SAFARI

A Simulation of Twisted Pairs

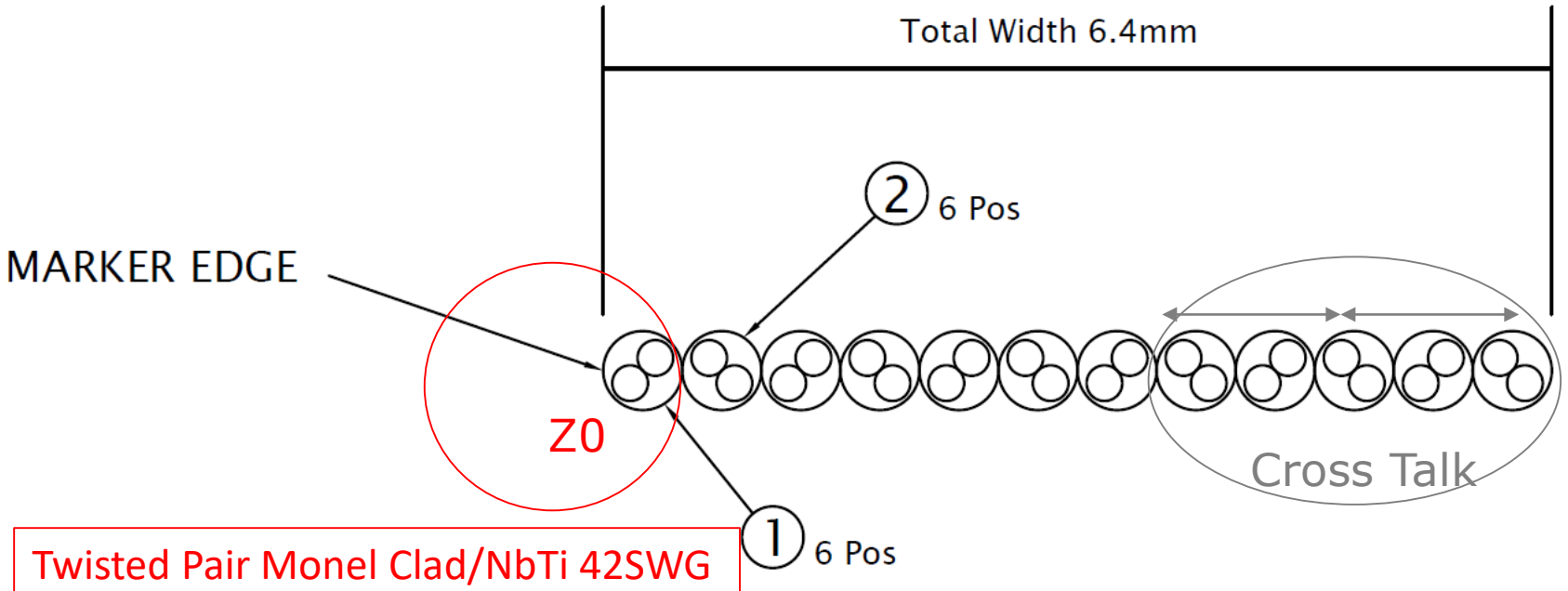
- Twisted Pair Monel Clad/NbTi 42SWG (in use in the Lab)

SRON

Amin Aminaei, 14 April 2020

Netherlands Institute for Space Research

Netherlands Organisation for Scientific Research (NWO)



Twisted Pair Monel Clad/NbTi 42SWG

Item 1&2
Wire Diameter Bare: 0.1mm
Wire Insulated Diameter: 0.127mm
Insulation Material: Formvar

