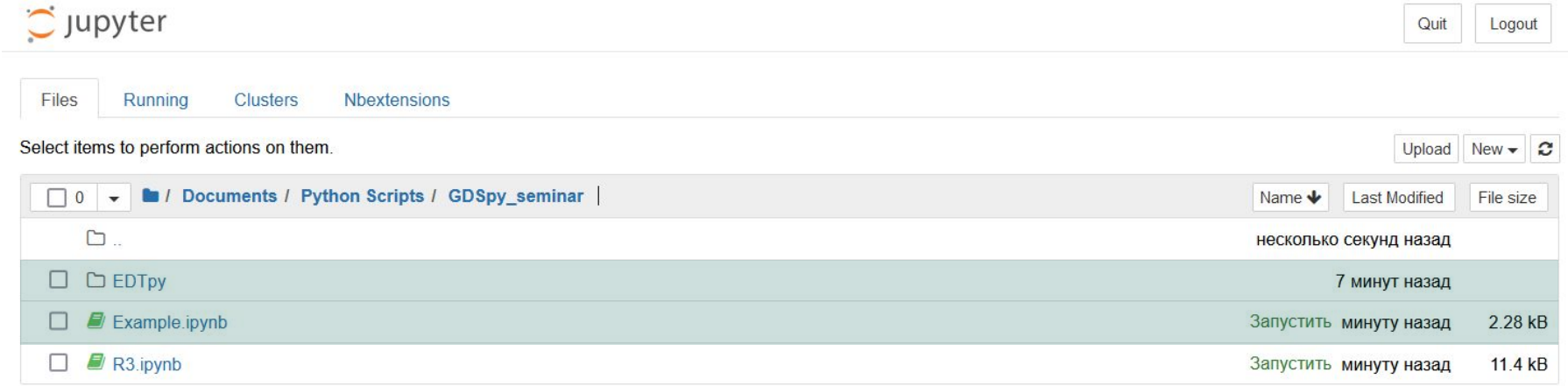
2D chip designs using GDSpy

Setting things up

1. Install KLayout
2. Open pre installed with anaconda Jupyter Notebook



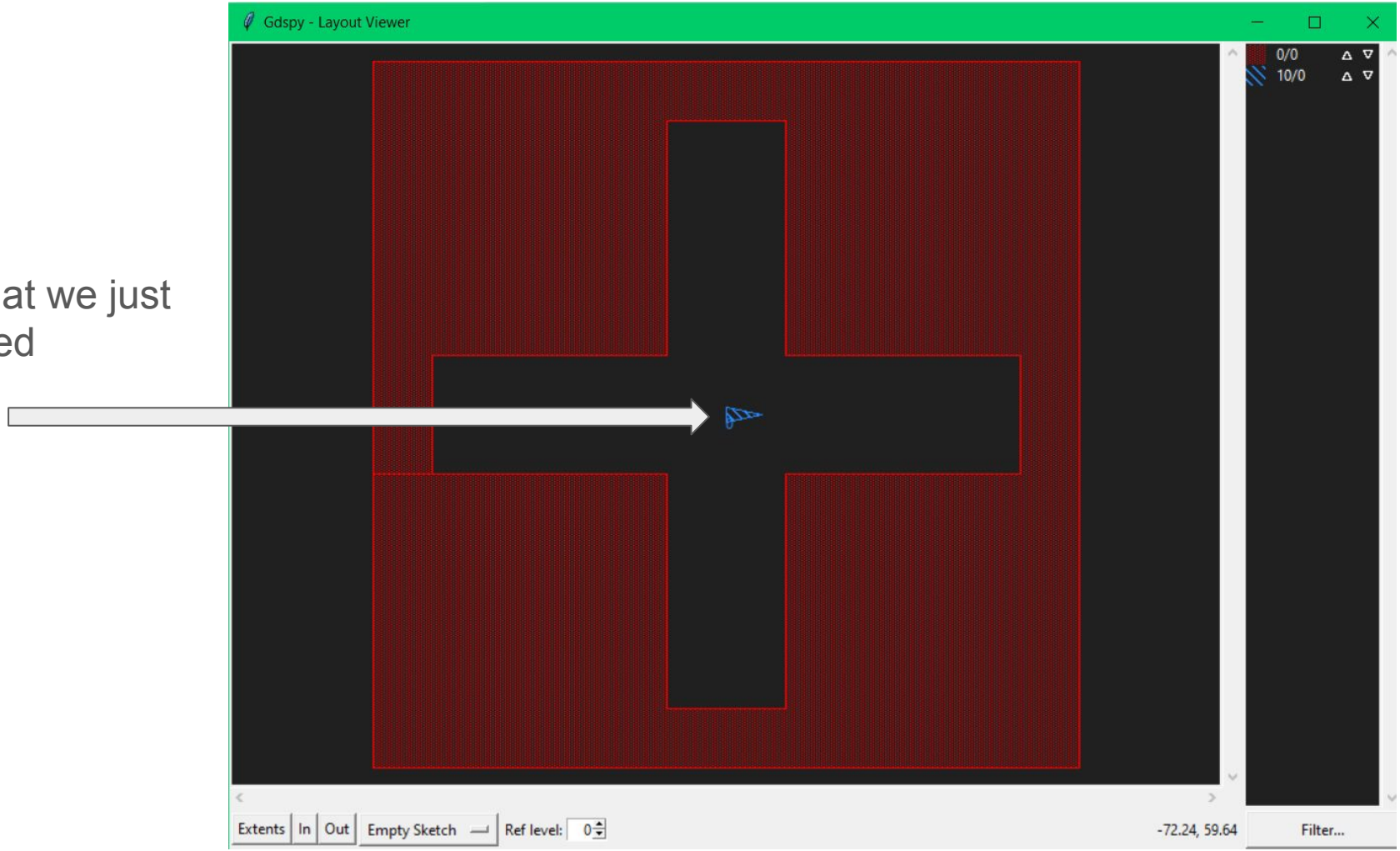
3. %pip install **gdspy** - sell magic
4. Make sure all imports from the Example.ipynb work

