

**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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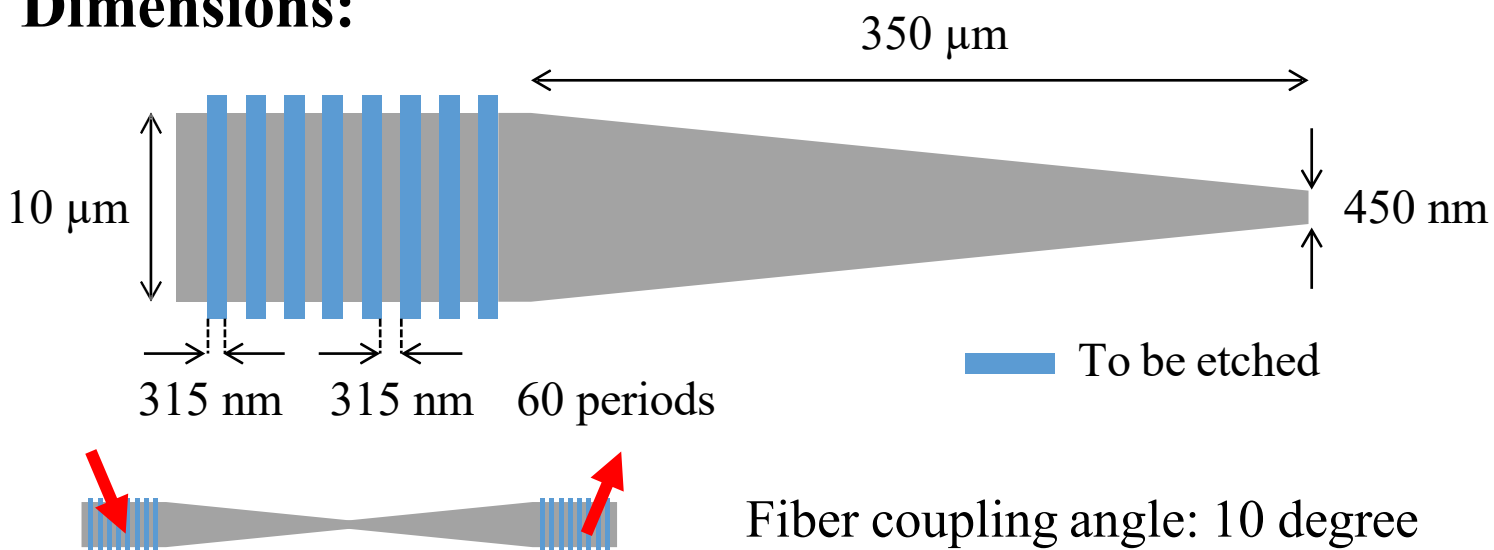


- **Wavelength: 1550 nm**
- **Platform: 220 nm SOI**

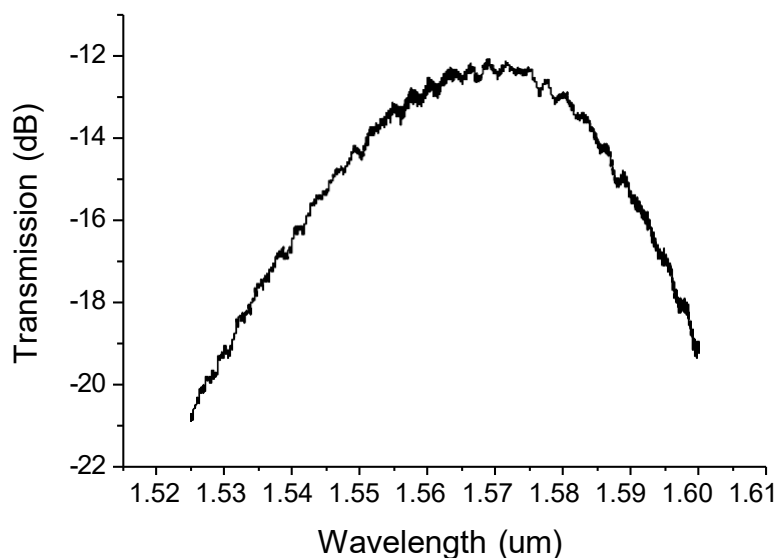
# SOI220\_cband\_TE\_RIB\_Grating\_Coupler

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

## Dimensions:



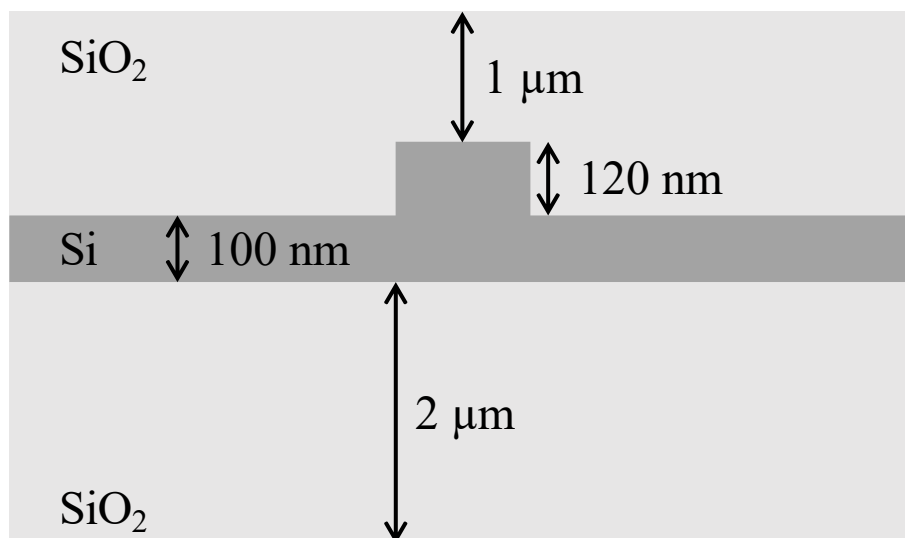
## Measured transmission spectrum



## Summarized performance:

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

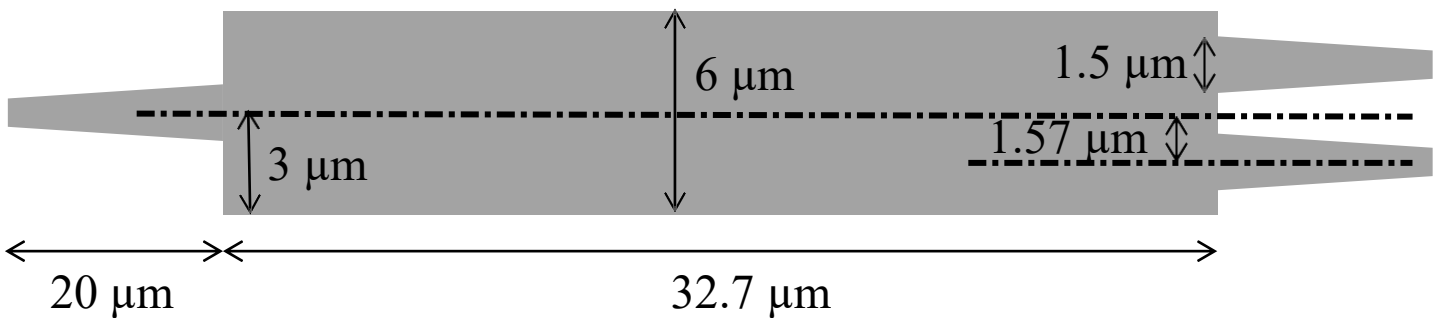
- Wavelength: 1550 nm
- Platform: 220 nm SOI
- **RIB**



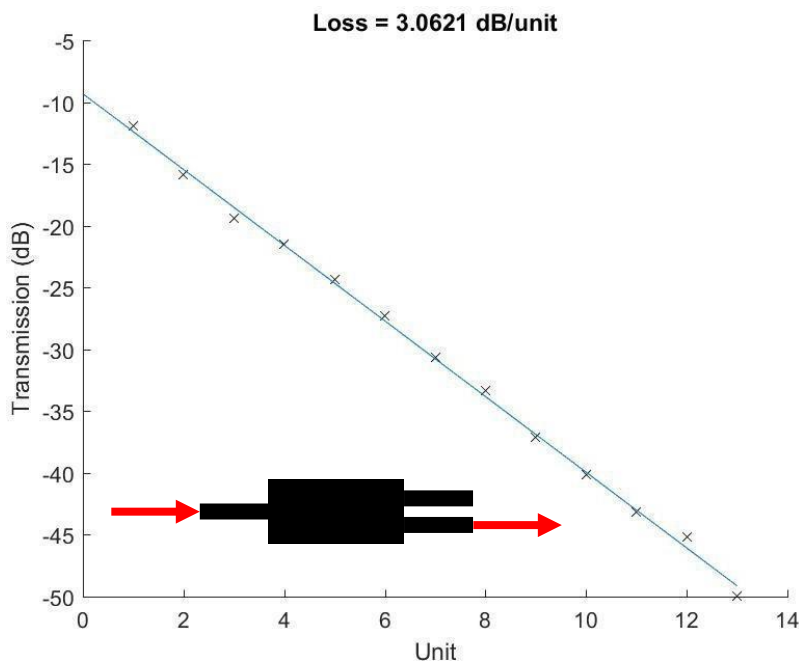
# SOI220\_cband\_TE\_RIB\_1x2\_MMI

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

## Dimensions:



## Measurement results:

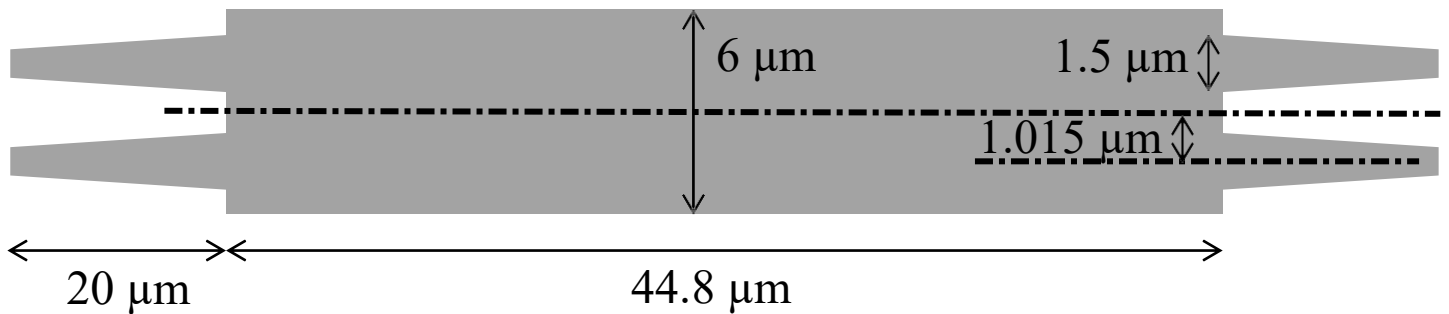


Transmission includes the measurement system loss, grating coupler loss and waveguide loss, as well as the measured device loss

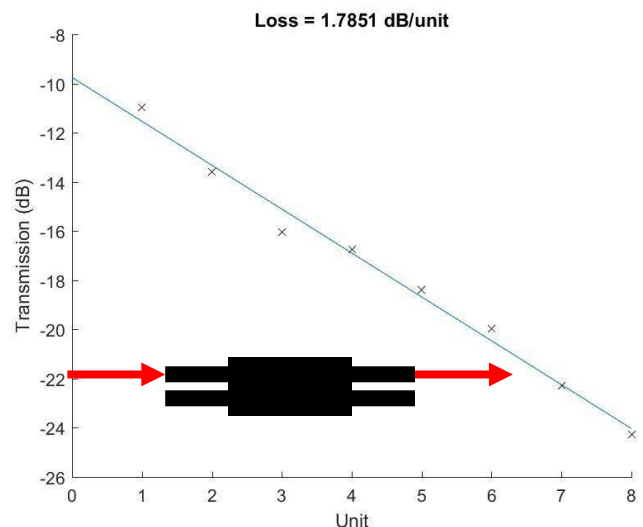
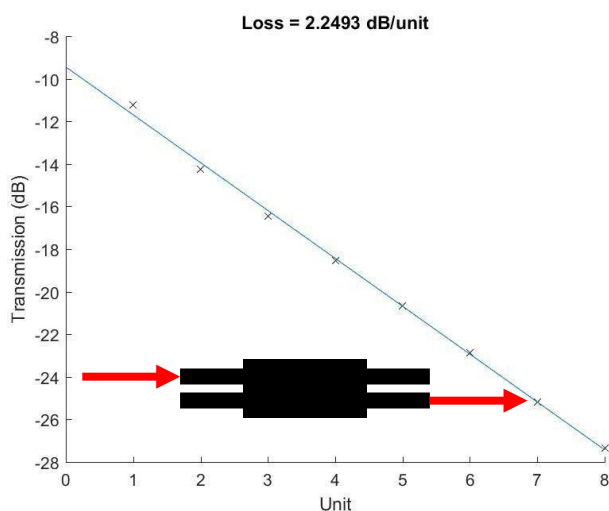
# SOI220\_cband\_TE\_RIB\_2x2\_MMI

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

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

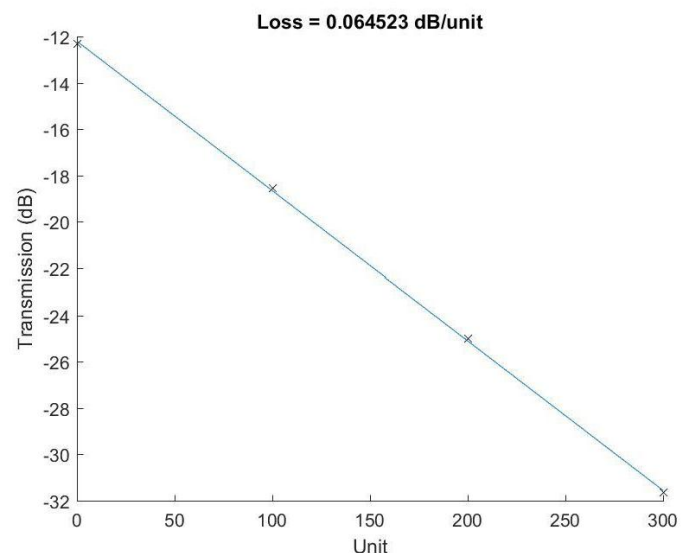
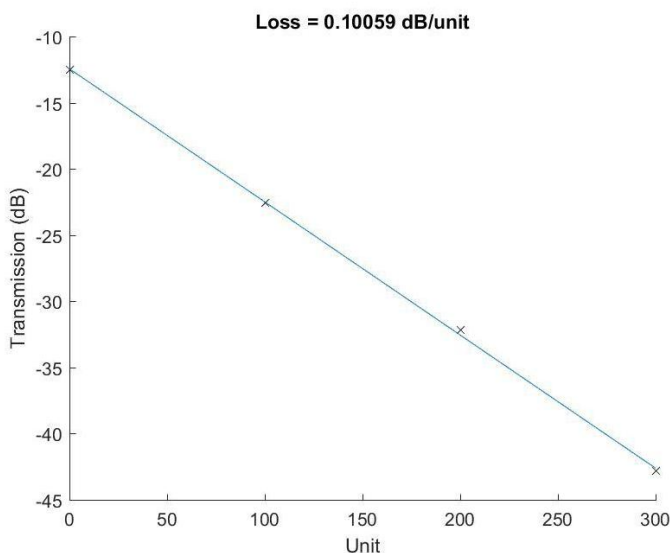
## Measurement results on varied dimensions:

(Unit: 90° bend)

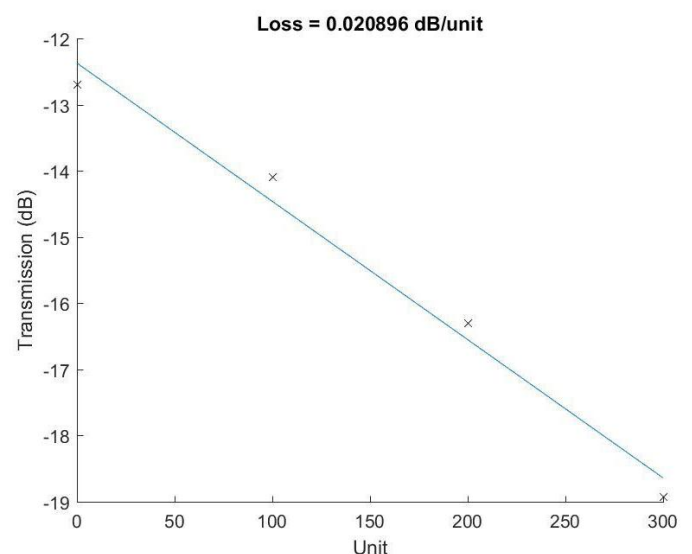
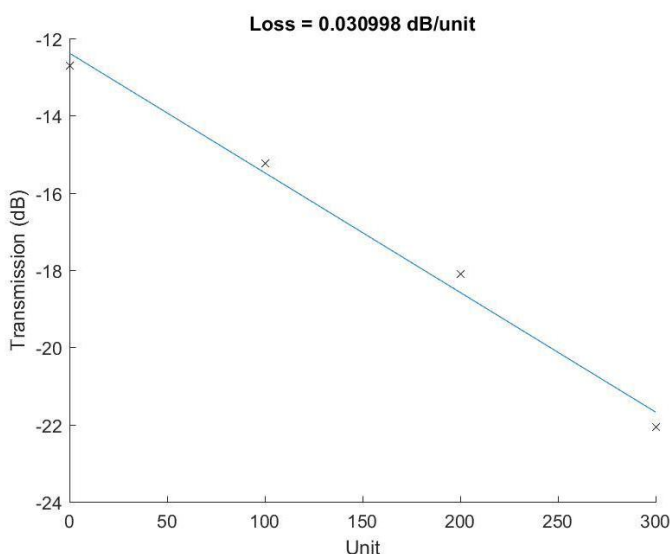
**W: 450 nm**

**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

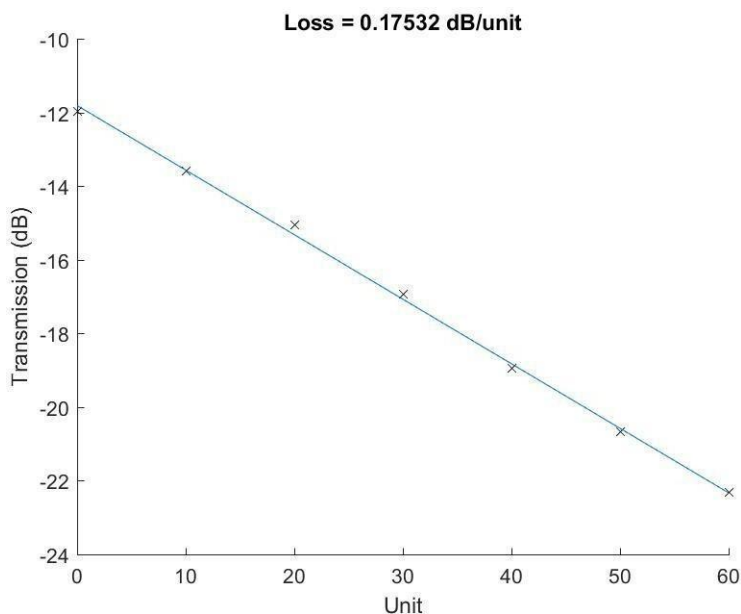
# SOI220\_cband\_TE\_RIB\_Waveguide\_Crossing

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

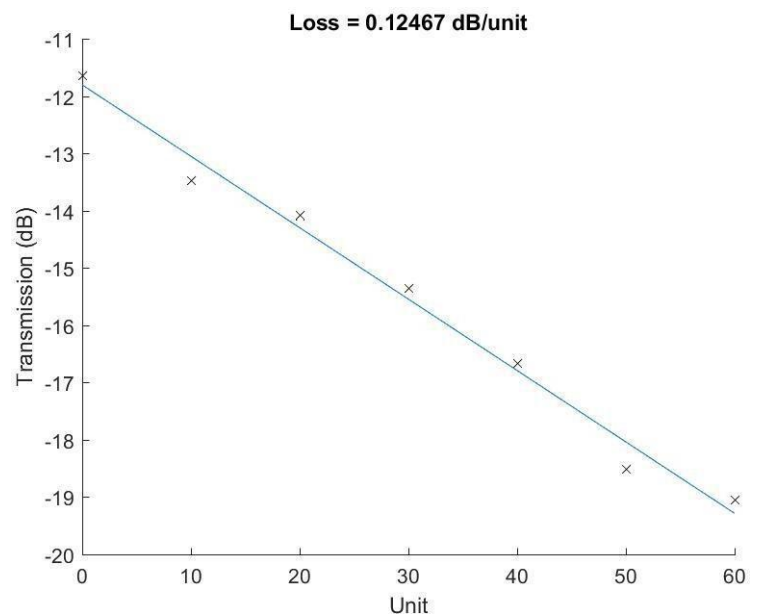
**Dimensions:** See the drawing in GDS library

## Measurement results on different waveguide width (W):

**W: 400 nm**



**W: 450 nm**

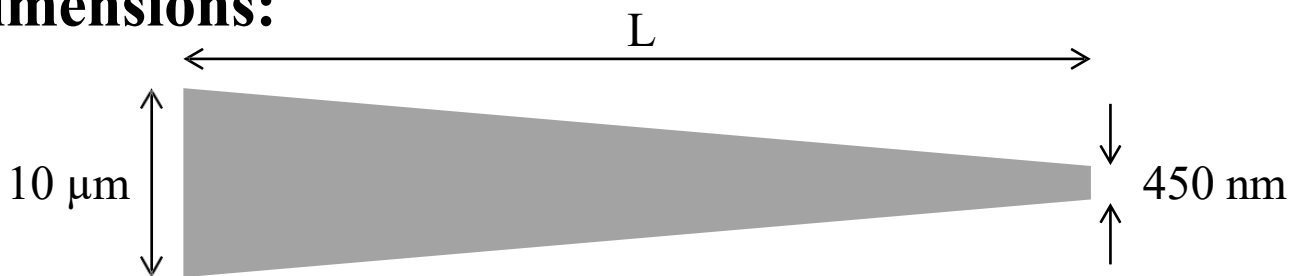


Transmission includes the measurement system loss, grating coupler loss and waveguide loss, as well as the measured device loss

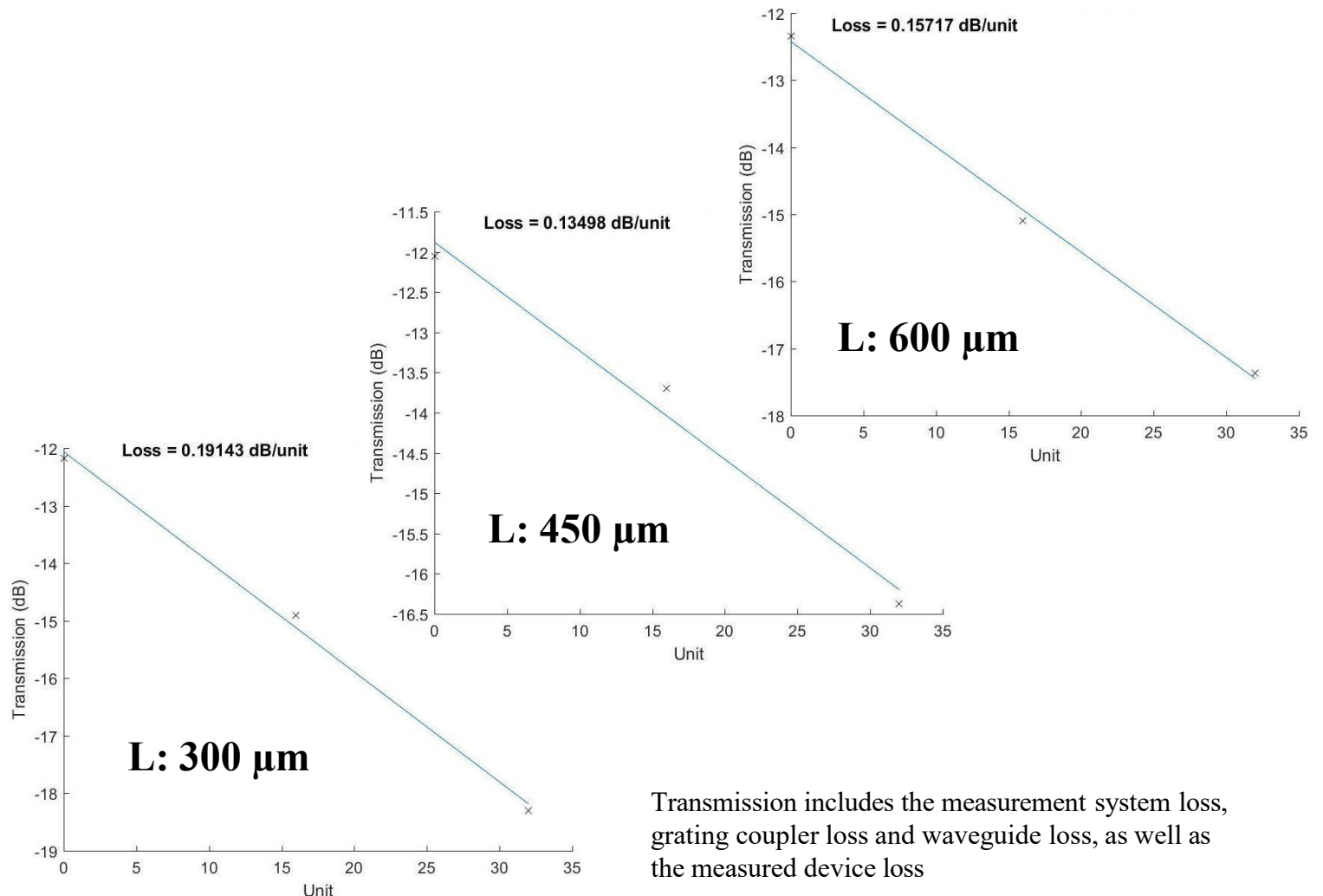
# SOI220\_cband\_TE\_RIB\_MM to SM\_TAPER

