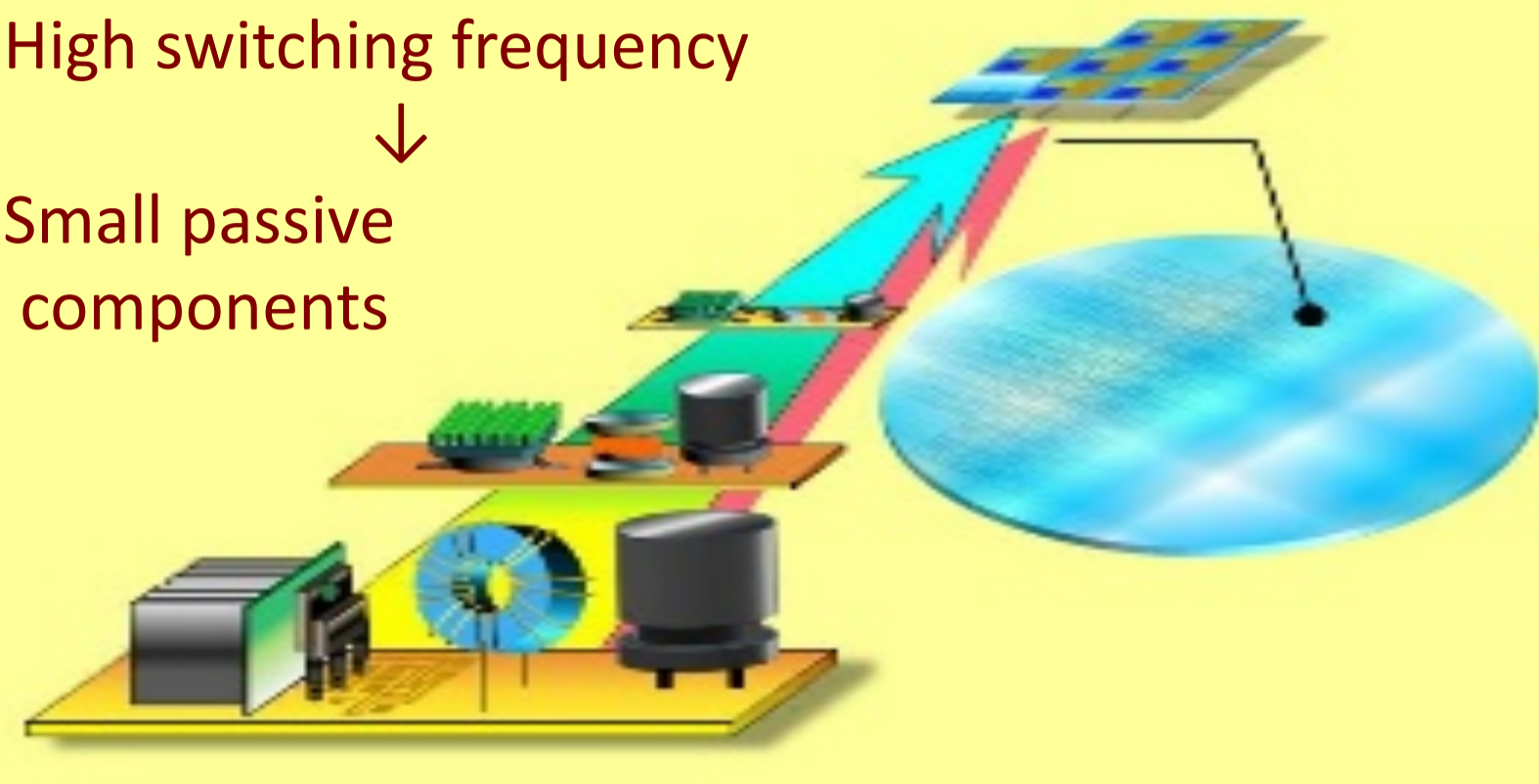


Introduction

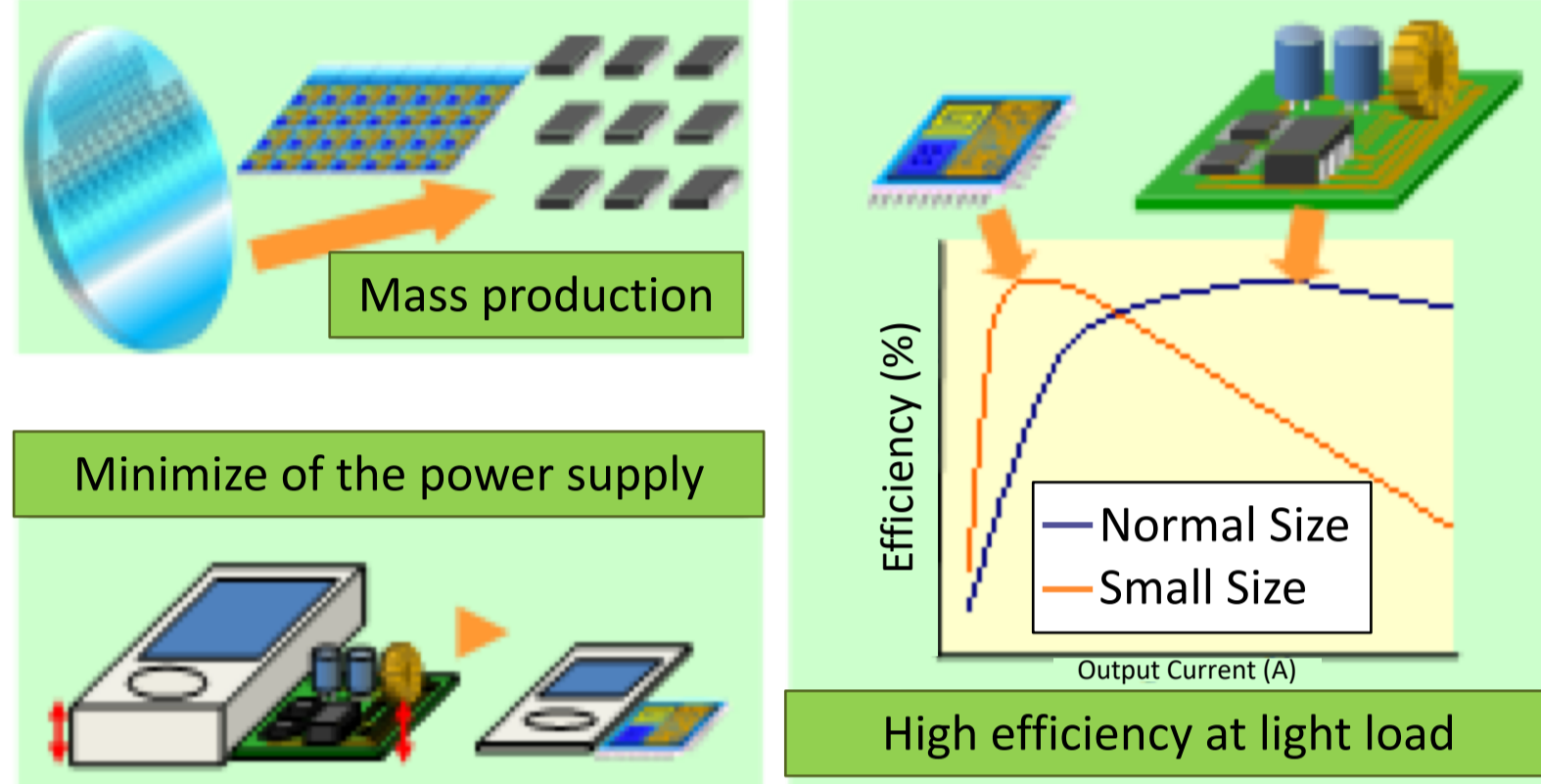
Miniaturization of the power supply

High switching frequency