Structure

B [3]:

```python
class Marker(EmptyGeometry):
    default_values = {
        "a": 20,
        "b": 100,
        "layer": 0,
    }

    def _drawing(self, values):
        self.name = "Marker"

        a = values['a']
        b = values['b']
        layer = values['layer']

        self + gdspy.Rectangle([-b/2-b/10, -b/2-b/10],
                               [b/2+b/10, b/2+b/10], layer = 0)

        mark = gdspy.boolean(gdspy.Rectangle([-b/2, -a/2],[b/2, a/2]), gdspy.Rectangle([-a/2, -b/2],
                               [a/2, b/2]), 'or', layer = 0)
        self - mark
        self.add_port([0, 0], 0)
```

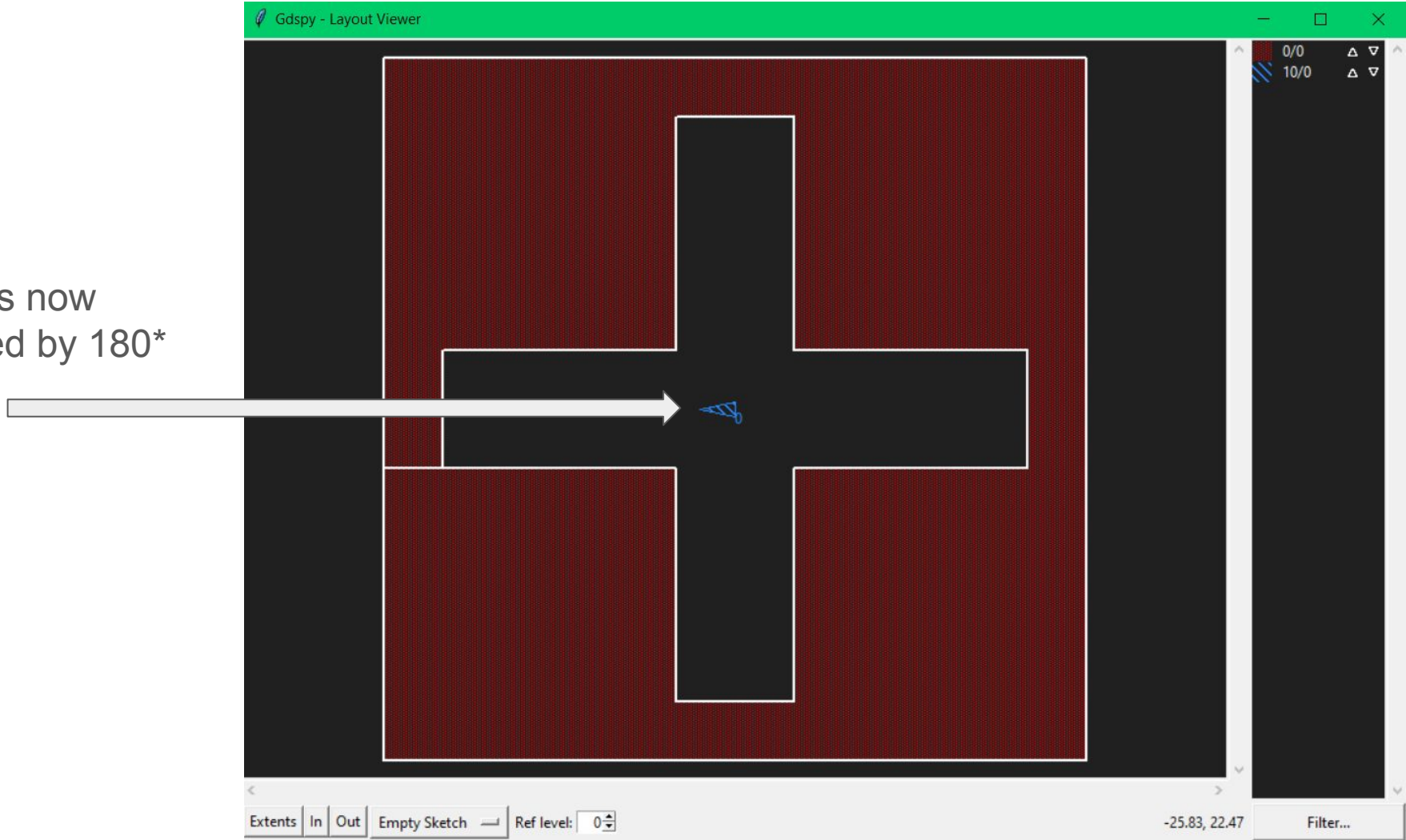
