KEYSIGHT

Lab1-
Introduction to UMS GH15 PDK

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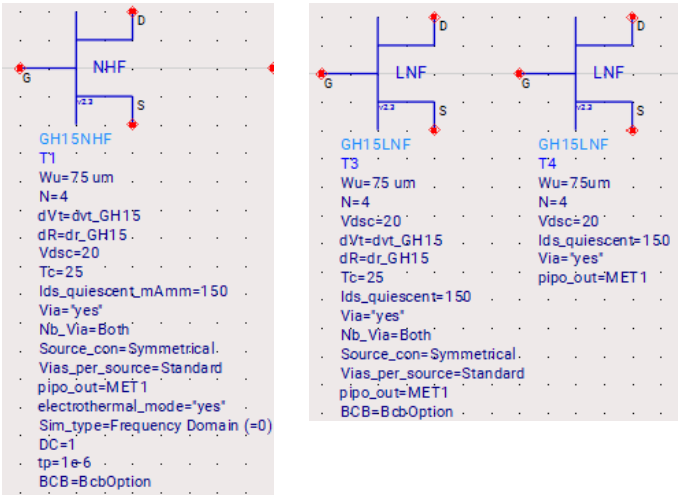
Lab 1 Overview

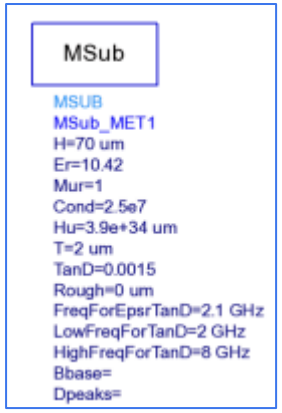
Objectives and Purpose

- Lab 1 will introduce the United Monolithic Semiconductors (UMS) 150nm GaN Process Design Kit (PDK) in Keysight's Advance Design System (ADS)
  - UMS website: https://www.ums-rf.com/
  - UMS Product Examples: https://www.ums-rf.com/products/
  - UMS Design Kits: https://my.ums-rf.com/login/
- Lab1 steps are:
  1. Create an ADS workspace "pdk_analysis" and install the PDK
  2. Inspect the component palette & parameters; place components (schematic & layout)
  3. Simulate Passive components: a)Spiral, b) MIM Cap, c) Thin Film Resistors, d) MLIN,
- Students should follow along the best they can. The lab will be recorded allowing students to return to the video and follow through the steps.

UMS GH15-1x Process and Device Model *

- Process Used: UMS GH15-11 (v2.3) 150 nm gate length AlGaN/GaN process
- Active Devices Used:
  - LNA = GH15LNF_NOFP & GH15NHF_NOFP; Linear noise model & non-linear model of transistor without field plate for low noise amplifier applications.
  - PA=GH15NHF: ” non-linear transistor model for power amplifier applications
- The substrate technology used includes BCB





GH15LNF noise capability validation domain	
Maturity level	**Confirmed**
Technology versions	**All**
Number of gate fingers	**4, 6, 8 fingers**
Unit gate width	**20 µm to 50 µm**
Frequency	**6 GHz – 40 GHz**
Drain voltage bias	**5V to 20V**
Drain current operating point	**50 to 150 mA/mm**
Temperature (SiC substrate)	**25 °C**

