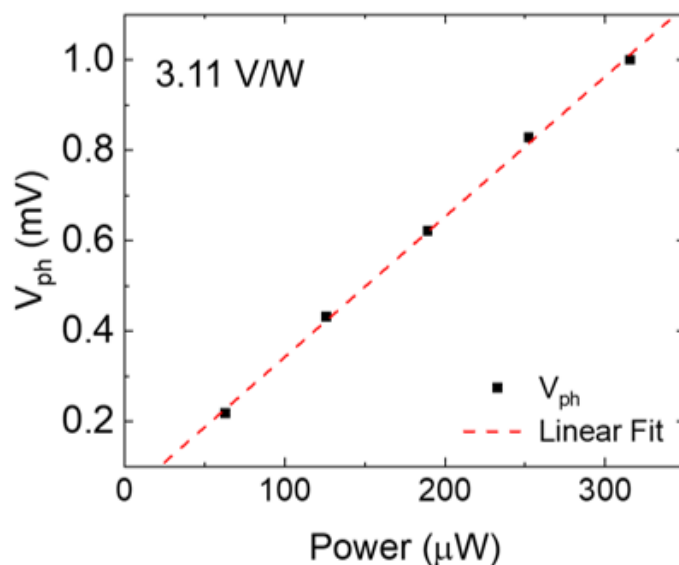
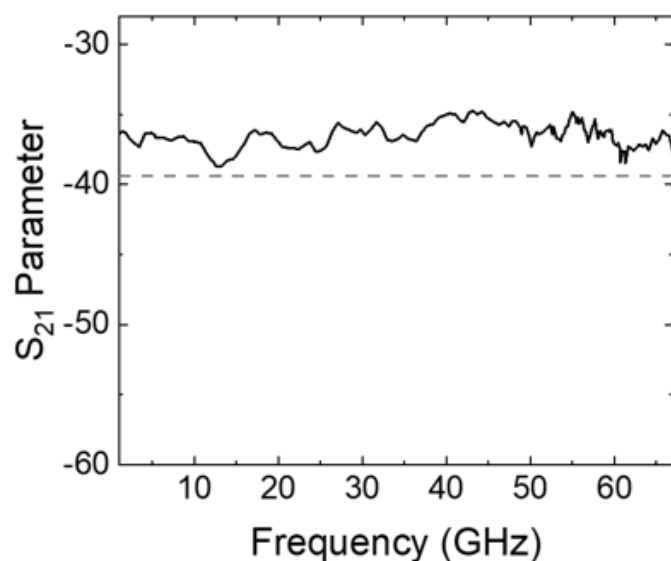
Dimensions:



Detector footprint,
210 μm x 230 μm



Notice: Please place all Building Blocks (BBs) at least **50 μm** away from the **footprint** boundary.

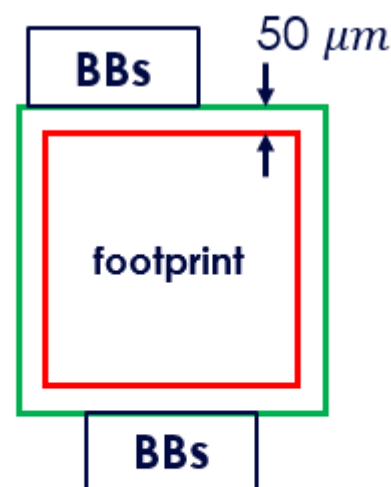
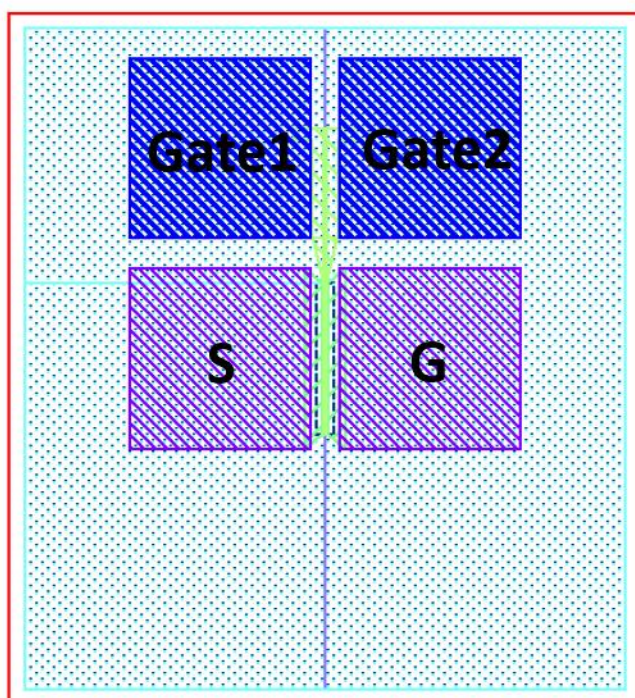