Port, that we just designed



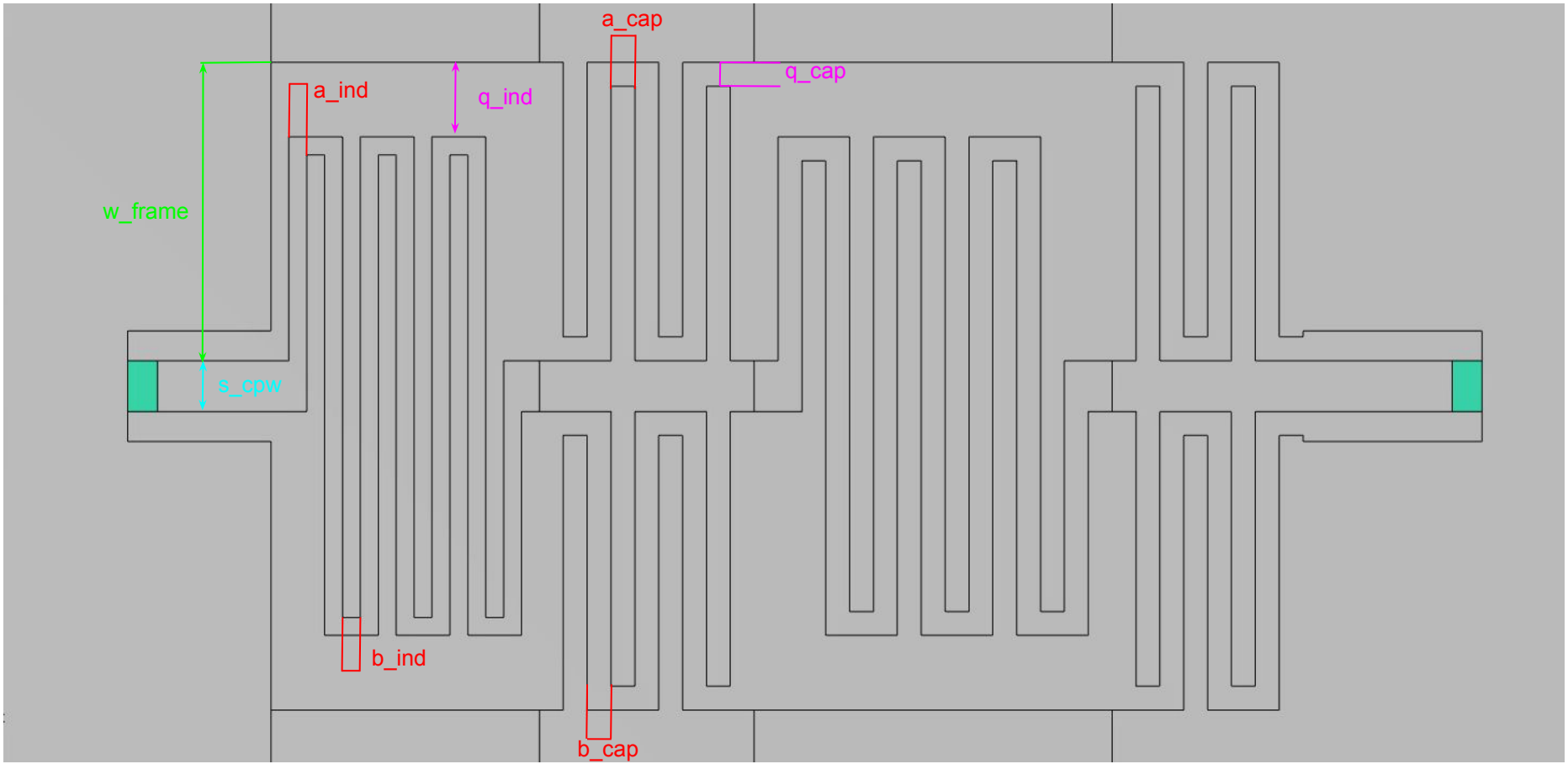
B [7]:

```python
class Marker(EmptyGeometry):
    default_values = {
        "a": 20,
        "b": 100,
        "layer": 0,
    }

    def _drawing(self, values):
        self.name = "Marker"

        a = values['a']
        b = values['b']
        layer = values['layer']

        self + gdspy.Rectangle([-b/2-b/10, -b/2-b/10],
                               [b/2+b/10, b/2+b/10], layer = 0)

        mark = gdspy.boolean(gdspy.Rectangle([-b/2, -a/2],[b/2, a/2]), gdspy.Rectangle([-a/2, -b/2],
                               [a/2, b/2]), 'or', layer = 0)
        self - mark
        self.add_port([0, 0], 180)
```

