MWI-2018 Software Instruction Manual

ROGERS CORPORATION

Advanced Connectivity Solutions

Helping power, protect, connect our world™

MWI-2018 Software Instruction Manual

- Installing software
- Starting software and basic operations
- Detailed software capabilities

MWI-2018 Software Instruction Manual

Installing:

- After downloading the mwi2018.exe file, save it on the hard drive of the computer that will be using the software
  - Do not install on a network system
  - If not able to download the *.exe file, there is an option to download the same file that is in a zip format
- Double click on the "mwi2018.exe"
- The computer that runs the software must have an operating system with the dot-net framework, from 2004 or more recent

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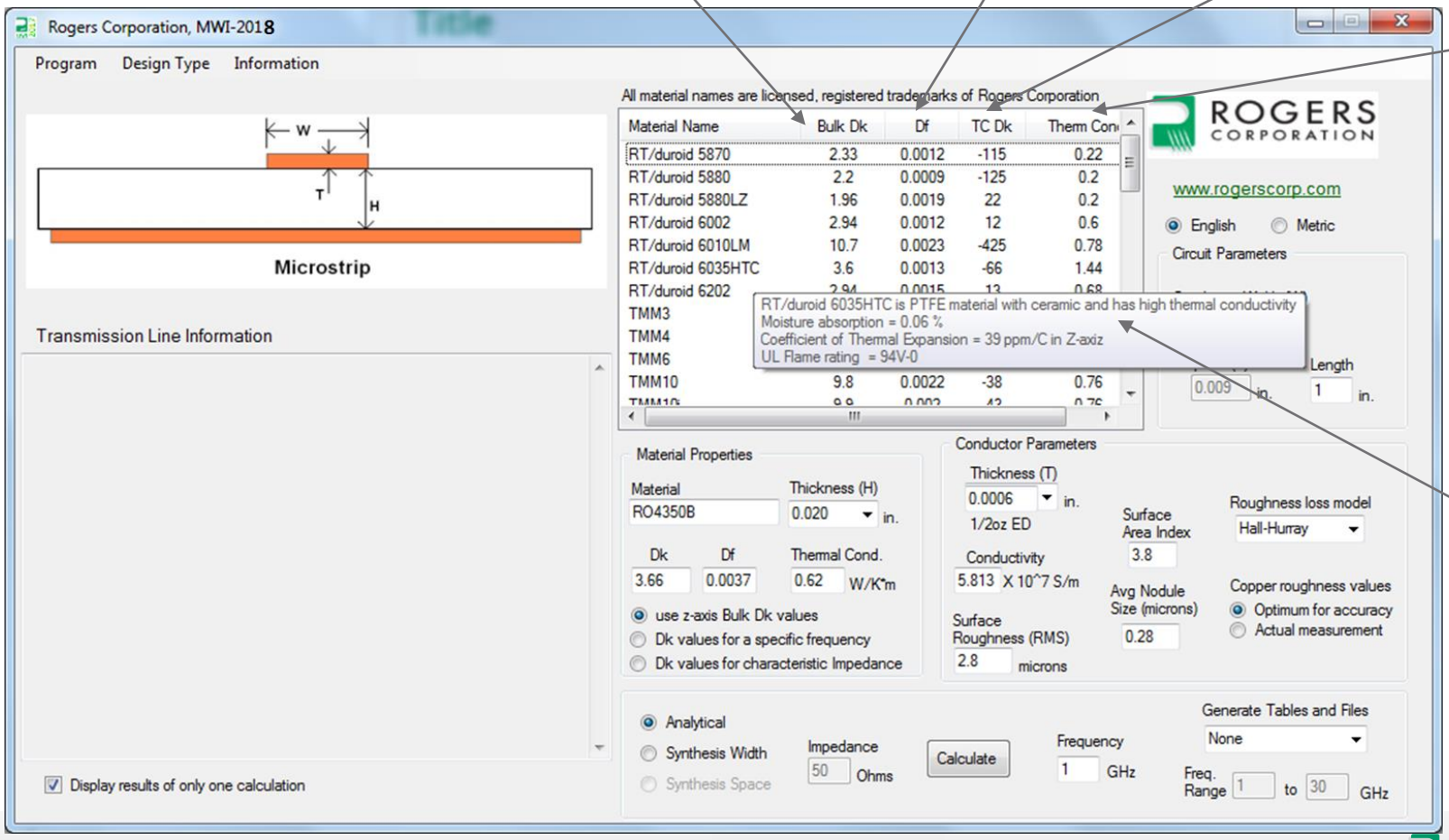
Software Operations, material list