SOI220_cband_TE_strip_SLG_PTE_metallic

Platform:	220 nm SOI (2 μm BOX layer)
Wavelength:	1550 nm
Etching depth:	220 nm (Strip design)
Cell name in GDS lib:	SOI220_cband_TE_strip_SLG_PTE_metallic
Responsivity	3.5 V/W
Bandwidth	> 50 GHz

Dimensions:

Detector footprint,
210 μm x 230 μm



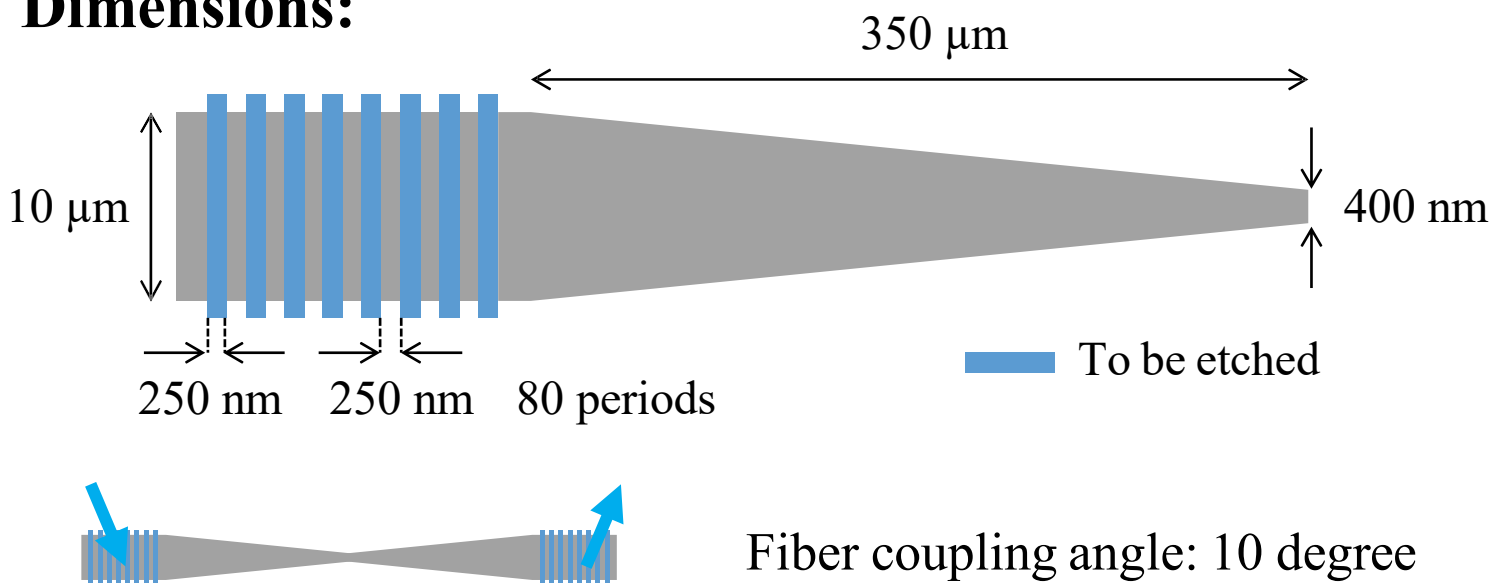
Notice: Please place all Building Blocks (BBs) at least **50 μm** away from the **footprint** boundary.

