Model Construction

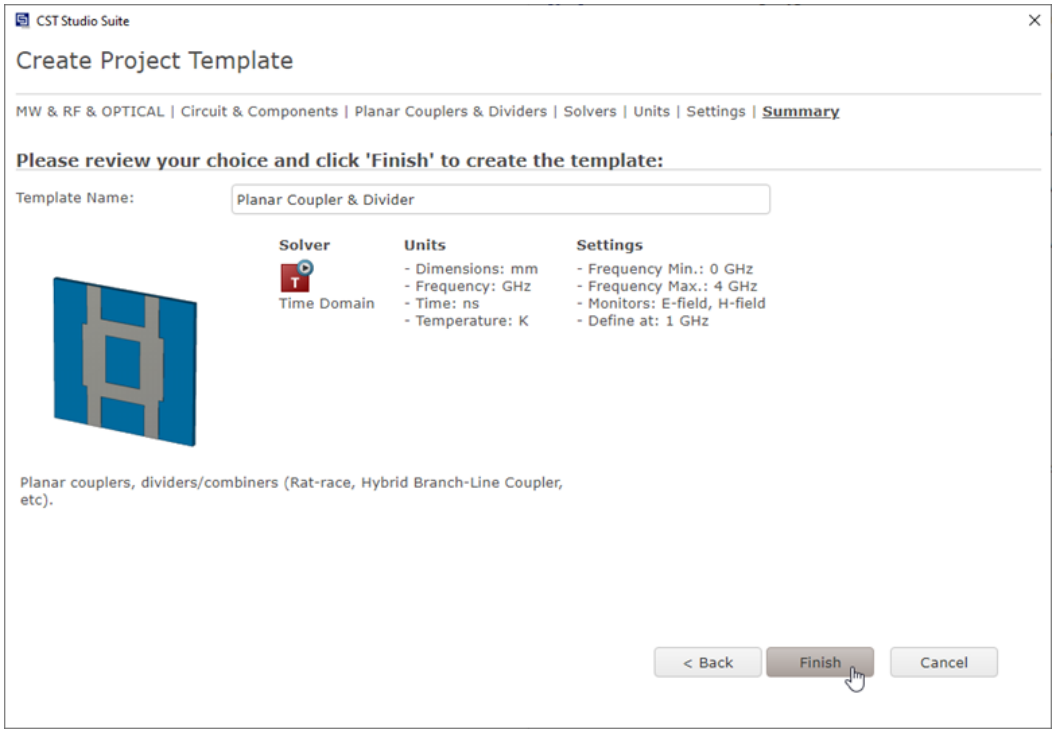

Figure 6: Summary of the project template for the simulation of a quarter-wave transformer at 1 GHz.

Select “Create Project”, and follow the template creation flow outlined in Figure 6. The simulation settings are defined automatically by the template wizard. This means that the mesh, boundary conditions and background material are all correctly set up.
The input line is created as a PEC brick of 10 mm long, with width *W50* and thickness *t* (Fig.7)