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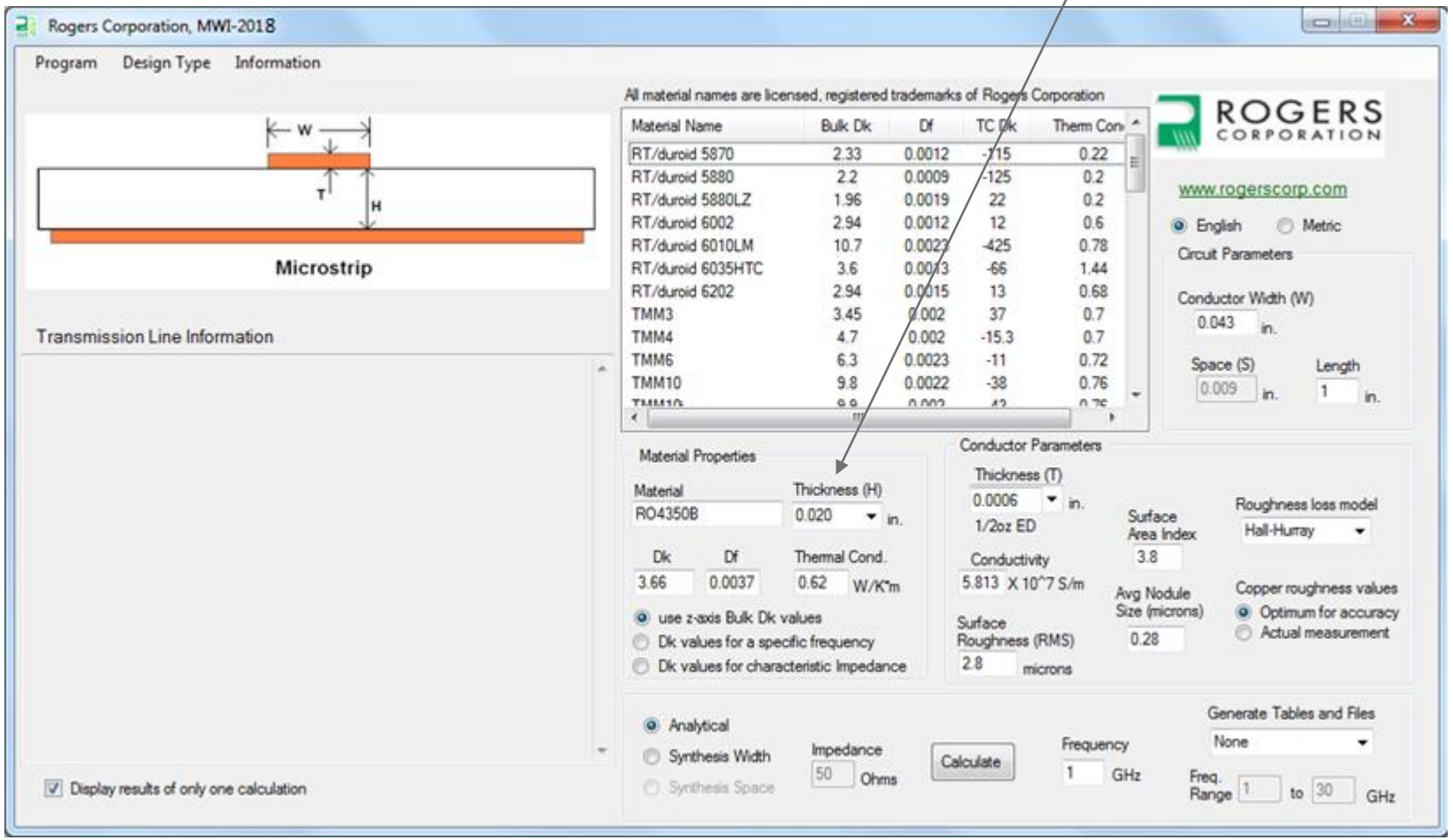
Software Operations, material thickness

Only standard thicknesses of the selected material are shown. This can be overridden.