* Ref: UMS_GH15-1x_Design_manual_v3.0 - SP_30S_Electrical_Models_GH15-1x.pdf

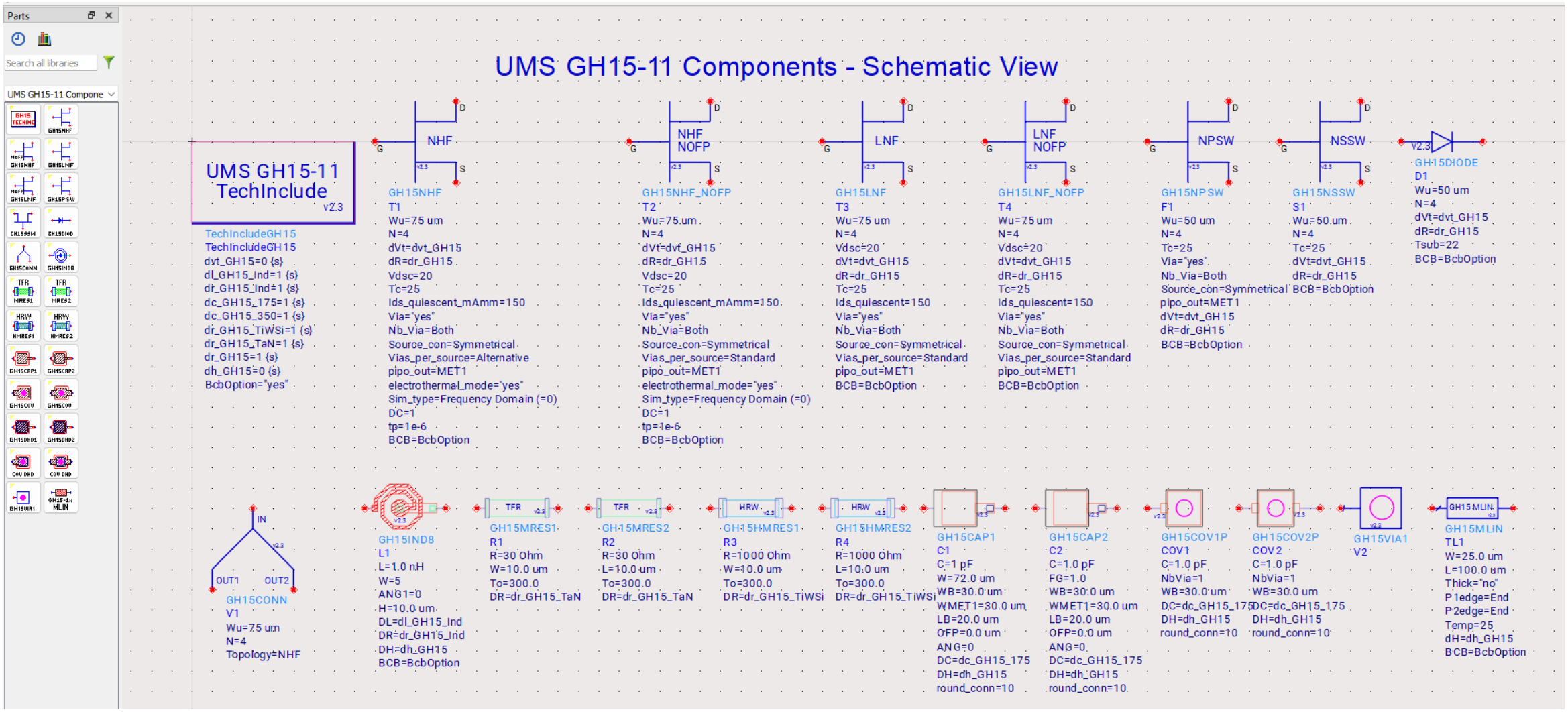
Lab 1, Steps 1 & 2

Create Workspace and Review PDK