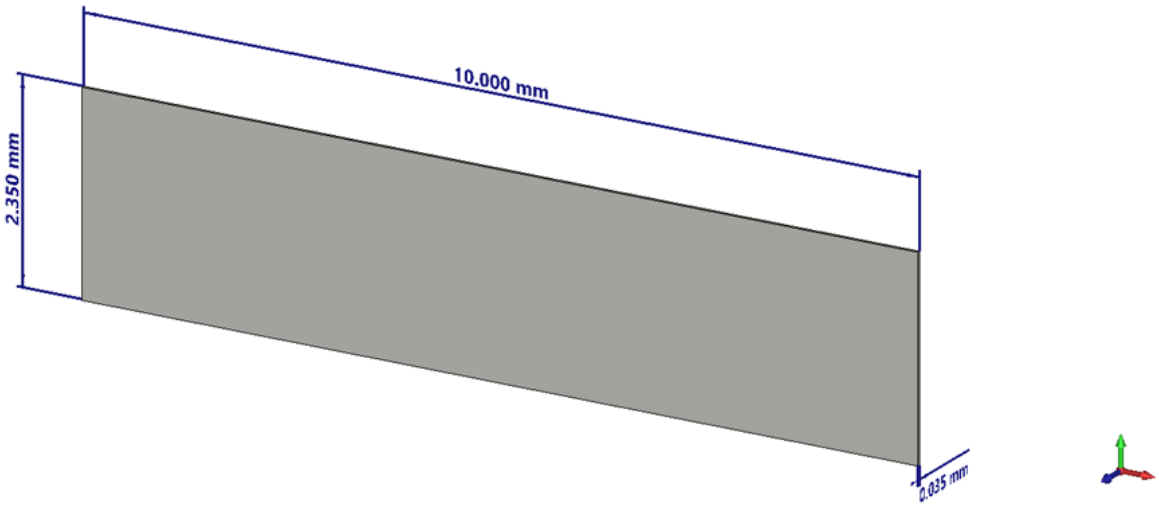

Figure 7: PEC brick modeled as the input 50 Ω line of the transformer.

The transforming line is also modeled as a brick, with length l70, width *W70,* and thickness *t*, and created in front of the previous one (Fig. 8)

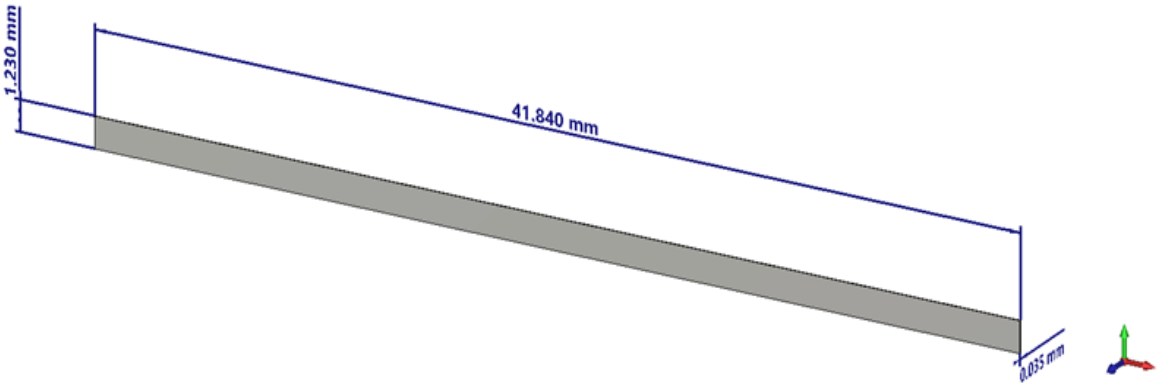

Figure 8: Second PEC brick with length equal to λ/4 at 1 GHz.

The substrate is created as brick with 26.35 x 63.84 x 1.2 mm to provide a 12 mm margin around the transformer, and placed under the PEC lines as shown in Fig. 9. It is defined as a normal material, with a permittivity eps_r of 4.3.