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

## Dimensions:

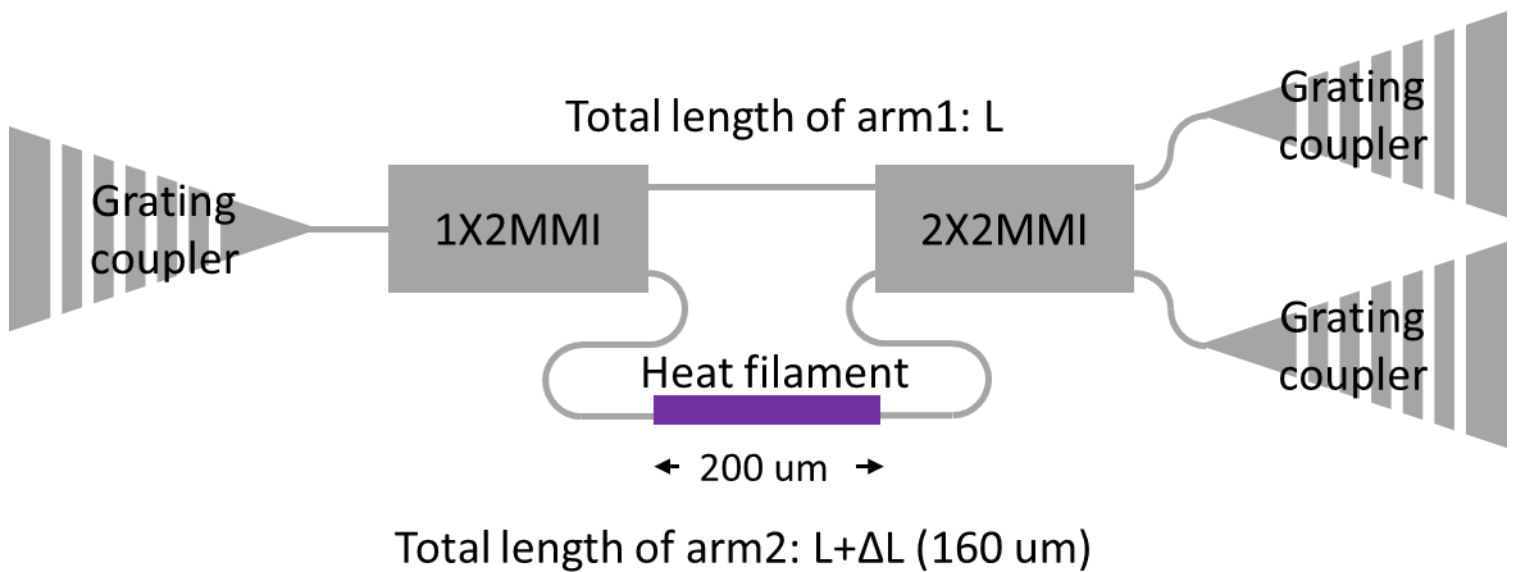


## Measurement results on different taper length (L):

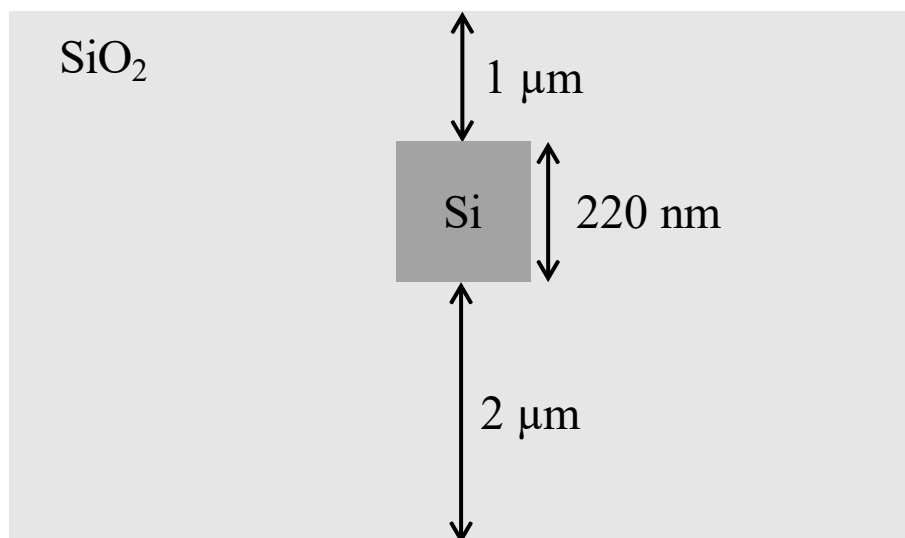


## SOI220\_cband\_TE\_RIB\_MZI

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



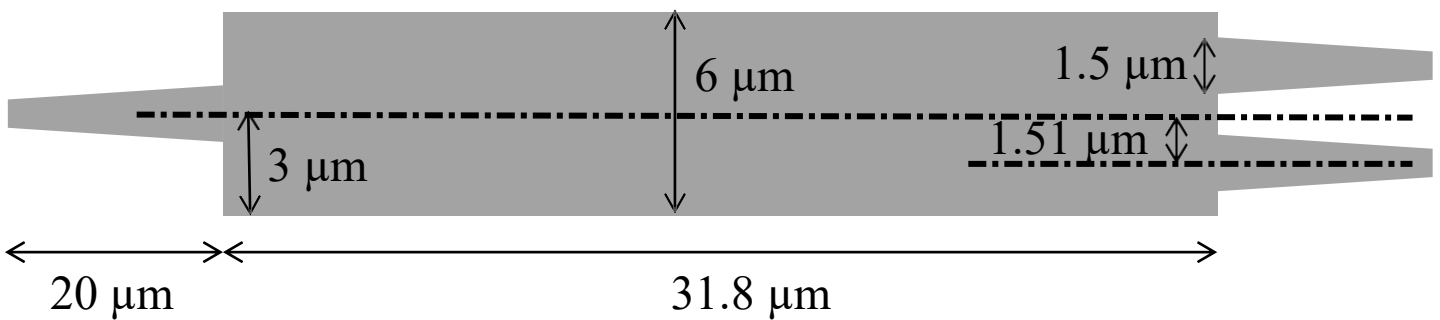
- Wavelength: 1550 nm
- Platform: 220 nm SOI
- **STRIP**



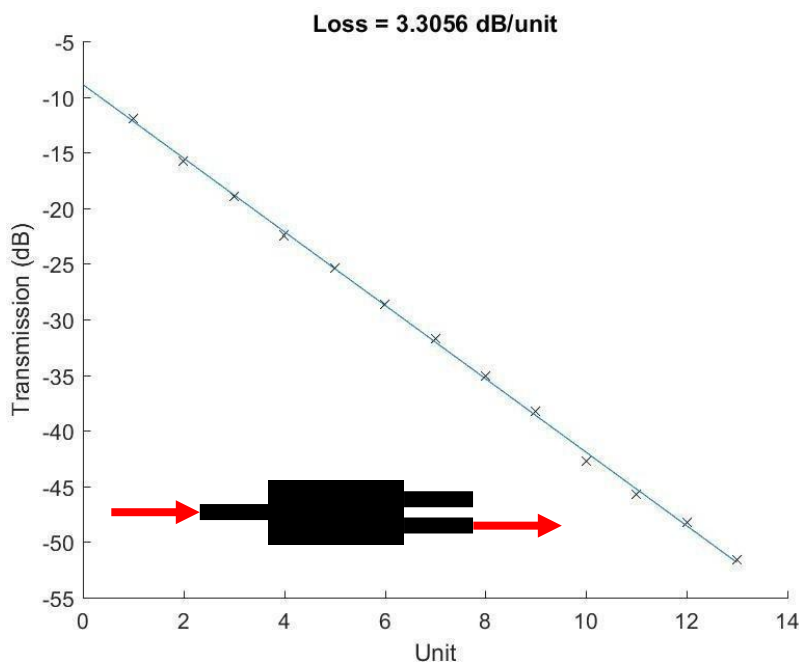
# SOI220\_cband\_TE\_STRIP\_1x2\_MMI

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

## Dimensions:



## Measurement results:

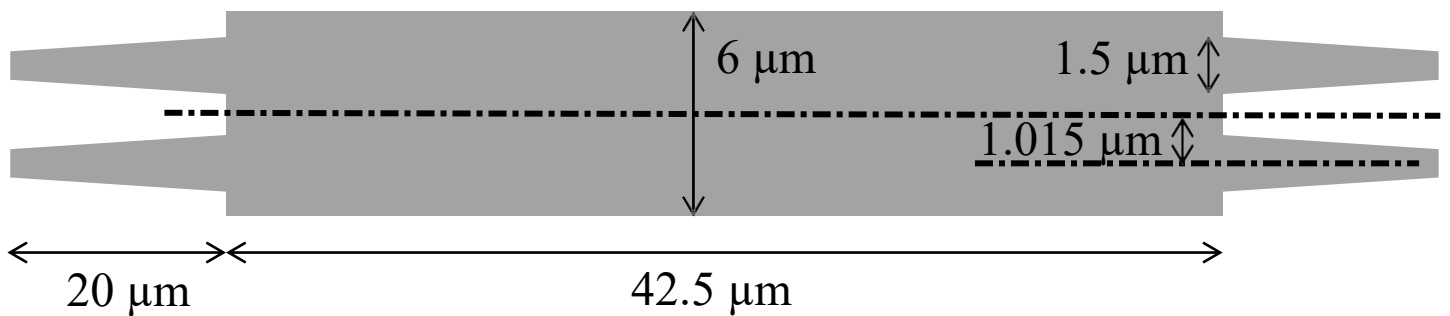


Transmission includes the measurement system loss, grating coupler loss and waveguide loss, as well as the measured device loss

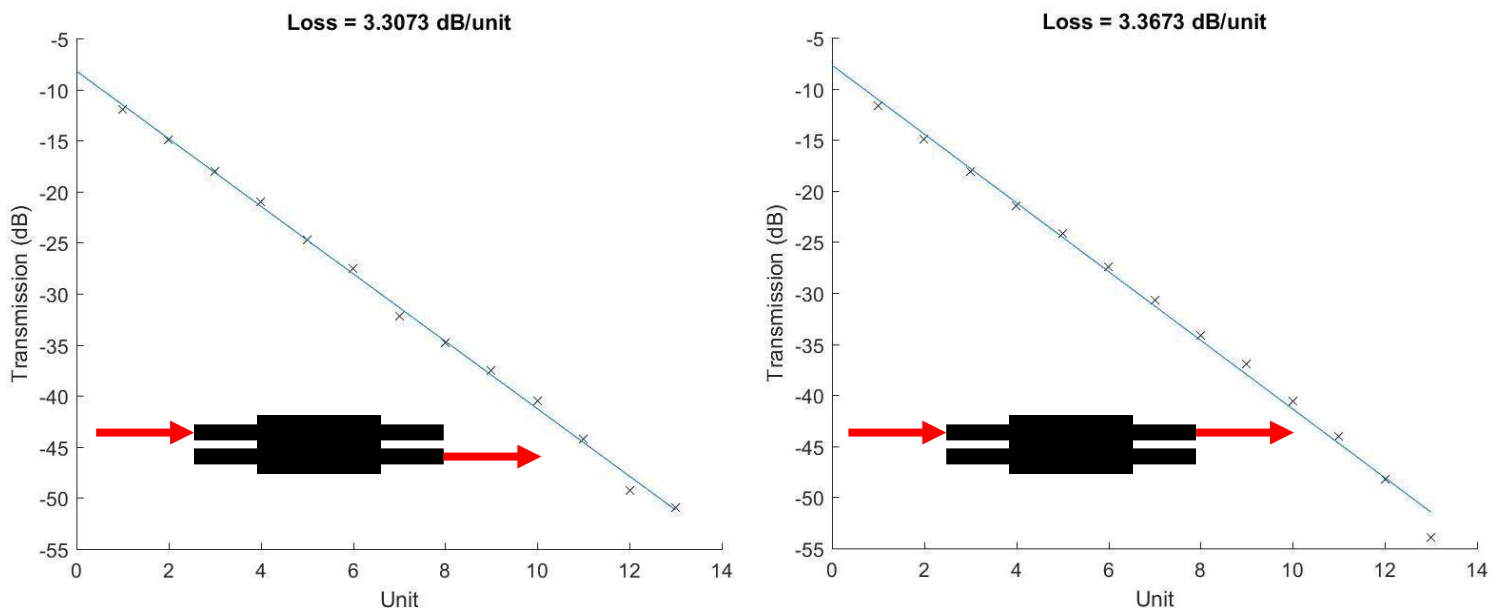
# SOI220\_cband\_TE\_STRIP\_2x2\_MMI

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

## Dimensions:



## Measurement results:

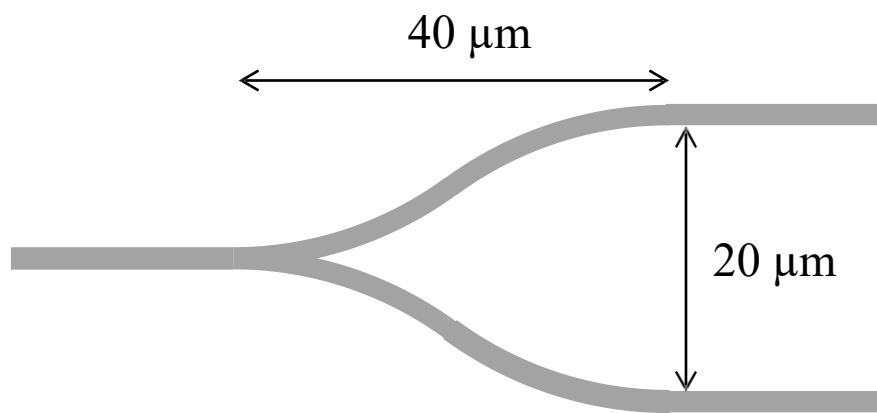


Transmission includes the measurement system loss, grating coupler loss and waveguide loss, as well as the measured device loss

# SOI220\_cband\_TE\_STRIP\_1x2\_Ysplitter

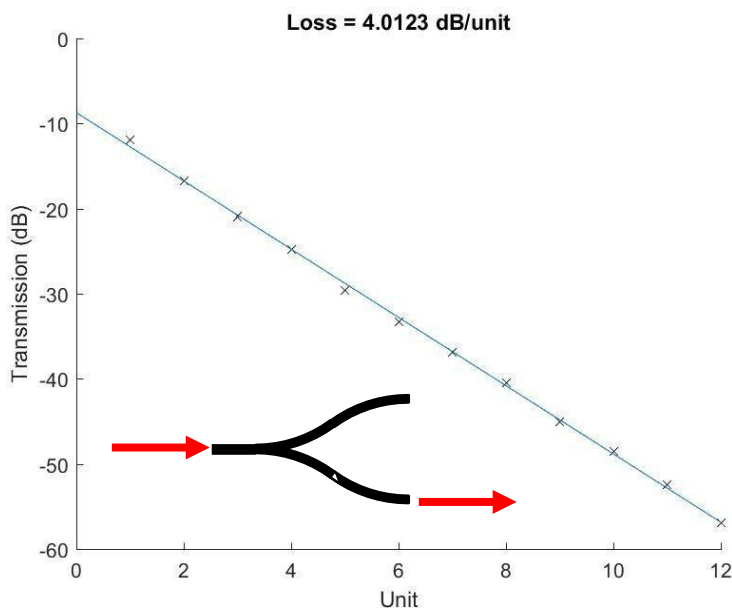
<b>Platform:</b>	220 nm SOI (2 um BOX layer)
<b>Wavelength:</b>	1550 nm
<b>Etching depth:</b>	220 nm (Strip design)
<b>Polarization:</b>	TE
<b>Cell name in GDS lib:</b>	SOI220_cband_TE_strip_1x2_Ysplitter

## Dimensions:

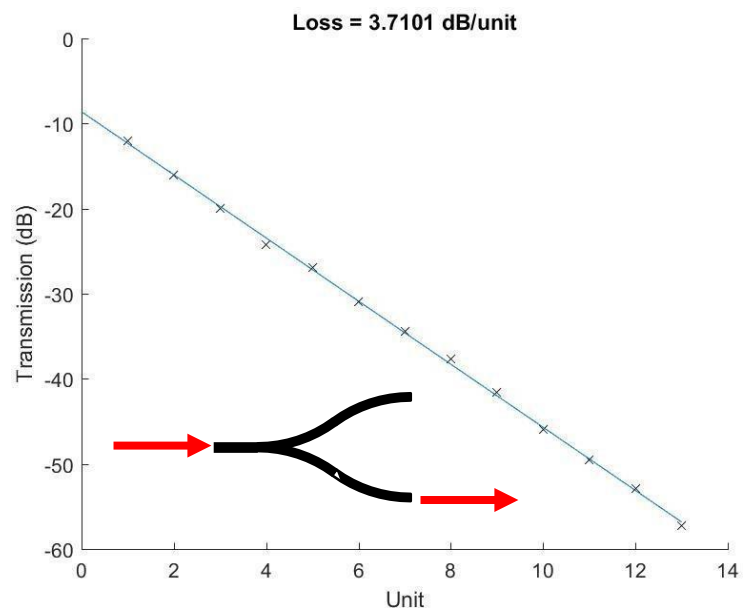


## Measurement results:

### 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

<b>Platform:</b>	220 nm SOI (2 um BOX layer)
<b>Wavelength:</b>	1550 nm
<b>Etching depth:</b>	220 nm (Strip design)
<b>Polarization:</b>	TE
<b>Cell name in GDS lib:</b>	SOI220_cband_TE_STRIP_90_Degree_Bend (Waveguide Width (W): 450 nm, Bend Radius (R): 5 um)