Small passive components

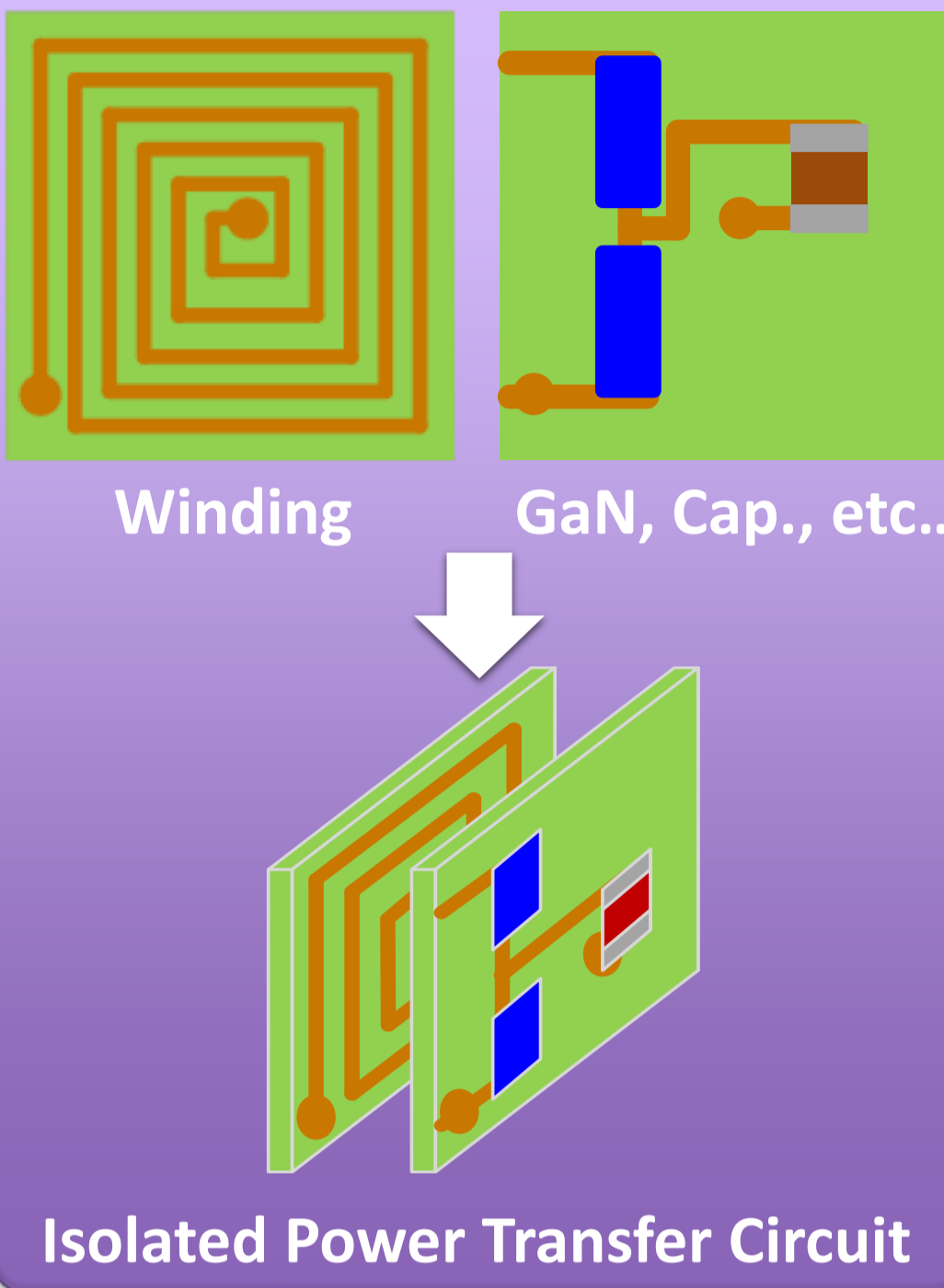


Advantages of Power-SoC

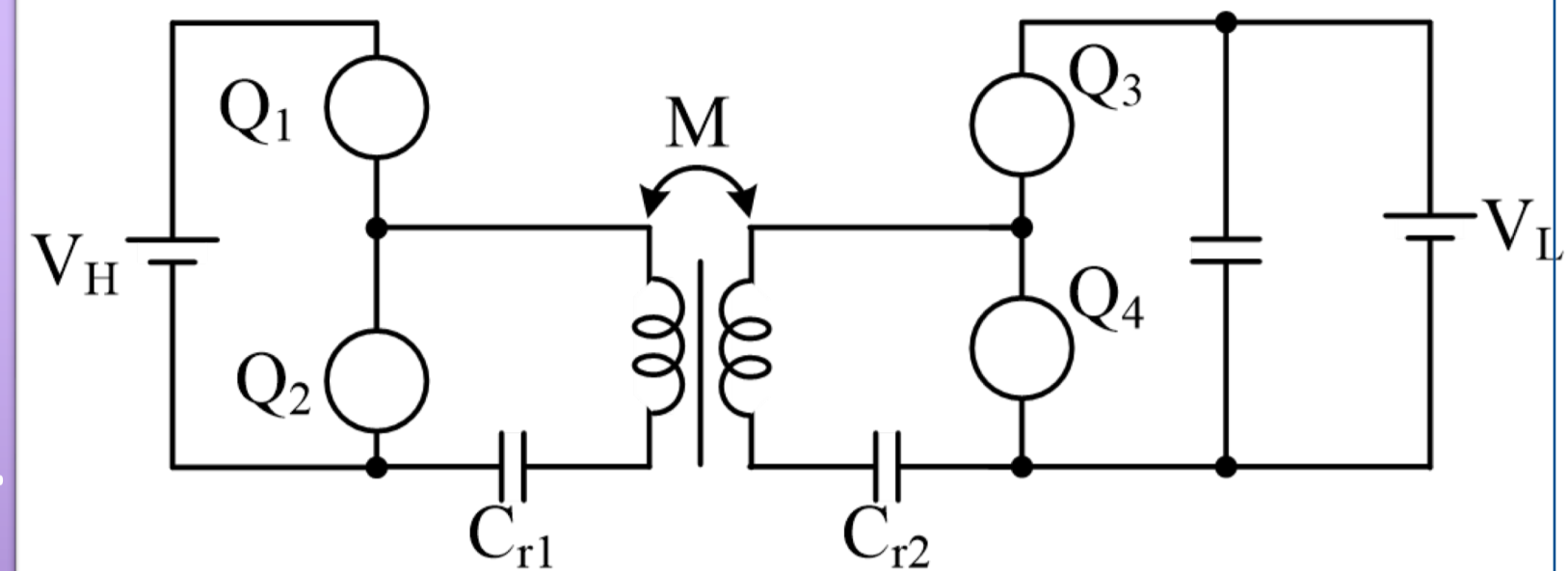


