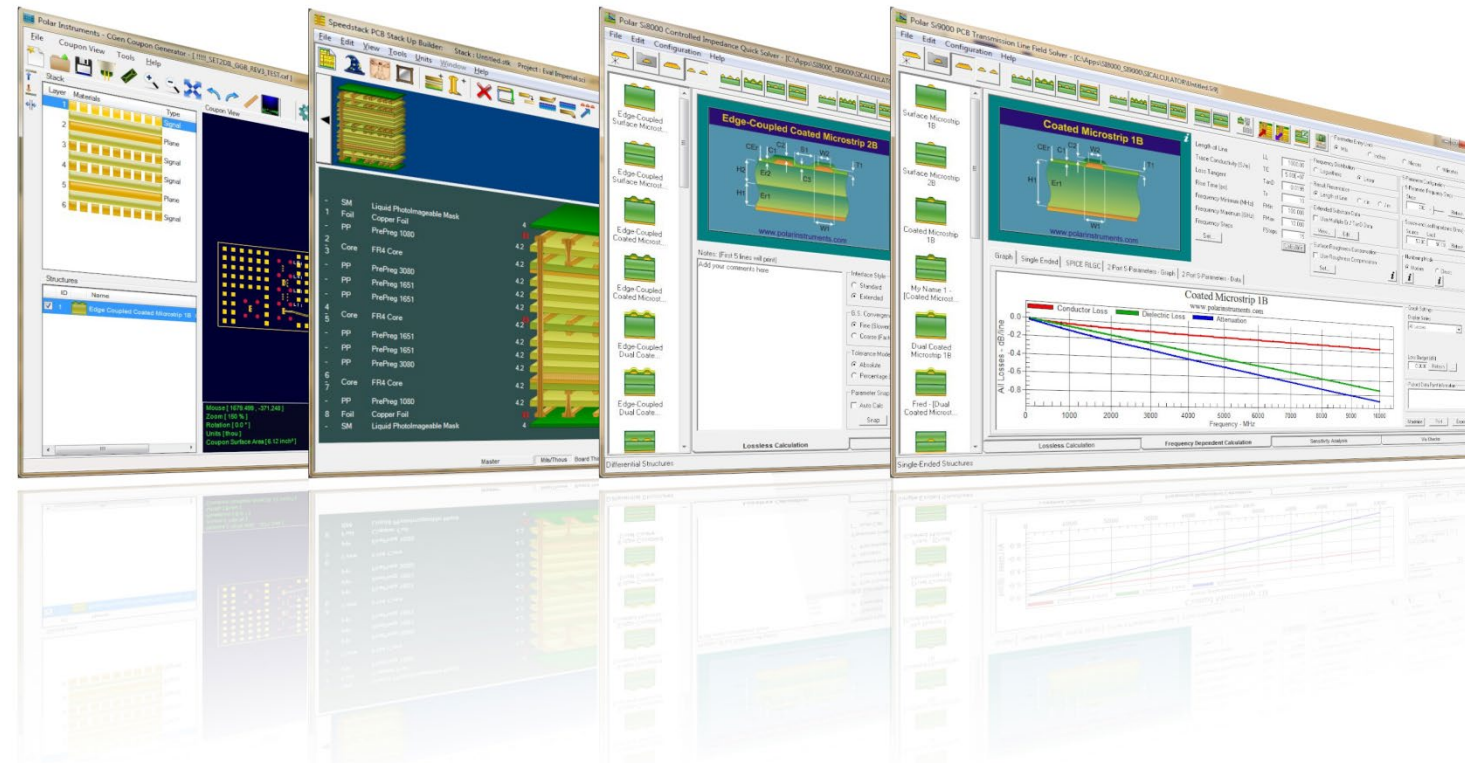


Speedstack 2021 Preview

Richard Attrill – March 2021 (Rev 2)



Introducing Speedstack 2021

Welcome to a preview of Speedstack 2021.

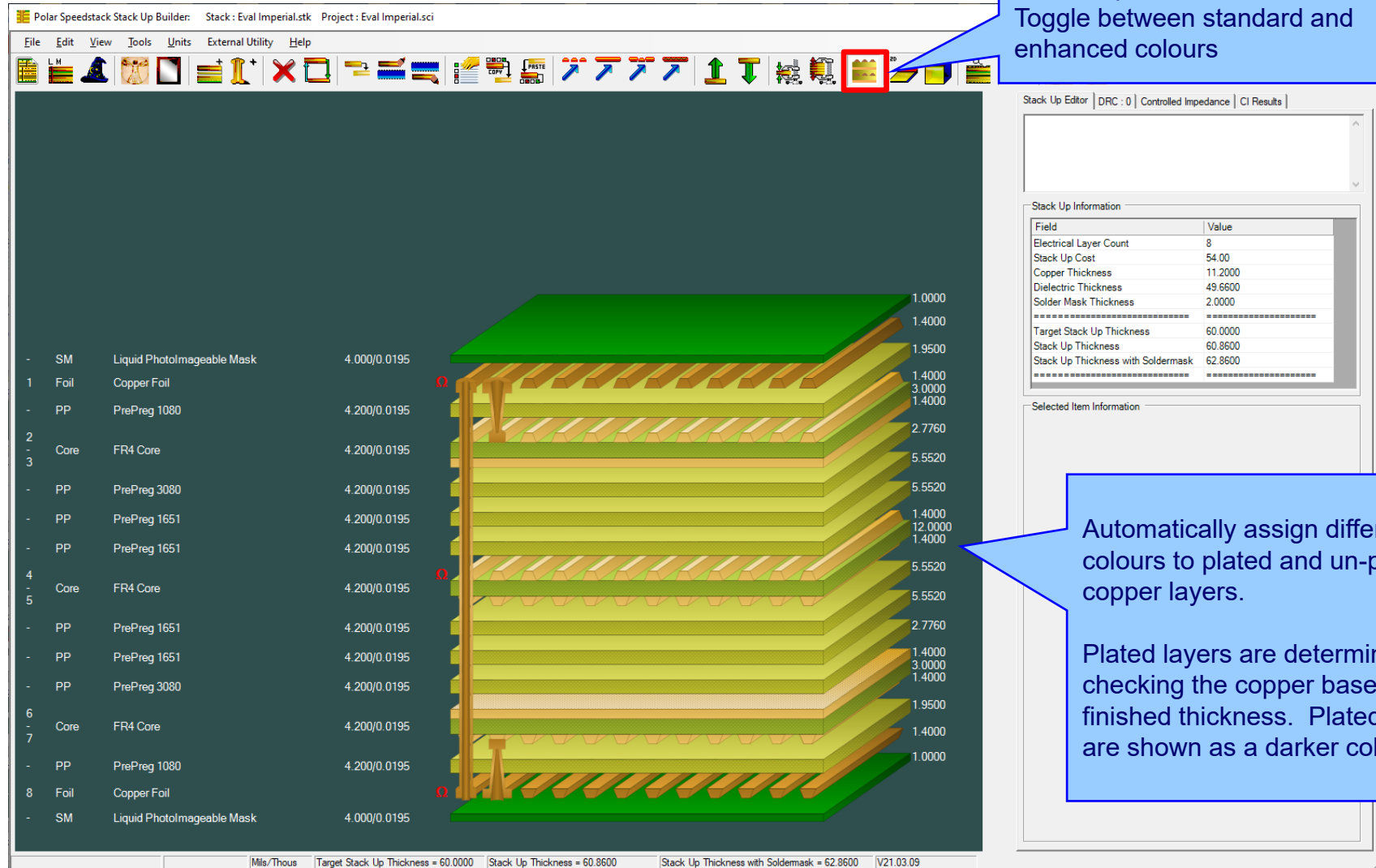
We have introduced a number of new features that have been requested through our Polarcare software maintenance service.

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 Speedstack units have been set to Mils in the following screen grabs

Speedstack v21.03 (March 2021)

New Apply Plating Colours toolbar option



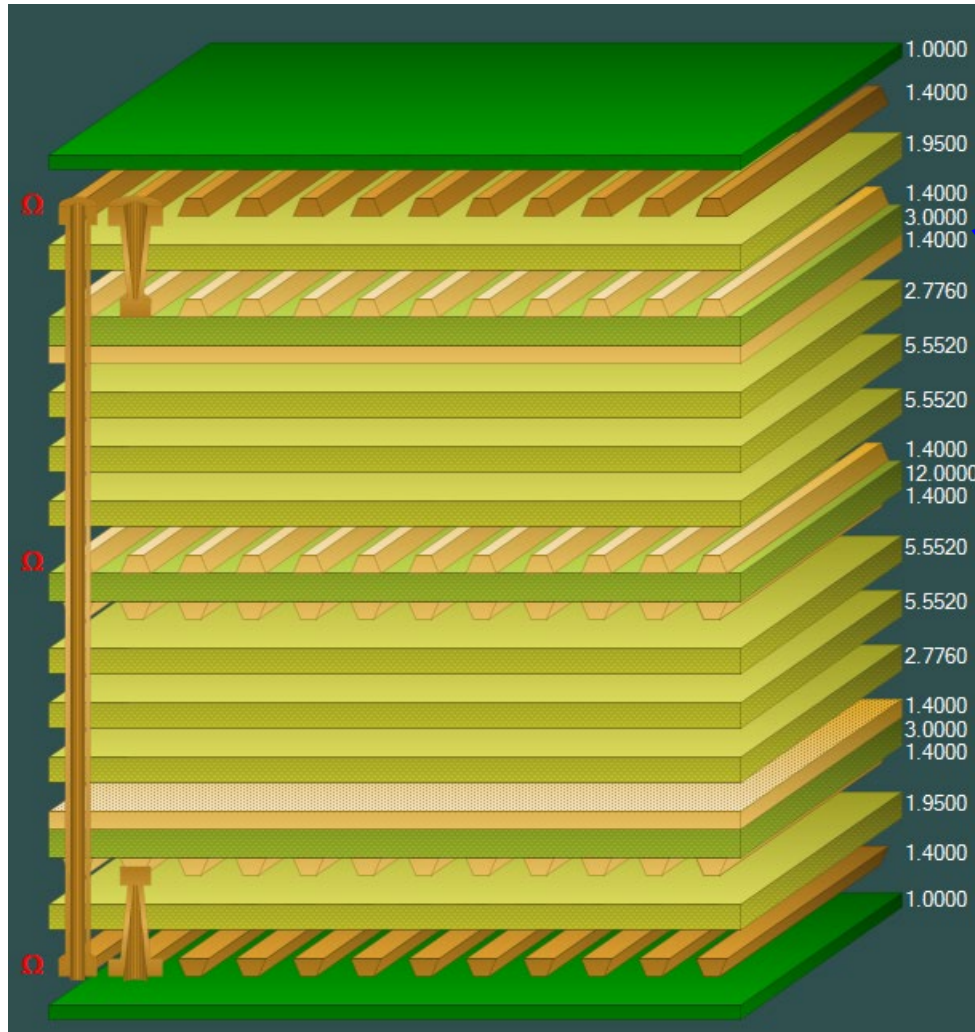
Stack Up Editor | DRC : 0 | Controlled Impedance | CI Results