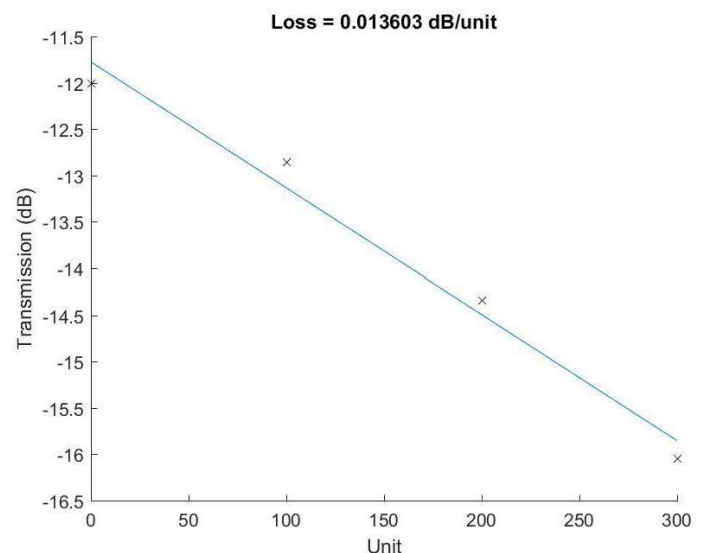
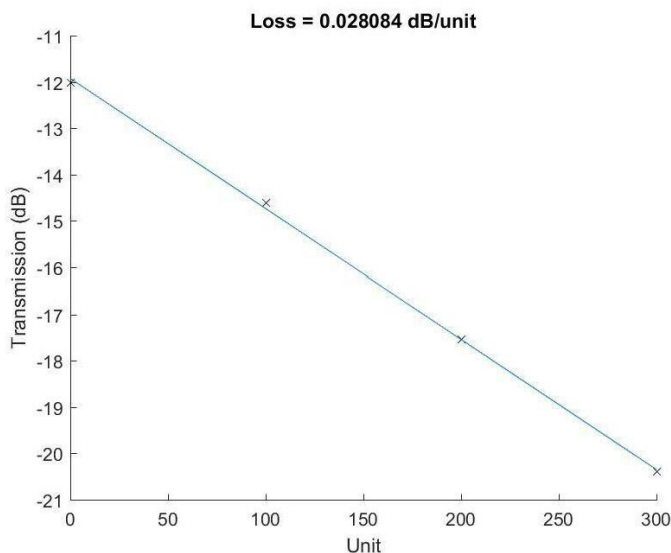
## Measurement results on varied dimensions:

(Unit: 90° bend)

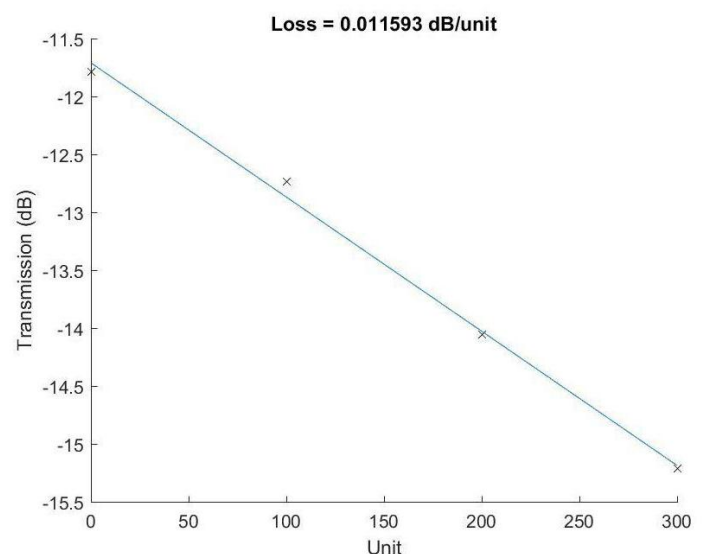
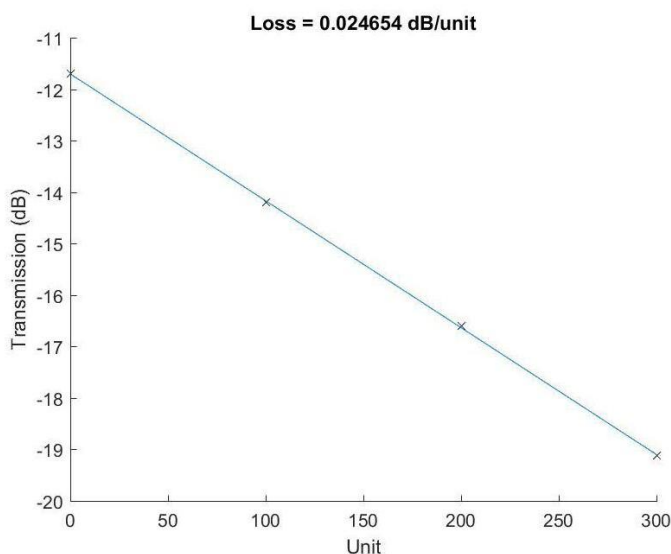
**W: 400 nm**

**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

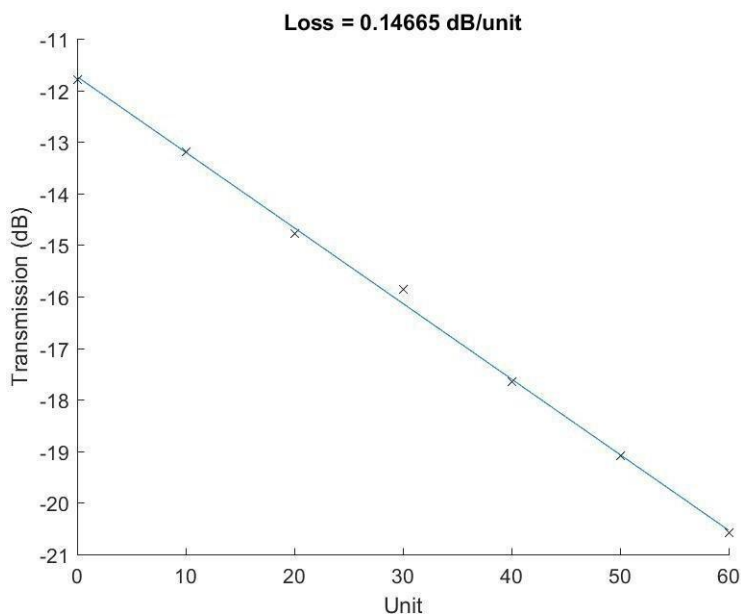
# SOI220\_cband\_TE\_STRIP\_Waveguide\_Crossing

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

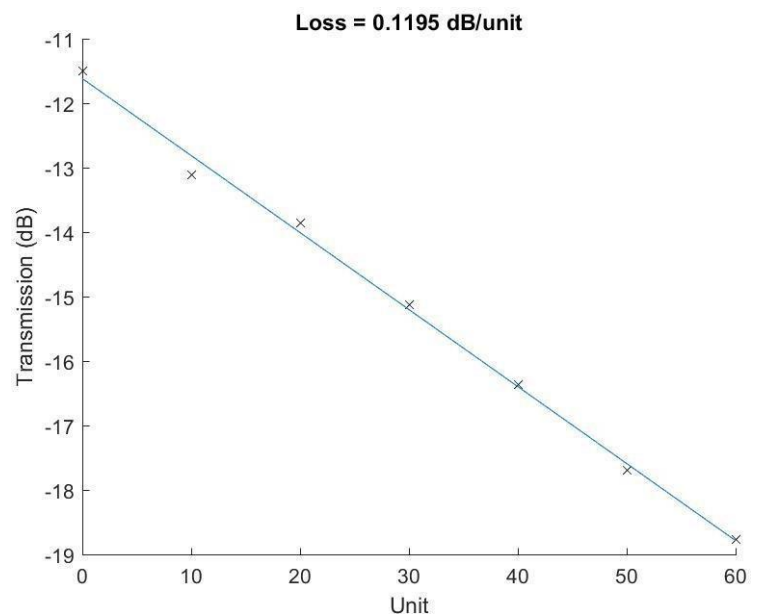
**Dimensions:** See the drawing in GDS library

## Measurement results on different waveguide width (W):

**W: 400 nm**



**W: 450 nm**

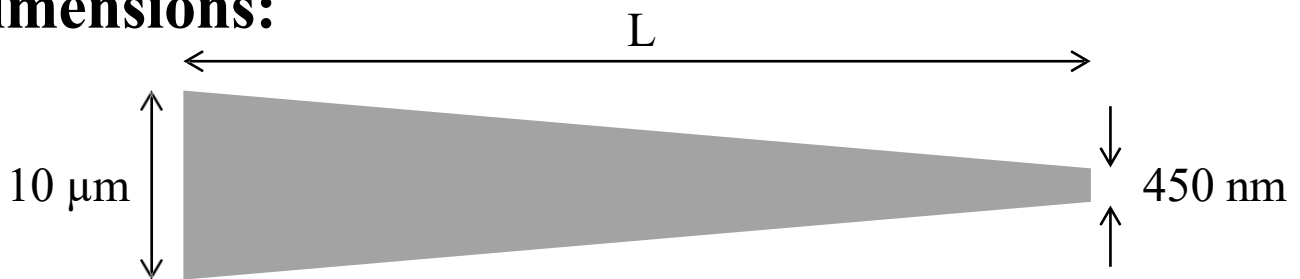


Transmission includes the measurement system loss, grating coupler loss and waveguide loss, as well as the measured device loss

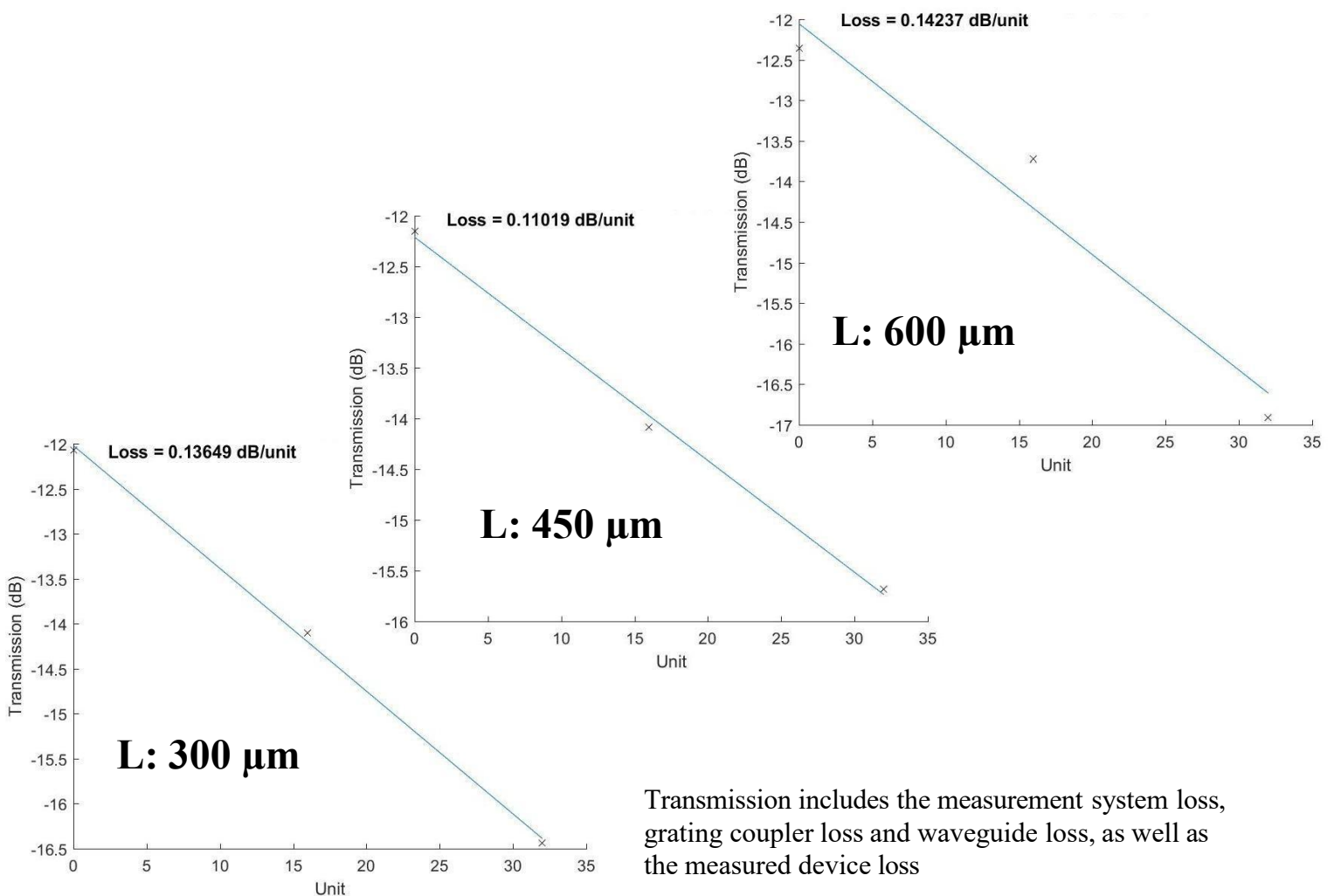
# SOI220\_cband\_TE\_STRIP\_MM to SM\_TAPER