Air-Core Spiral Coil Loss Evaluation on Prototype Board

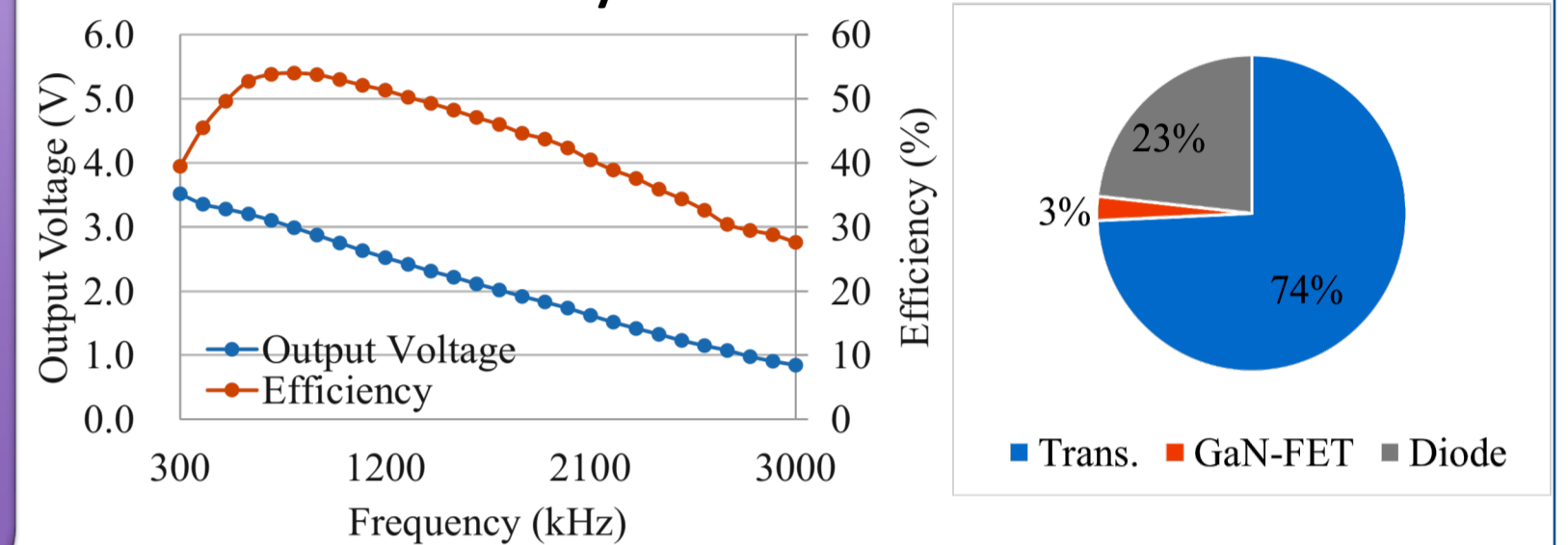
Concept of Isolated Power-SoC



Current Resonant Converter



