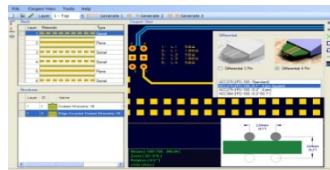
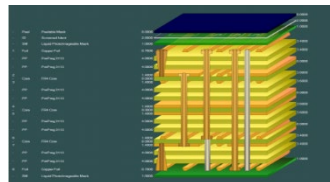
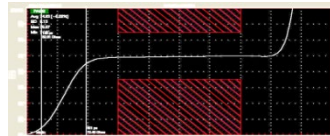
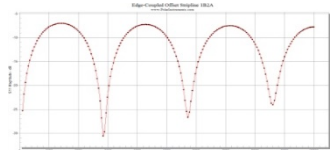
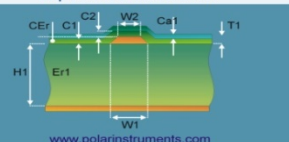


Si8000m 2021 Preview

Richard Attrill – Sept 2021 (Rev 1)

Impedance calculation



Introducing Si8000m 2021

Welcome to a preview of Si8000m 2021.

We have introduced a number of new features that have been requested through our Polarcare software maintenance service.

If you would like to have a web-based demonstration please contact your local Polar office, details are shown on the last slide of this presentation.

Please note: the Si8000m units have been set to Mills in the following screen grabs

Si8000m v21.09 (Sept 2021)

Populate a Project from Sensitivity Analysis Results

(requires the Si Projects feature)

When using the Sensitivity Analysis option it is often useful to examine the calculated results in more details. It is now possible to auto-create a Project containing structures based upon the Sensitivity Analysis results data.

The following slides provide further details:

Populate a Project from Sensitivity Analysis Results

Polar Si8000 Controlled Impedance Quick Solver - [C:\Program Files (x86)\Polar\Si8000\Untitled.Si8] [C:\Program Files (x86)\Polar\Si8000\Untitled.SIP]

File Edit Configuration Help

- Surface Microstrip 1B
- Surface Microstrip 2B
- Coated Microstrip 1B
- Coated Microstrip 2B
- Dual Coated Microstrip 1B
- Dual Coated Microstrip 2B
- Embedded Microstrip 1B1A
- Embedded Microstrip 1B2A

Coated Microstrip 1B

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Impedance vs Changing Parameter(s)

Parameter: H1 None Calculate

Range Start Value: 3.0000 4.0000

Range Finish Value: 12.0000

Increment: 1.0000 1.0000

Constant Impedance vs Changing Parameters

Parameter: W1 Calculate

Target Impedance: 50.0000

Process Window: Minimum / Maximum 67.5000 82.5000

In this Sensitivity Analysis example, as the Substrate Height (H1) sweeps from 3 to 12 mils, Trace Width (W1) is calculated to achieve a Target Impedance of 50 ohms

Graph Results

Coated Microstrip 1B - 50 Ohms

www.polarinstruments.com

The plot shows Substrate Height (H1) X-axis and the Trace Width (W1) Y-axis. Each data point represents the H1 / W1 parameter values to achieve 50 ohms.

Graph Settings

2D 3D

Display Series: Constant Impedance

Target Impedance: 0.0000 Refresh

Picked Data Point Information

H1 (Mils): 5.000
W1: 8.286

Maximise Print Export

Lossless Calculation Sensitivity Analysis Via Checks

All Structures

Populate a Project from Sensitivity Analysis Results

Polar Si8000 Controlled Impedance Quick Solver - [C:\Program Files (x86)\Polar\Si8000\Untitled.Si8] [C:\Program Files (x86)\Polar\Si8000\Untitled.SIP]

File Edit Configuration Help

Parameter Entry Units:
 Mils Inches
 Microns Millimetres

Coated Microstrip 1B

Impedance vs Changing Parameter(s)