Wire Resistance Ohm's/Mt: 85.20

$$R_{dc} = 2/(\sigma.A)$$

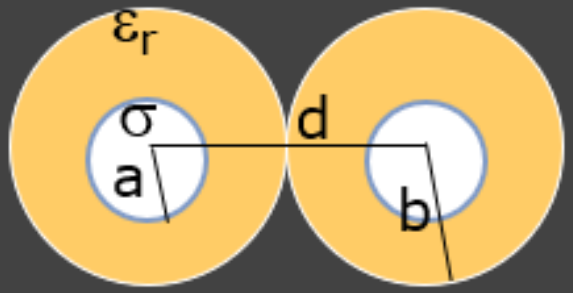
$$\sigma = 2.99E6$$

A = Cross section of conductor

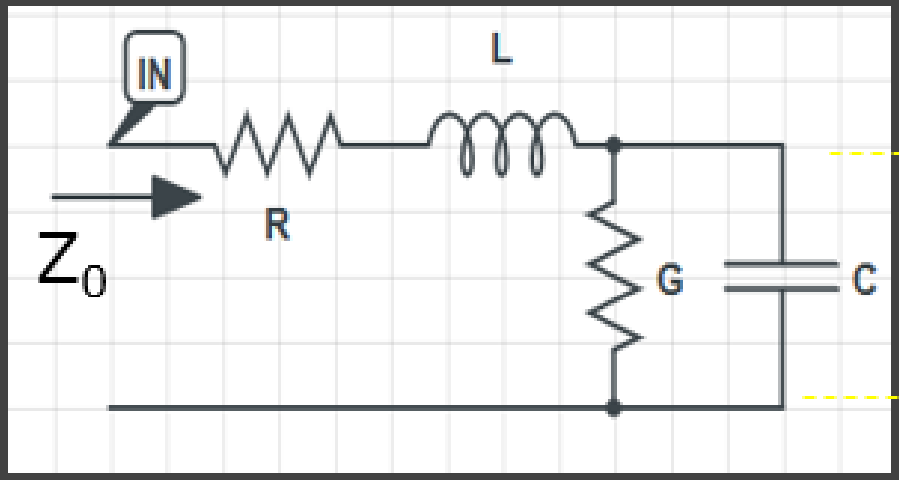
$\sigma = Electrical\ Conductivity$

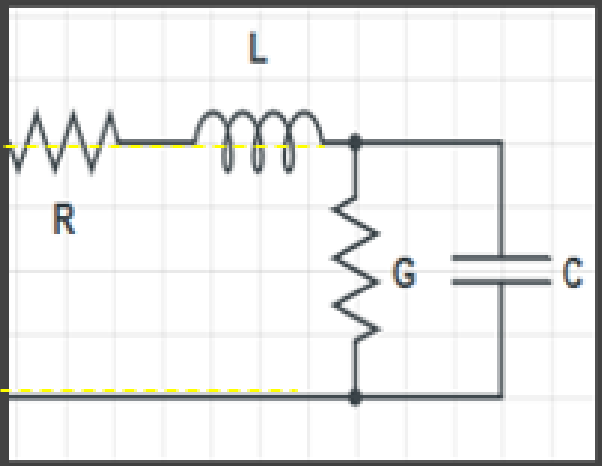
Network Model

σ 2.99E6
Conductor diameter 2a=2x100µm (a=50um)
Insulated diameter 2b=127um
distance between cable centres, d=127um
permittivity of inner dielectric and outer dielectric permitivity(2.8)
Polyvinal formal (Formvar) 2.8



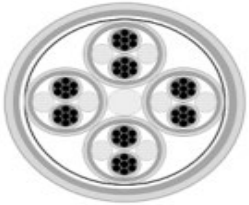
$$Z_0 = \sqrt{\frac{Z}{Y}} = \sqrt{\frac{R(\omega)+j\omega.L(\omega)}{G(\omega)+j\omega.C(\omega)}}$$





SACAMOS

State of the Art Cable Models for Spice



WWW.SACAMOS.ORG

```
High frequency Per-Unit-length Inductance Matrix, L
          1  Dimension of L
 2.92754683E-07
High frequency Per-Unit-length Capacitance Matrix, C
          1  Dimension of C
 3.80062257E-11
```