Peak efficiency is 55%.



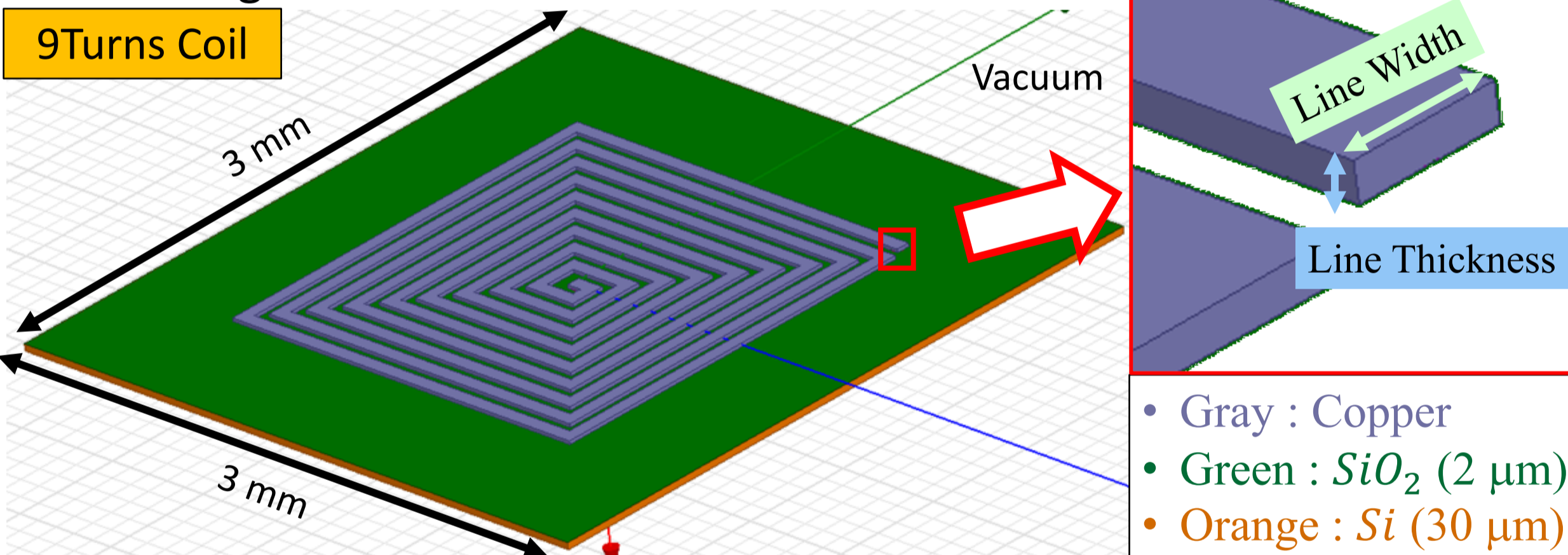
Transformer loss accounts for 74% of total loss.

Transformer loss reduction is needed.