Parameter: H1 None Calculate

Range Start Value: 3.0000 4.0000

Range Finish Value: 12.0000 1.0000

Changing Parameters: W1 Calculate

Maximum: 50.0000 67.5000 82.5000

Graph Results

H1	Er1	W1	W2	T1	C1	C2	CEr	Zo	Calc Success
3.0000	4.2000	4.5870	3.5870	1.2000	1.0000	1.0000	4.2000	50.0051	Yes
4.0000	4.2000	6.4263	5.4263	1.2000	1.0000	1.0000	4.2000	49.9918	Yes
5.0000	4.2000	8.2865	7.2865	1.2000	1.0000	1.0000	4.2000	49.9991	Yes
6.0000	4.2000	10.1886	9.1886	1.2000	1.0000	1.0000	4.2000	49.9957	Yes
7.0000	4.2000	12.0847	11.0847	1.2000	1.0000	1.0000	4.2000	50.0006	Yes
8.0000	4.2000	13.9988	12.9988	1.2000	1.0000	1.0000	4.2000	49.9906	Yes
9.0000	4.2000	15.9248	14.9248	1.2000	1.0000	1.0000	4.2000	49.9923	Yes
10.0000	4.2000	17.8508	16.8508	1.2000	1.0000	1.0000	4.2000	49.9952	Yes
11.0000	4.2000	19.7769	18.7769	1.2000	1.0000	1.0000	4.2000	50.0044	Yes
12.0000	4.2000	21.6909	20.6909	1.2000	1.0000	1.0000	4.2000	50.0043	Yes

Copy Results to Clipboard (for Excel)

Create Project Structures

Project

Lossless Calculation Sensitivity Analysis Via Checks

The Results tab contains the calculated results data used for the Sensitivity Analysis plot

The right-click menu now has a new Create Project Structures option. On selection the software will create an individual structure per row of the Results grid and add it to the Project. In this example there are 10 result rows so 10 structures will be created

The Project now contains 10 structures.

Notice the structure name is auto-assigned based upon the sensitivity analysis parameters selected. In this example the H1 and W1 parameter values are used

Populate a Project from Sensitivity Analysis Results

The structure name is auto-assigned from the sensitivity analysis parameters / result

Once the Project has been generated the structures within work in exactly the same way as if they were created manually.

The parameter values / results used for the structure name

Parameter	Value	Tolerance	Minimum	Maximum	Action
H1	5.0000	± 0.0000	5.0000	5.0000	Calculate
Er1	4.2000	± 0.0000	4.2000	4.2000	Calculate
W1	8.2865	± 0.0000	8.2865	8.2865	Calculate
W2	7.2865	± 0.0000	7.2865	7.2865	Calculate
T1	1.2000	± 0.0000	1.2000	1.2000	Calculate
C1	1.0000	± 0.0000	1.0000	1.0000	Calculate
C2	1.0000	± 0.0000	1.0000	1.0000	Calculate
CEr	4.2000	± 0.0000	4.2000	4.2000	Calculate
Impedance Zo	50.00		50.00	50.00	Calculate More...

Populate a Project from Sensitivity Analysis Results

Polar Si8000 Controlled Impedance Quick Solver - [C:\Program Files (x86)\Polar\Si8000\Untitled.Si8] [C:\Program Files (x86)\Polar\Si8000\Untitled.SIP]

File Edit Configuration Help

Substrate 1 Height	H1	5.0000
Substrate 1 Dielectric	Er1	4.2000
Lower Trace Width	W1	8.2865
Upper Trace Width	W2	7.2865
Trace Thickness	T1	1.2000
Coating Above Substrate	C1	1.0000
Coating Above Trace	C2	1.0000
Coating Dielectric	CEr	4.2000
Impedance	Zo	50.00

Notes: (First 5 lines will print)
Add your comments here

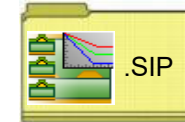
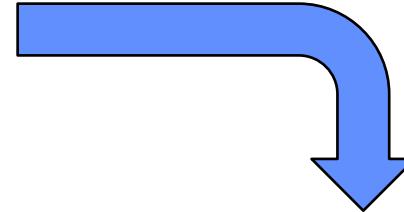
Interface Style
 Standard
 Extended

G.S Convergence
 Fine (Slower)
 Coarse (Faster)

Tolerance Mode
 Absolute
 Percentage (%)

Parameter Snap
 Auto Calc

Lossless Calculation Sensitivity Analysis



Save the newly created project to the Si Project file format (.SIP) so that it can be recalled at a later date.