UMS PDK install, schematic, layout, 2-to-3D

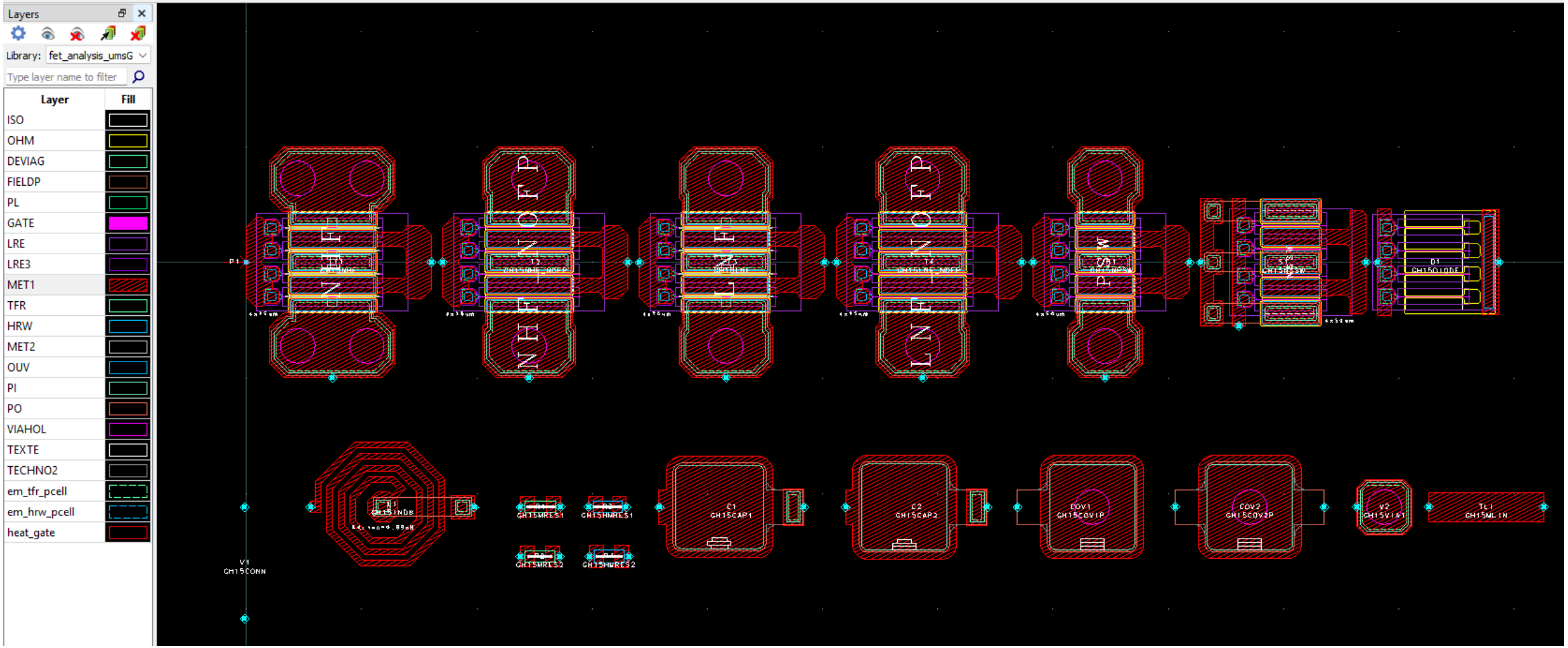
UMS GH15-11 ADS Components

Schematic View



UMS GH15-11 ADS Components

Layout View



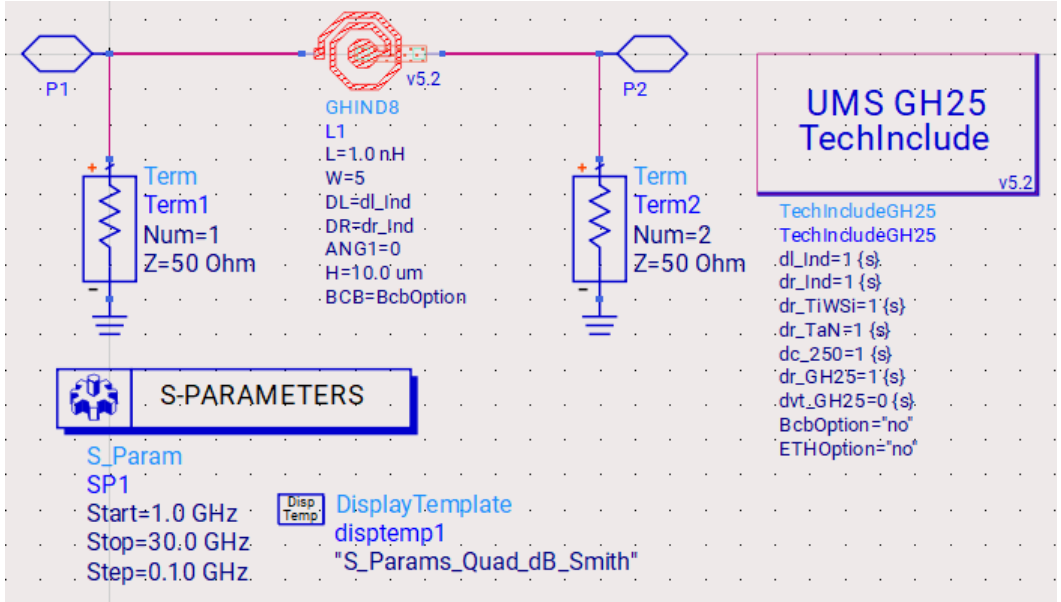
