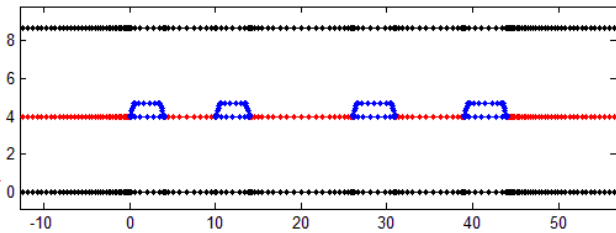


Free 2D field solver

AtaiTec Corporation
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Features

- Compute impedance and create W-element RLGC models for microstrip or striplines with trapezoidal cross section and mixed width/spacing.



Frequency = 3.000000e+09 Hz

Lossy Characteristic Impedance Matrix [ZC] (Ohm)

```
4.854347e+01+i* 4.192044e-01 2.138467e+00+i* 1.784579e-02
2.138467e+00+i* 1.784579e-02 4.854259e+01+i* 4.192210e-01
31e-03
35e-05
```

```
* Lo
3.118439e-07
1.368082e-08 3.118400e-07
6.395089e-11 1.394415e-09 2.771430e-07
1.247383e-12 2.719850e-11 5.283962e-09 2.771455e-07
```

```
* Co
1.325639e-10
-5.863922e-12 1.325701e-10
-1.343702e-15 -6.741986e-13 1.488909e-10
-5.916489e-19 -2.965864e-16 -2.866957e-12 1.488847e-10
```

Dielectric layers

- Bottom ground plane is assumed to be present. Air is assumed for the background dielectric.
- The user specifies the dielectric stack (the bottom and top layers) by entering thickness, dielectric constant (ϵ_r) and loss tangent ($\tan\delta$).

The screenshot shows the 'Free 2D Field Solver' window. The 'Dielectric' section is highlighted with a red oval. It contains the following fields:

Layer	Thickness	Er	tanD
Layer 1	4	3.6	0.015

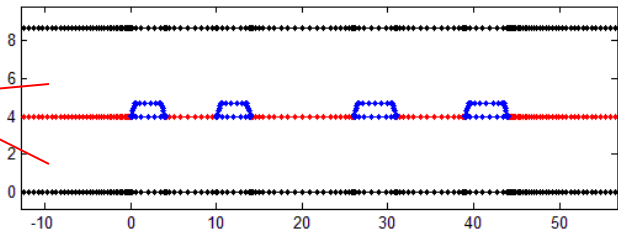
Below this, the 'Top' layer is also highlighted with a red oval:

Top	Thickness	Er	tanD
	4.7	3.8	0.02

The 'Top Ground Plane' checkbox is checked. The 'Conductor' section shows a table for Metal 1:

# Conductors	Thickness	Top Width	Bottom Width	Spacing	x Offset
4	0.7	3 3 4 4	4 4 5 5	6 12 8	0

Other fields include: Unit (mm, mil, um, in), Conductivity (5e7 S/m), Frequency (3 GHz), Ground (), Float (), Shoulder Width (50), Total # Segments (800), Min # Segments Per Side (7), and Order of Differential Pair ((1,2), (3,4), ...).



Conductor width and spacing

- Conductors sit on the top of bottom dielectric layer. All thickness, top width, bottom width and spacing can be entered in scalar or vector. Each conductor can be assigned different thickness, width and spacing through vectored inputs.

Free 2D Field Solver by AtaiTec Corporation

Free 2D Field Solver

Setup

Unit: ☒ mm ☐ mil
☐ um ☐ in

Conductivity: 5e7 S/m

Frequency: 3 GHz

Dielectric

Number of Layers: 1

Layer 1: Thickness: 4, Er: 3.6, tanD: 0.015

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Post-processing

Ground:
Float:

Conductor

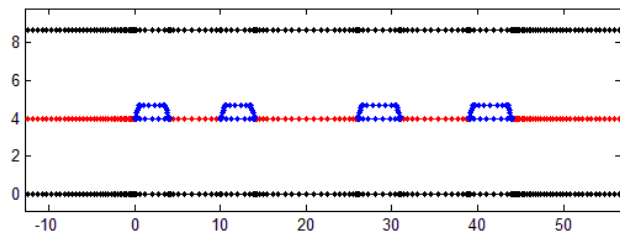
Conductors: 4

Thickness: 0.7, Top Width: 3 3 4 4, Bottom Width: 4 4 5 5, Spacing: 6 12 8, x Offset: 0