Populate a Project from Sensitivity Analysis Results - Summary

- As separate structure in a Project it is now possible to examine the results in a lot more detail than when in sensitivity analysis
- As a Project the structure data can be stored as a .SIP file and recalled later
- Useful to both fabricators and design companies

Track Resistance Calculator (TRC Plus)

Polar Si8000 Controlled Impedance Quick Solver - [C:\Program Files (x86)\Polar\Si8000\Untitled.Si8] [C:\Program Files (x86)\Polar\Si8000\Untitled.SIP]

File Edit Configuration Help

Surface Microstrip 1B

Surface Microstrip 2B

Coated Microstrip 1B

Coated Microstrip 2B

Dual Coated Microstrip 1B

Dual Coated Microstrip 2B

Embedded Microstrip 1B1A

Embedded Microstrip 1B2A

Substrate 1 Height H1 8.5000 ± 0.0000 8.5000 8.5000 Calculate

Substrate 1 Dielectric Er1 4.2000 ± 0.0000 4.2000

Lower Trace Width W1 7.0000 ± 0.0000 7.0000

Upper Trace Width W2 6.0000 ± 0.0000 6.0000

Trace Thickness T1 1.2000 ± 0.0000 1.2000

Impedance Zo 75.18 75.18

Notes: (First 5 lines will print)
Add your comments here

Parameter Snap
 Auto Calc
Snap

TRC Plus

Material: Copper

Resistivity (Ohm Metres) 1.68E-08 Ωm

Conductivity (Siemens / m) 5.952E+07 S/m

Temp. Coefficient (/ °C) TCR 0.00386

Reference Temp. (°C) 20

Operating Temp. (°C) 20

Track Dimensions

Lower Trace Width W1 7.0000

Upper Trace Width W2 6.0000

Trace Thickness T1 1.2000

Length of Line LL 1000.0000

Units: Mils Inches
 Microns Millimetres

Track Resistance Ω 0.0848

Voltage Drop Current (Amps) 1

VD (Volts) 0.084800

Close

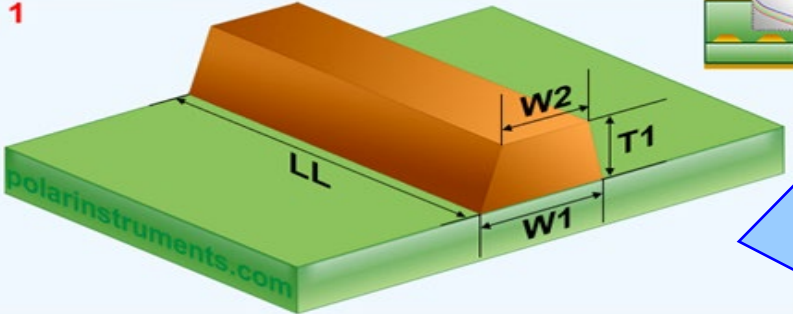
The new TRC Plus calculator includes a number of enhancements including:

- Support for longer Length of Line (LL) values
- Support for Temperature Coefficient of Resistance

Lossless Calculation Sensitivity Analysis

All Structures

Track Resistance Calculator (TRC Plus)



1

2

3

4

5

6

Material		Units	
-- From Si9000 --		<input checked="" type="radio"/> Mils	<input type="radio"/> Inches
Resistivity (Ohm Metres)	1.724E-08 Ωm	<input type="radio"/> Microns	<input type="radio"/> Millimetres
Conductivity (Siemens / m)	5.80E+07 S/m	Track Resistance Ω	
Temp. Coefficient (/ °C) TCR	0.00386	0.5221	
Reference Temp. (°C)	20	Voltage Drop	
Operating Temp. (°C)	20	Current (Amps)	1
Track Dimensions		VD (Volts)	0.522100
Lower Trace Width	W1 7.0000	Close	
Upper Trace Width	W2 6.0000		
Trace Thickness	T1 1.2000		
Length of Line	LL 6000.0000		

1. Interactive track material image.

Clicking on a track parameter label will highlight the associated Track Dimension field (text box). Enter data into the active field.

Double-clicking anywhere on the image will bring up the Materials Editor.

2. Material selection and properties

Select the material via the drop-down list.