Field	Value
Electrical Layer Count	8
Stack Up Cost	54.00
Copper Thickness	11.2000
Dielectric Thickness	49.6600
Solder Mask Thickness	2.0000
=====	
Target Stack Up Thickness	60.0000
Stack Up Thickness	60.8600
Stack Up Thickness with Soldermask	62.8600
=====	

Selected Item Information

Mils/Thous | Target Stack Up Thickness = 60.0000 | Stack Up Thickness = 60.8600 | Stack Up Thickness with Soldermask = 62.8600 | V21.03.09

New Apply Plating Colours toolbar option



Plated Copper Layers

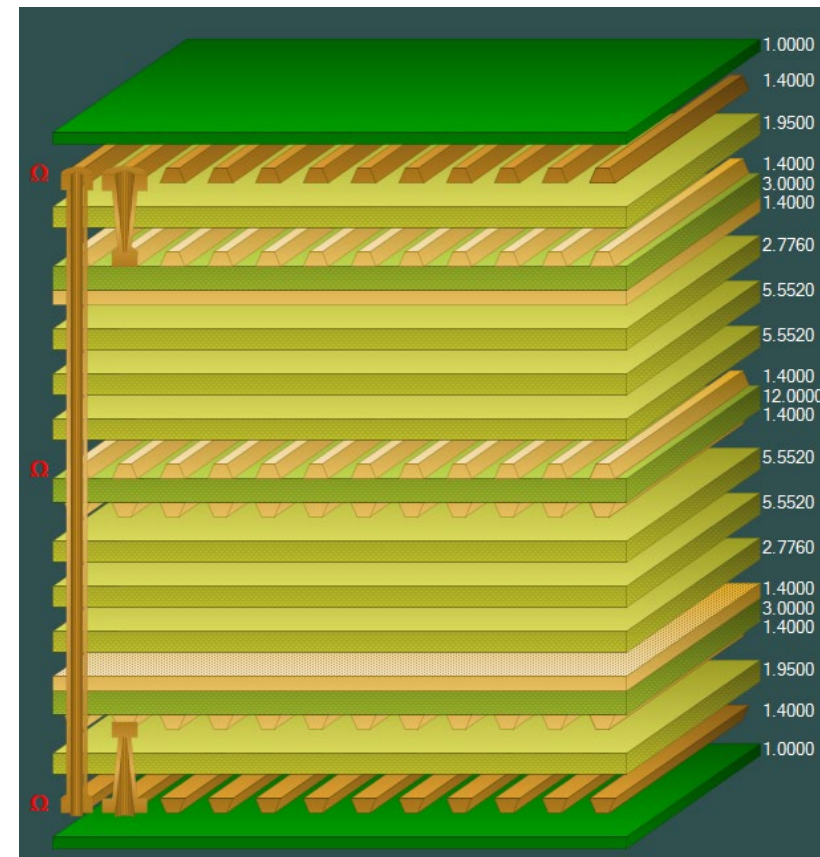
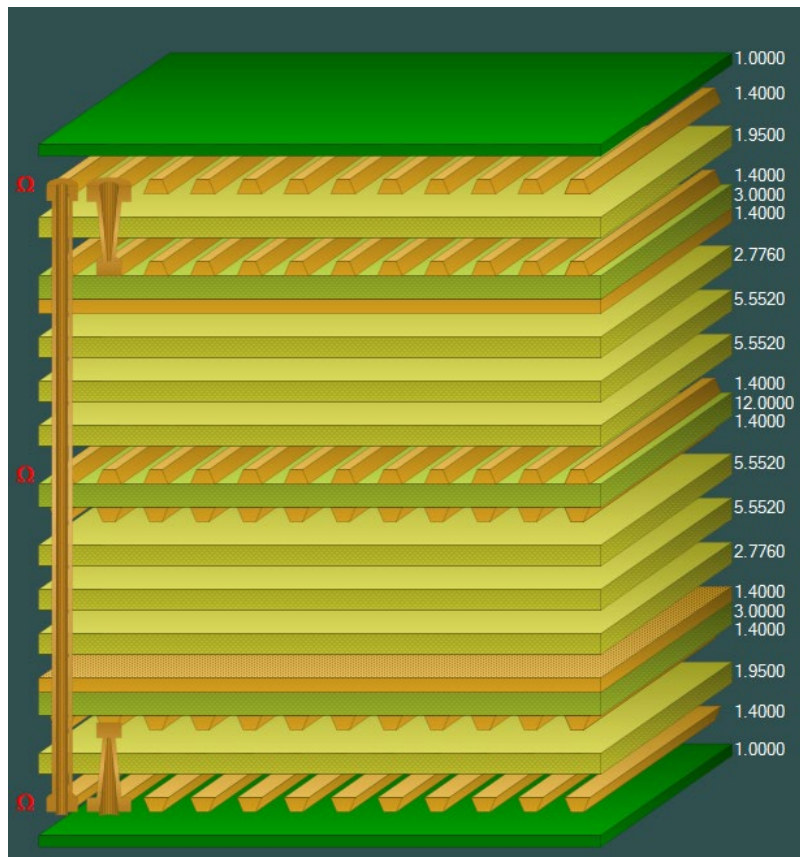
During PCB fabrication drill holes commonly have copper applied to the barrel wall by an electroplating process. This provides an interconnect between copper layers in the stack up.

This electroplating process often results in additional copper also being applied to the exposed copper layers where the mechanical drill starts / ends.

It is important to account for this additional plated copper thickness when calculating the overall stack up thickness and controlled impedance / insertion loss structures.

Speedstack has always allowed this additional plating thickness to be applied to the relevant copper layers. With v21.03 this has been enhanced further with automatic colour assignments to the plated and unplated layers

New Apply Plating Colours toolbar option



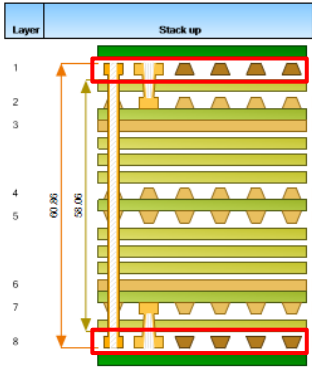
New Apply Plating Colours toolbar option

Speedstack Report Printer

File Options

Display Page 1




C:\App\Samples\Eval Imperial.sci Units: MILS



Layer	Stack up	Supplier	Description	Type	Processed Thickness	cr	Loss Tangent	Impedance ID
1		Polar Samples	Liquid Photoimageable Mask	SolderMask	1.000	4.000	0.0195	
		Polar Samples	Copper Foil	Copper	1.400			1, 2
2		Polar Samples	PreProg 1080	Dielectric	1.950	4.200	0.0195	
3		Polar Samples	FR4 Core	FR4	1.400	3.000	4.200	0.0195
		Polar Samples	PreProg 3080	Dielectric	2.776	4.200	0.0195	
		Polar Samples	PreProg 1651	Dielectric	5.552	4.200	0.0195	
		Polar Samples	PreProg 1651	Dielectric	5.552	4.200	0.0195	
4		Polar Samples	FR4 Core	FR4	1.400	12.000	4.200	0.0195
		Polar Samples	PreProg 1651	Dielectric	5.552	4.200	0.0195	
		Polar Samples	PreProg 1651	Dielectric	5.552	4.200	0.0195	
		Polar Samples	PreProg 3080	Dielectric	2.776	4.200	0.0195	
6		Polar Samples	FR4 Core	FR4	1.400	3.000	4.200	0.0195
		Polar Samples	PreProg 1080	Dielectric	1.950	4.200	0.0195	
8		Polar Samples	Copper Foil	Copper	1.400			4
		Polar Samples	Liquid Photoimageable Mask	SolderMask	1.000	4.000	0.0195	

Copper Thickness = 11.200 | Dielectric Thickness = 49.660 | Solder Mask Thickness = 2.000 | Stack Up Thickness = 60.860 | Stack Up Thickness with Soldermask = 62.860
Stack Up Cost = 54.00

Notes

Impedance ID	Structure Image	Structure Name	Impedance Signal Layer	Ref. Plane 1 in Layer	Ref. Plane 2 in Layer	Lower Trace Width (W1)	Upper Trace Width (W2)	Trace Separation (S1)	Target Impedance	Tol (+/- %)	Calculated Impedance
1		Edge Coupled Coated Microstrip 1B	1	3	0	7.650	6.650	8.115	100.000	10.000	100.290
2		Coated Microstrip 1B	1	3	0	4.000	3.000	0.000	75.000	10.000	75.740
3		Edge Coupled Offset Stripline 1B1A	4	3	6	7.250	6.250	8.500	100.000	10.000	101.280