Twisted_pair

Conductor Radius (m):
0.000050

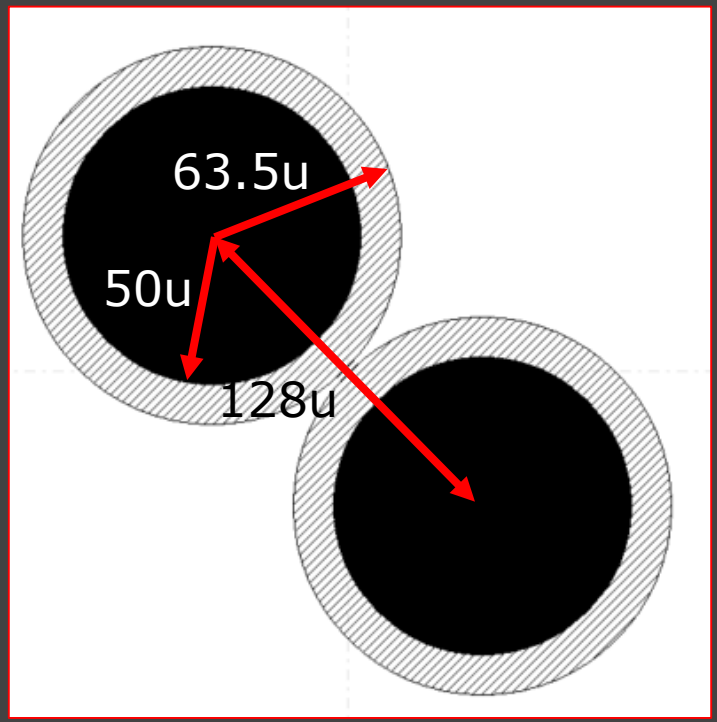
Conductor Separation (m):
0.000128

Dielectric Radius (m):
0.000064

$Z_0 = (L/C)^{0.5}$

At High Frequencies

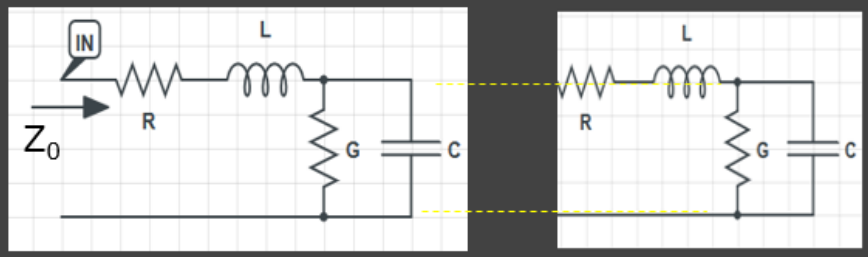
= 87.8 Ohm



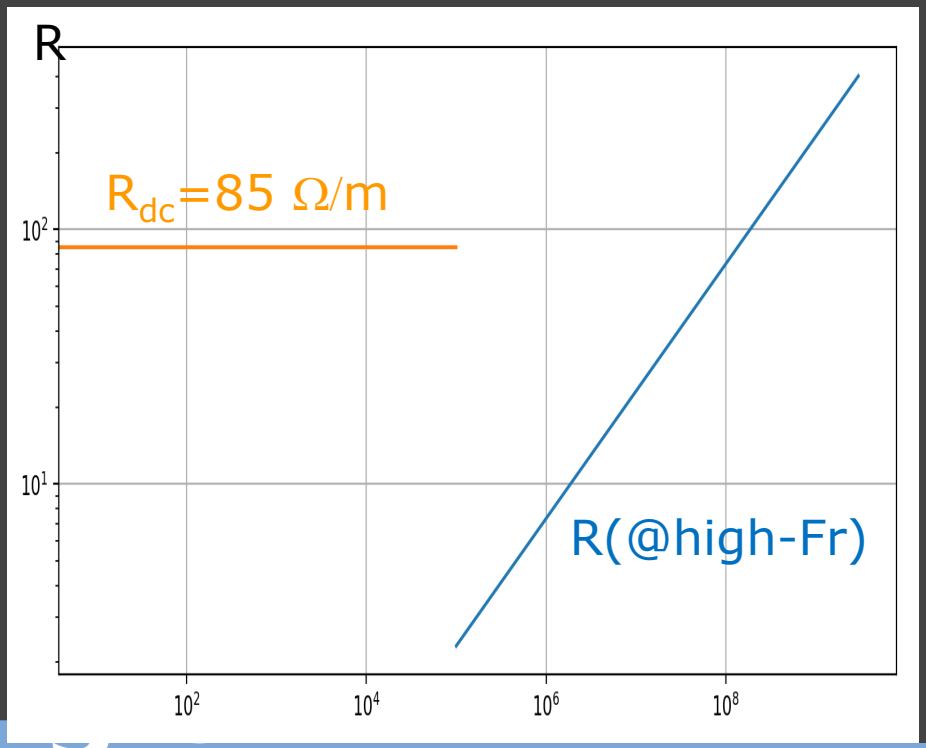