Fields coloured in light-blue are not directly editable but the field values can be in the Materials Editor.

Fields coloured in light-green are editable by the user. For example, Operating Temperature will determine a material's resistivity at that temperature, which in turn will be applied in calculating the track resistance.

3. Units

Switch to your preferred units by clicking the associated option button – imperial units include Mils (Thou) and Inches; for metric units choose Microns (Micrometres) or Millimetres.

4. Track or trace dimensions

Enter or change track dimensions in the Track Dimensions in the chosen units.

5. Resistance result

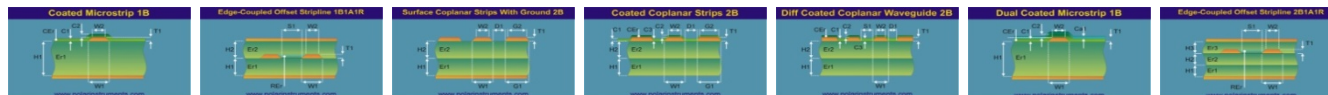
Calculation of the track resistance. The result should update immediately upon any changes to the editable (light-green) fields.

6. Voltage Drop calculation result

The calculated Voltage Drop is displayed in the VD (Volts) text box

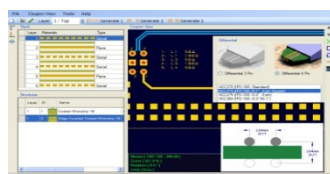
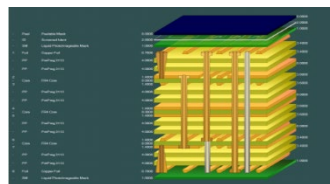
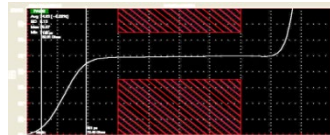
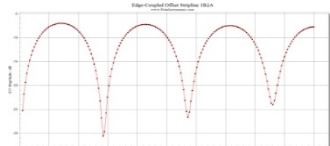
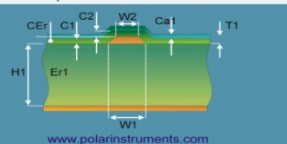
Other enhancements

- Monte Carlo Analysis. New option added to export the Iterations / Results to Clipboard (for Excel), accessible from the right-click menu
- Solver Accuracy Mode introduced to the Si8000m:
 - A new option has been added to the Configuration menu to switch the solver accuracy between Default and Enhanced modes.
 - The Enhanced Mode is especially useful when calculating fine Trace Thickness geometries.
 - Enhanced Mode will increase calculation times

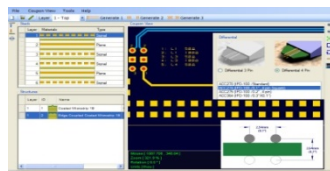
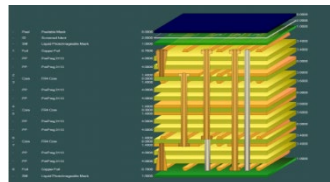
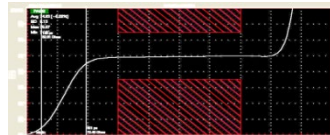
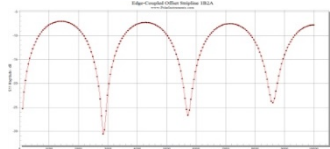
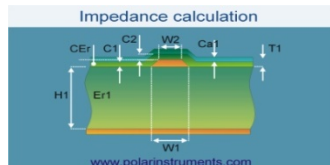
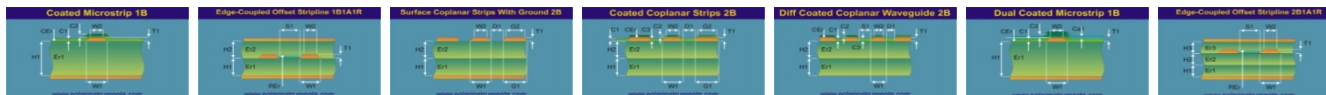


Thank you for viewing this Si8000m 2021 preview. If you have questions we would be delighted to help you. Your local contact information is contained on the following slide

Impedance calculation



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