Lab 1, Steps 3a, b, c

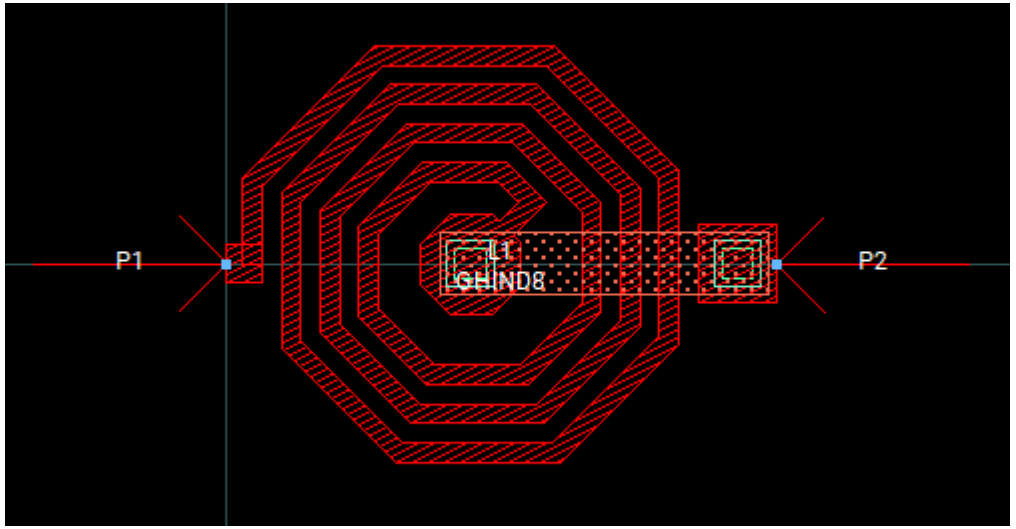
Simulate Passive components

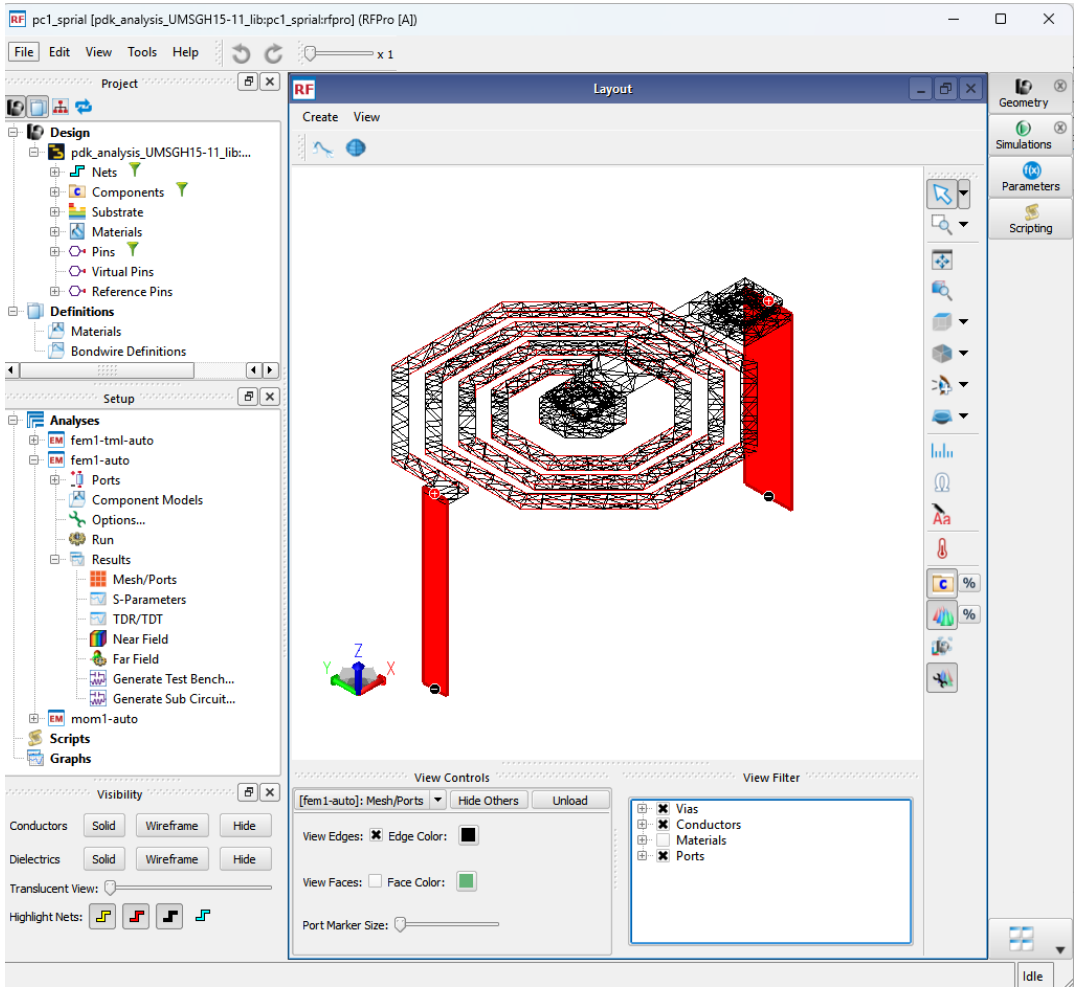
Simulate L, C, R, MLIN in Schematic and EM with RFPro