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

## Dimensions:



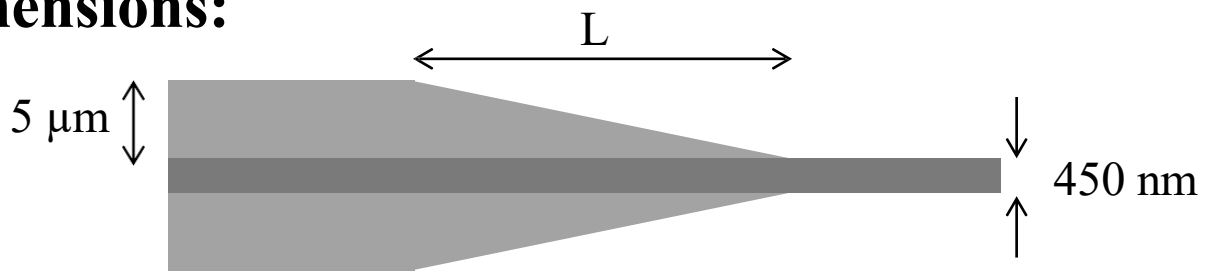
## Measurement results on different taper length (L):



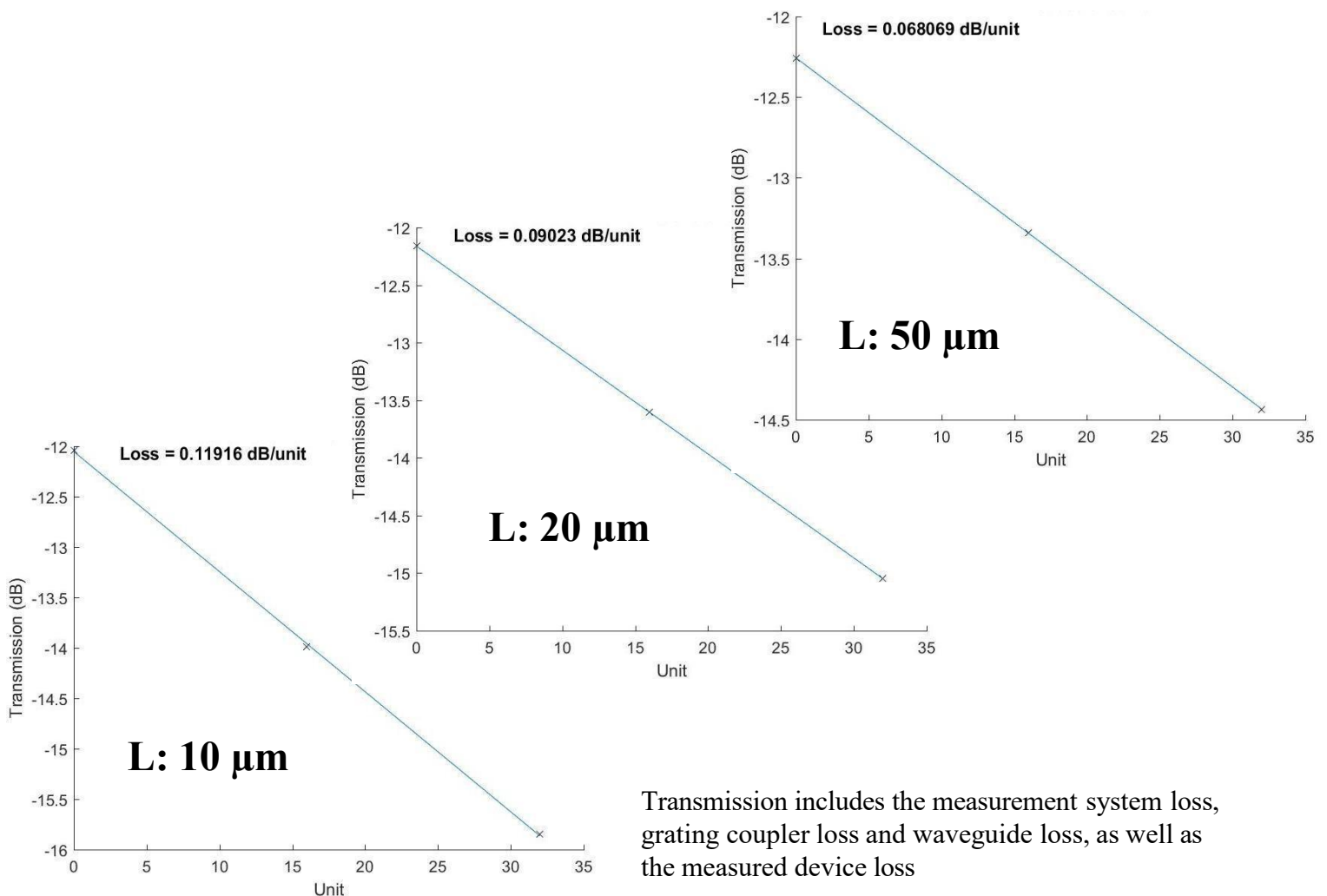
## SOI220\_cband\_TE\_STRIP\_RIB to STRIP\_TAPER

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

### Dimensions:

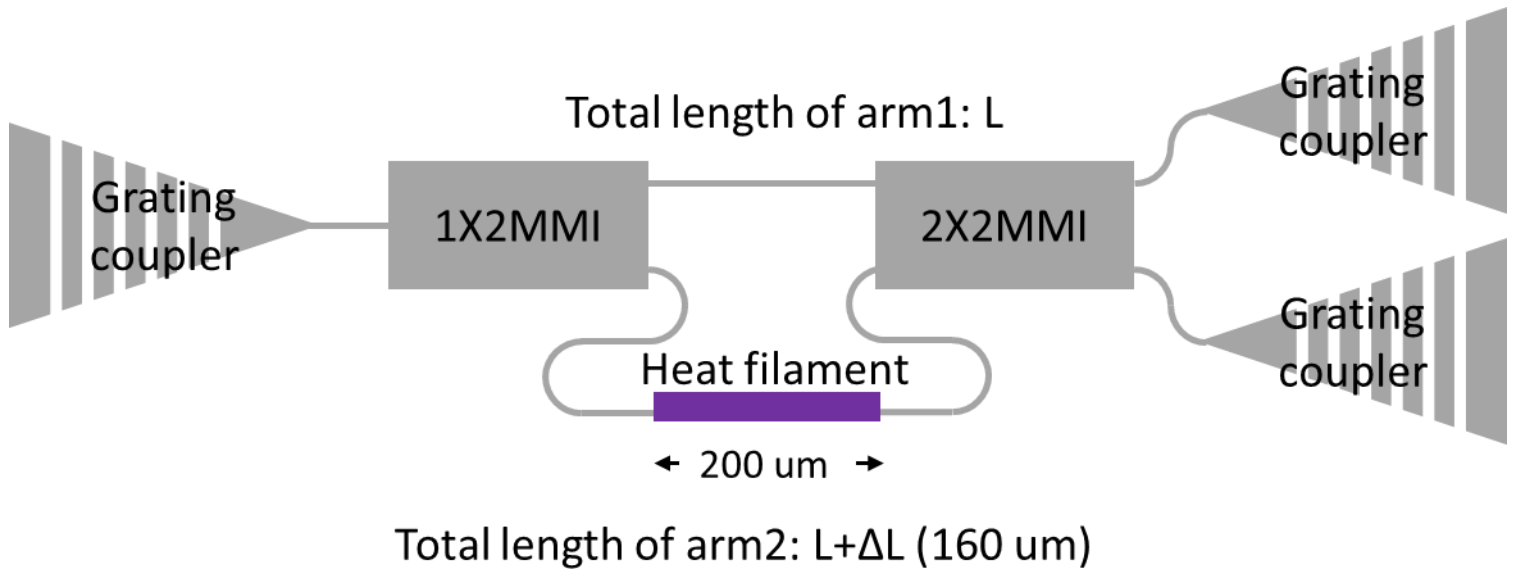


### Measurement results on different taper length (L):



## SOI220\_cband\_TE\_STRIP\_MZI

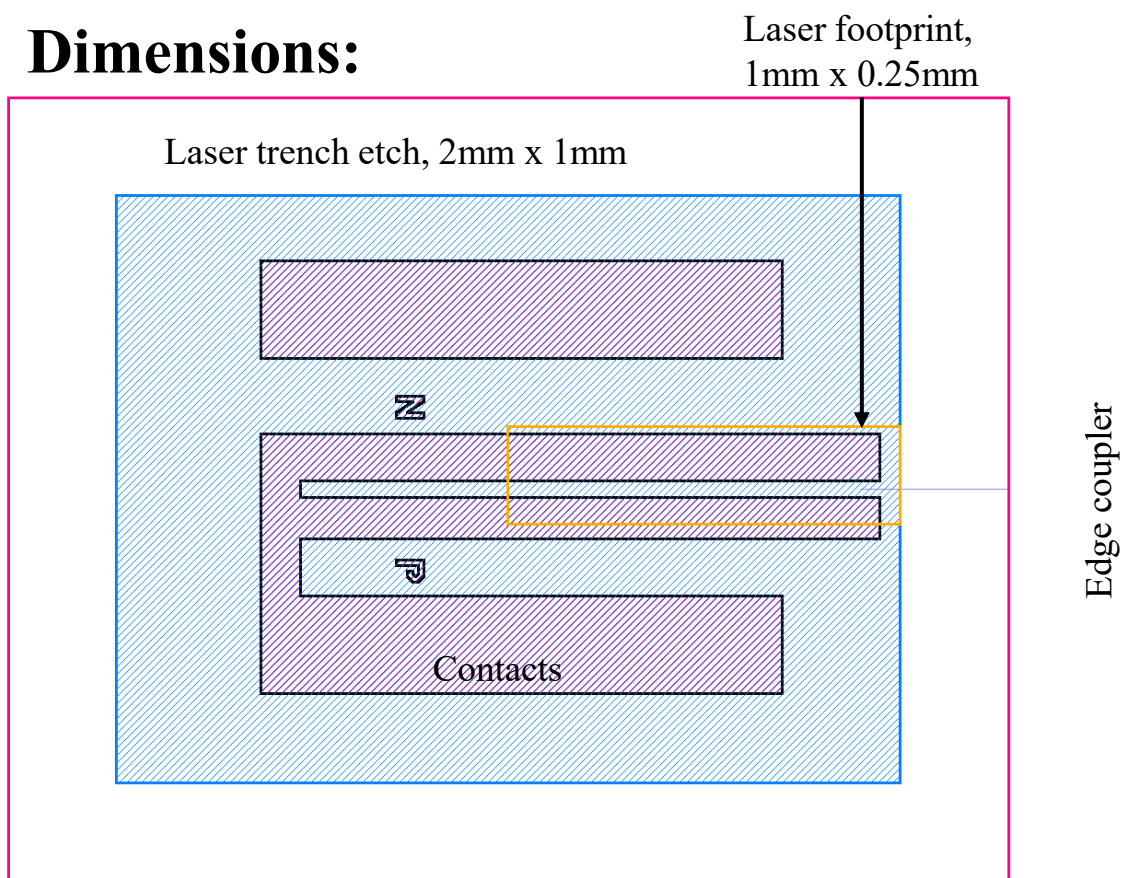
<b>Platform:</b>	220 nm SOI (2 um BOX layer)
<b>Wavelength:</b>	1550 nm
<b>Etching depth:</b>	220 nm (Strip design)
<b>Polarization:</b>	TE
<b>Cell name in GDS lib:</b>	SOI220_cband_TE_strip_MZI



