SMD Resistor Simulation

Modeling, Material Setting, Mesh



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How to Simulate an SMD Resistor?



Ports constructed by macro: "Macros/Solver/Ports/Calculate port extension coefficient"

Recommended Approach

Thin resistive layer



Projects including SMD + microstrip line are included in a zip archive.

Select Appropriate Template





Material Setting - Thin Resistive Layer



| Material Parameters: ResistiveMaterial | × |
|--|-----|
| Problem type: Default | |
| General properties Material name: ResistiveMaterial Material folder: Type: Ohmic sheet Resistance: 41.66667 Ohm/sq O Ohm/sq O Ohm/sq O | /sq |
| Color 0% Transparency 100% | , |
| OK Cancel Apply H | elp |

Boundary Conditions

If the port covers the **whole plane**, it is recommended to use **electric boundaries**.



Hexahedral Mesh



x Local Mesh Properties - Hexahedral Name: OK Resistive_layer_refinement Cancel Automesh and simulation settings Help Consider for refinement Material based refinement Snapping settings Consider for snapping Intervals in x, y, z: ÷ 0 ÷ 0 -0 Mesh refinement settings Use edge refinement factor * Use volume refinement factor 1 Maximum mesh step width settings Use step width and extend range Extend x range by: Dx: L/8 0 Extend y range by: Dy: W/8 0 Extend z range by: Dz: 0 0



Tetrahedral Mesh



It is recommended to use Adaptive mesh refinement, manual refinement is not necessary

Comparison to Thick Resistive Layer



Material Setting - Thick Resistive Layer



Results



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Conclusion

 To obtain accurate results adjust local mesh properties of the resistive layer.

 A thin layer modeling is preferred both in the time domain and frequency domain.

 For extraction of SMD equivalent circuit PEC boundary conditions are recommended.

All projects can be found in zip archive.

Wilkinson Power Divider with SMD Resistor



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Selected Template

| ST STUDIO SUITE | | | | | x | |
|--|--------------------------|---|---|---------------|---|--|
| Create a new template | | | | | | |
| MW & RF & OPTICAL Circuit & Components Planar Couplers & Dividers Solvers Units Settings Summary | | | | | | |
| Please review your choice and click 'Finish' to create the template: | | | | | | |
| Template Name: | Planar Coupler & Divider | | | | | |
| | Solver | Units | Settings | | | |
| Planar couplers, dividers/com | Time Domain | Dimensions: mm Frequency: GHz Time: ns Temperature: Kelvin brid Branch-Line Coupler, | - Frequency Min.: 0 GHz - Frequency Max.: 18 GHz | | | |
| etc). | | | < Back | Finish Cancel | | |

Hexahedral Mesh



Use the local mesh properties to refine the mesh. (See previous section of this document)

Results

S-Parameters [Magnitude in dB]

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