SRON

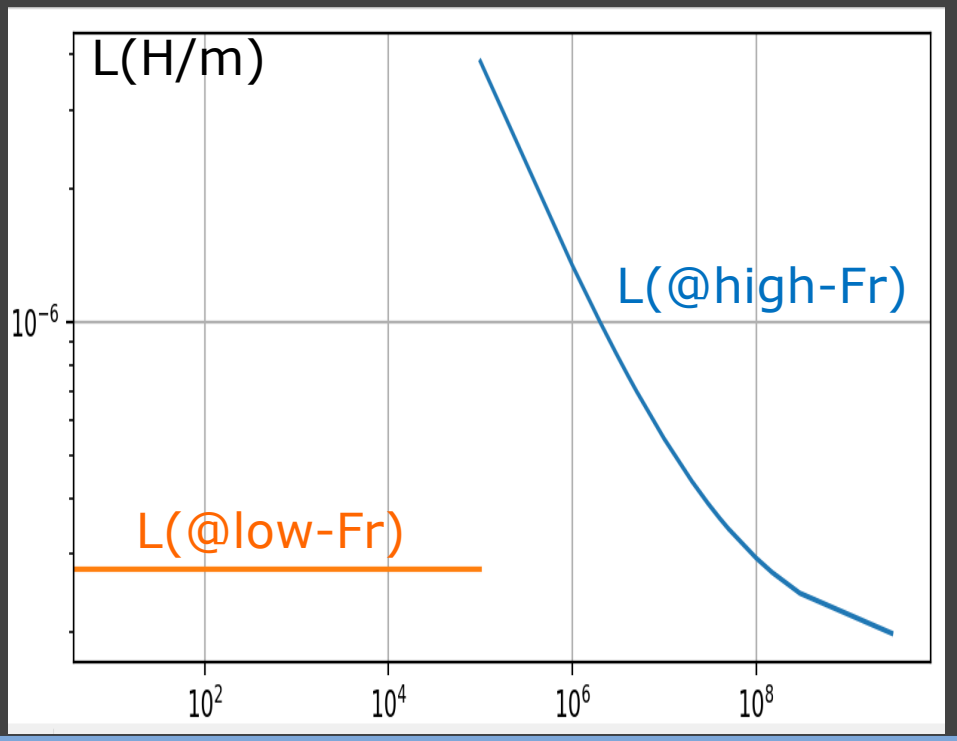
Zo Elements

SS Stainless Steel σ 1.45E6
diameter 2a=2x100µm (a=50um)
total wire =300 µm
insulation 100.0 µm, each side
distance between cable centres, d=300um
permittivity of inner dielectric and outer dielectric (4)