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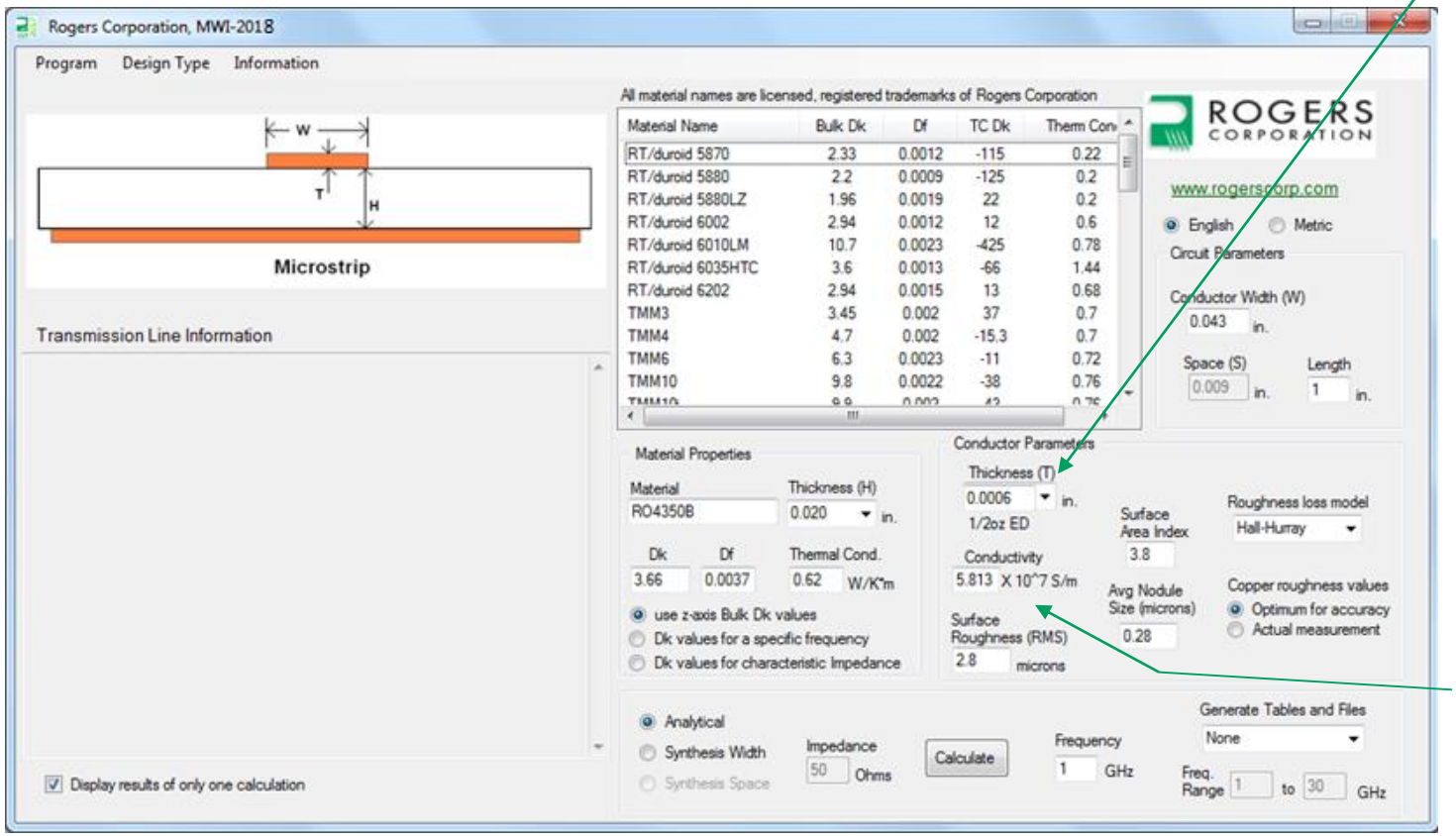
Software Operations, copper definition



When copper is selected only standard thicknesses and copper types of the selected material are shown. This can be overridden.

Conductor conductivity can be entered; however it will affect all conductor layers of the circuit