Shoulder Width: 50, Total # Segments: 800, Min # Segments Per Side: 7

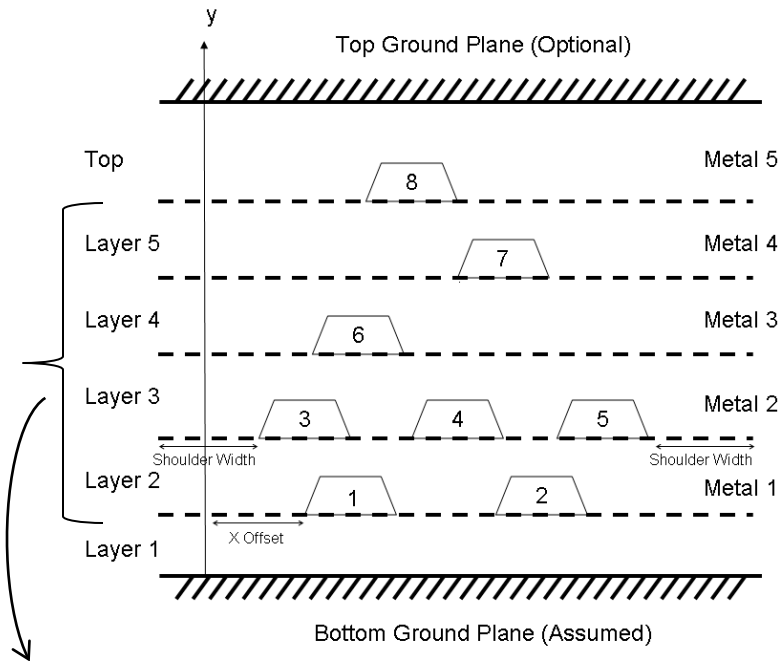
Order of Differential Pair: ☐ (1,2), (3,4), ... ☐ (1, n/2+1), (2, n/2+2), ...

Load & View UserFile, Load TmpFile, View & Save, Run UserFile, New, Save As..., Run



Conductor's numbering sequence

- Conductors are numbered from left to right and from bottom to top.



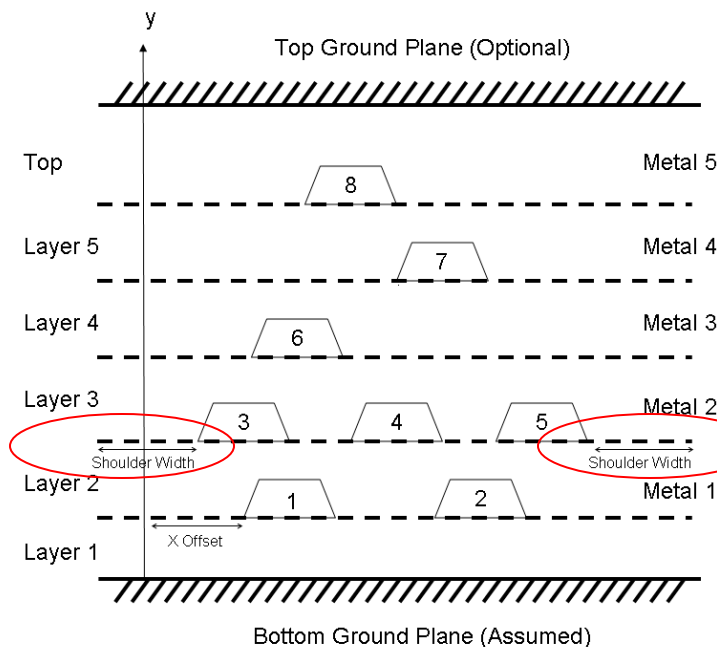
Layers 2 to 5 are available only through ADK.

The screenshot shows the 'Free 2D Field Solver' software interface. The window title is 'Free 2D Field Solver by AtaiTec Corporation'. The interface is divided into several sections: 'Setup', 'Dielectric', 'Post-processing', and 'Conductor'. The 'Setup' section includes fields for Unit (mm, um, mil, in), Conductivity (5e7 S/m), and Frequency (3 GHz). The 'Dielectric' section includes a dropdown for 'Number of Layers' (set to 1), and fields for 'Thickness', 'Er' (3.6), and 'tanD' (0.015) for 'Layer 1'. The 'Post-processing' section has fields for 'Ground' and 'Float'. The 'Conductor' section includes a table for conductor properties and fields for 'Shoulder Width' (50), 'Total # Segments' (800), and 'Min # Segments Per Side' (7). The table has columns for '# Conductors', 'Thickness', 'Top Width', 'Bottom Width', 'Spacing', and 'x Offset'. The 'Order of Differential Pair' is set to (1,2), (3,4), At the bottom, there are buttons for 'Load & View UserFile', 'Run UserFile', 'Load TmpFile', 'View & Save', 'New', 'Save As...', and 'Run'.