## SOI220\_DC1550HP01\_Integrated

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

### Dimensions:

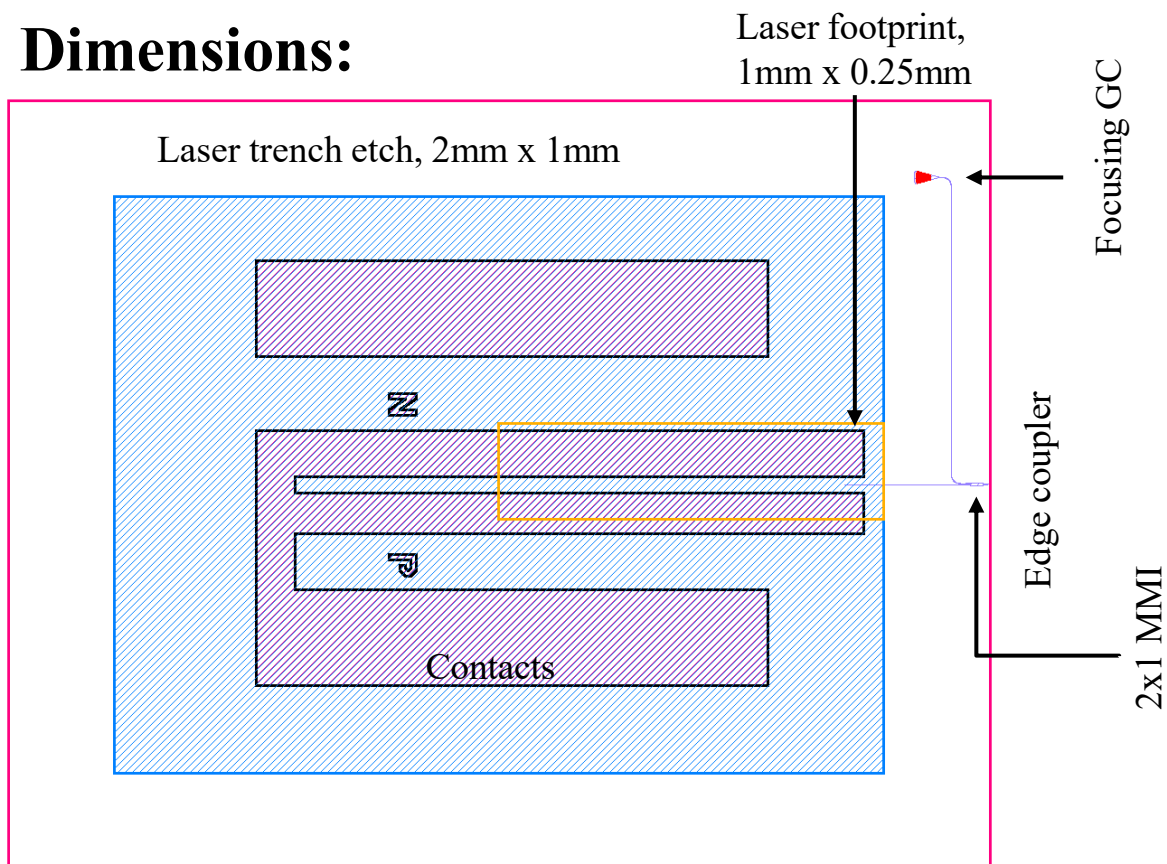


Exclusion zone  
2.5mm x 2mm

# SOI220\_DC1550HP01\_Integrated\_with\_GC

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

## Dimensions:

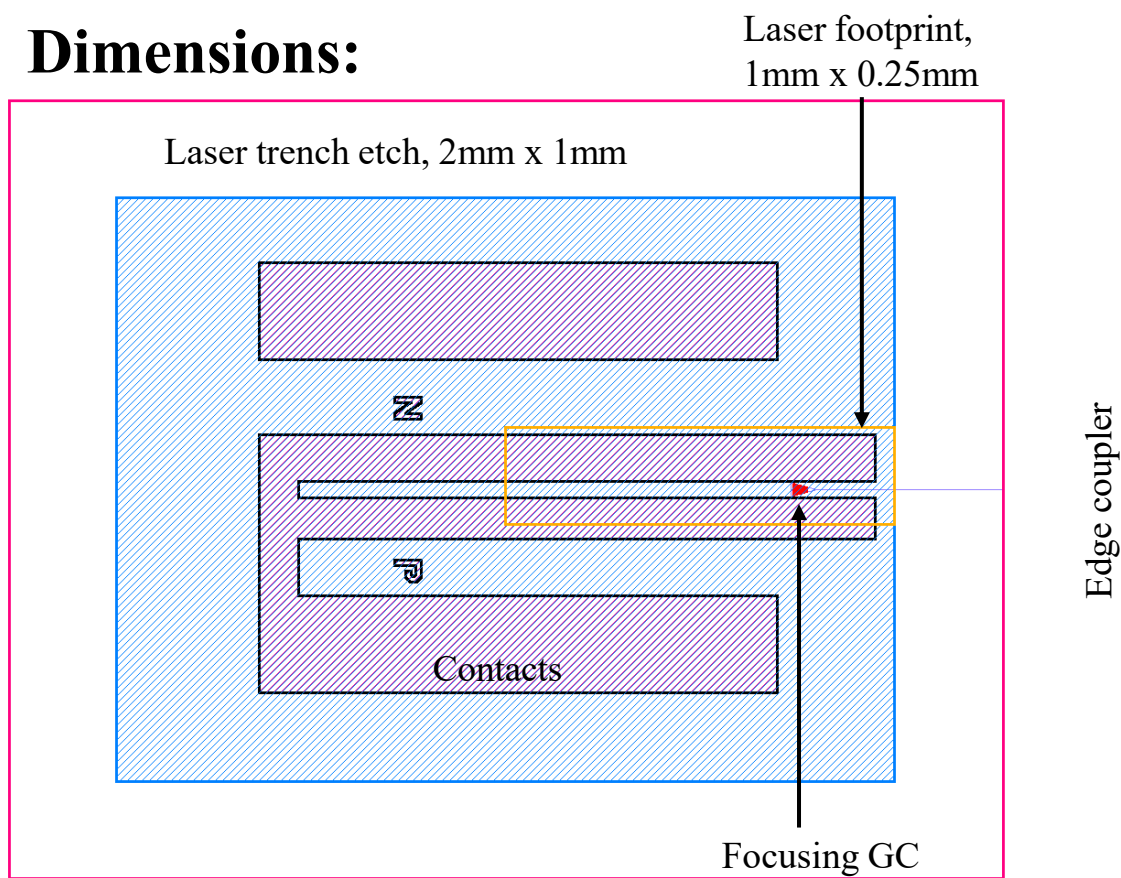


Exclusion zone  
2.5mm x 2mm

# SOI220\_DC1550HP01\_Integrated\_or\_GC

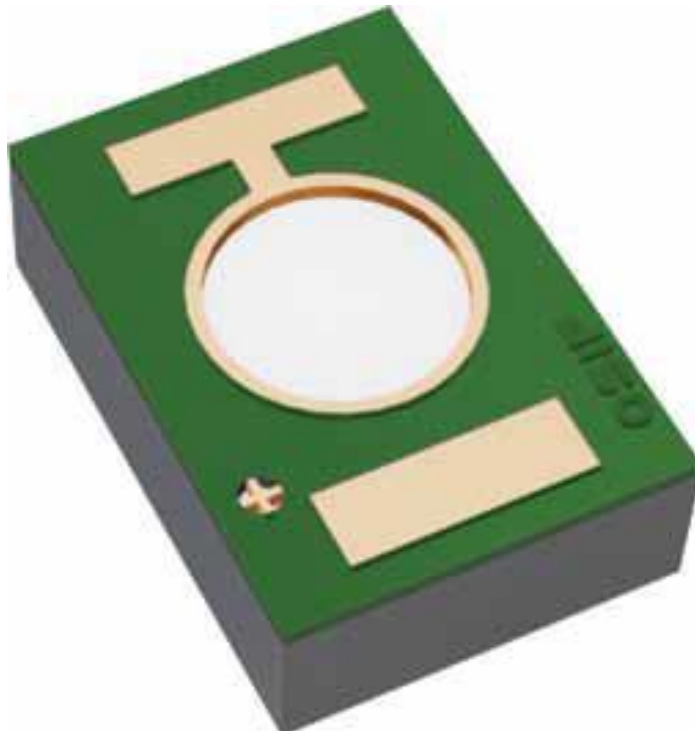
<b>Platform:</b>	220 nm SOI (2 um BOX layer)
<b>Wavelength:</b>	1550nm $\pm$ 3nm
<b>Producer</b>	Shijia Photons
<b>Model number</b>	DC1550HP01
<b>Cell name in GDS lib:</b>	Usable as part of Full/Half Design Templates
<b>Optical power</b>	>1 mW total optical power into the edge coupler

## Dimensions:



Exclusion zone  
2.5mm x 2mm

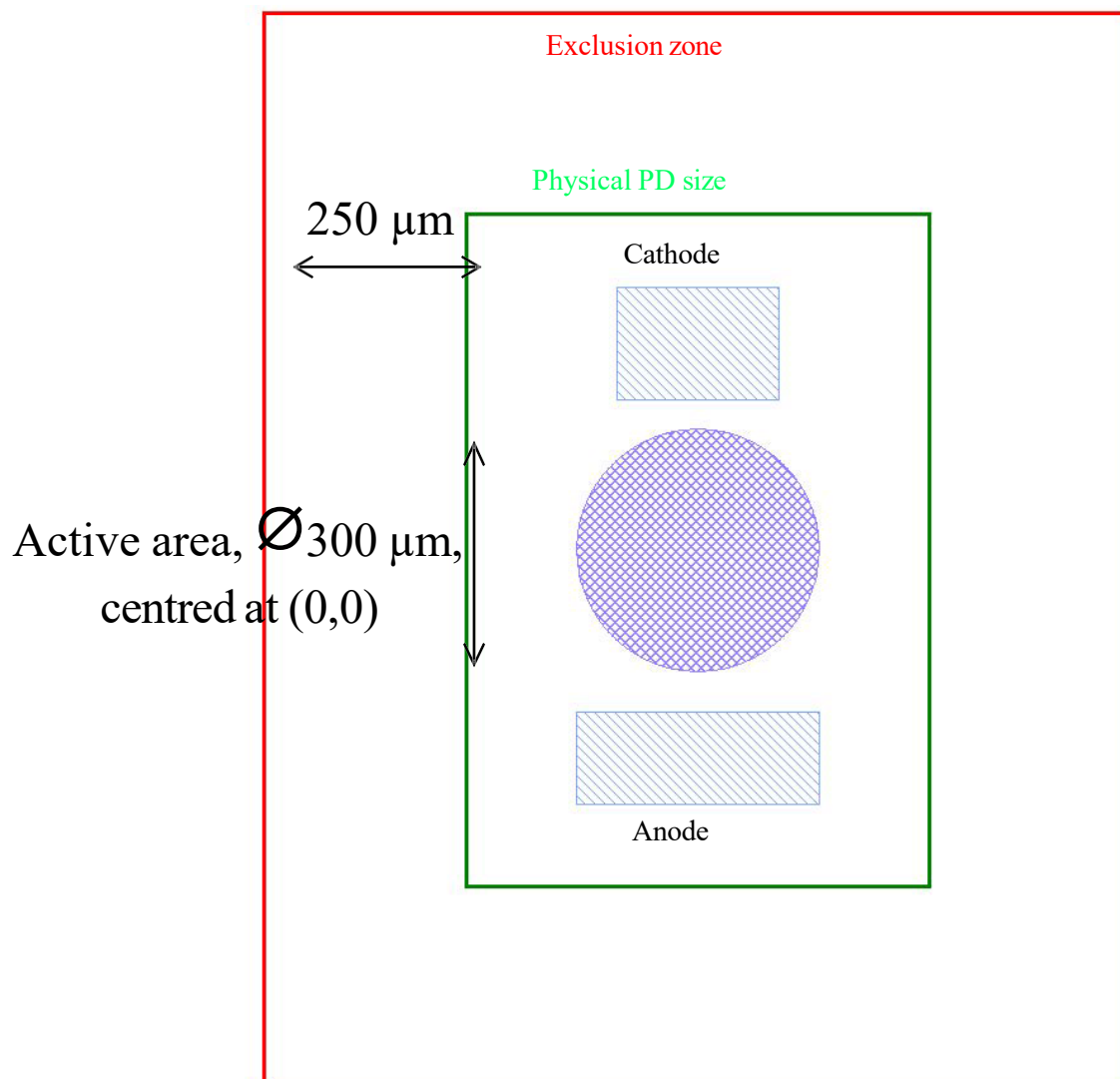
- Wavelength:  
Broadband
- Platform: 220 nm SOI
- **SOI PD**
- OSI Optoelectronics  
(FCI-InGaAs-300B1)



## SOI220\_PD\_FCI300B1\_Plain

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

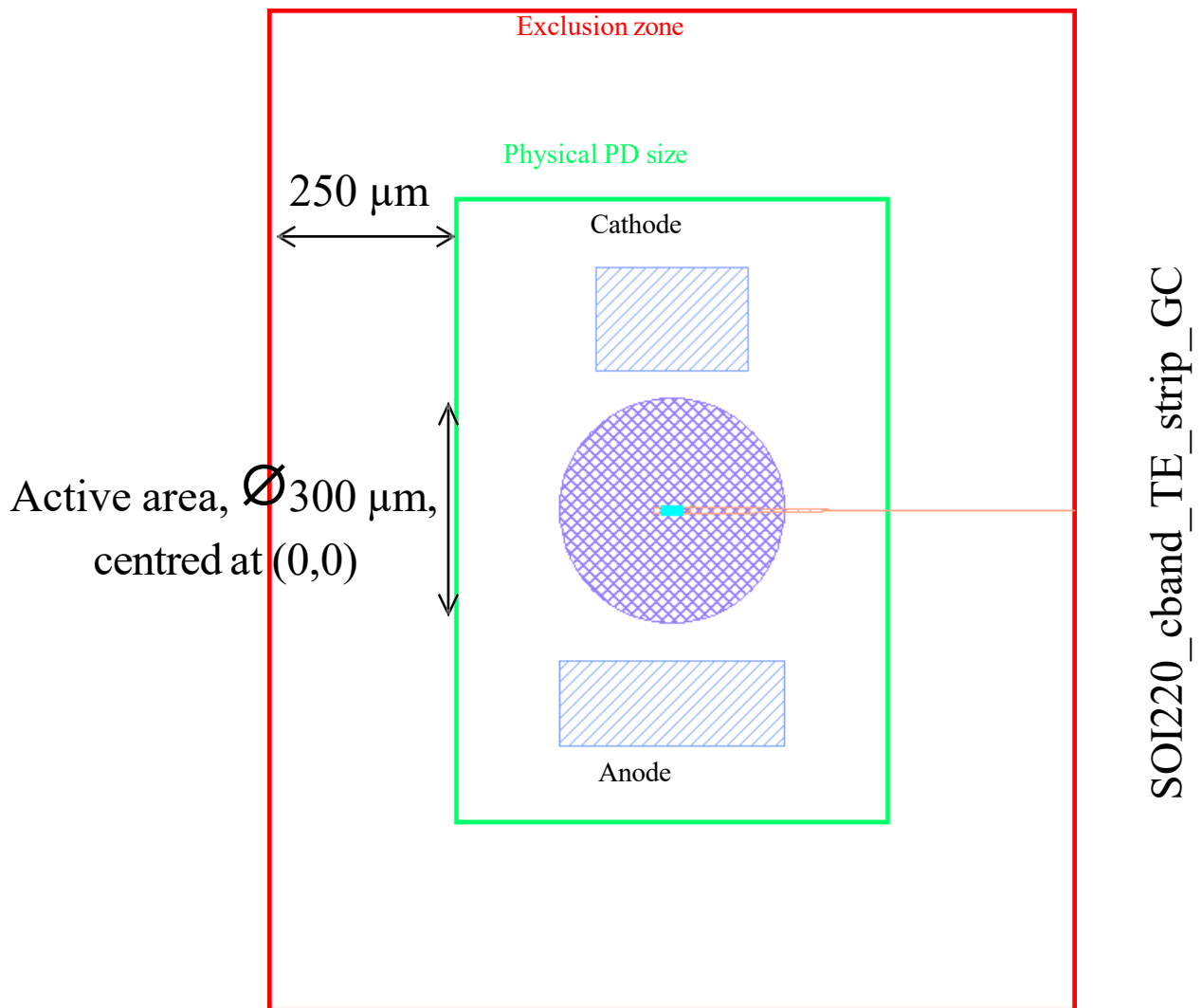
### Dimensions:



## SOI220\_PD\_FCI300B1\_Integrated

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

### Dimensions:



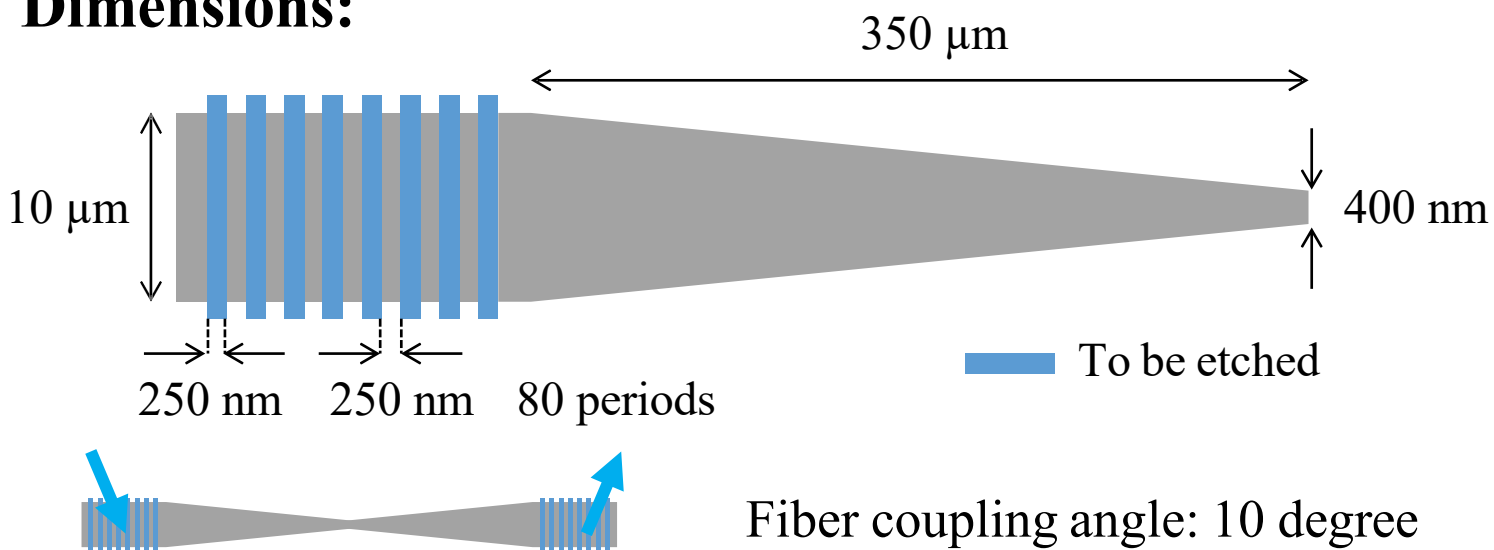


- **Wavelength: 1310 nm**
- **Platform: 220 nm SOI**

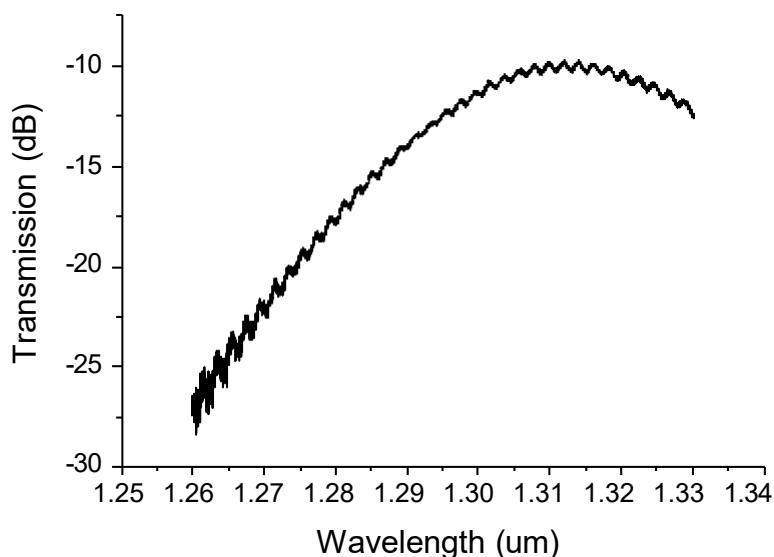
# SOI220\_oband\_TE\_RIB\_Grating\_Coupler

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

## Dimensions:



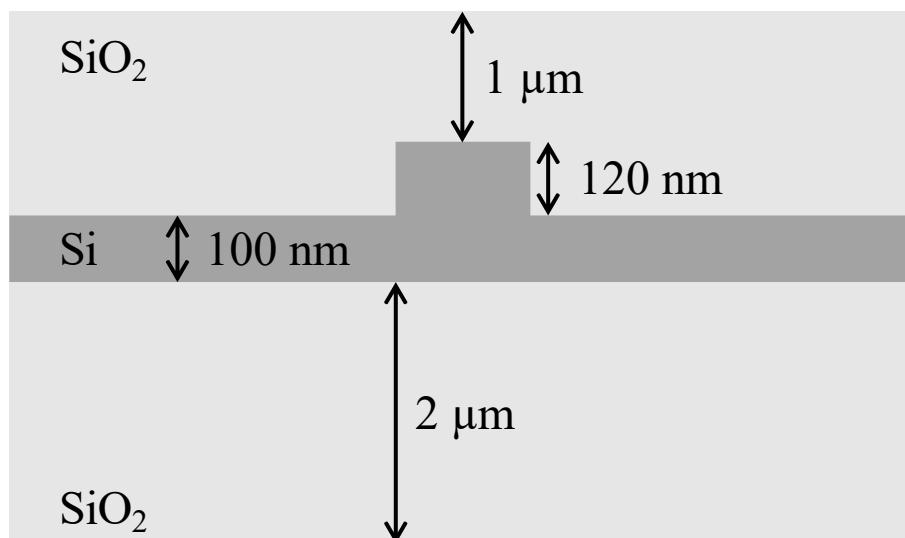
## Measured transmission spectrum



## Summarized performance:

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

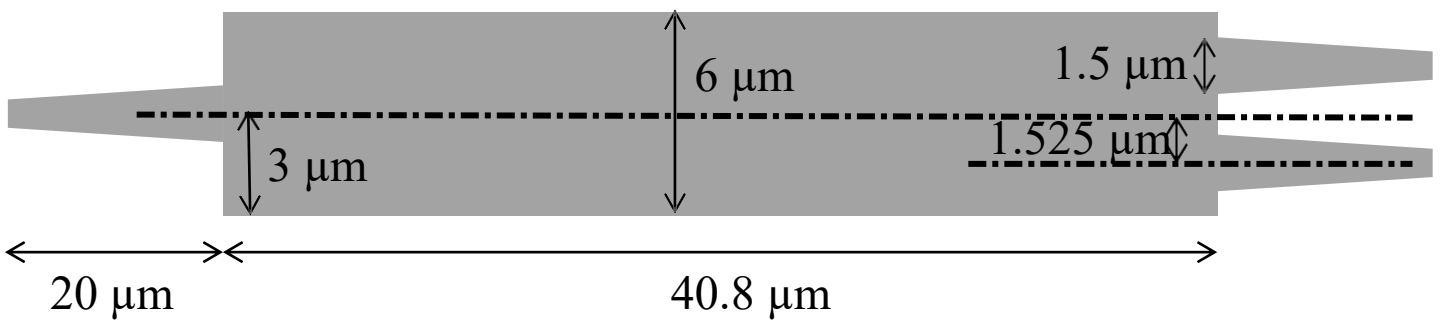
- Wavelength: 1310 nm
- Platform: 220 nm SOI
- **RIB**



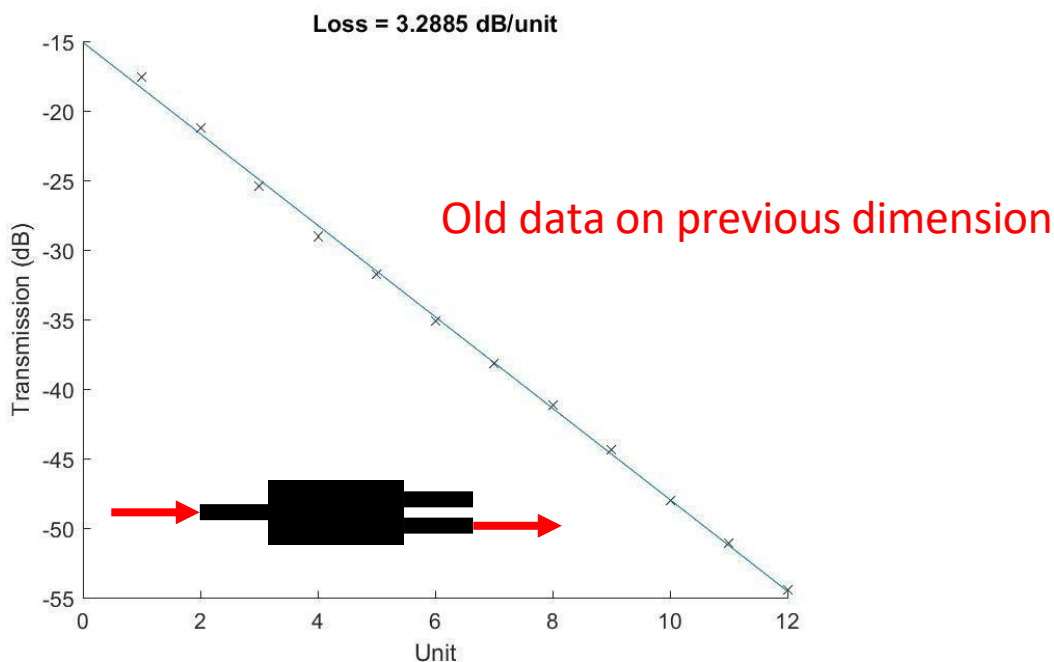
# SOI220\_oband\_TE\_RIB\_1x2\_MMI

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

## Dimensions:



## Measurement results:

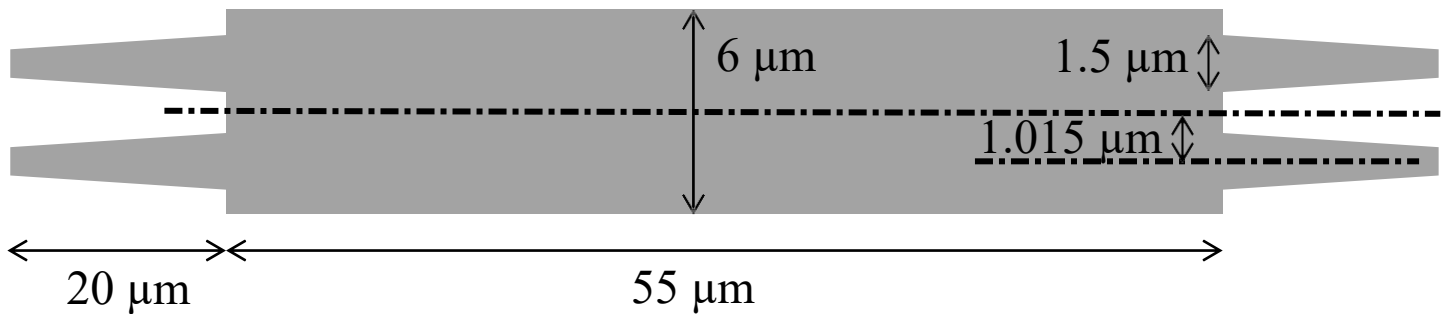


Transmission includes the measurement system loss, grating coupler loss and waveguide loss, as well as the measured device loss

## SOI220\_oband\_TE\_RIB\_2x2\_MMI

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

### Dimensions:



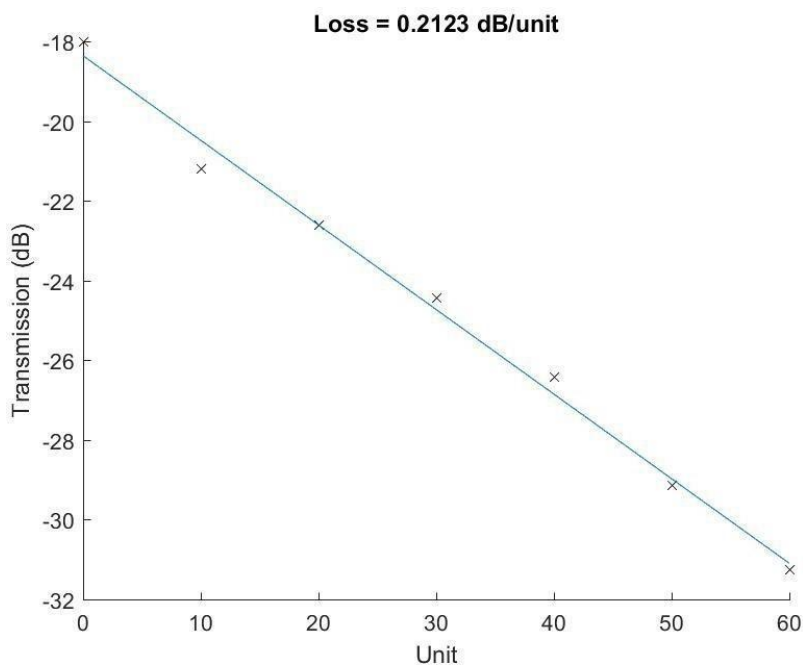
### Measurement results:

## SOI220\_oband\_TE\_RIB\_Waveguide\_Crossing

<b>Platform:</b>	220 nm SOI (2 um BOX layer)
<b>Wavelength:</b>	1310 nm
<b>Etching depth:</b>	120 nm (Rib design)
<b>Polarization:</b>	TE
<b>Cell name in GDS lib:</b>	SOI220_oband_TE_RIB_Waveguide_Crossing

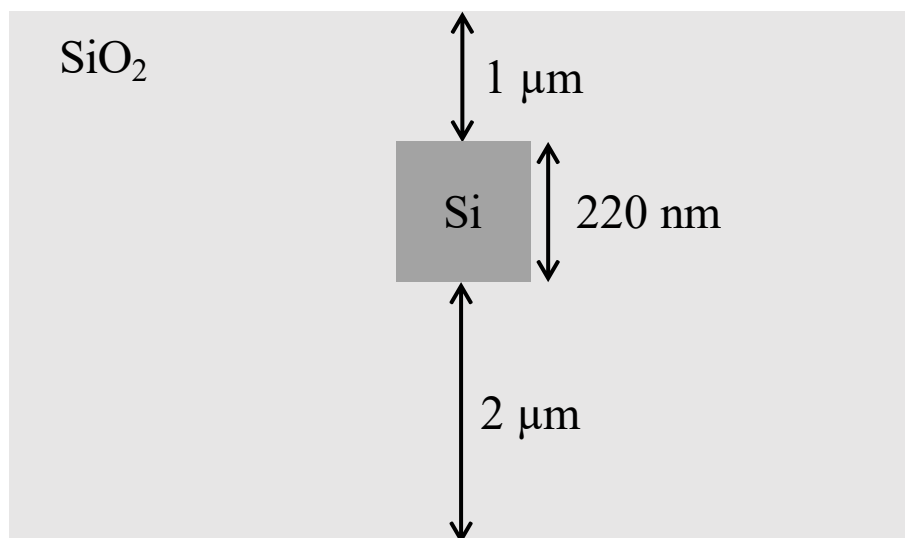
**Dimensions:** See the drawing in GDS library