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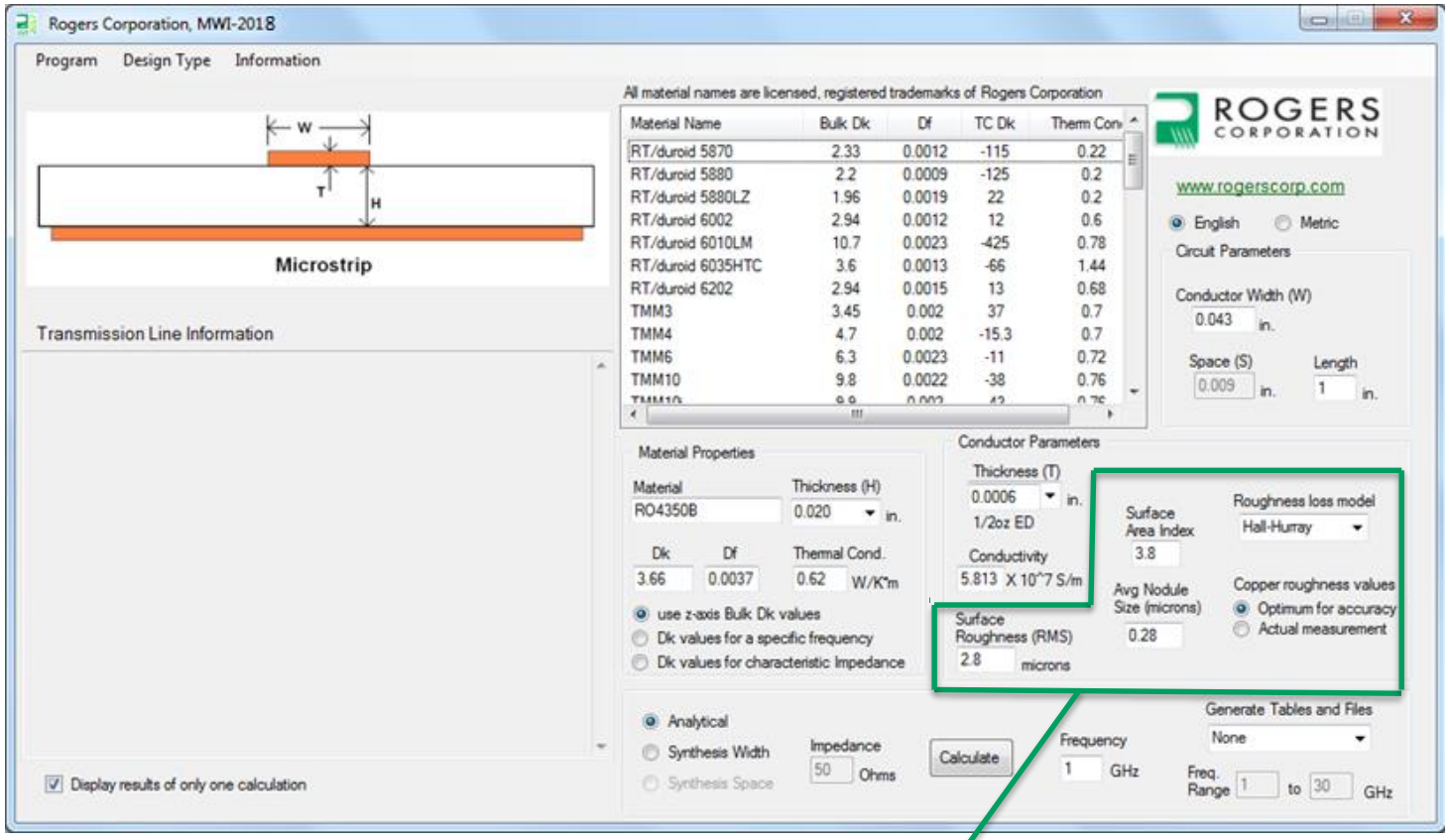
Software Operations, copper definition



Copper roughness information

There are two copper roughness models available, which will supplement the insertion loss calculations with increased conductor loss due to copper surface roughness.