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

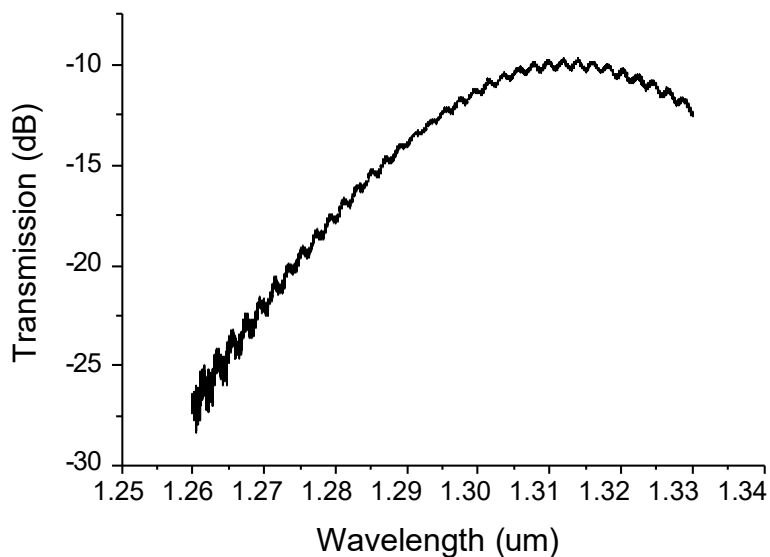
SOI220_oband_TE_RIB_Grating_Coupler

Platform:	220 nm SOI (2 μm BOX layer)
Wavelength:	1310 nm
Etching depth:	70 nm (Grating etch depth)
Polarization:	TE
Cell name in GDS lib:	SOI220_oband_TE_RIB_Grating_Coupler

Dimensions:



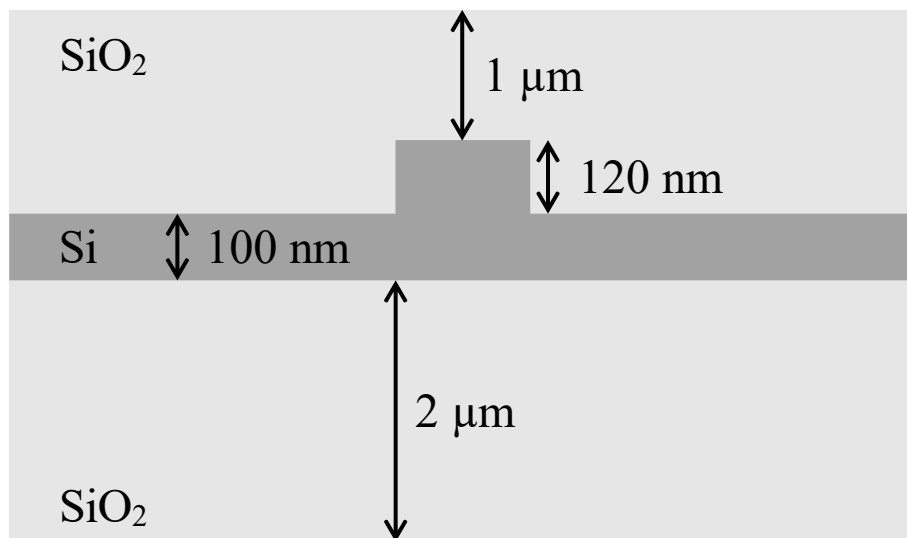
Measured transmission spectrum



Summarized performance:

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

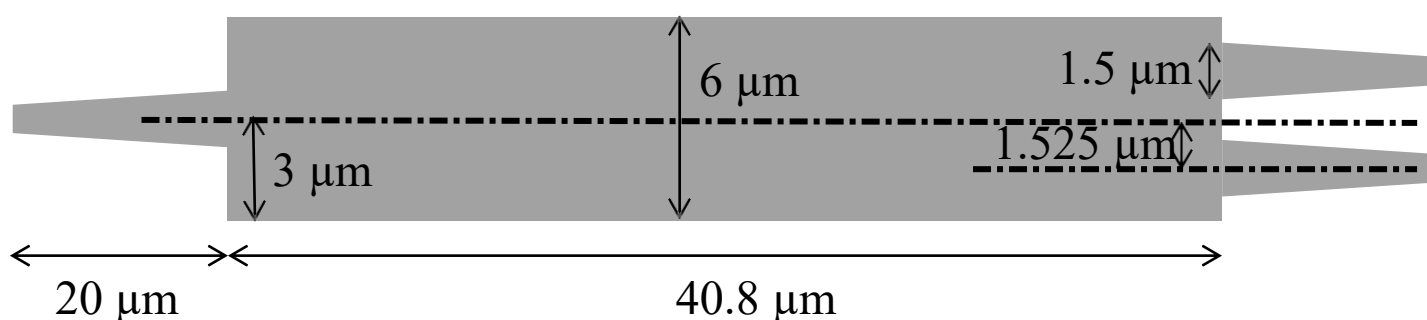
- Wavelength: 1310 nm
- Platform: 220 nm SOI
- **RIB**