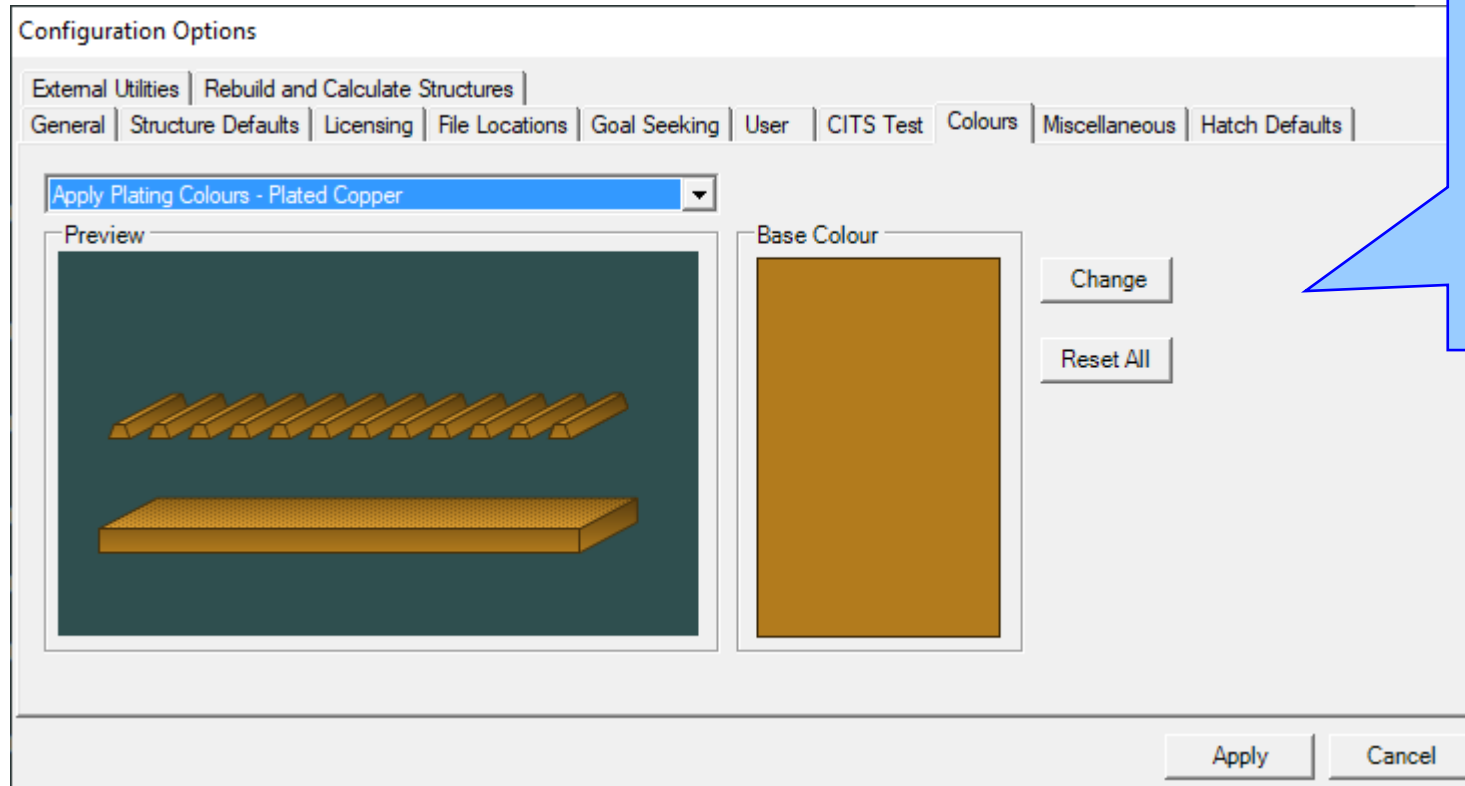
StackName: Master	Version:	Revision:	Modification:	Date of Revision:	Editor:
Date:	Associated Documents:				
Author:					
Department:					
Site:					

Page 1/1

Copyright © Polar Instruments Ltd

The technical report will also show the plated and un-plated copper layers.

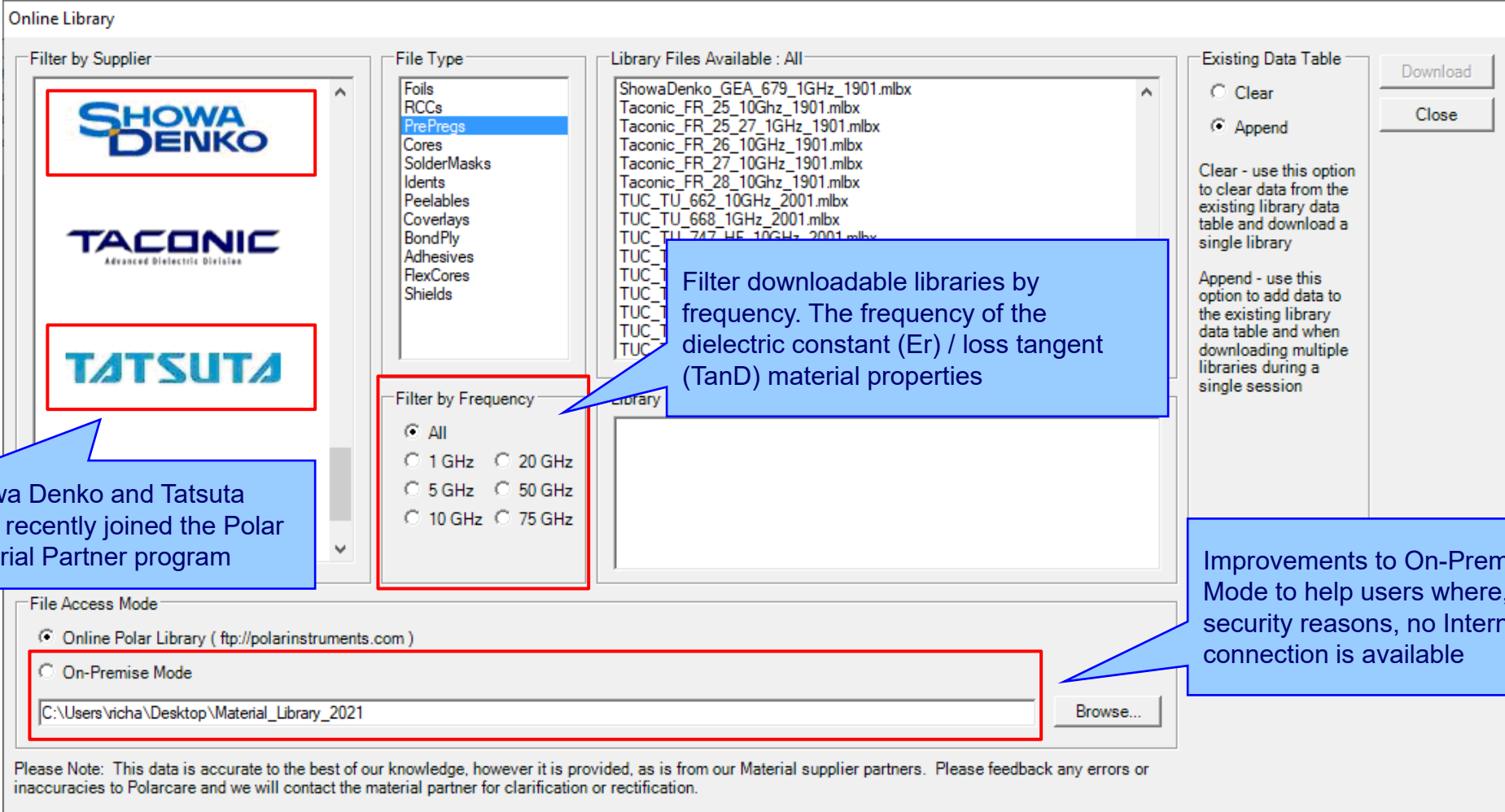
New Apply Plating Colours toolbar option



Two new user-definable colours have been introduced to the Speedstack Configuration Options.

Customise the Plated and Un-plated colours to suit existing colour schemes adopted by your organisation

Online Library enhancements



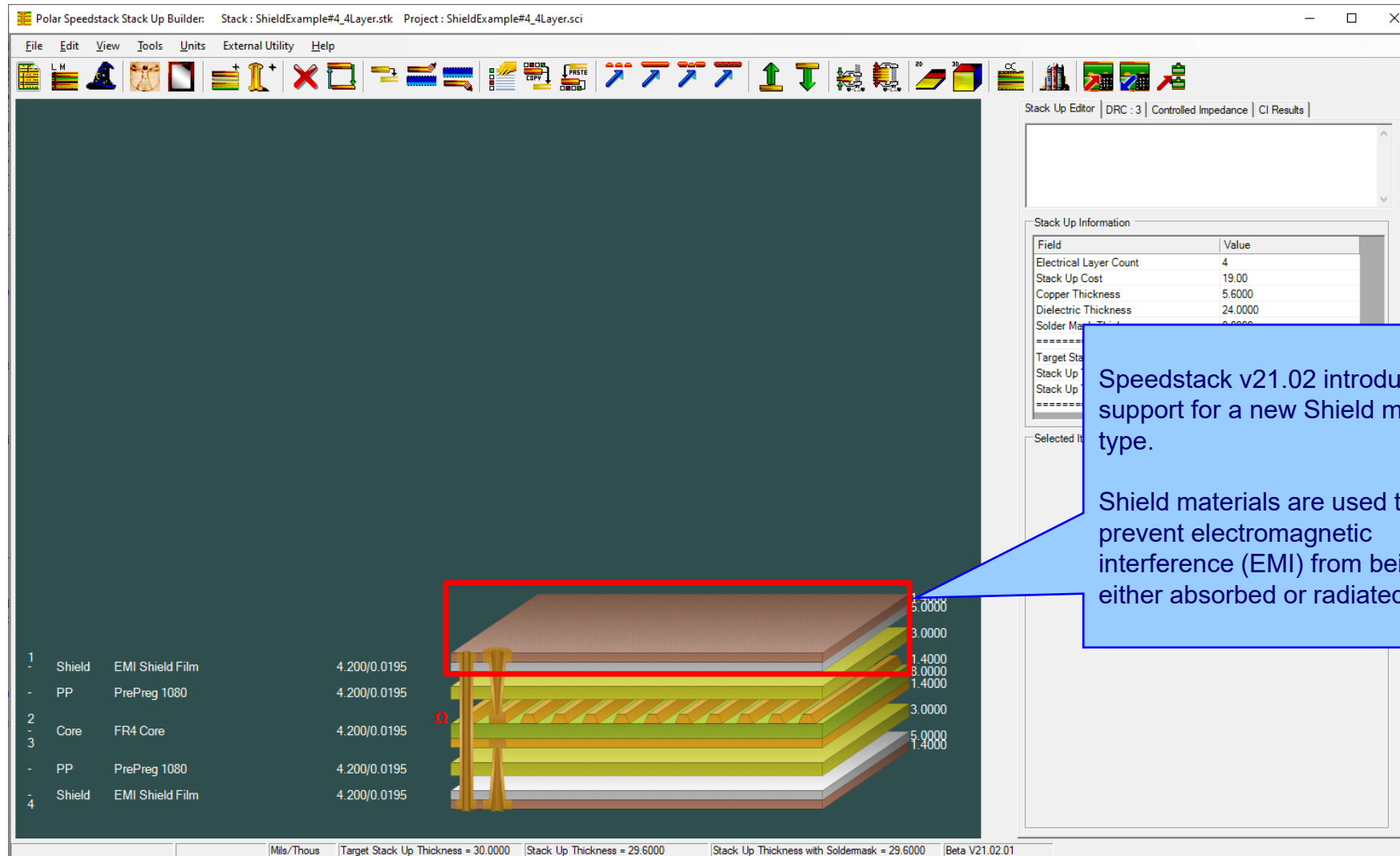
The screenshot shows the 'Online Library' window with several enhancements highlighted by callouts:

- Filter by Supplier:** A list of suppliers including SHOWA DENKO, TACONIC, and TATSUTA. A callout states: "Showa Denko and Tatsuta have recently joined the Polar Material Partner program".
- File Type:** A list of file types including Foils, RCCs, PrePregs, Cores, SolderMasks, Idents, Peelables, Coverlays, BondPly, Adhesives, FlexCores, and Shields.
- Filter by Frequency:** A section with radio buttons for frequency ranges: All, 1 GHz, 20 GHz, 5 GHz, 50 GHz, 10 GHz, and 75 GHz. A callout states: "Filter downloadable libraries by frequency. The frequency of the dielectric constant (ϵ_r) / loss tangent ($\tan\delta$) material properties".
- Library Files Available:** A list of available files, including ShowaDenko_GEA_679_1GHz_1901.mlbx, Taconic_FR_25_10GHz_1901.mlbx, and others.
- Existing Data Table:** A section with radio buttons for 'Clear' and 'Append'. A callout states: "Improvements to On-Premise Mode to help users where, for security reasons, no Internet connection is available".
- File Access Mode:** A section with radio buttons for 'Online Polar Library (ftp://polarinstruments.com)' and 'On-Premise Mode'. A callout states: "Improvements to On-Premise Mode to help users where, for security reasons, no Internet connection is available". Below this is a text field for the local path and a 'Browse...' button.

Please Note: This data is accurate to the best of our knowledge, however it is provided, as is from our Material supplier partners. Please feedback any errors or inaccuracies to Polarcare and we will contact the material partner for clarification or rectification.

Speedstack v21.02 (February 2021)

New Shield material



Speedstack v21.02 introduces support for a new Shield material type.

Shield materials are used to prevent electromagnetic interference (EMI) from being either absorbed or radiated.

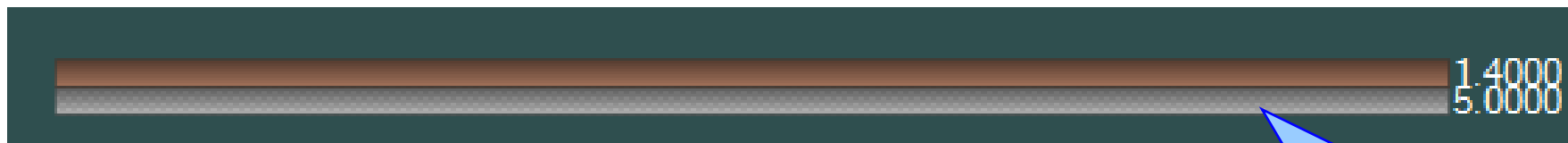
Field	Value
Electrical Layer Count	4
Stack Up Cost	19.00
Copper Thickness	5.6000
Dielectric Thickness	24.0000
Solder Mask Thickness	0.0000

Target Stack Up Thickness = 30.0000
Stack Up Thickness = 29.6000
Stack Up Thickness with Soldermask = 29.6000
Beta V21.02.01

New Shield material

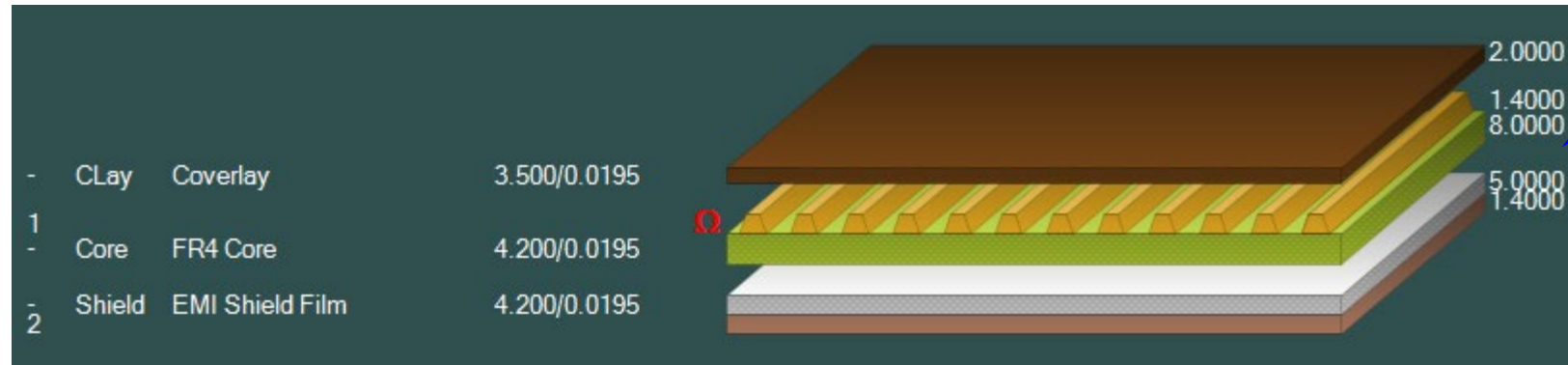
Shields are typically applied to the outer layer(s) of the stack up

1	Shield	EMI Shield Film	4.200/0.0195	1.4000
-	PP	PrePreg 1080	4.200/0.0195	5.0000
2	Core	FR4 Core	4.200/0.0195	3.0000
3	PP	PrePreg 1080	4.200/0.0195	1.4000
-	PP	PrePreg 1080	4.200/0.0195	8.0000
-	Shield	EMI Shield Film	4.200/0.0195	1.4000
4				5.0000

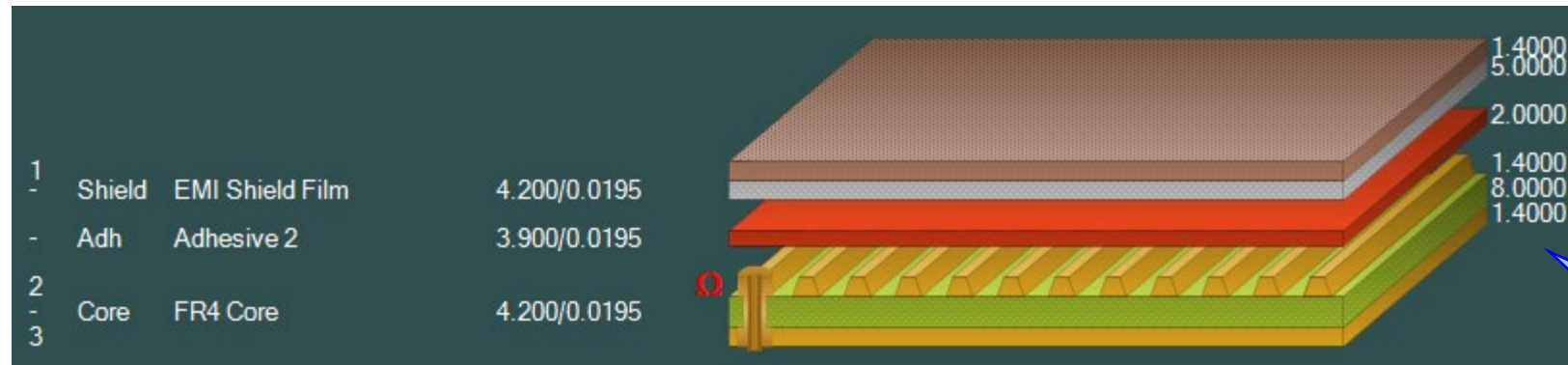


They consist of a shield layer (brown) and dielectric adhesive (silver)