Spiral

Schematic and EM simulations

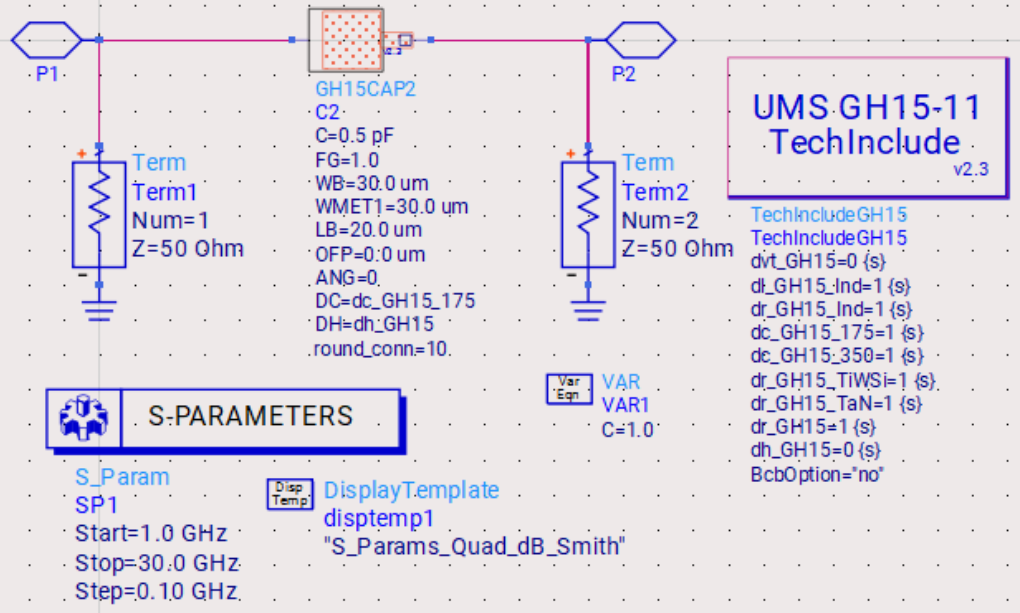


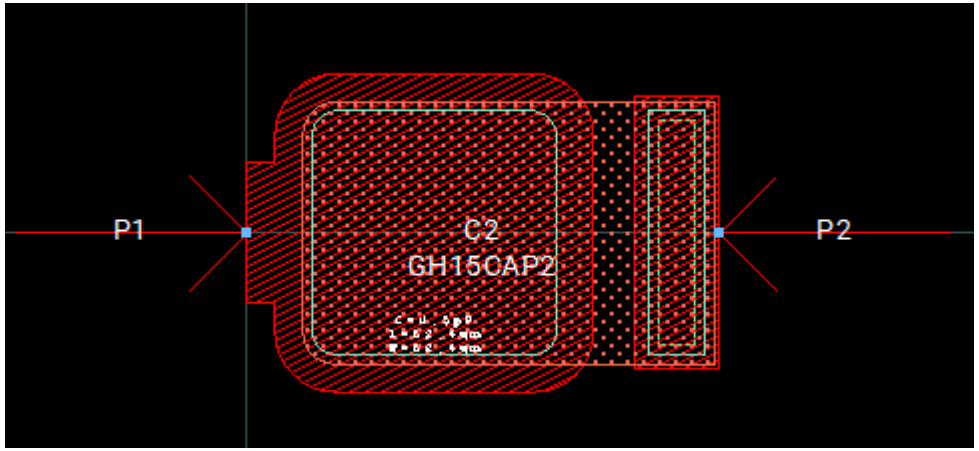


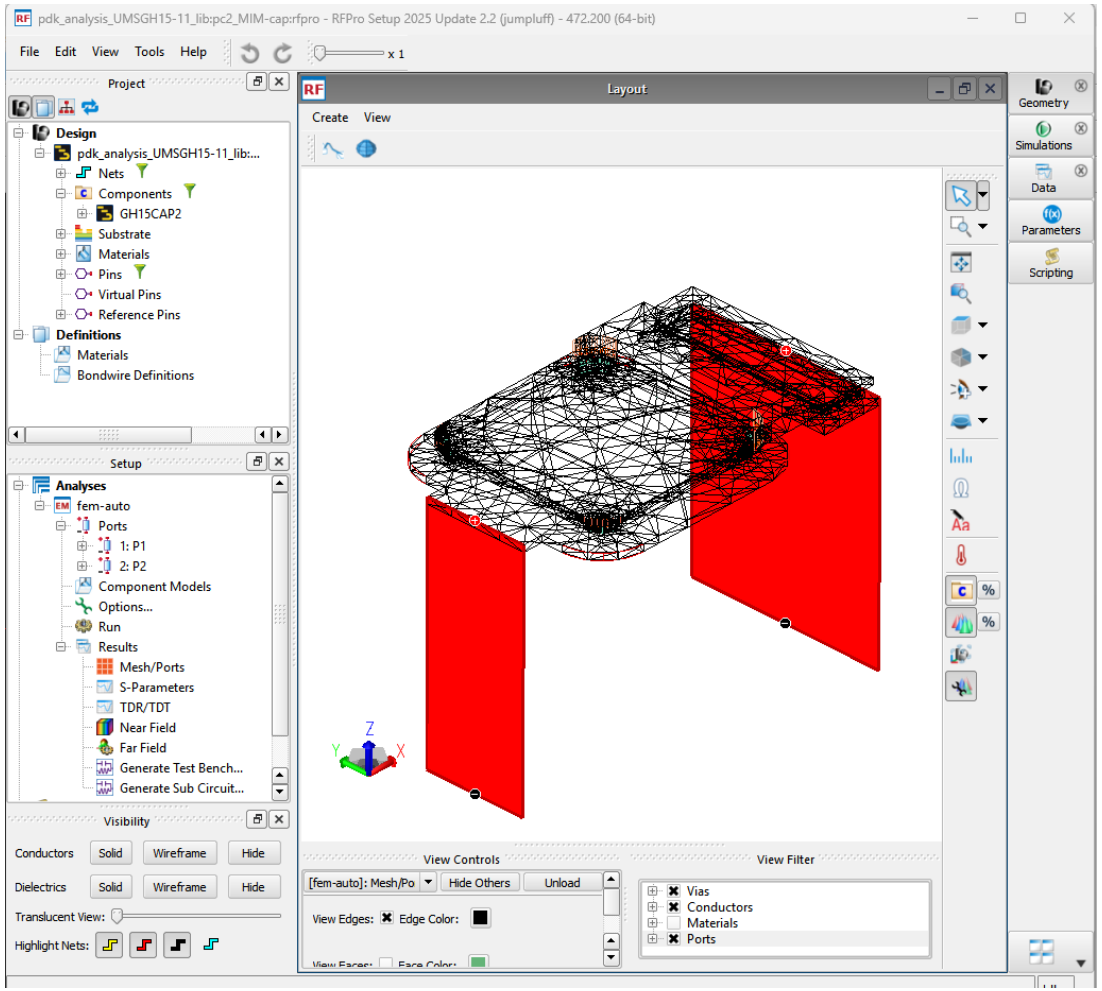