SOI220_oband_TE_RIB_1x2_MMI

Platform:	220 nm SOI (2 μm BOX layer)
Wavelength:	1310 nm
Etching depth:	120 nm (Rib design)
Polarization:	TE
Cell name in GDS lib:	SOI220_oband_TE_RIB_1x2_MMI

Dimensions:



Measurement results:

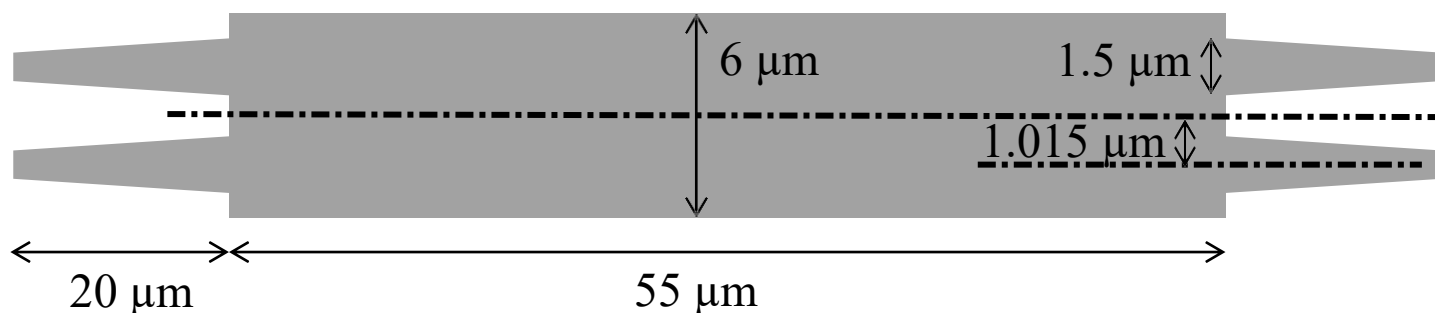


Transmission includes the measurement system loss, grating coupler ss and waveguide loss, as well as the measured device loss

SOI220_oband_TE_RIB_2x2_MMI

Platform:	220 nm SOI (2 μm BOX layer)
Wavelength:	1550 nm
Etching depth:	120 nm (Rib design)
Polarization:	TE
Cell name in GDS lib:	SOI220_oband_TE_RIB_2x2_MMI

Dimensions:



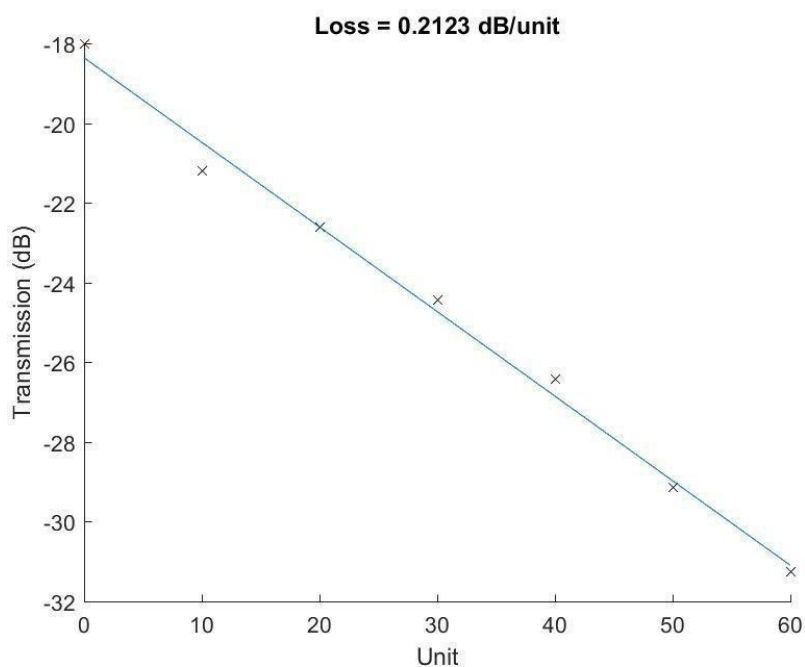
Measurement results:

SOI220_oband_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:	SOI220_oband_TE_RIB_Waveguide_Crossing

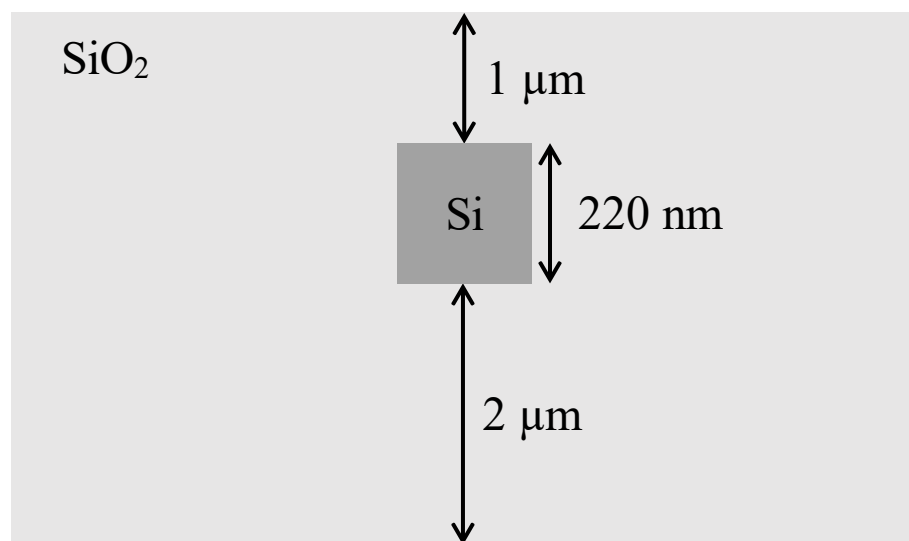
Dimensions: See the drawing in GDS library

Measurement results:



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

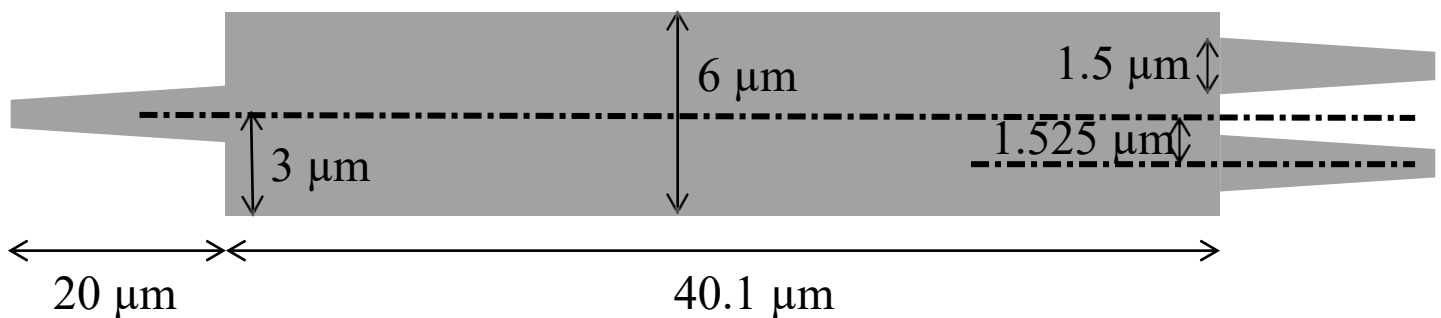
- Wavelength: 1310 nm
- Platform: 220 nm SOI
- **STRIP**