Design Considerations of Air-Core Spiral Coil

Electromagnetic Field Simulation

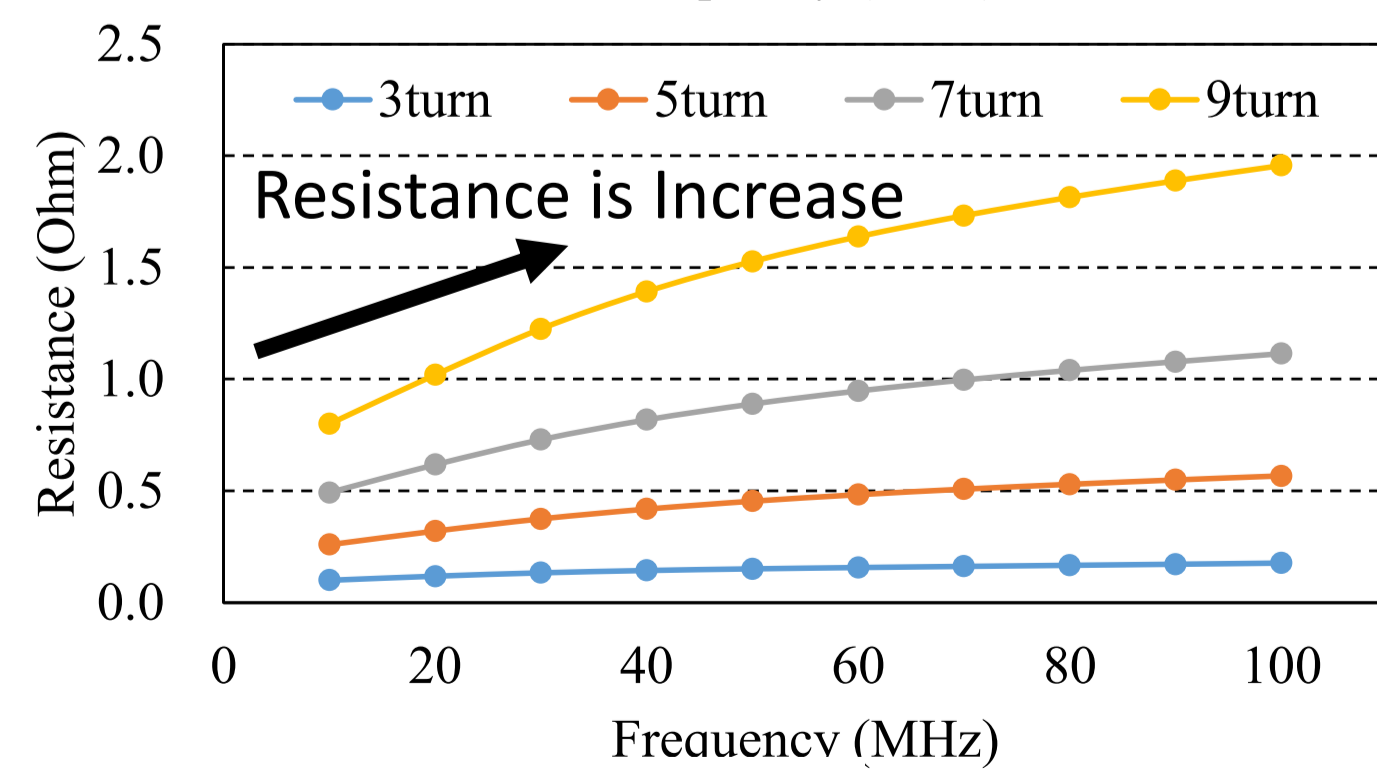
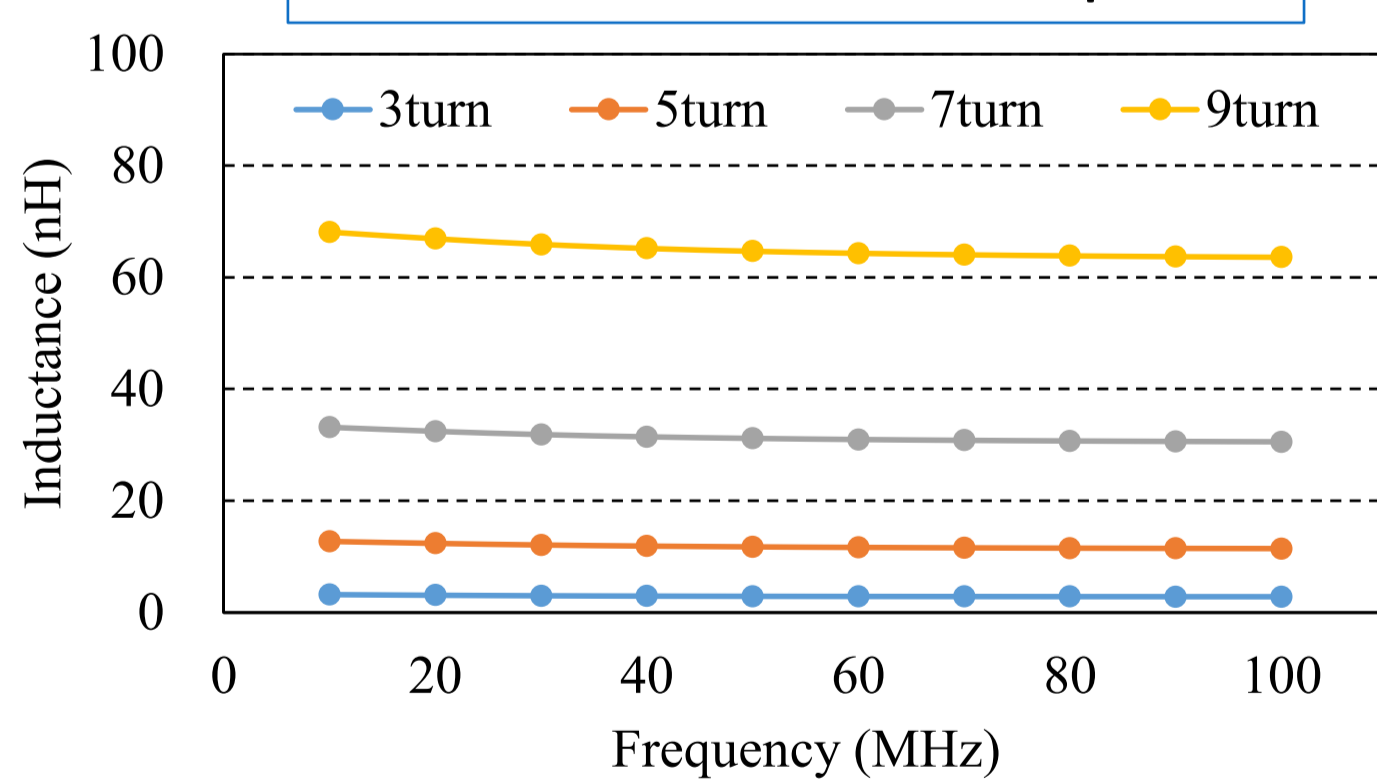
9Turns Coil