MIM Cap

Schematic and EM simulations

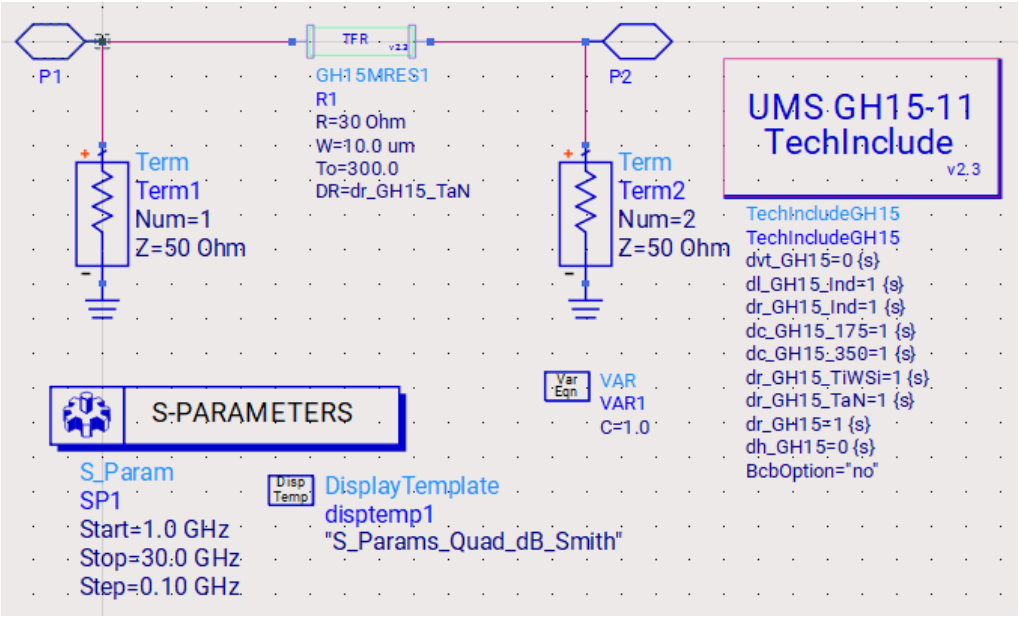


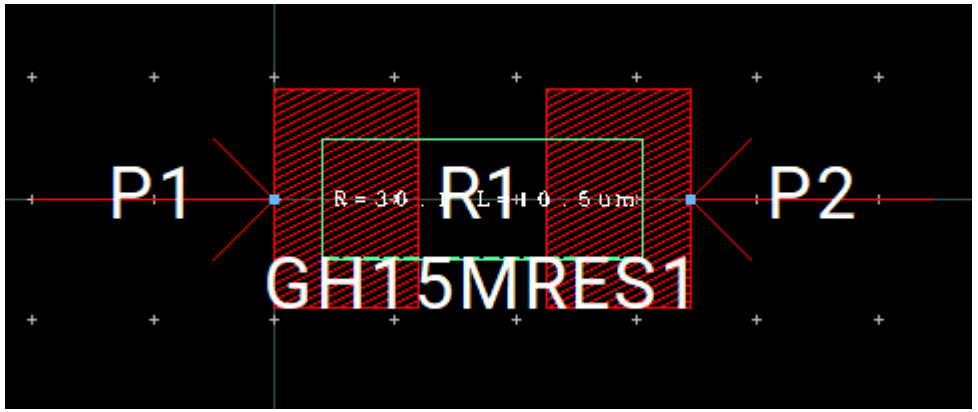


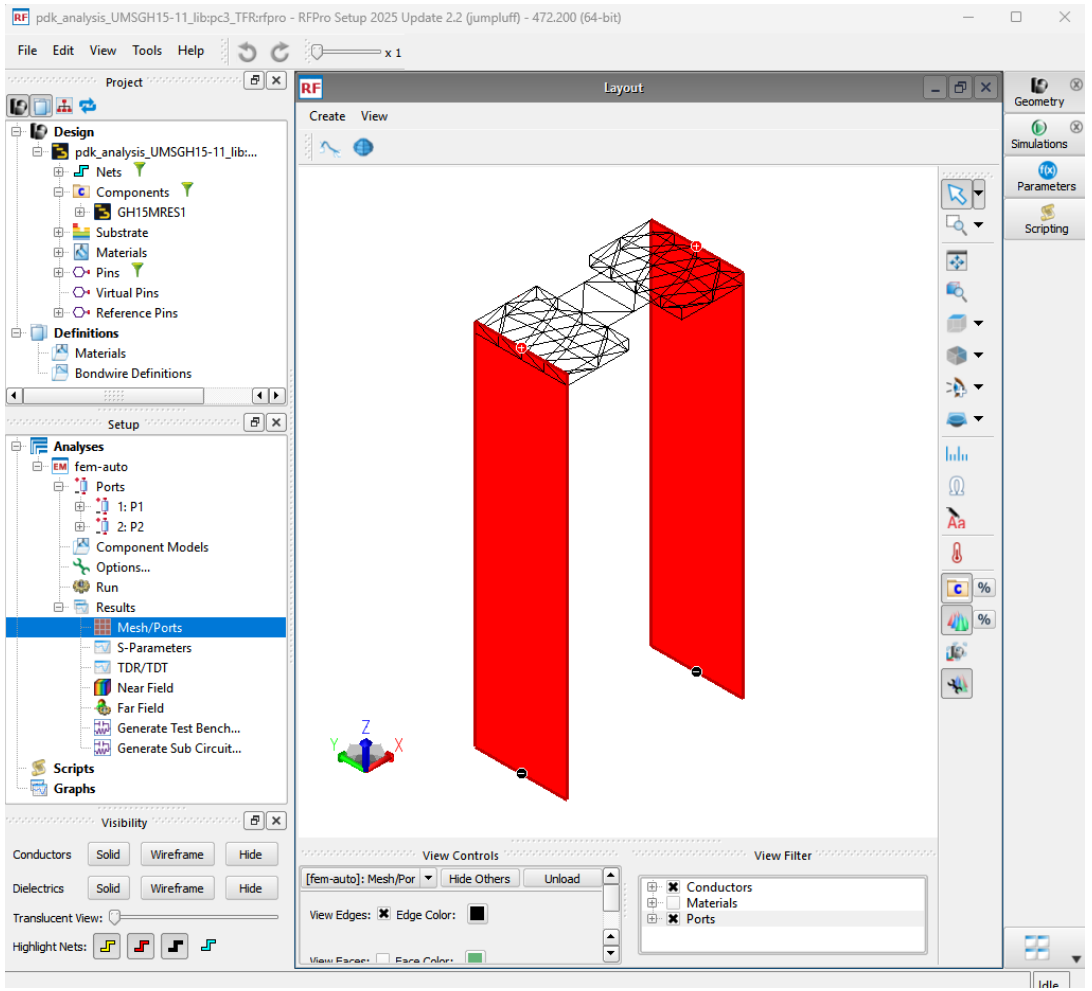