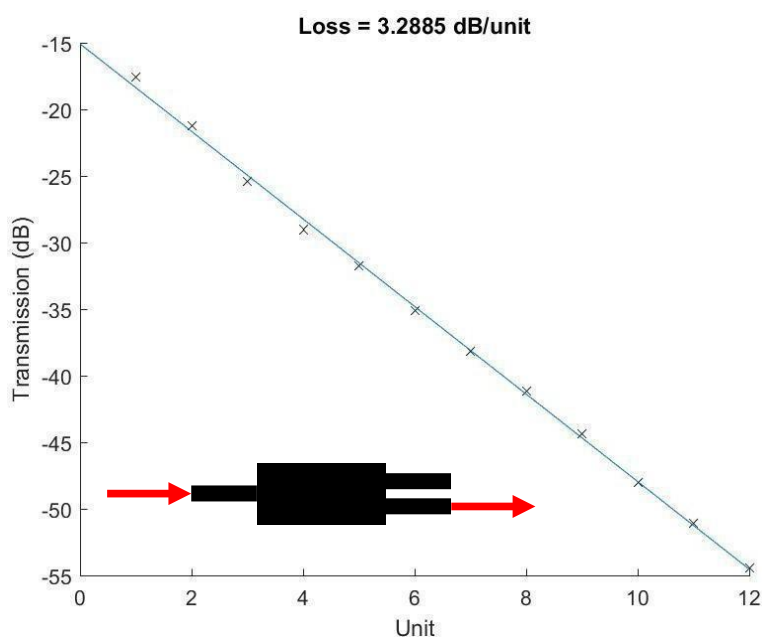
SOI220_oband_TE_STRIP_1x2_MMI

Platform:	220 nm SOI (2 μm BOX layer)
Wavelength:	1310 nm
Etching depth:	220 nm (Strip design)
Polarization:	TE
Cell name in GDS lib:	SOI220_oband_TE_STRIP_1x2_MMI

Dimensions:



Measurement results:

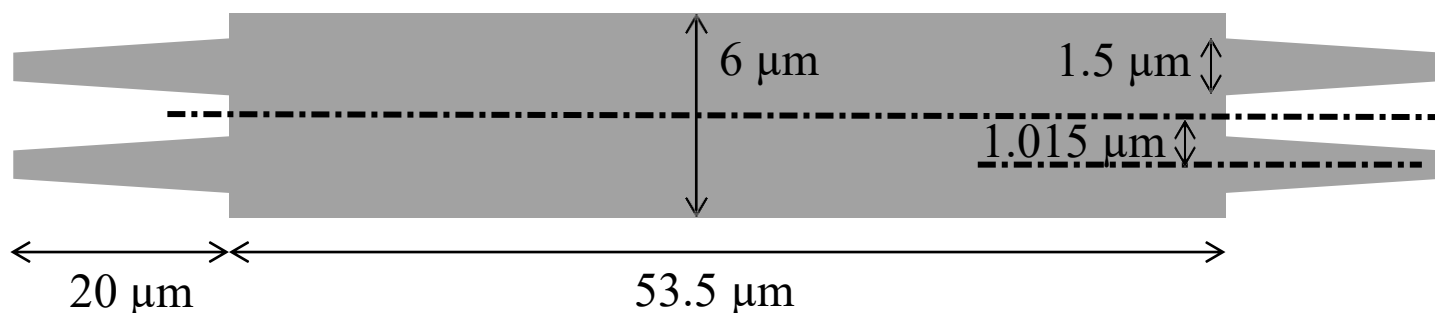


Transmission includes the measurement system loss, grating coupler loss and waveguide loss, as well as the measured device loss

SOI220_oband_TE_STRIP_2x2_MMI

Platform:	220 nm SOI (2 μm BOX layer)
Wavelength:	1310 nm
Etching depth:	220 nm (Strip design)
Polarization:	TE
Cell name in GDS lib:	SOI220_oband_TE_STRIP_2x2_MMI

Dimensions:



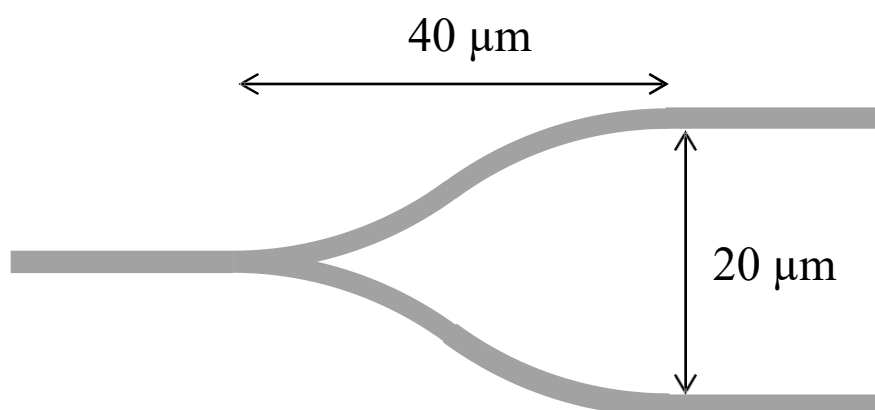
Measurement results:



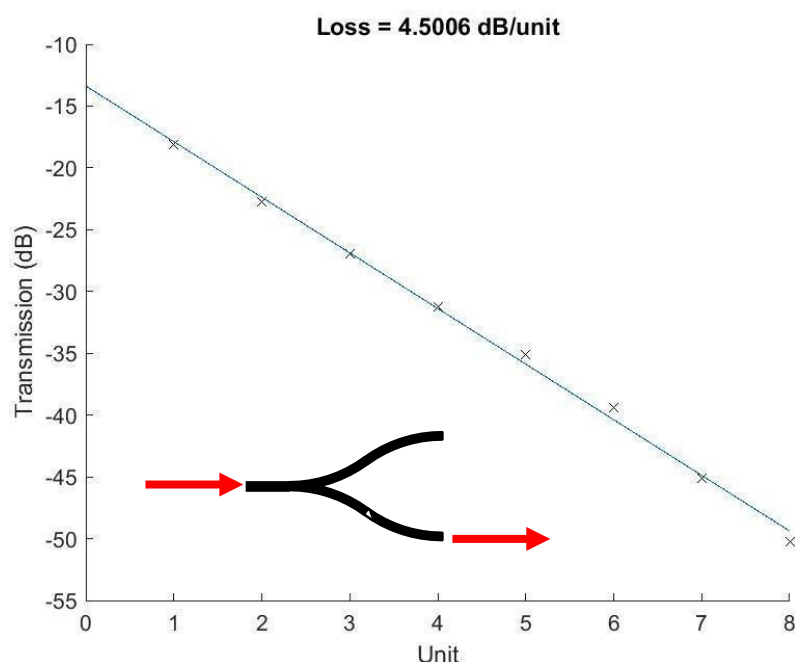
SOI220_oband_TE_STRIP_1x2_Ysplitter

Platform:	220 nm SOI (2 μm BOX layer)
Wavelength:	1310 nm
Etching depth:	220 nm (Strip design)
Polarization:	TE
Cell name in GDS lib:	SOI220_oband_TE_strip_1x2_Ysplitter

Dimensions:



Measurement results:



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

SOI220_oband_TE_STRIP_90_Degree_Bend

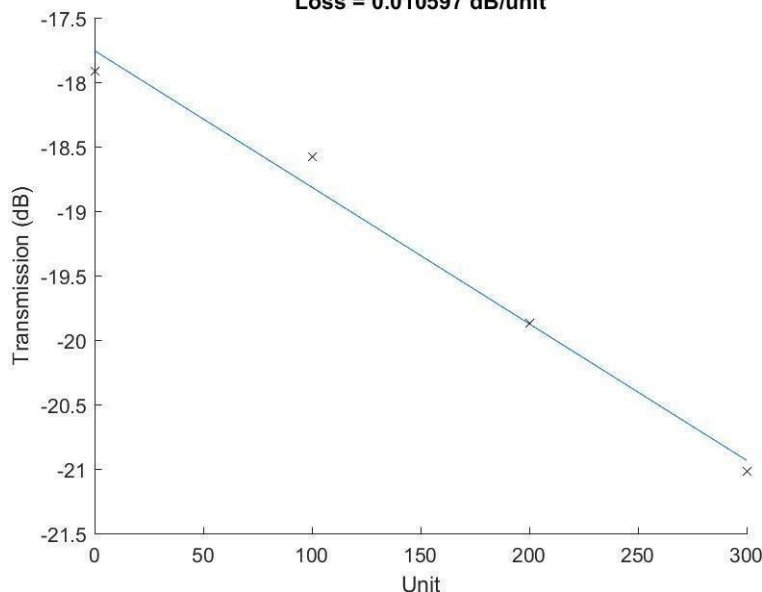
Platform:	220 nm SOI (2 um BOX layer)
Wavelength:	1310 nm
Etching depth:	220 nm (Strip design)
Polarization:	TE
Cell name in GDS lib:	SOI220_oband_TE_strip_90deg_bend (Waveguide Width (W): 400 nm, Bend Radius (R): 30 um)