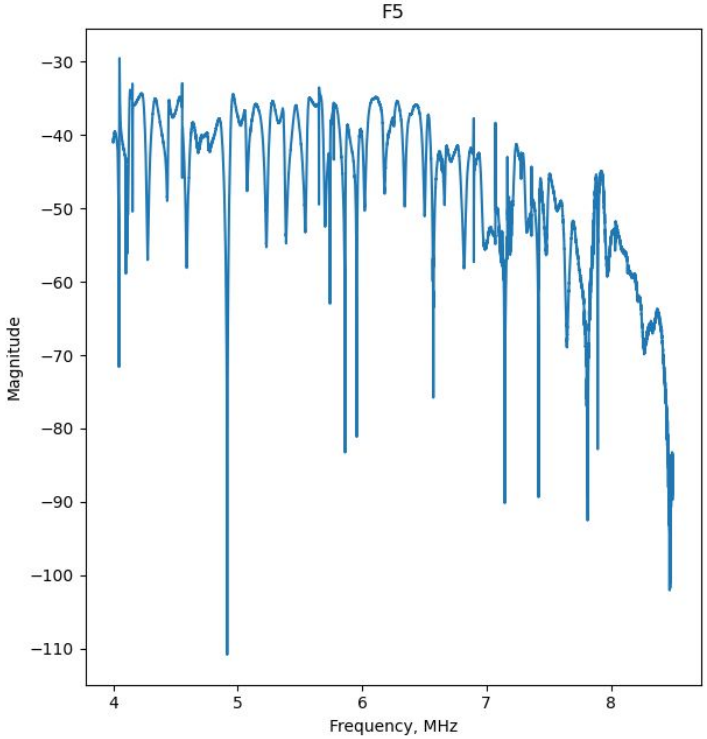
Port is now rotated by 180*



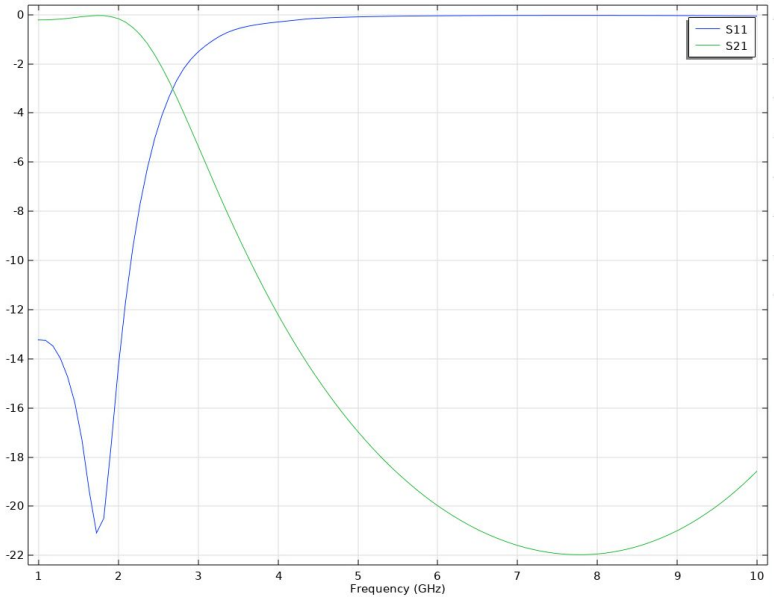
Filters

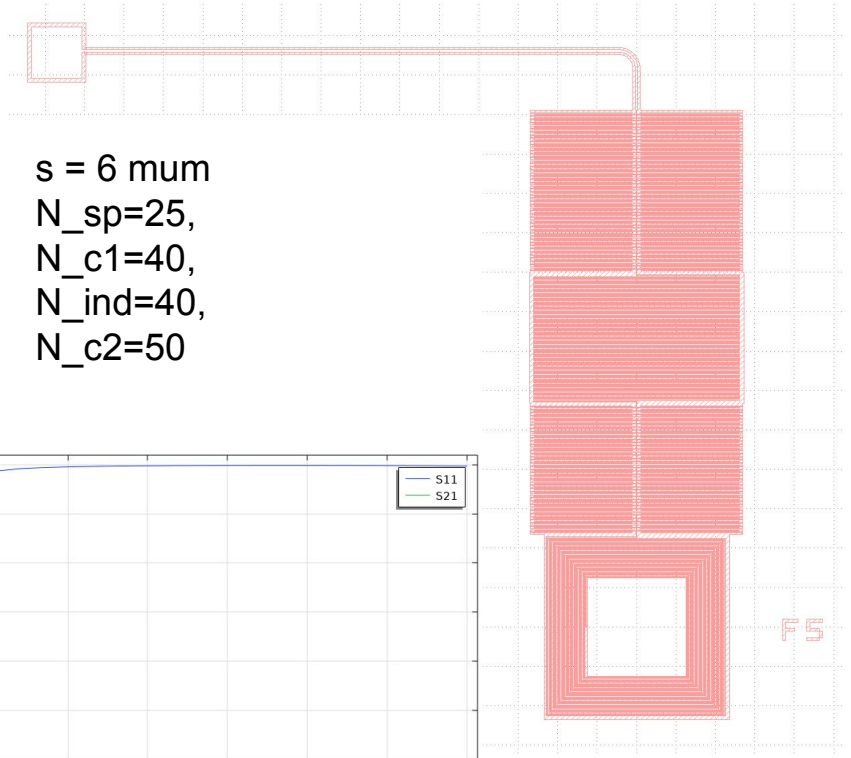


Tested filters

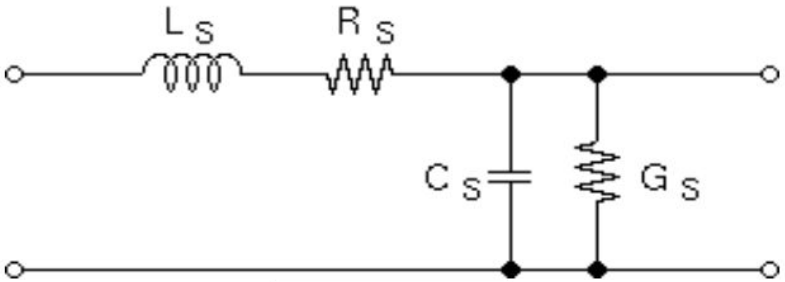


s = 6 mum
N_sp=25,
N_c1=40,
N_ind=40,
N_c2=50



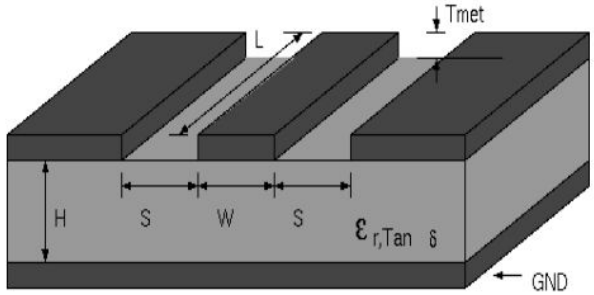


CPW resonator parameters



Values In Sync

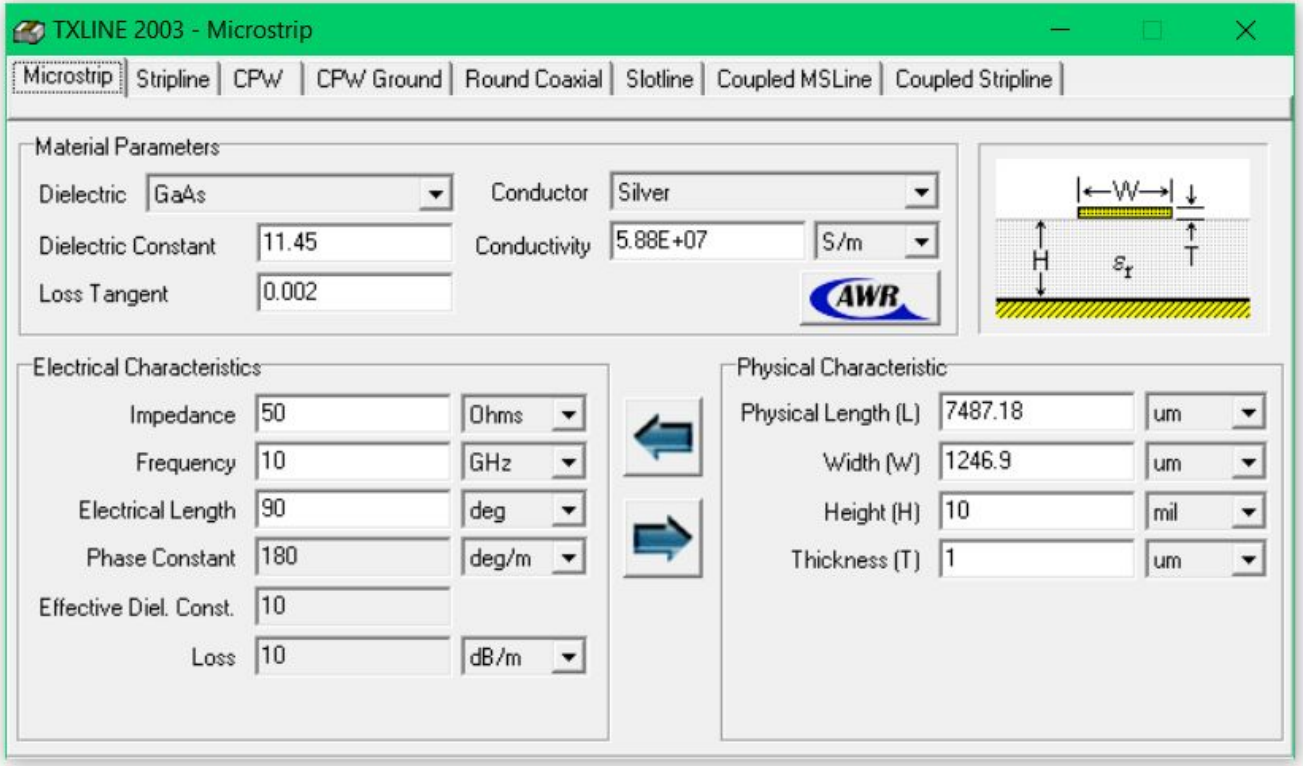
Ls =	4.14368e-10	H /	mm
Rs =	211667	mOhm /	inch
Cs =	4.28206	pF /	inch
Gs =	2711.97	uMho /	inch
Z0 =	49.5774 + j 0 [ohm]		
Loss =	3.39212	dB	
Loss/len =	19.3923	dB /	inch
Skin depth =	0.0443069	mil	