Thin Film Resistor

Schematic and EM simulations

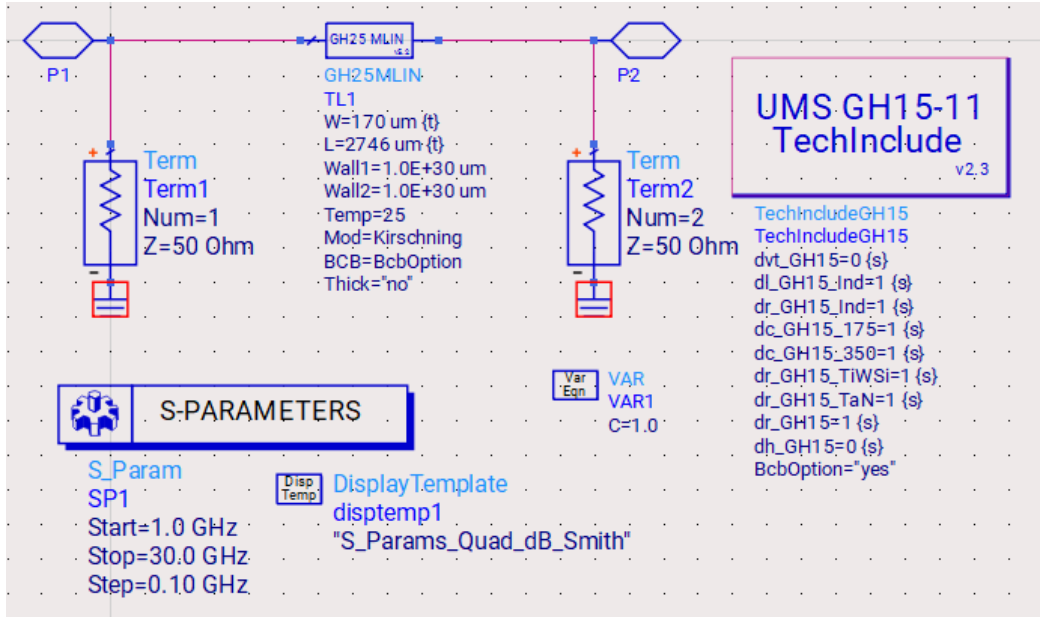


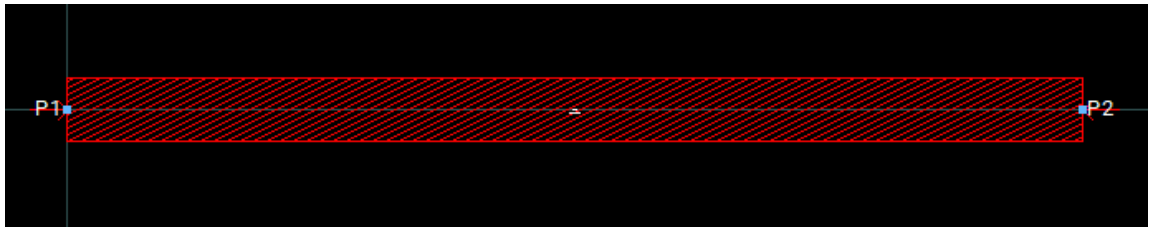


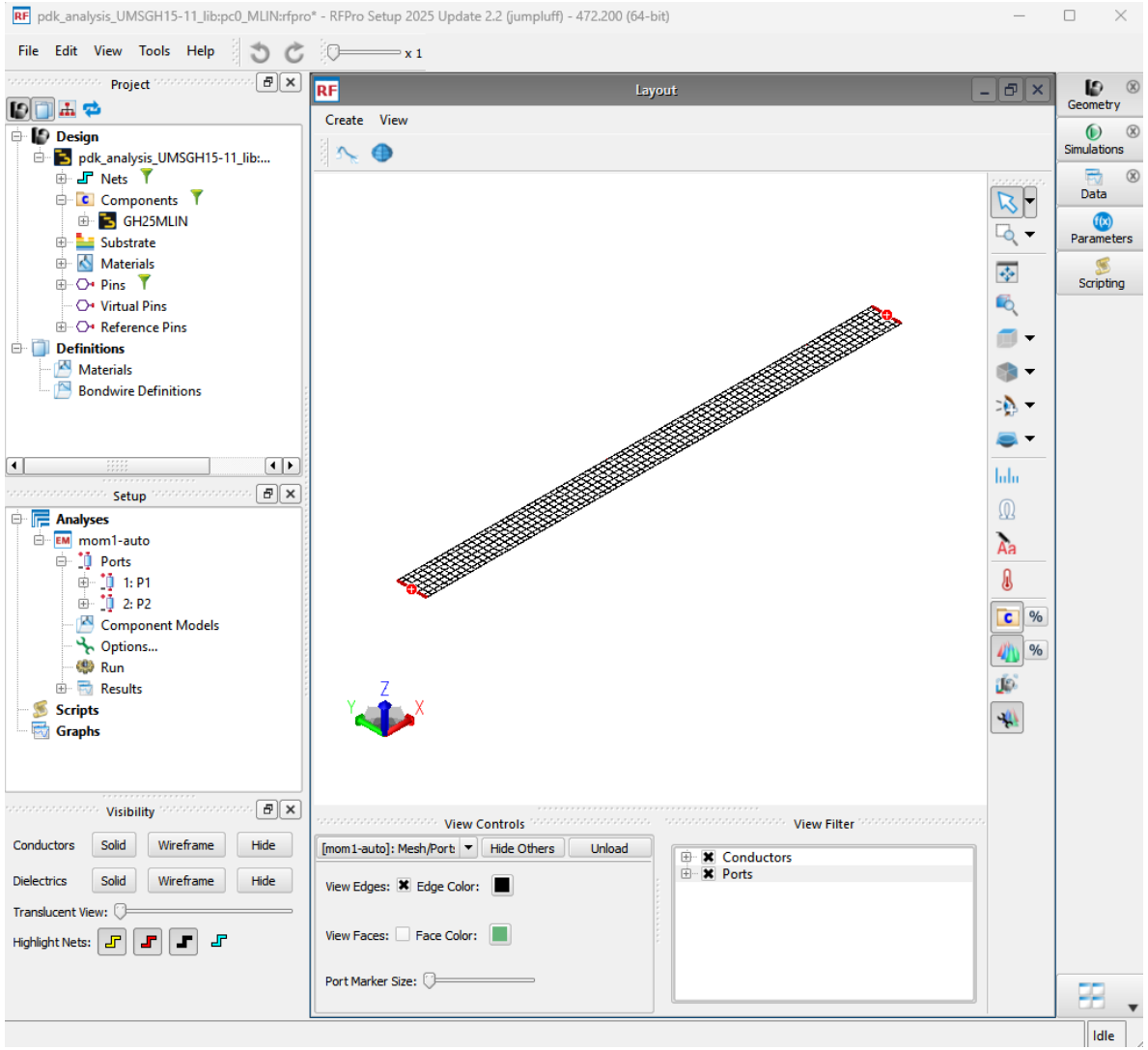


Microstrip Transmission Line

Schematic and EM simulations







Line Calculator & Controlled Impedance Designer

Layout Substrate tool to calculate Line Impedances