The Morgan rule is most accurate when used below about 12 GHz

The Hall-Huray model is most accurate at higher frequencies

The surface roughness (RMS) is used for Morgan rule only

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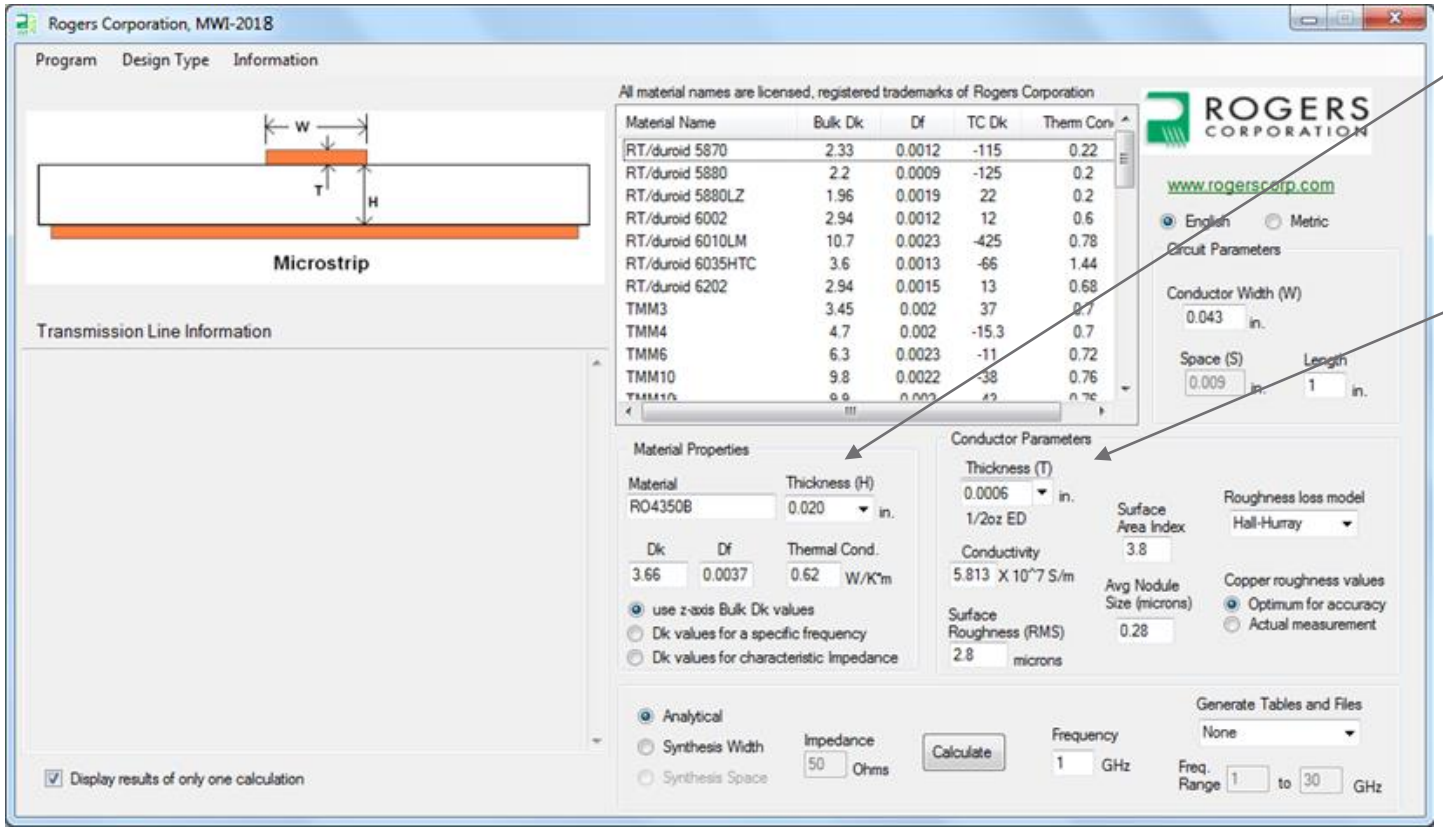
Software Operations, changing materials



When changing from one material to another, the nearest standard thickness of new material selected will be chosen.

The optimum copper type will be automatically selected, for the newly selected material.

Both of these can be overridden.

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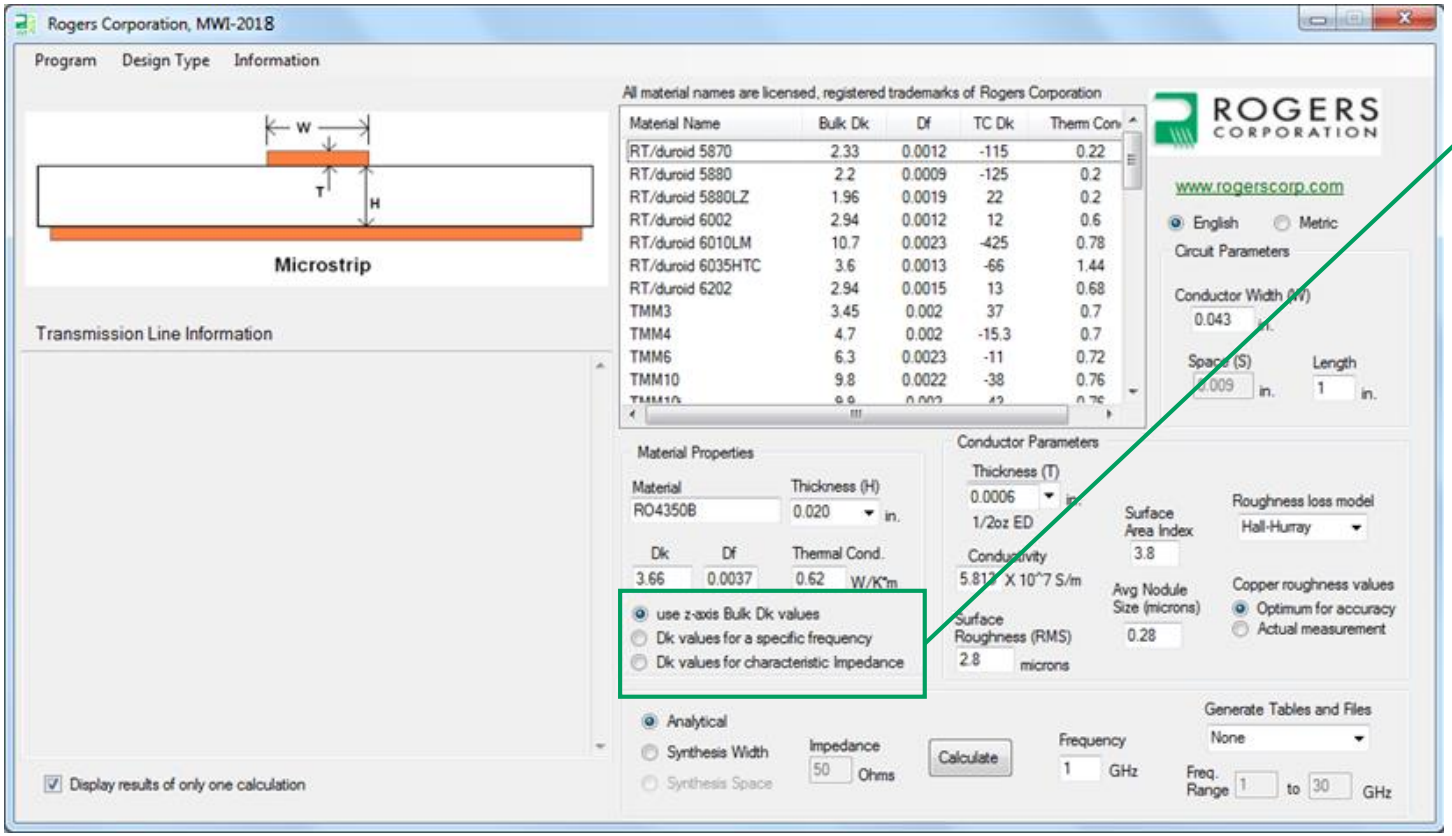
Software Operations, Design Dk values