Measurement results on varied dimensions:

(Unit: 90° bend)

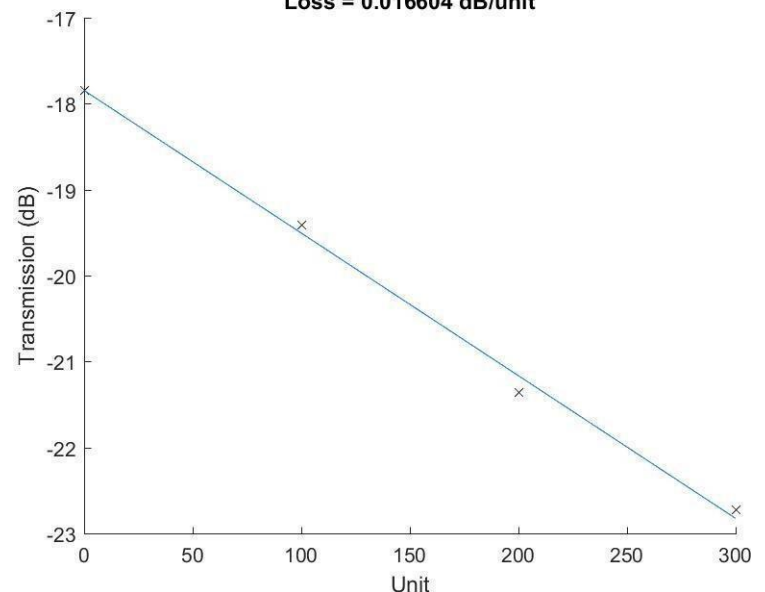
R: 5 μ m

Loss = 0.010597 dB/unit



R: 10 μ m

Loss = 0.016604 dB/unit



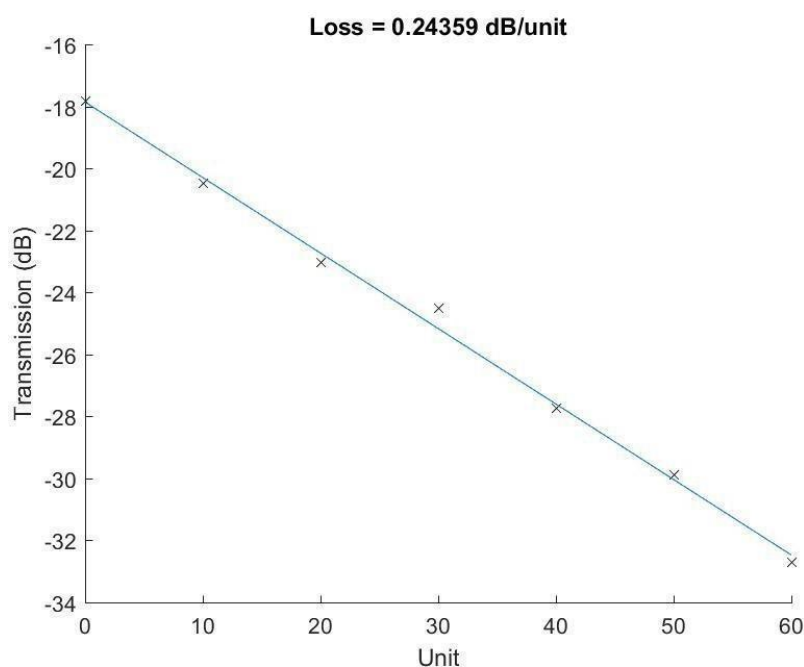
Transmission includes the measurement system loss, grating coupler loss and waveguide loss, as well as the measured device loss

SOI220_oband_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:	SOI220_oband_TE_strip_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