Shield material examples

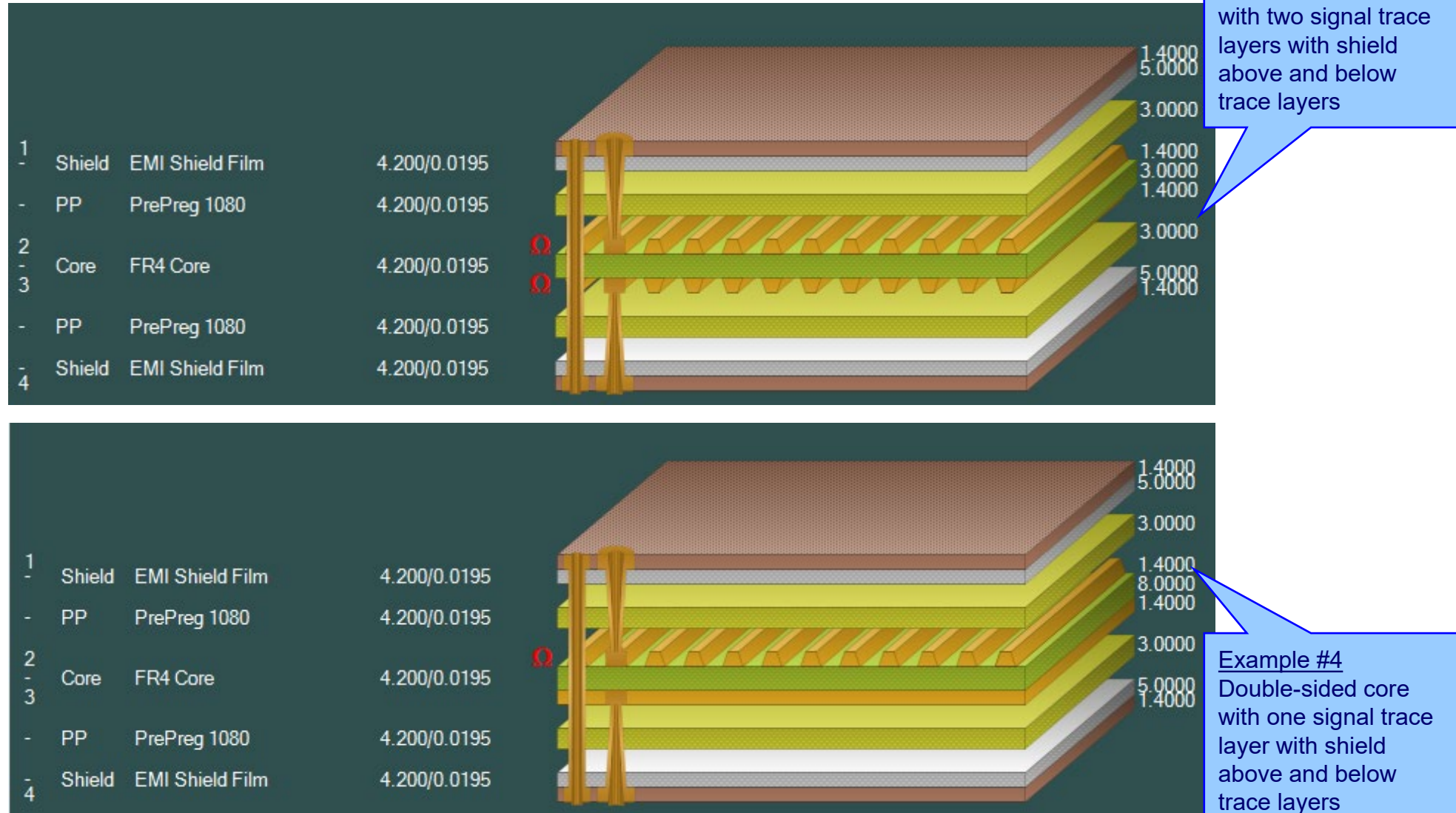


Example #1
Single-sided core,
coverlay above trace,
shield below



Example #2
Double-sided core,
adhesive and shield
above

Shield material examples



Material library enhancements

C:\Apps\Samples\Speedstack Imperial.mlbx

EXIT

NEW

OPEN

SAVE

PRINT

EXPORT

IMPORT

DELETE

RENAME

LOCK

UNLOCK

HELP

Foils | Prepregs | RCCs | Cores | Solder Masks | Ident Inks | Peelable Masks | Coverlays | Bond Ply | Adhesive | Flexible Cores | **Shields**

Supplier	Supplier Description	Description	Stock Number	Dielectric Base Thickness	Dielectric Finished Thickne	Shield Cu Thickness	Dielectric
PolarSamples	SH/001	EMI Shield Film	1200-001	5	5	0.7	4.2
PolarSamples	SH/002	EMI Shield Film	1200-002	5	5	1.4	4.2
PolarSamples	SH/003	EMI Shield Film	1200-003	5	5	2.8	4.2
PolarSamples	SH/004	EMI Shield Film	1200-004	10	10	0.7	4.2
PolarSamples	SH/005	EMI Shield Film	1200-005	10	10	1.4	4.2
PolarSamples	SH/006	EMI Shield Film	1200-006	10	10	2.8	4.2

*

New Shields tab contains Shield material information

Material library enhancements

Review/Edit Shield





Supplier	<input type="text" value="Polar Samples"/>	Size	<input type="text" value=""/>
Supplier Description	<input type="text" value="SH/001"/>	Note 1	<input type="text"/>
Description	<input type="text" value="EMI Shield Film"/>		
StockNumber	<input type="text" value="1200-001"/>		
Type	<input type="text" value="Shield"/>	Note 2	<input type="text"/>
Base Thickness	<input type="text" value="5.0000"/>		
Finished Thickness	<input type="text" value="5.0000"/>		
Dielectric Constant	<input type="text" value="4.2"/>	Note 3	<input type="text"/>
Loss Tangent	<input type="text" value="0.0195"/>		
Resin Content	<input type="text" value="0"/>		
Tg	<input type="text" value="0"/>	Note 4	<input type="text"/>
Td	<input type="text" value="0"/>		
CAF Resistance	<input type="text" value="0"/>		
Z Axis Expansion	<input type="text" value="0"/>		
Excess Resin	<input type="text" value="0.0000"/>	Note 5	<input type="text"/>
Tolerance +/- %	<input type="text" value="10"/>		
Shield Copper Thickness	<input type="text" value="0.7000"/>		
Cost	<input type="text" value="0"/>		
Lead Time	<input type="text" value="0"/>		
Laser Drillable	<input type="checkbox"/>		

Material library Edit Shield dialog

Online Library enhanced to support Shield materials

Online Library

Filter by Supplier

File Type

Foils
RCCs
PrePregs
Cores
SolderMasks
Idents
Peelables
Coverlays
BondPly
Adhesives
FlexCores
Shields

Library Files Available : All

Polar_Shield_21_02.mlbx
Tatsuta_SF_PC3000_Series_1GHz_21_02_BETA.mlbx

Download the latest material library data from the Polar Online Material Library

New Shields file type has been introduced.

Existing Data Table

☐ Clear
☒ Append

Clear - use this option to clear data from the existing library data table and download a single library

Append - use this option to add data to the existing library data table and when downloading multiple libraries during a single session

Download
Close

Library Files Downloaded during this session

Polar_Shield_21_02.mlbx

Filter by Frequency

☒ All
☐ 1 GHz
☐ 10 GHz

File Access Mode

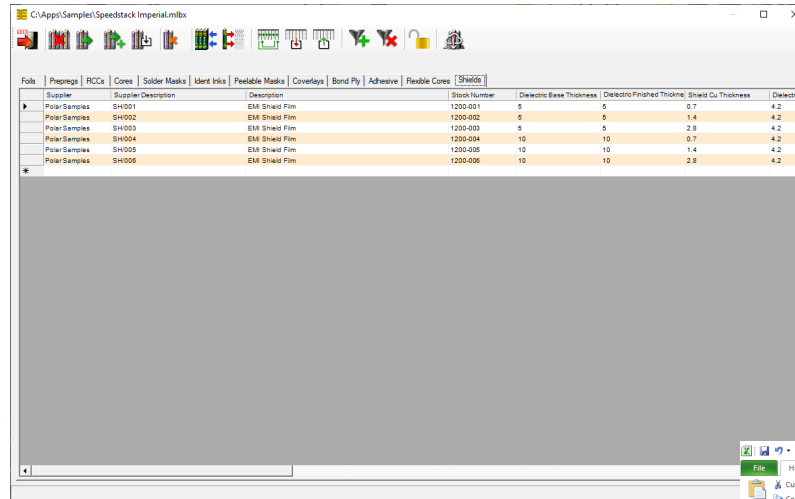
☒ Online Polar Library (ftp://polarinstruments.com)
☐ On-Premise Mode

S:\Software\Speedstack\MaterialLibrary_v20_11

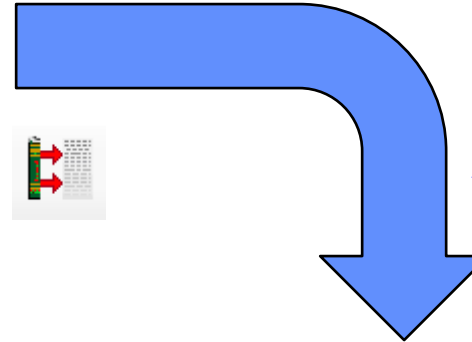
Browse...

Please Note: This data is accurate to the best of our knowledge, however it is provided, as is from our Material supplier partners. Please feedback any errors or inaccuracies to Polarcare and we will contact the material partner for clarification or rectification.