	# Conductors	Thickness	Top Width	Bottom Width	Spacing	x Offset
Metal 1	4	0.7	3 3 4 4	4 4 5 5	6 12 8	0

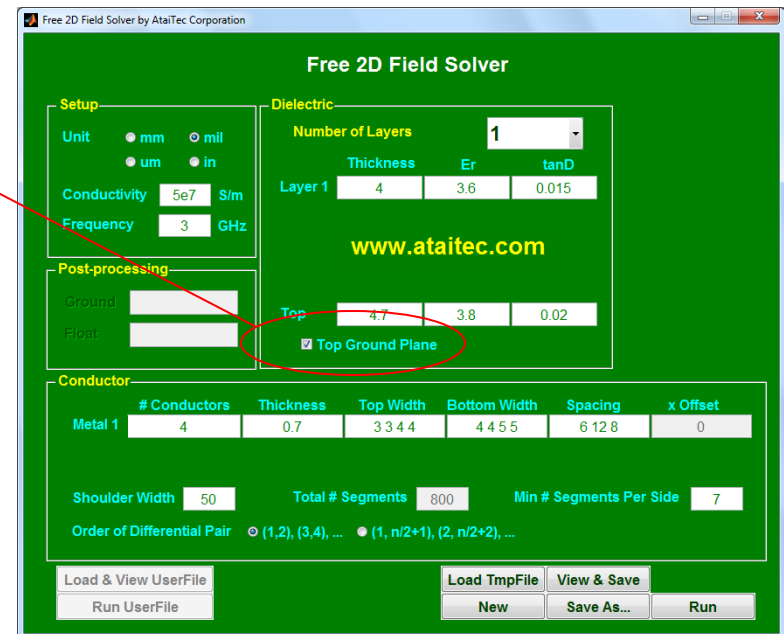
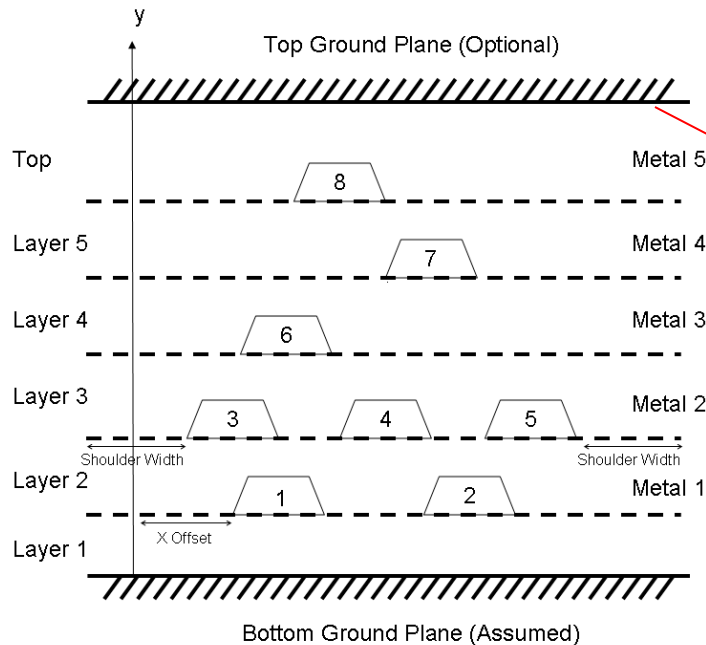
Shoulder width

- Dielectric interface is extended up to the shoulder width from the leftmost and rightmost conductors. To mimic infinite dielectric interface, 5x or more vertical + horizontal dimension can be used for shoulder width.



Top ground plane

- Top ground plane can be turned on/off to simulate stripline or microtrip.



Advanced features

- ADK is required to simulate coplanar waveguide, floating conductors, multiple dielectrics or arbitrary cross section.

The screenshot shows the 'Free 2D Field Solver' window by AtaiTec Corporation. The interface is divided into several sections: Setup, Dielectric, Post-processing, and Conductor. Red circles and lines highlight specific features with annotations:

- Dielectric Section:** A red circle around the 'Number of Layers' dropdown (set to 1) is annotated with 'More dielectric layers'.
- Post-processing Section:** Red circles around the 'Ground' and 'Float' checkboxes are annotated with 'Ground or float conductors'.
- Conductor Section:** A red circle around the 'Total # Segments' input (set to 800) is annotated with 'More meshes'.
- Bottom Section:** A red circle around the 'Load & View UserFile' button is annotated with 'Use-defined file for arbitrary structures'.

The 'Setup' section includes Unit (mm, mil, um, in), Conductivity (5e7 S/m), and Frequency (3 GHz). The 'Dielectric' section shows Layer 1 properties: Thickness 4, Er 3.6, tanD 0.015. The 'Conductor' section shows Metal 1 properties: # Conductors 4, Thickness 0.7, Top Width 3344, Bottom Width 4455, Spacing 6128, x Offset 0. The 'Order of Differential Pair' is set to (1, n/2+1), (2, n/2+2).