### Measurement results:



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

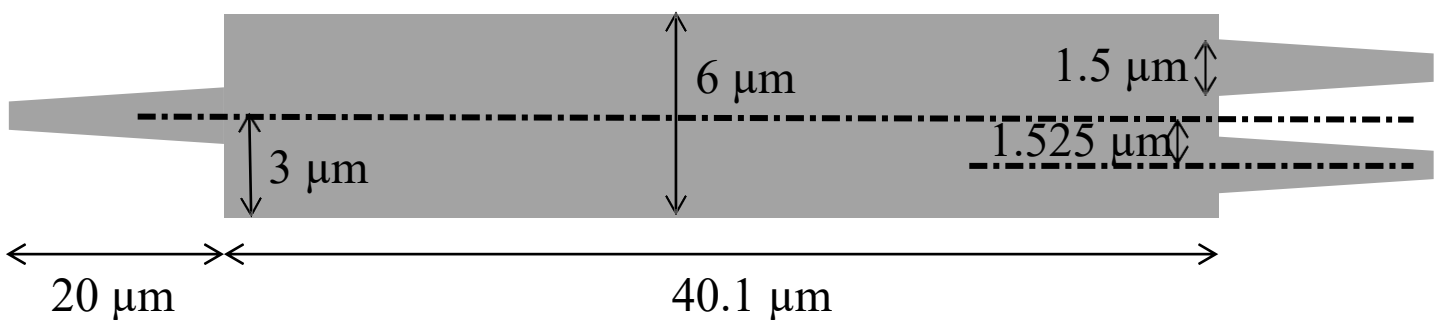
- Wavelength: 1310 nm
- Platform: 220 nm SOI
- **STRIP**



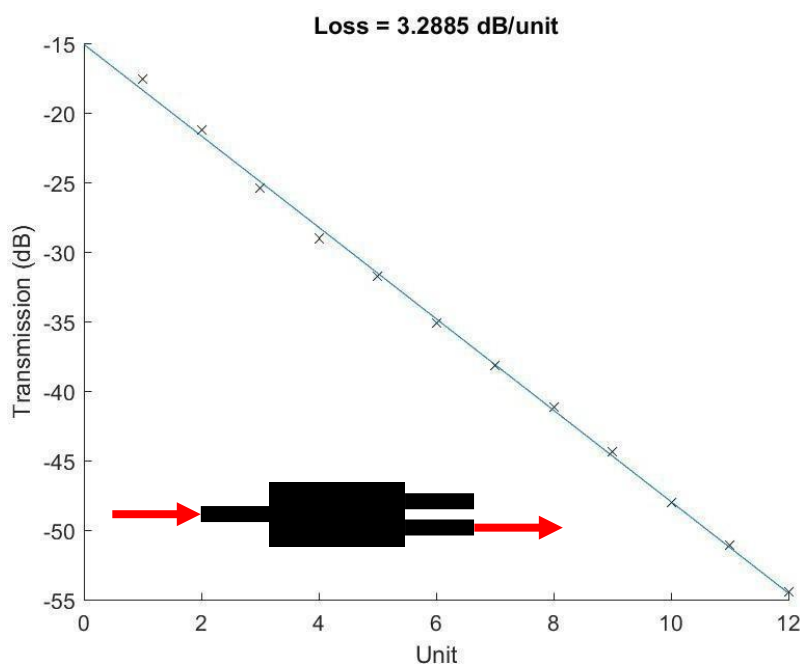
## SOI220\_oband\_TE\_STRIP\_1x2\_MMI

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

### Dimensions:



### Measurement results:

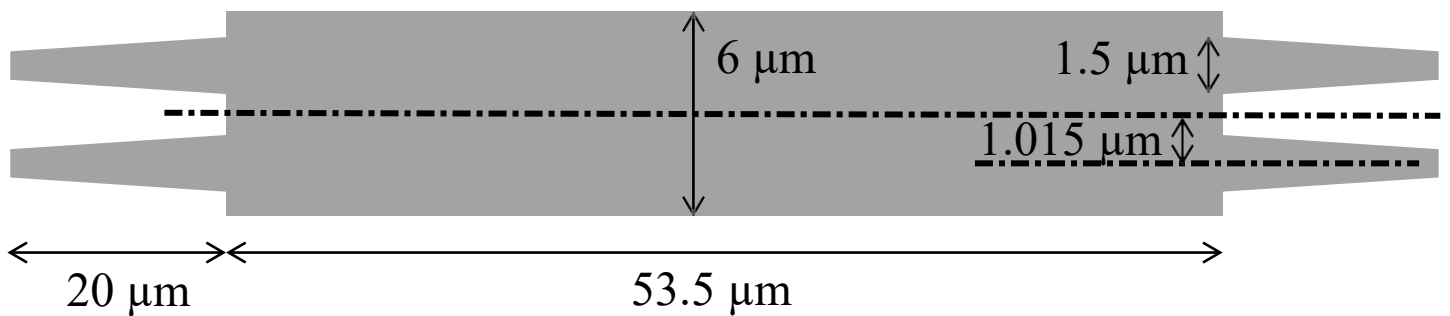


Transmission includes the measurement system loss, grating coupler loss and waveguide loss, as well as the measured device loss

## SOI220\_oband\_TE\_STRIP\_2x2\_MMI

<b>Platform:</b>	220 nm SOI (2 $\mu\text{m}$ BOX layer)
<b>Wavelength:</b>	1310 nm
<b>Etching depth:</b>	220 nm (Strip design)
<b>Polarization:</b>	TE
<b>Cell name in GDS lib:</b>	SOI220_oband_TE_STRIP_2x2_MMI

### Dimensions:



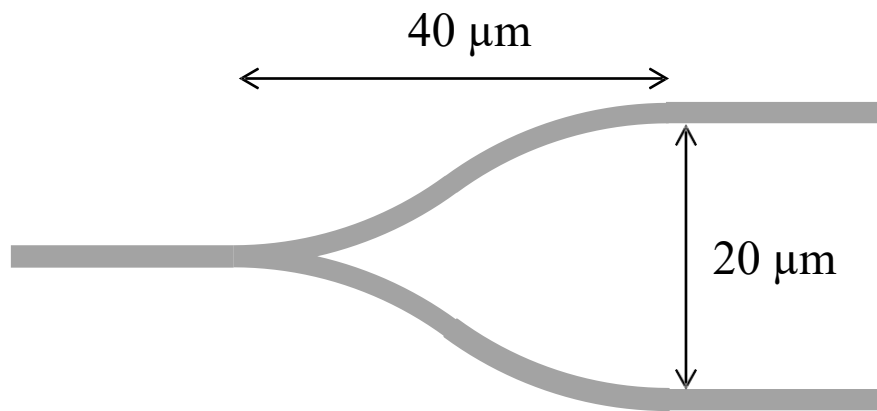
### Measurement results:



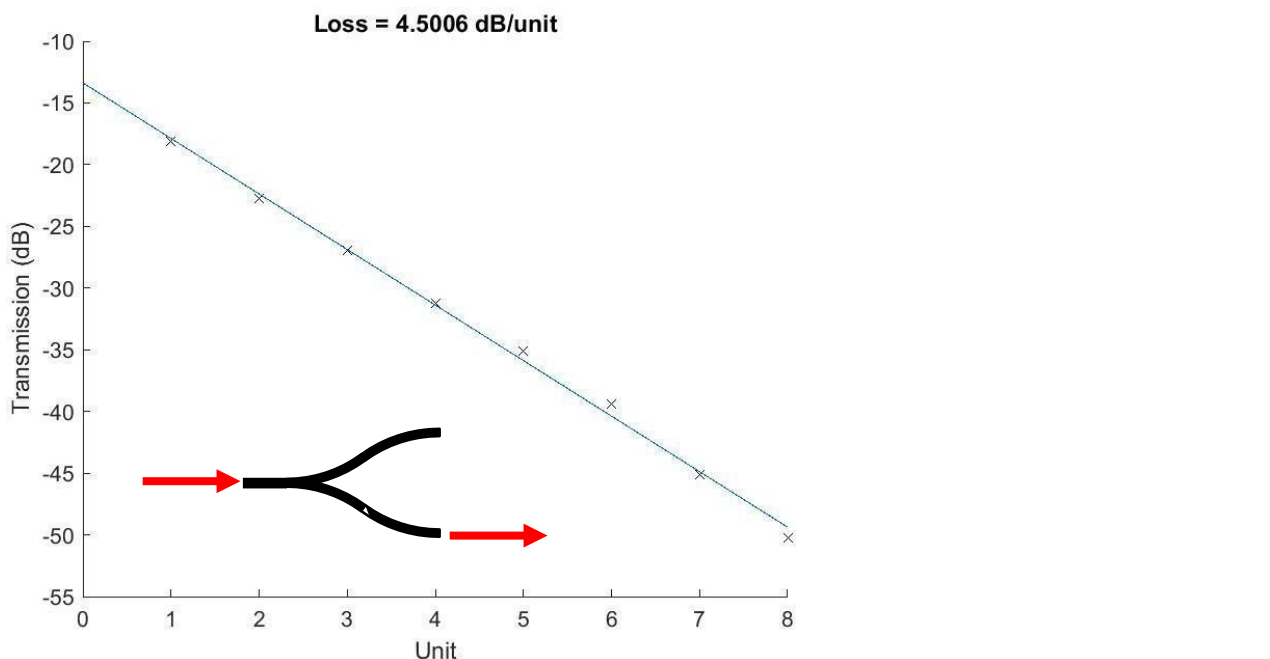
# SOI220\_oband\_TE\_STRIP\_1x2\_Ysplitter

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

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

## Measurement results on varied dimensions:

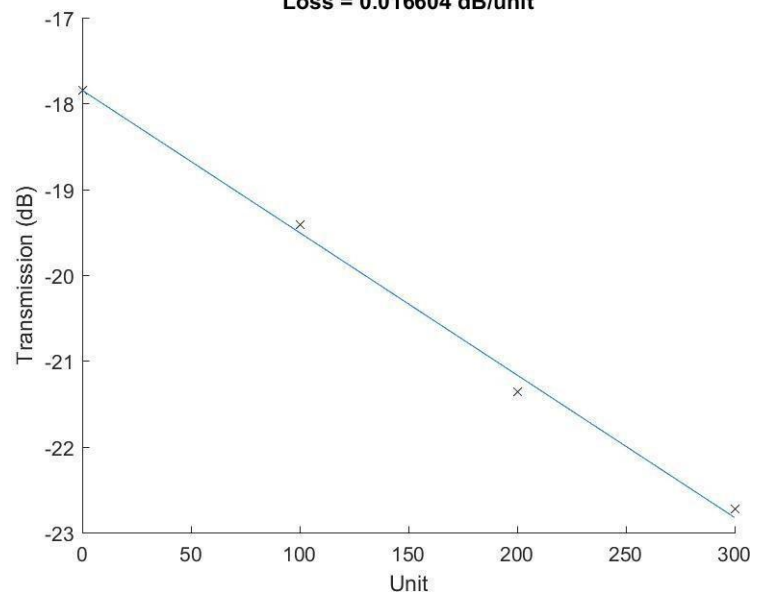
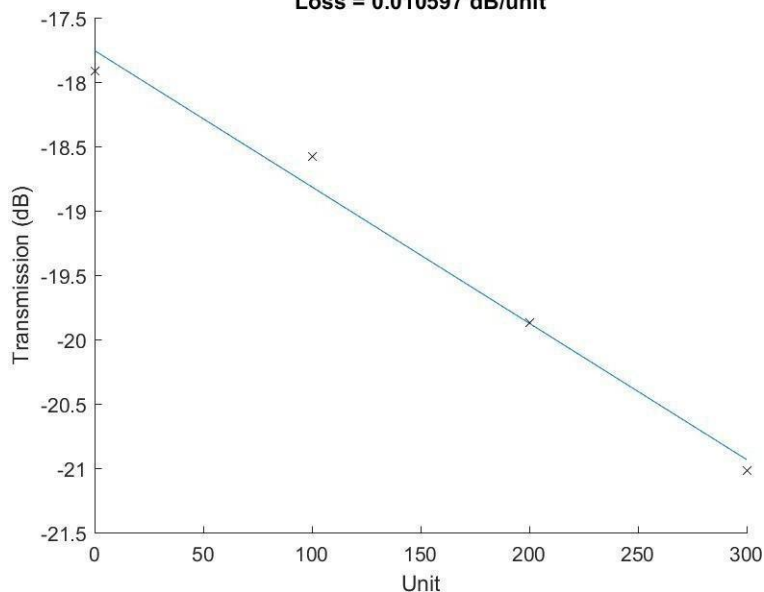
(Unit: 90° bend)

**R: 5 μm**

**R: 10 μm**

Loss = 0.010597 dB/unit

Loss = 0.016604 dB/unit



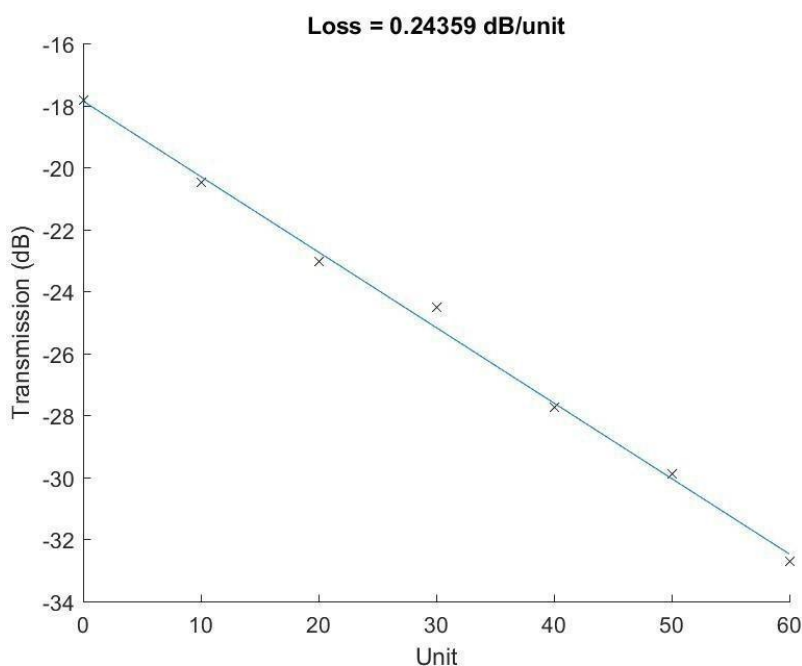
Transmission includes the measurement system loss, grating coupler loss and waveguide loss, as well as the measured device loss

# SOI220\_oband\_TE\_STRIP\_Waveguide\_Crossing

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