Delay =	0.0371346	ns	
End correction =	0	inch	
Corrected length =	4443	um	



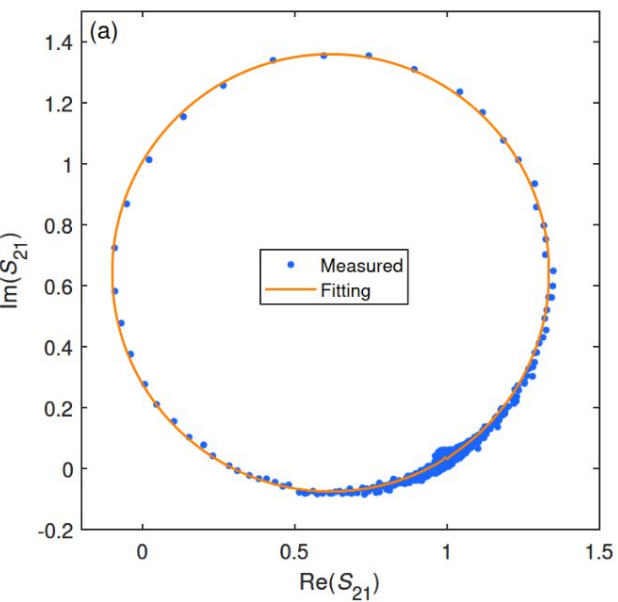
Metal width (W)	18	um	calc
Metal spacing (S)	11	um	calc
Trace length (L)	4443	um	
Metal thickness (Tmet)	0.2	um	
Metal resistivity (RHO)	3e-08	Ohm -	m
Metal surface roughness (RGH)	0.001	mil	-rms
Substrate thickness (H)	670	um	calc
Substrate relative dielectric constant (Er)	11.45		calc
Substrate loss tangent (tand)	0.01		
Frequency	6	GHz	
Analyze Reset	☐	Include bottom side ground	
Characteristic Impedance	49.5774	[ohms]	
Electrical Length	80.2108	[degrees]	