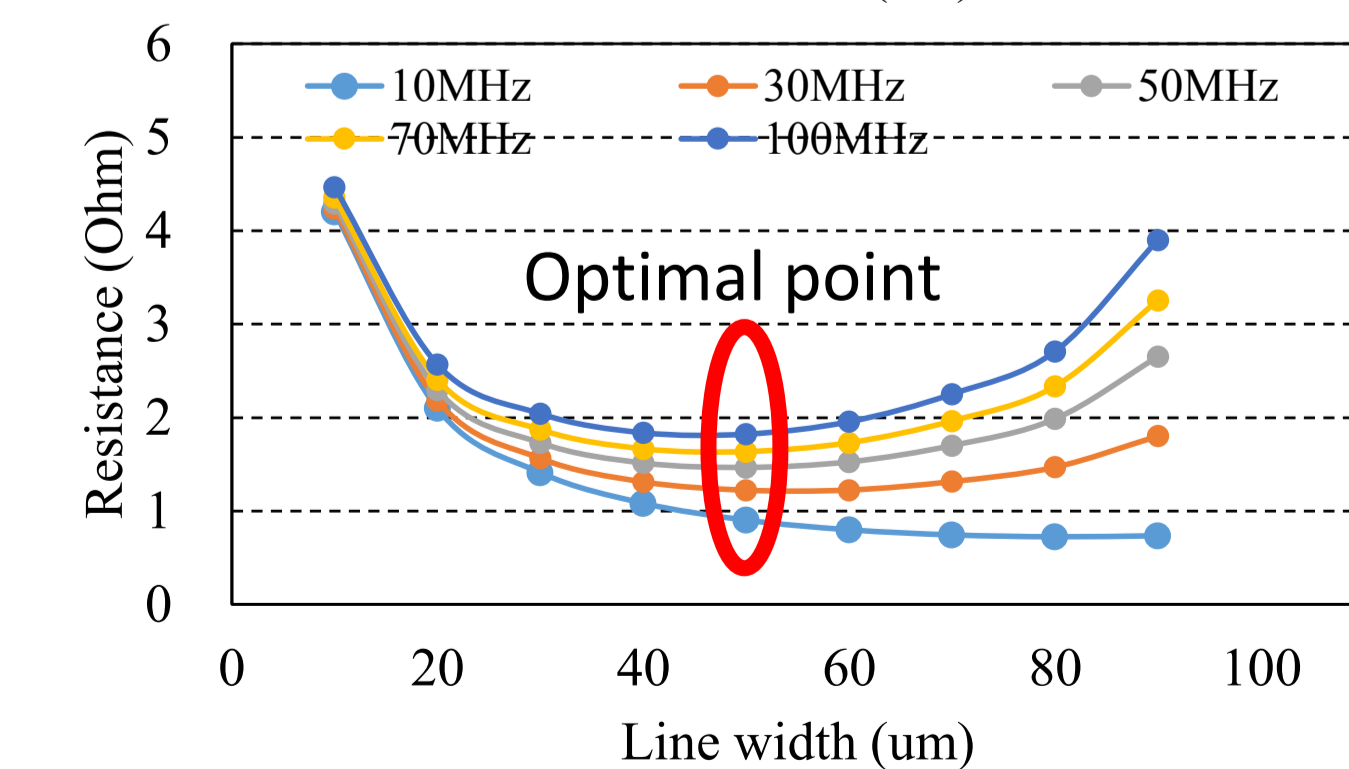
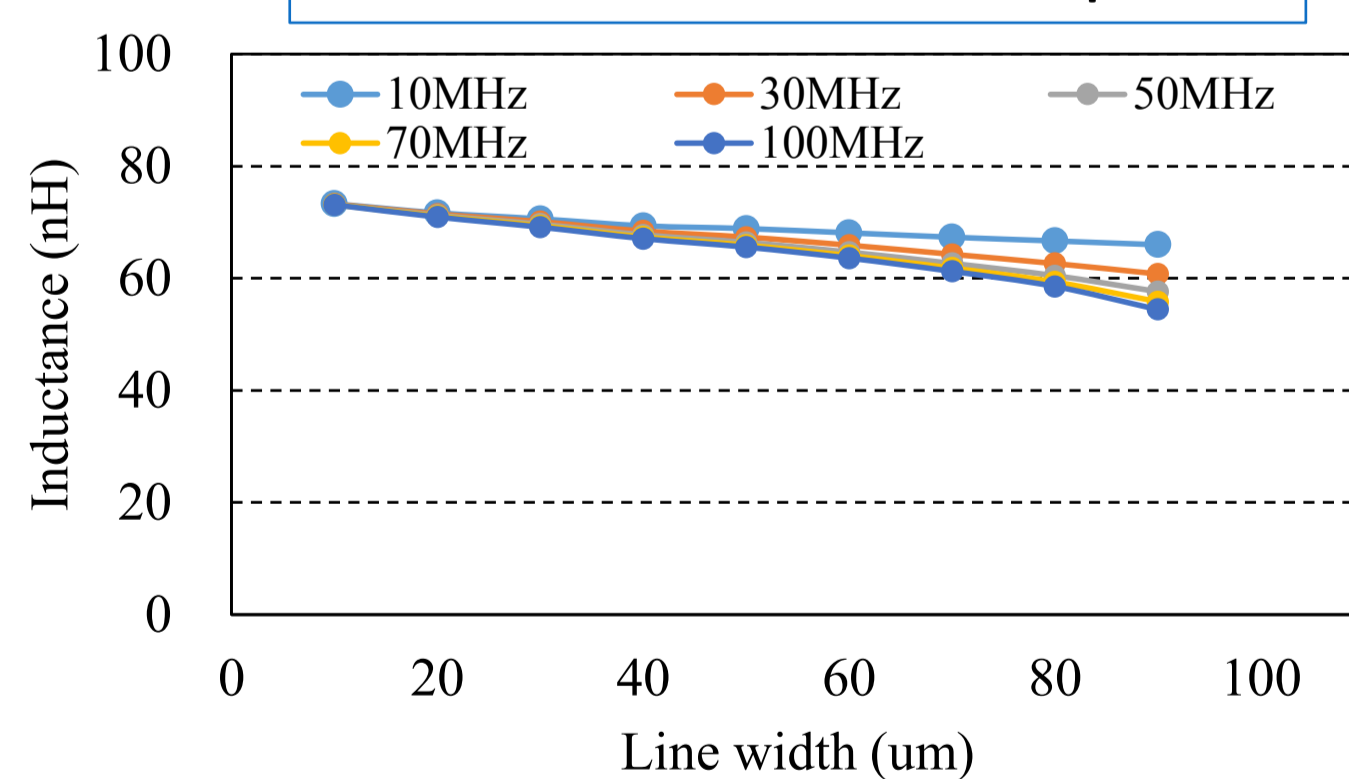
Simulation Conditions