Design Dk is built into this software

For simple calculations the default z-axis Bulk Dk can be used

More accurate results can be achieved by using the RF Design Dk or Digital Dk Values

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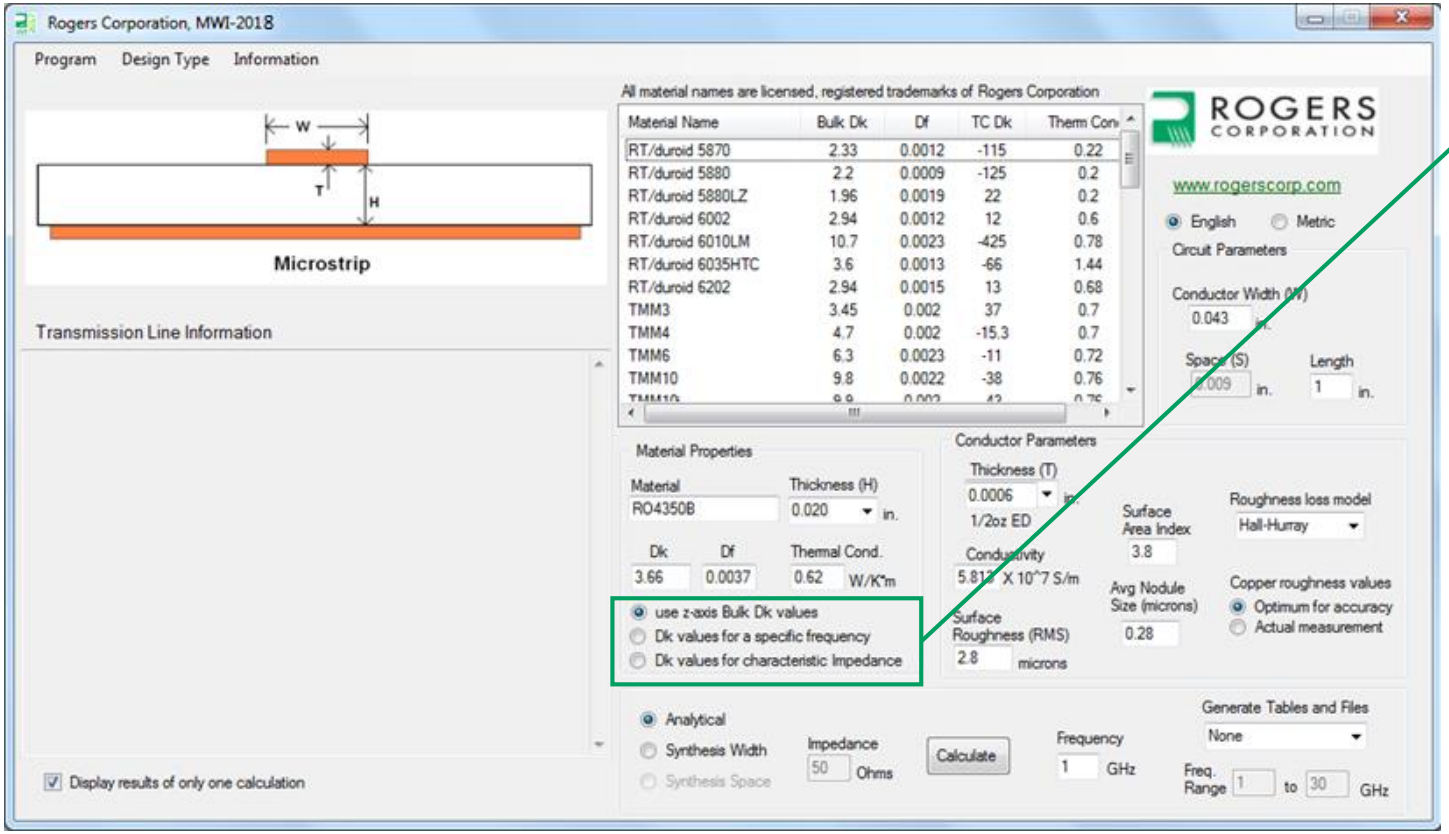
Software Operations, Design Dk values