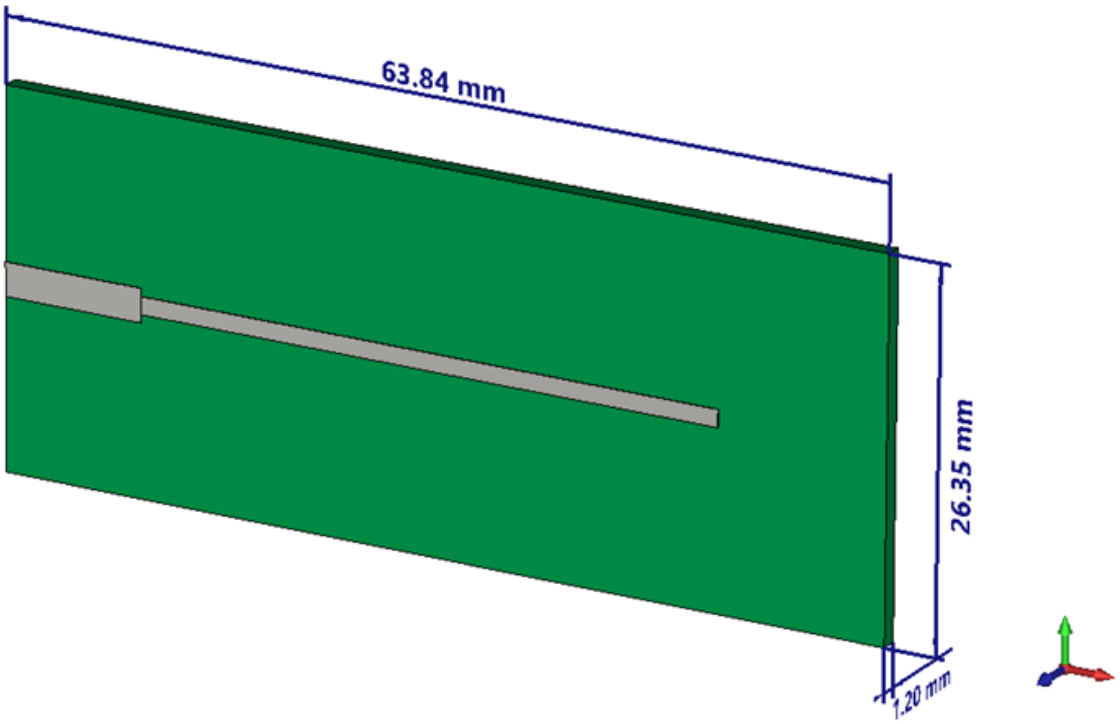

Figure 9: Brick modeled as the substrate, where the input line is located at the edge.

For the load, a lumped element is created, using the pick tools to select the lower edge of the transforming line and bottom face of the substrate, with a resistance of RL ohms. The macro “Solver > Ports > Calculate port extension coefficient” is used to create the wave guide port with the appropriate dimensions. In the “Background Properties” dialog, 10 mm of space is added in the upper Z distance. The final model is shown in Fig. 10.

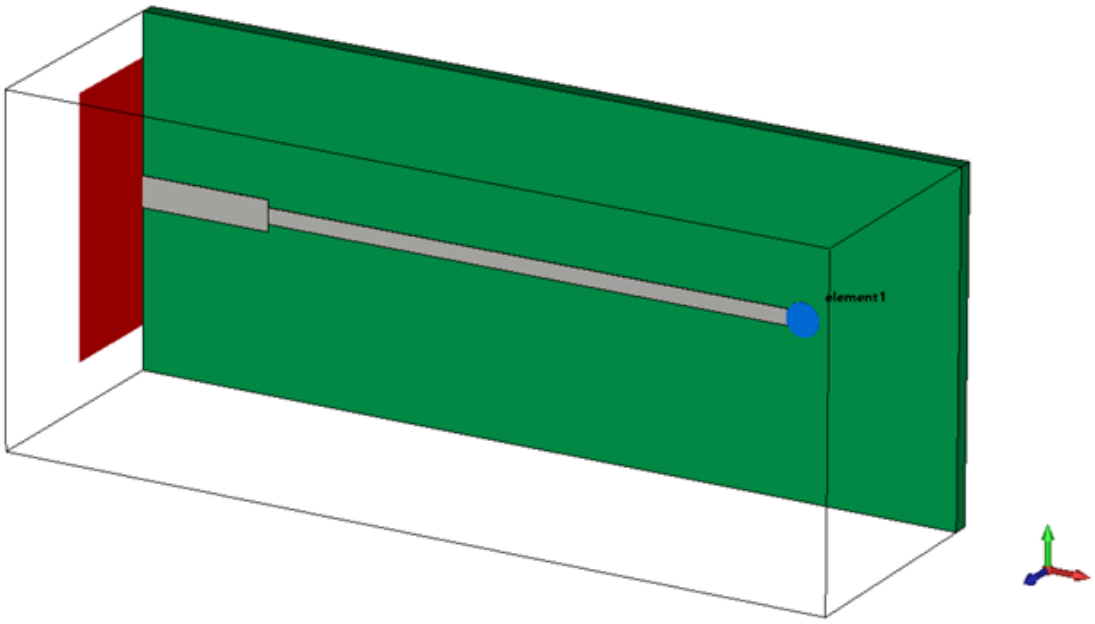

Figure 10: Final model of a quarter-wave transformer at 1 GHz of a 100 Ω load to a 50 Ω line, including the port, lumped element and bounding box.