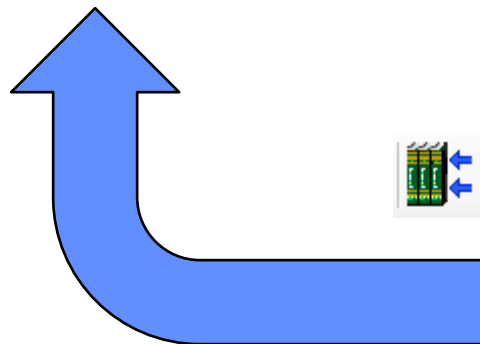
Export / Import Shield library to Excel



Supplier	Supplier Description	Description	Stock Number	Dielectric Base Thickness	Dielectric Finished Thickness	Shield Cu Thickness	Dielectric
Polar Samples	SH001	EMI Shield Film	1200-001	5	5	0.7	4.2
Polar Samples	SH002	EMI Shield Film	1200-002	5	5	1.4	4.2
Polar Samples	SH003	EMI Shield Film	1200-003	5	5	2.8	4.2
Polar Samples	SH004	EMI Shield Film	1200-004	10	10	0.7	4.2
Polar Samples	SH005	EMI Shield Film	1200-005	10	10	1.4	4.2
Polar Samples	SH006	EMI Shield Film	1200-006	10	10	2.8	4.2

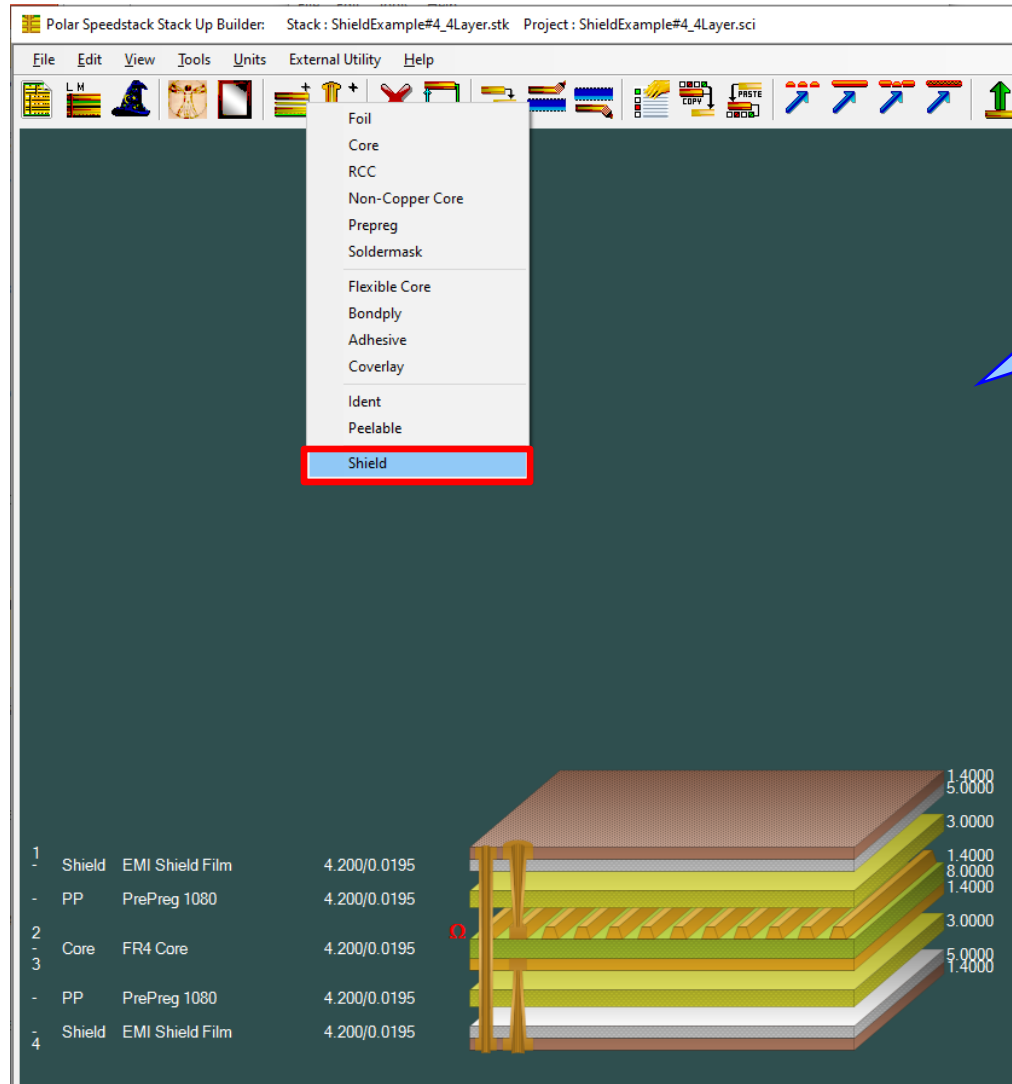


It is possible to export / import Shield library data with 3rd part tools like Excel



FileHomeInsertPage LayoutFormulasDataReviewViewDeveloperTeam

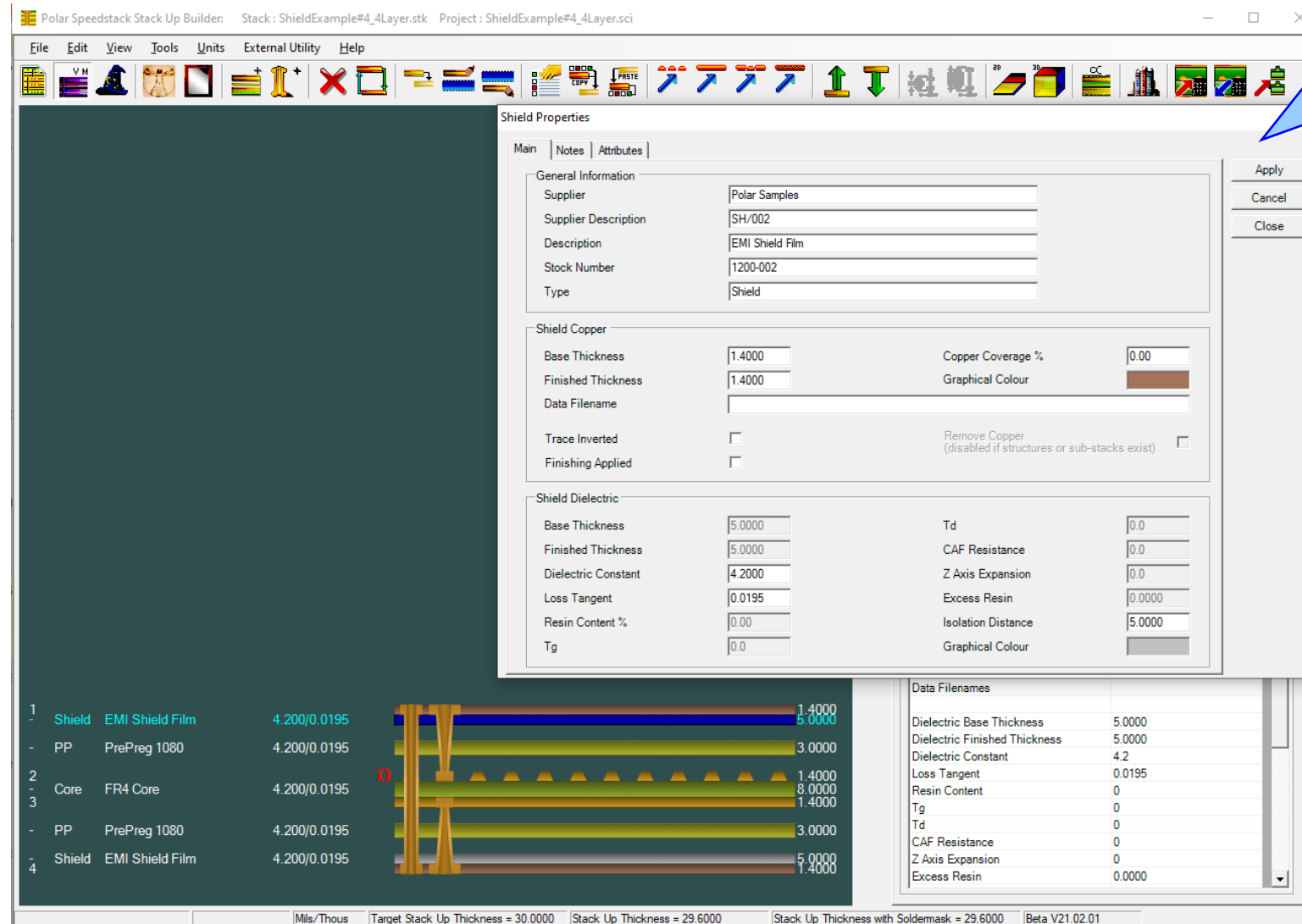
Stack up editor enhancements



Stack Up editor enhancements:

Shield material options to add, delete, swap, move up, move down, symmetry and set properties

Shield properties



Polar Speedstack Stack Up Builder: Stack: ShieldExample#4_4Layer.stk Project: ShieldExample#4_4Layer.sci

File Edit View Tools Units External Utility Help

Shield Properties

Main Notes Attributes

General Information

Supplier: Polar Samples

Supplier Description: SH/002

Description: EMI Shield Film

Stock Number: 1200-002

Type: Shield

Shield Copper

Base Thickness: 1.4000

Finished Thickness: 1.4000

Data Filename:

Trace Inverted: ☐

Finishing Applied: ☐

Copper Coverage %: 0.00

Graphical Colour:

Remove Copper (disabled if structures or sub-stacks exist): ☐

Shield Dielectric

Base Thickness: 5.0000

Finished Thickness: 5.0000

Dielectric Constant: 4.2000

Loss Tangent: 0.0195

Resin Content %: 0.00

Tg: 0.0

Td: 0.0

CAF Resistance: 0.0

Z Axis Expansion: 0.0

Excess Resin: 0.0000

Isolation Distance: 5.0000

Graphical Colour:

Apply

Cancel

Close

1 Shield EMI Shield Film 4.200/0.0195 1.4000 5.0000

2 PP PrePreg 1080 4.200/0.0195 3.0000

3 Core FR4 Core 4.200/0.0195 1.4000 8.0000 1.4000

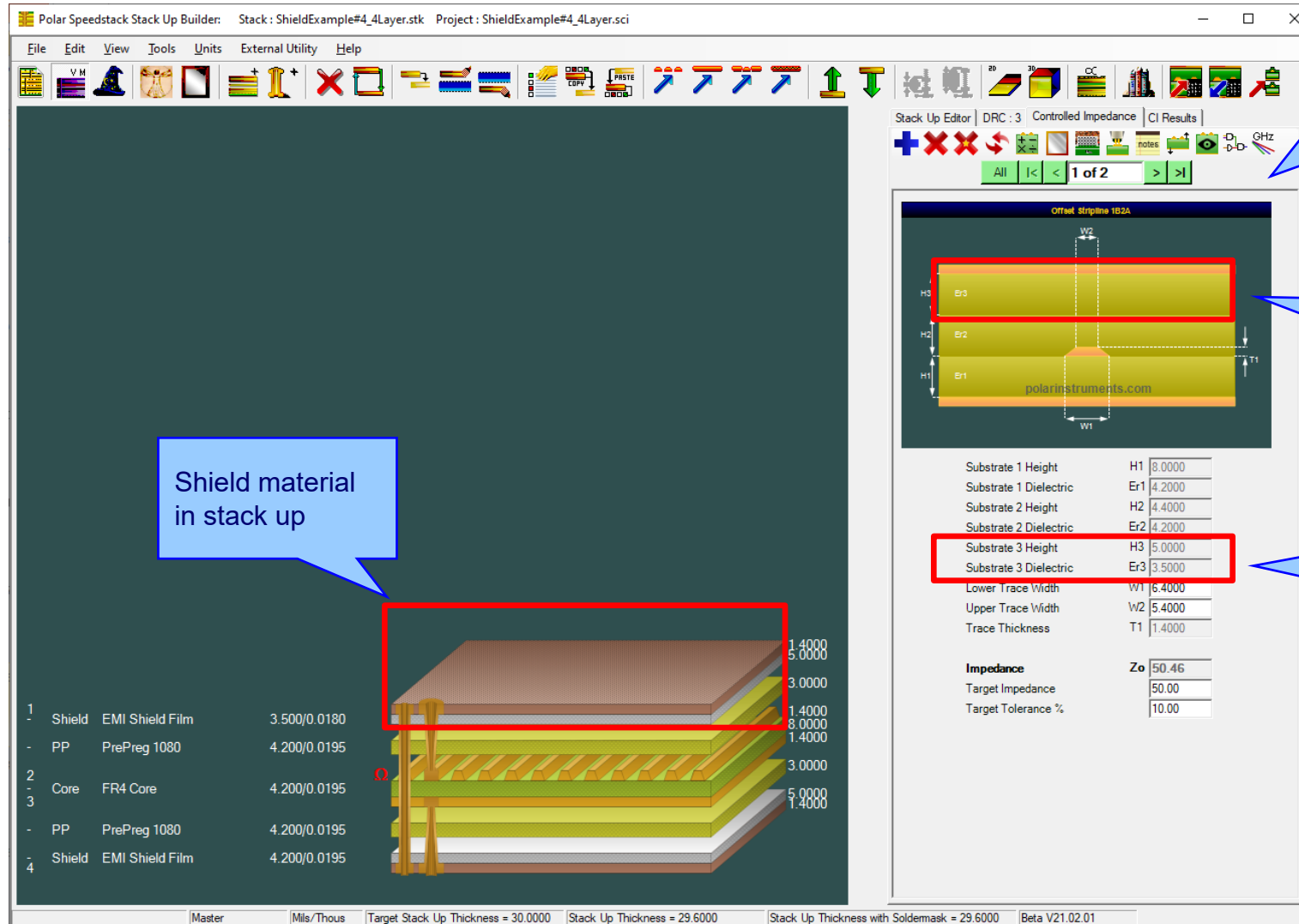
4 PP PrePreg 1080 4.200/0.0195 3.0000

5 Shield EMI Shield Film 4.200/0.0195 5.0000 1.4000

Mils/Thous Target Stack Up Thickness = 30.0000 Stack Up Thickness = 29.6000 Stack Up Thickness with Soldermask = 29.6000 Beta V21.02.01

View and customise the Shield properties. Useful in 'what-if' scenarios

Controlled impedance and insertion loss calculations

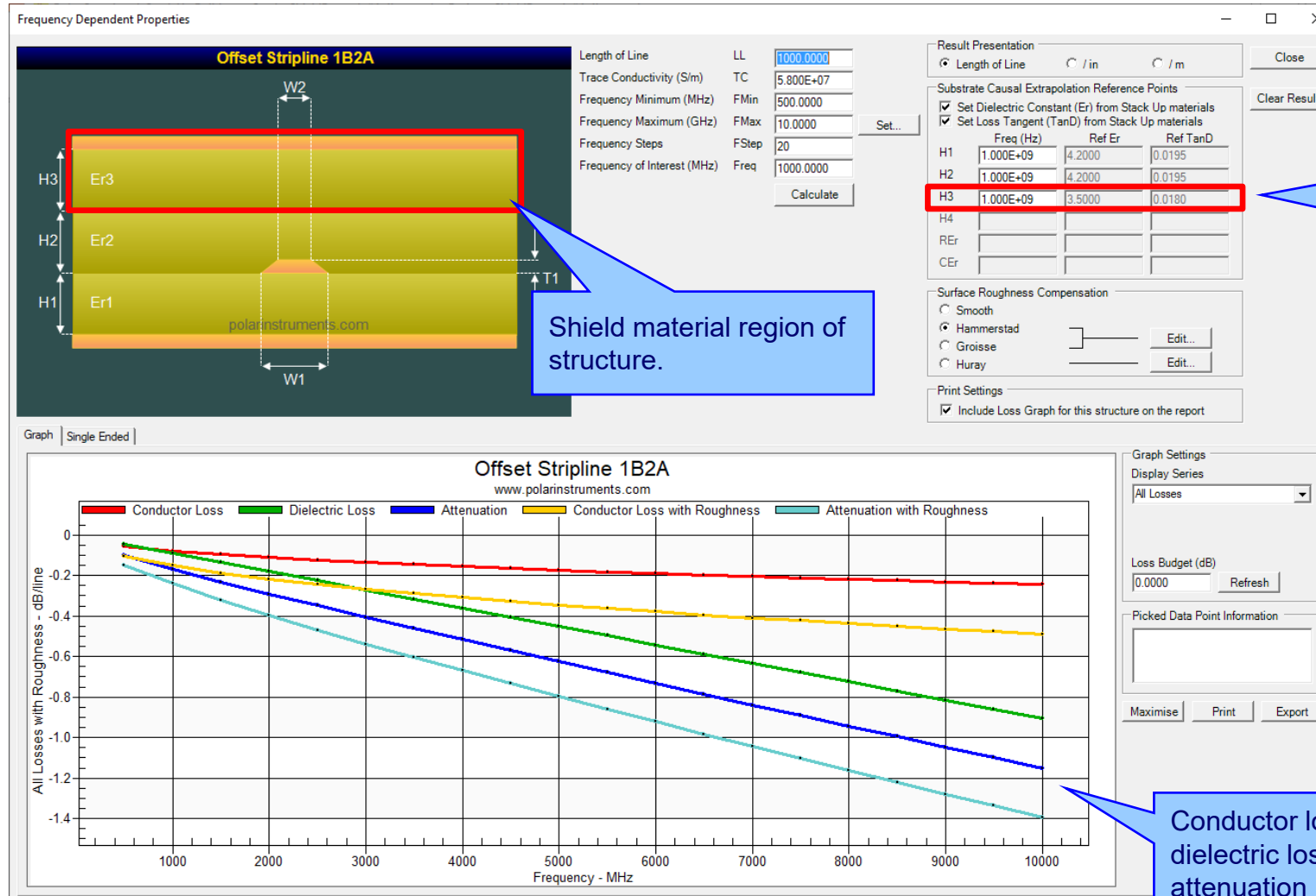


Impedance and insertion calculations support the new Shield material type.

Shield material region of structure.

Shield adhesive height / thickness dimension and dielectric constant.

Controlled impedance and insertion loss calculations



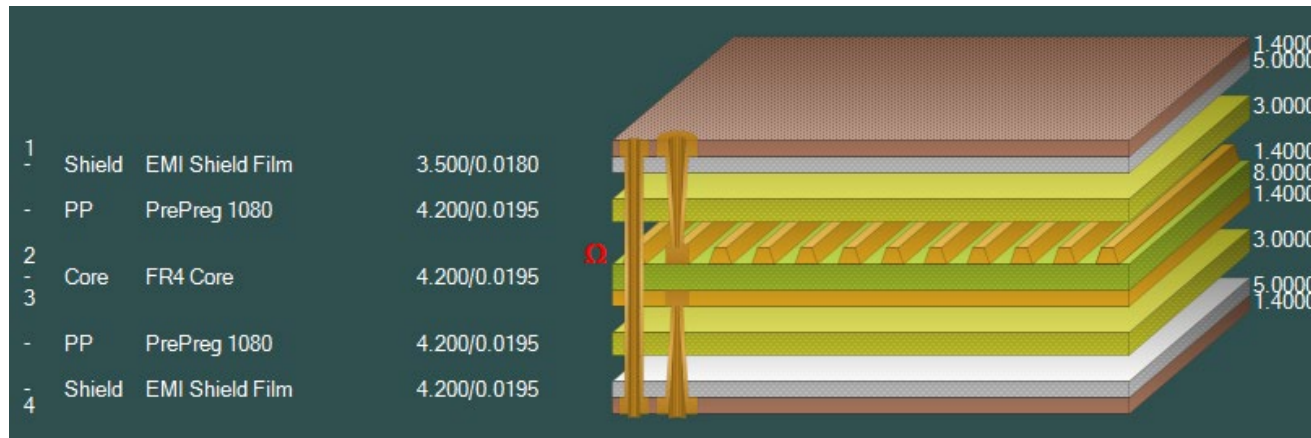
Shield adhesive dielectric constant / loss tangent.

Shield material region of structure.

Conductor loss, dielectric loss, total attenuation

Controlled impedance and insertion loss calculations

Please note: Speedstack is capable of supporting many shield types for stack up design and documentation. However, it is important to use the correct type of shield material for controlled impedance and insertion loss applications. They are often designated by the shield vendor as ‘for high speed signal transmission applications’.