Design Dk is built into this software

For RF applications at a specific frequency or narrow frequency range, then the RF Design Dk values can be used.

Example: When designing a filter at 3 GHz the Design Dk “Dk values for a specific frequency” should be used and the Frequency input set to 3

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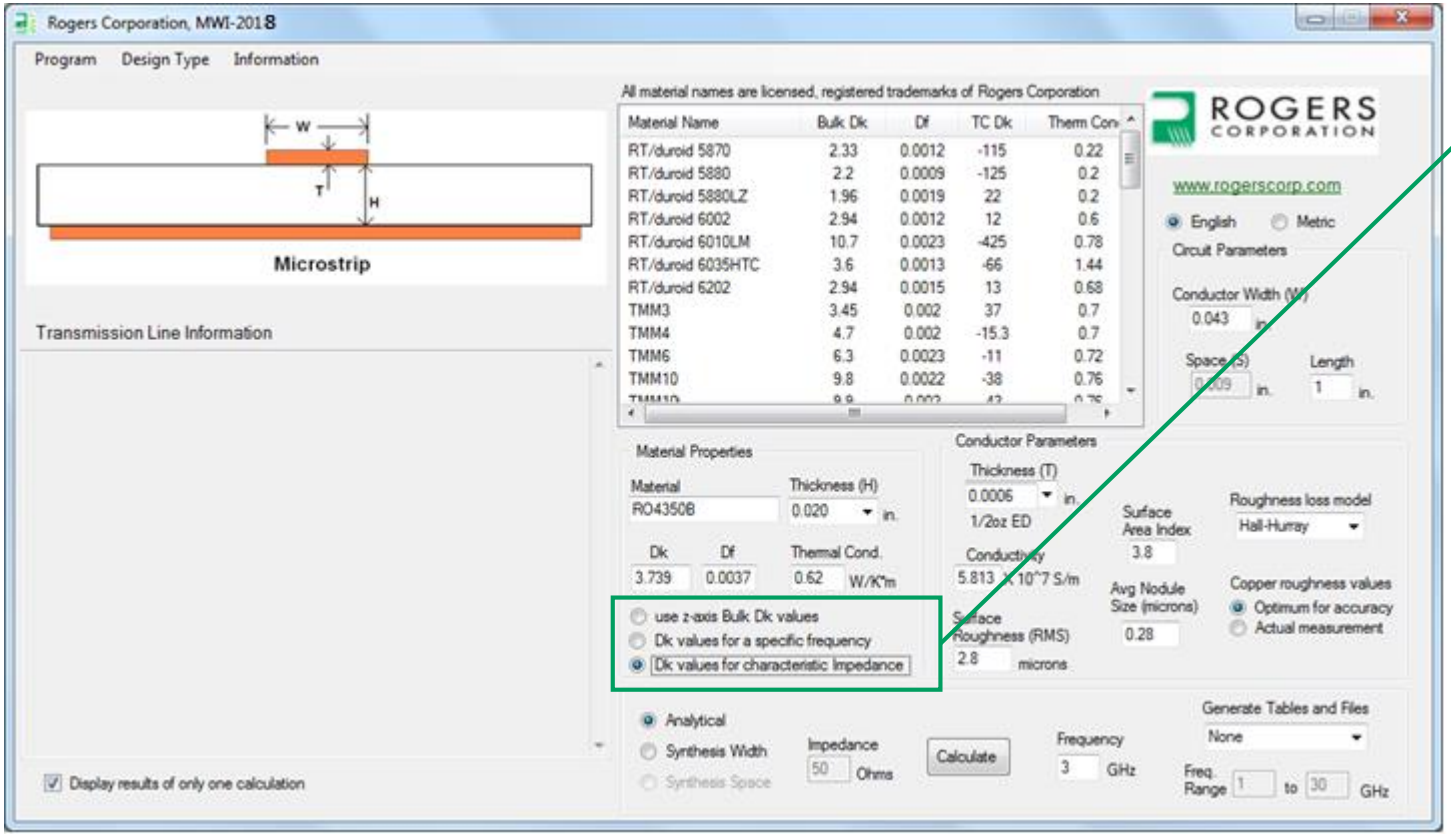
Software Operations, Design Dk values



Design Dk is built into this software

Typically the user will use Digital Design Dk values for characteristic impedance, such as PCB fabricators trying to achieve a controlled impedance for a circuit.