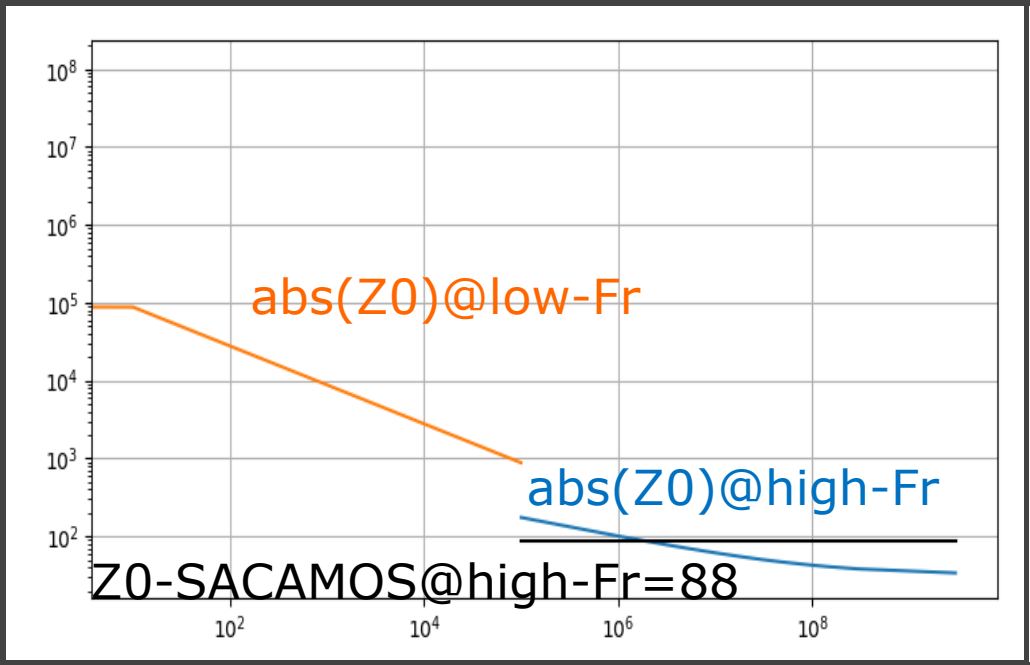
G=1.95femto S/m C=0.7pF/m



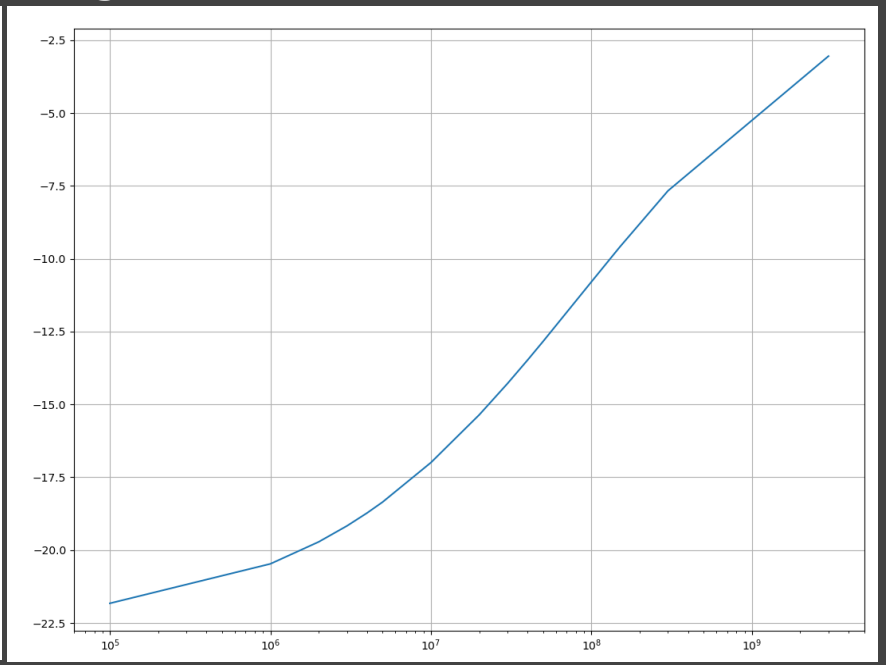


Characteristic Impedance, Z0

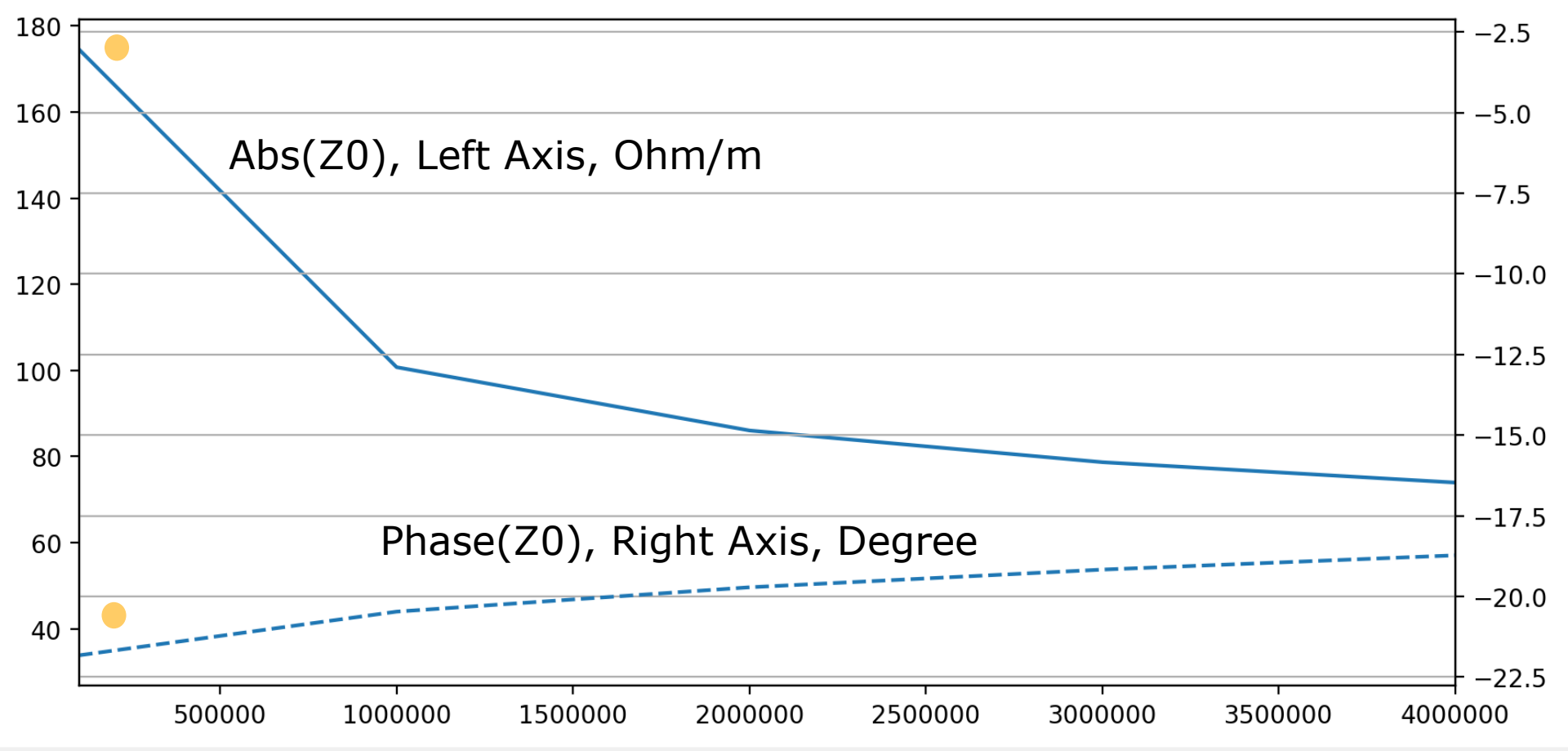
Ω/m



Degree



Z0 of NbTi 42SWG, in use in the lab, **100KHz-4MHz**



OBR due to NbTi 42SWG, in use in the lab, Length=0.6m **as input loom in LT-Spice model**