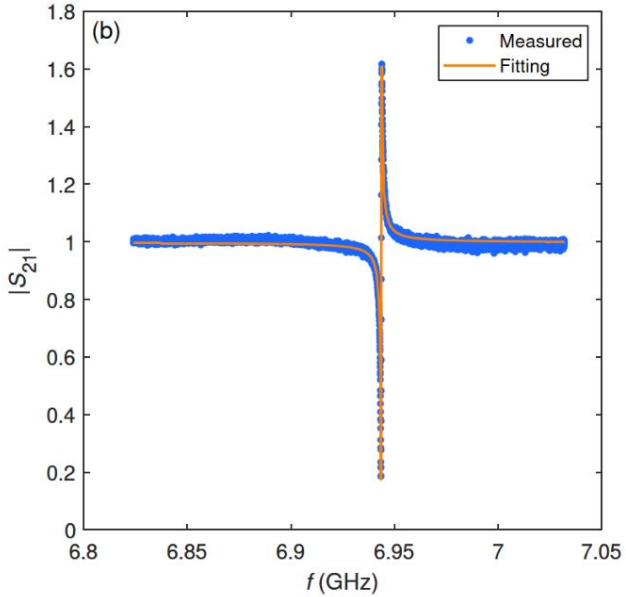
https://wcalc.sourceforge.net/cgi-bin/coplanar.cgi