	Relative Permittivity	Relative Permeability	Conductivity [MS/m]
Cooper	1	1	58
SiO ₂	4	1	0
Silicon	11.9	1	0
Vacuum	1	1	0

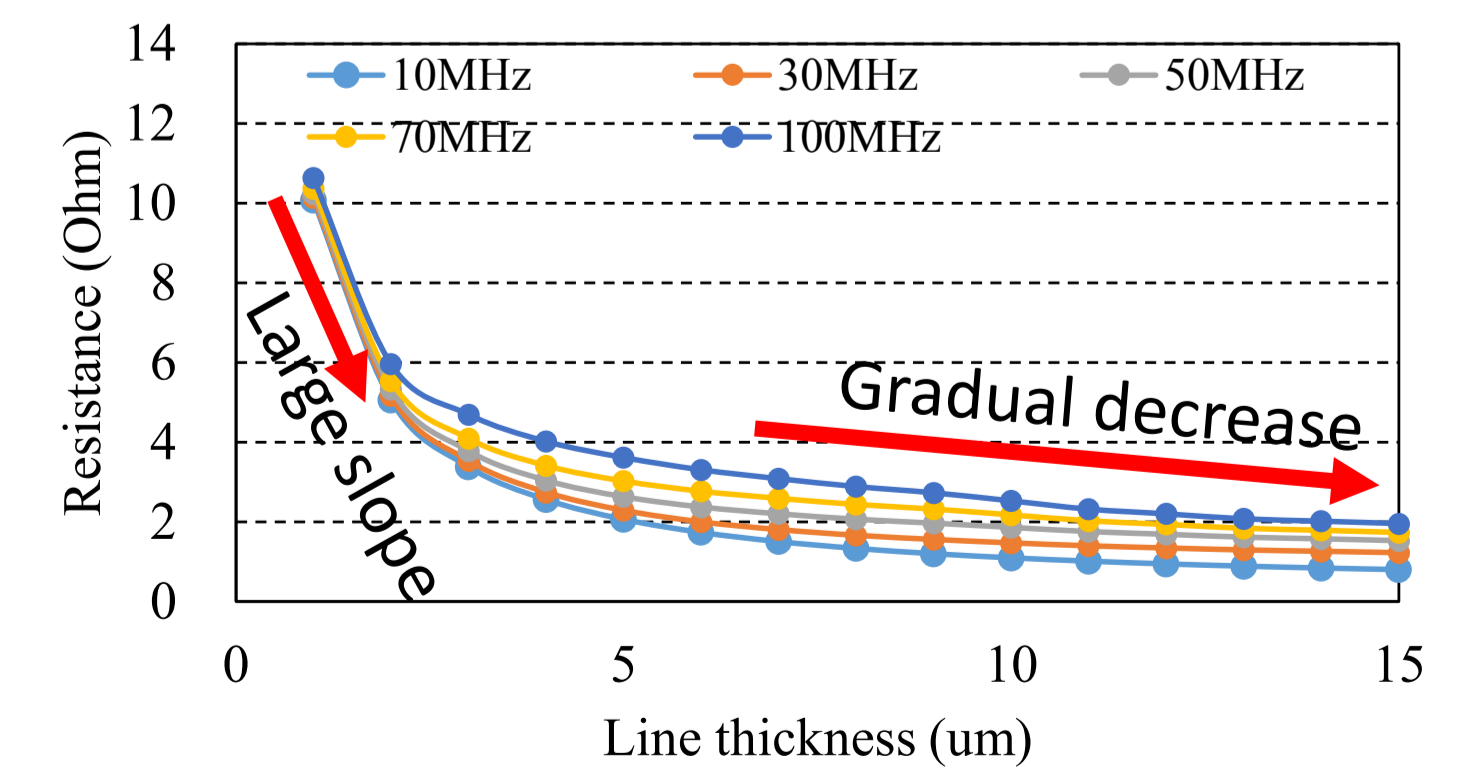
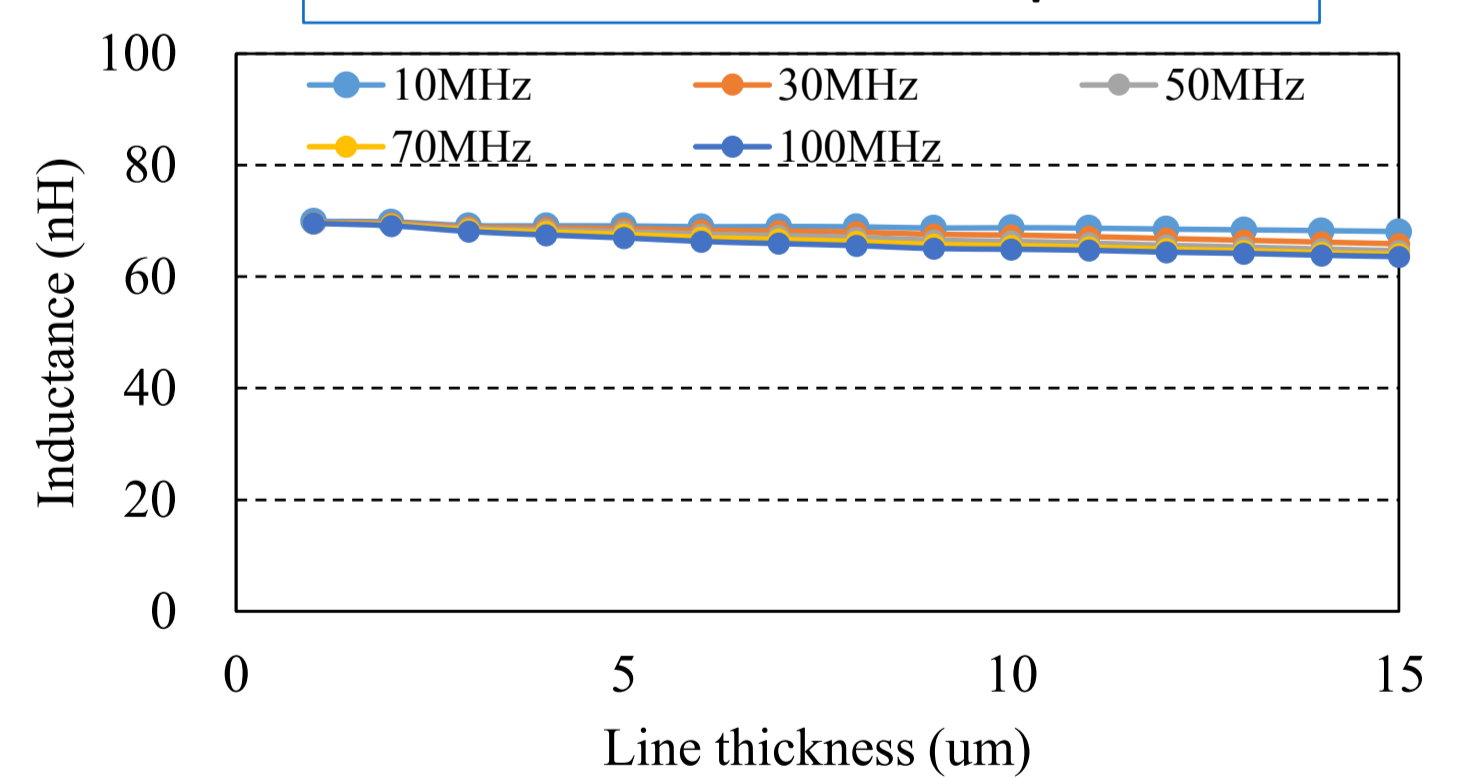
Line Width = 60 μm
Line Thickness = 15 μm



9Turns Coil, 100 MHz
Line Thickness = 15 μm



9Turns Coil, 100 MHz
Line Width= 60 μm



conclusions

It is confirmed that the design parameters can be optimized if the inductance and the maximum operating frequency are decided. The number of turns is decided from the inductance, and the optimal line width is 50μm in this case. The line thickness is preferred 5μm or more.