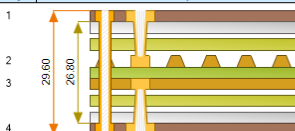


Technical report enhancements

Technical report showing shield materials

Speedstack Report Printer
File Options



C:\Apps\Samples\ShieldExample\5_4Layer.sci Units: Mils






Layer	Stack up	Supplier	Description	Type	Processed Thickness	εr	Loss Tangent	Impedance ID
1		Polar Samples	EMI Shield Film	Shield	1.400	3.500	0.0180	
		Polar Samples	PrePreg 1080	Dielectric	3.000	4.200	0.0195	
2		Polar Samples	FR4 Core	FR4	1.400	4.200	0.0195	1, 2
3		Polar Samples	PrePreg 1080	Dielectric	3.000	4.200	0.0195	
4		Polar Samples	EMI Shield Film	Shield	1.400	4.200	0.0195	

Copper Thickness = 5.600 | Dielectric Thickness = 24.000 | Solder Mask Thickness = 0.000 | Stack Up Thickness = 29.600 | Stack Up Thickness with Soldermask = 29.600
Stack Up Cost = 19.00

Notes

Impedance ID	Structure Image	Structure Name	Impedance Signal Layer	Ref. Plane 1 in Layer	Ref. Plane 2 in Layer	Lower Trace Width (W1)	Upper Trace Width (W2)	Trace Separation (S1)	Target Impedance	Tol (+/- %)	Calculated Impedance
1		Offset Stripline 1B2A	2	1	3	6.400	5.400	0.000	50.000	10.000	50.460
2		Edge Coupled Offset Stripline 1B2A	2	1	3	5.000	4.000	8.800	100.000	10.000	100.010

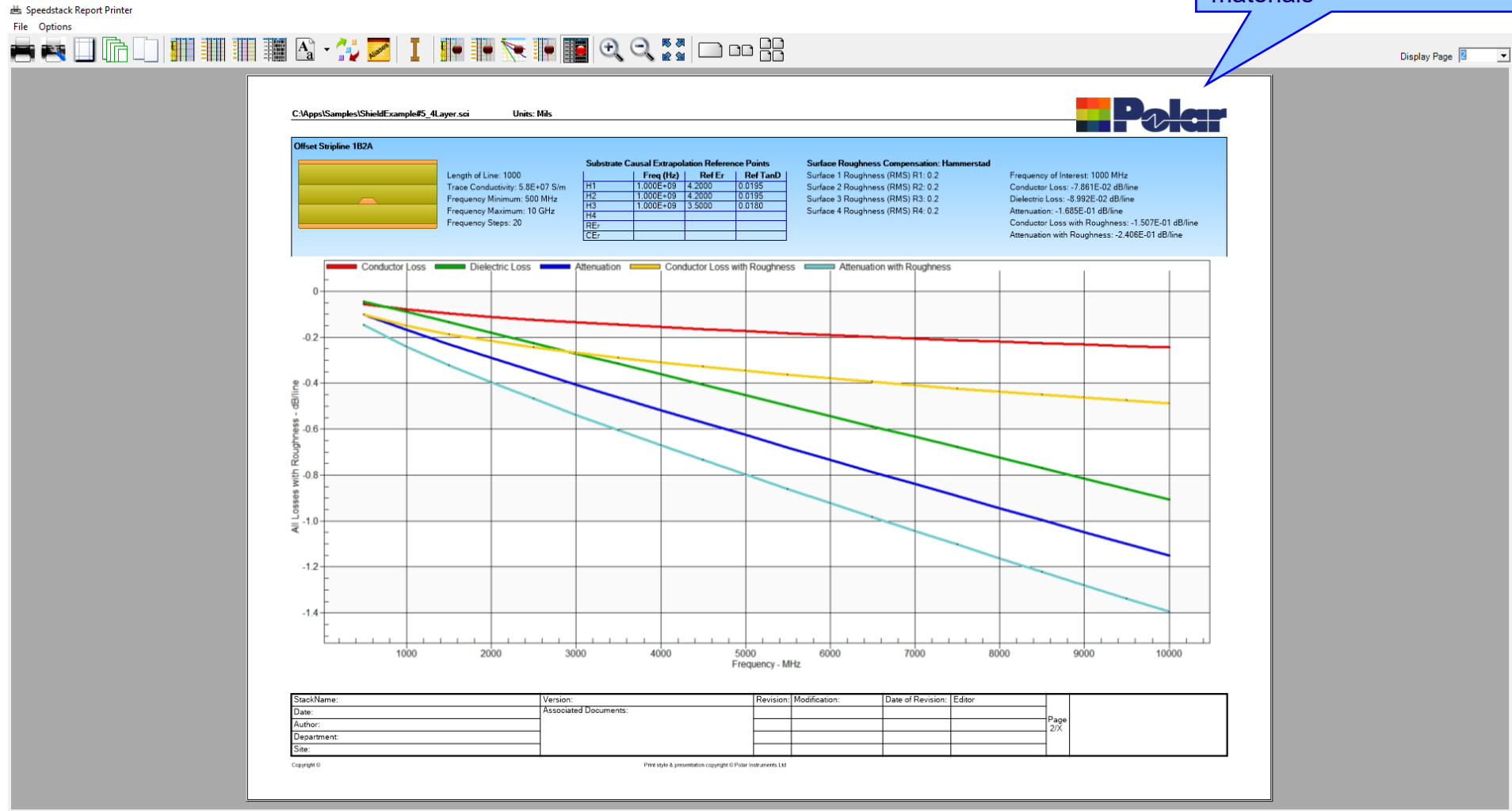
Drill Image	1st Layer	2nd Layer	Column Position	Drill Type
	1	2	2	Laser PTH
	1	4	1	Mechanical PTH
	4	3	2	Laser PTH

StackName: Master	Version:	Revision:	Modification:	Date of Revision:	Editor:	Page 1/X
Date:	Associated Documents:					
Author:						
Department:						
Site:						

Copyright © Polar Instruments Ltd

Technical report enhancements

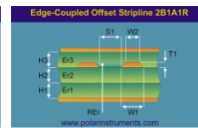
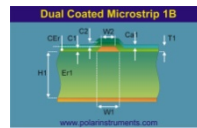
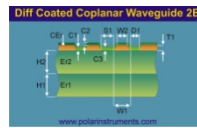
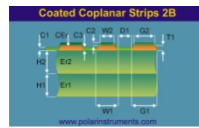
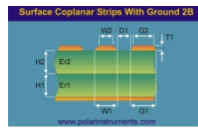
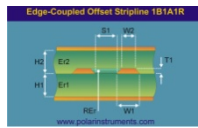
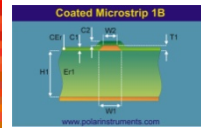
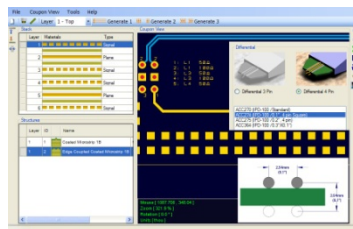
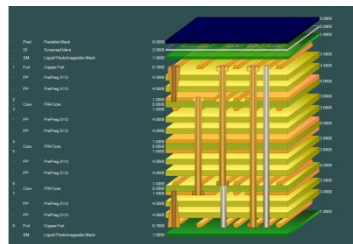
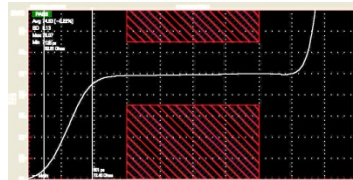
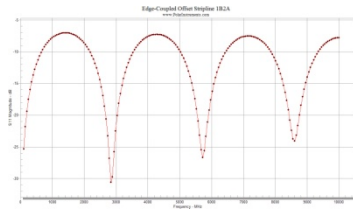
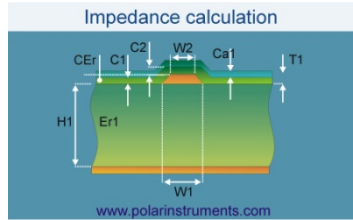
Insertion loss report
supporting shield
materials



Import / Export enhancements

The following Import / Export options have been updated to support the new shield material introduced with Speedstack 2021:

- XML STKX v20.00 and SSX v10.00 import / export options
- CSV export option
- Gerber / DXF export option

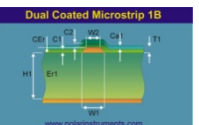
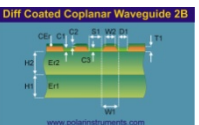
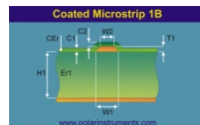
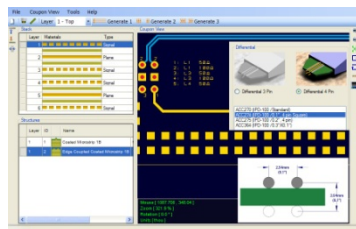
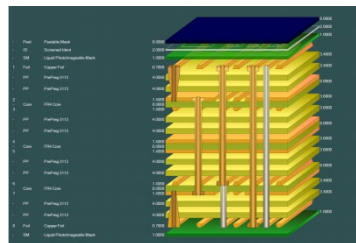
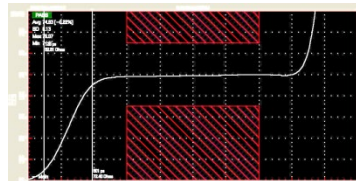
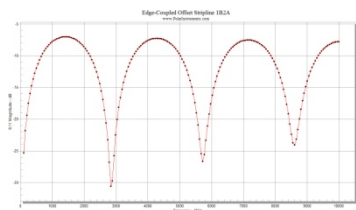
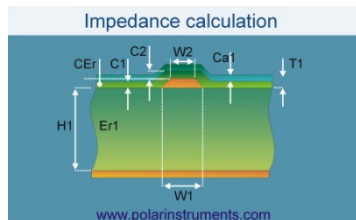


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For more information:

Contact Polar now:

Phone

USA / Canada / Mexico

[Geoffrey Hazelett](mailto:Geoffrey.Hazelett@polarinstruments.com)

(503) 356 5270

Asia / Pacific

[Terence Chew](mailto:Terence.Chew@polarinstruments.com)

+65 6873 7470

UK / Europe

[Neil Chamberlain](mailto:Neil.Chamberlain@polarinstruments.com)

+44 23 9226 9113

Germany / Austria / Switzerland

[Hermann Reischer](mailto:Hermann.Reischer@polarinstruments.com)

+43 7666 20041-0

www.polarinstruments.com

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