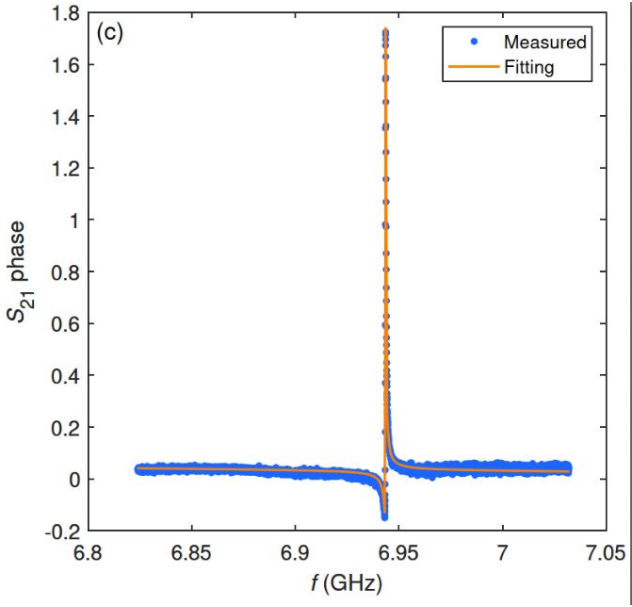
Also one can use TXline



Fitting notch-type resonator

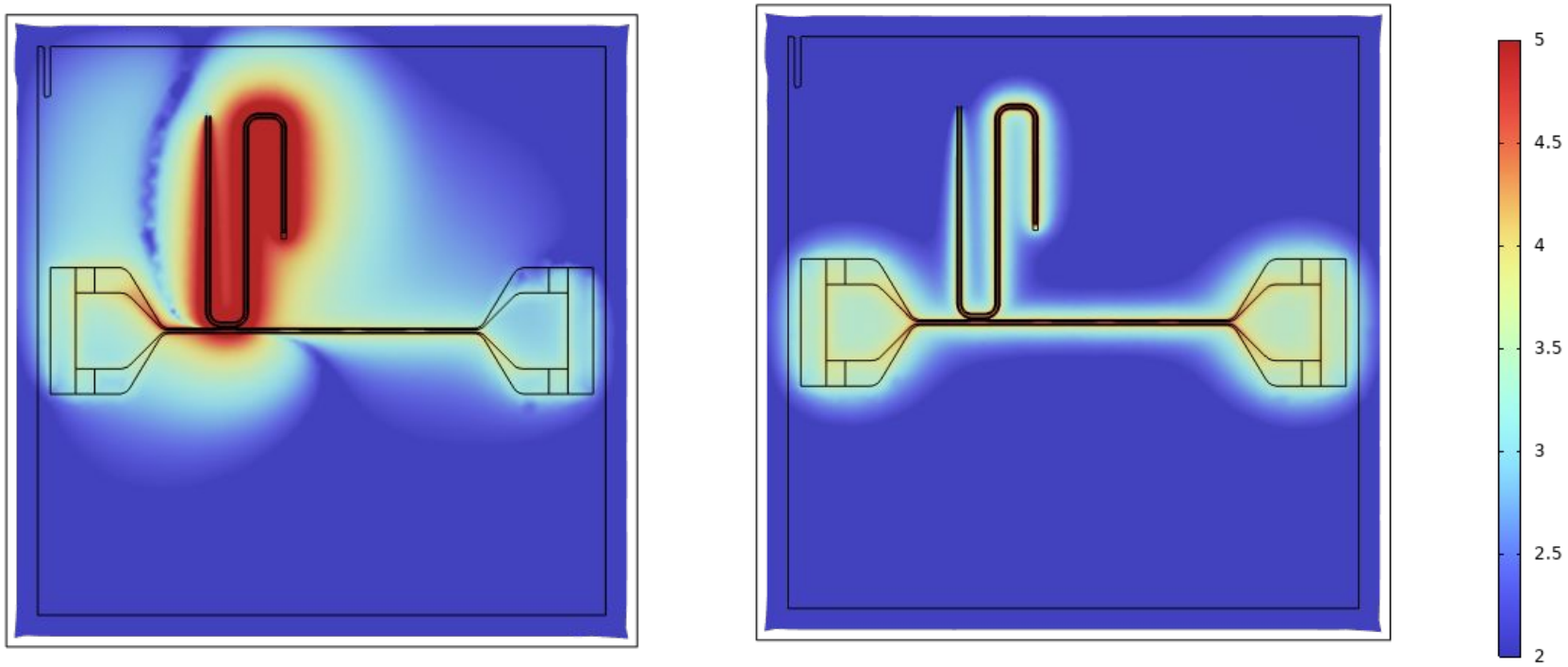




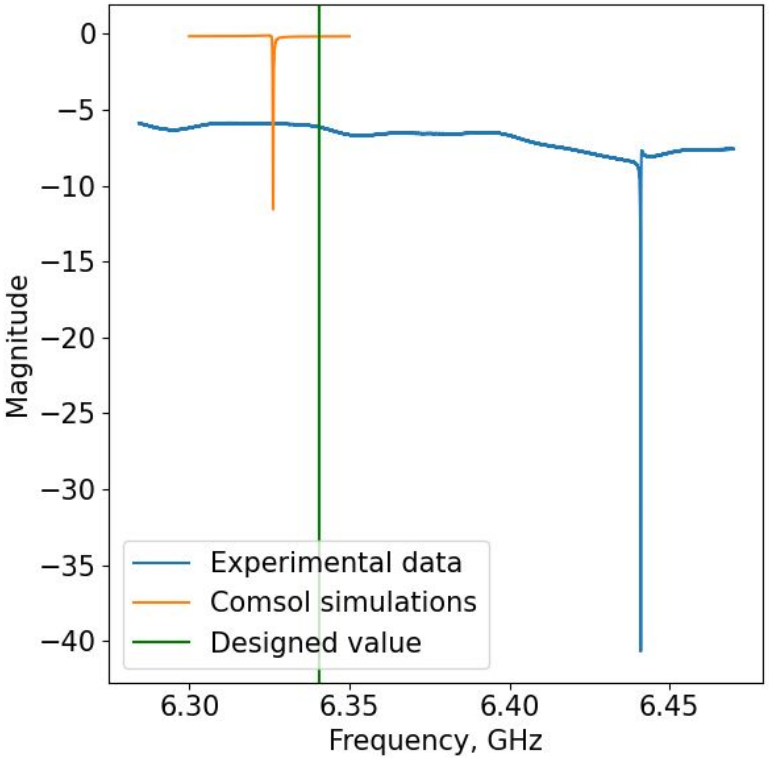


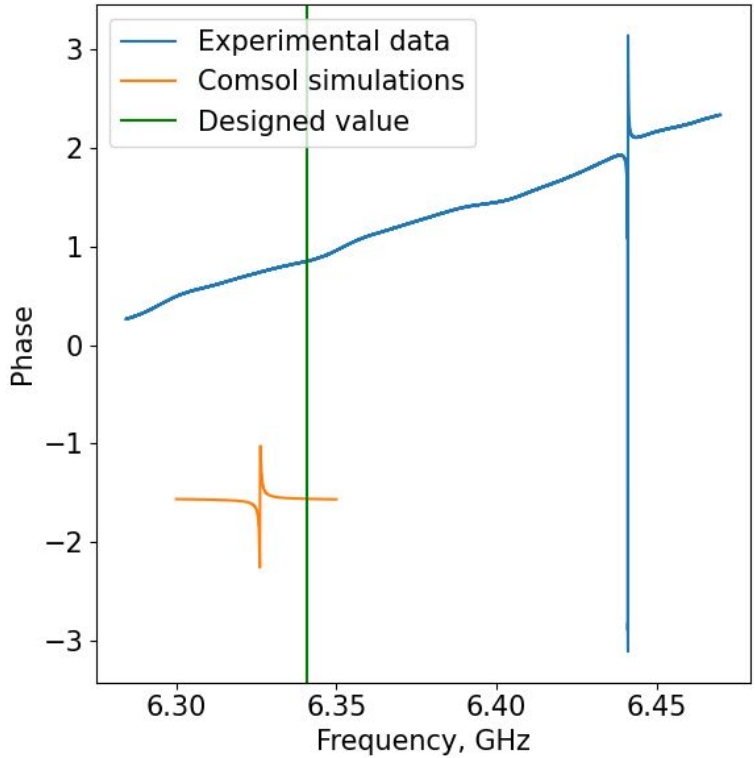
https://github.com/sebastianprobst/resonator_tools

Field distribution in log scale



Notch-type resonator





Sweep distance to GND from central line - d