Also this option is good for high speed digital applications or very wideband RF applications

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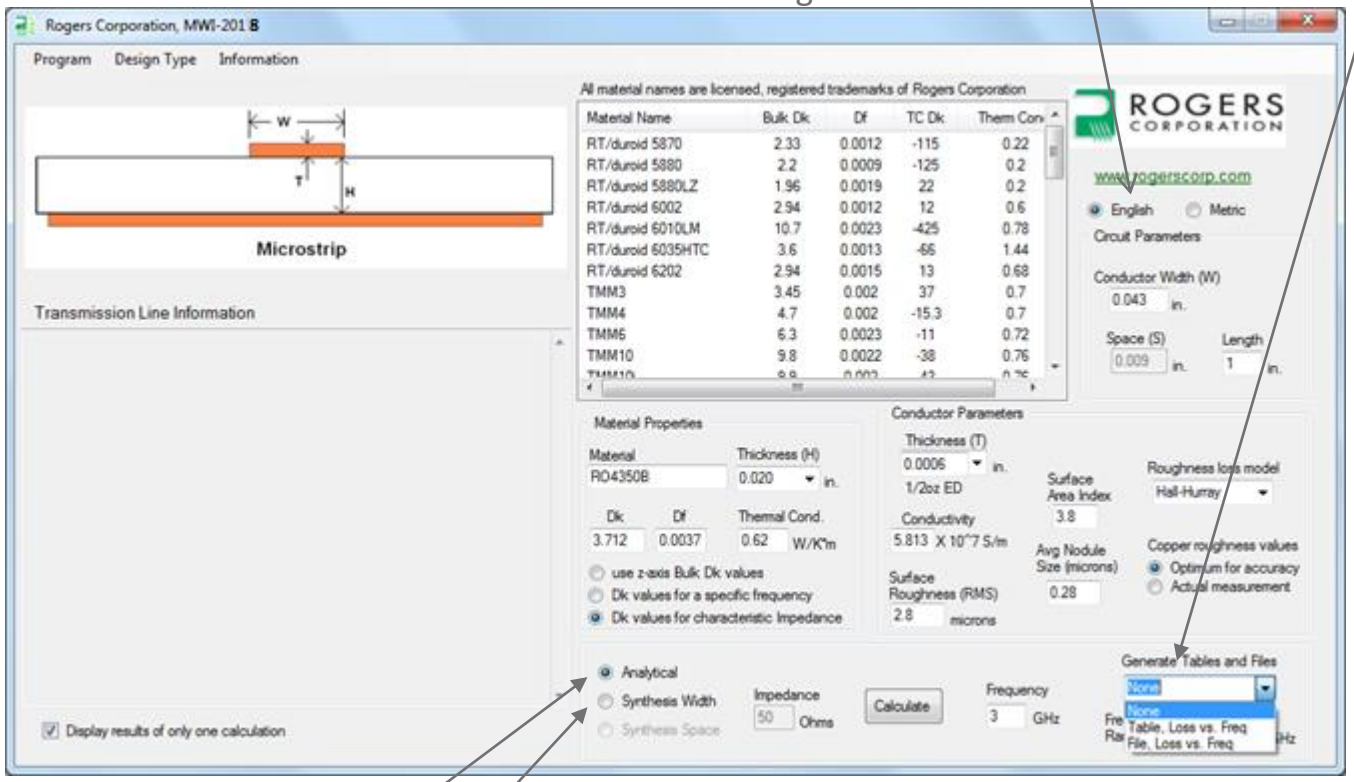
Software Operations, Analytical and Synthesis

Units can be changed between English and Metric



User can select to generate a table or file of information for a range of frequencies.

For some circuit geometries and/or designs, the synthesis may be unstable.

Using the Analytical option is safer and gives much more information.

User can do a simple Synthesis, then click to Analytical and it will hold the same data and give much more information when the calculate button is pressed.

Synthesis will generate the conductor width or spacing, given an impedance target.

Analytical will solve for impedance and other electrical properties given circuit geometry.

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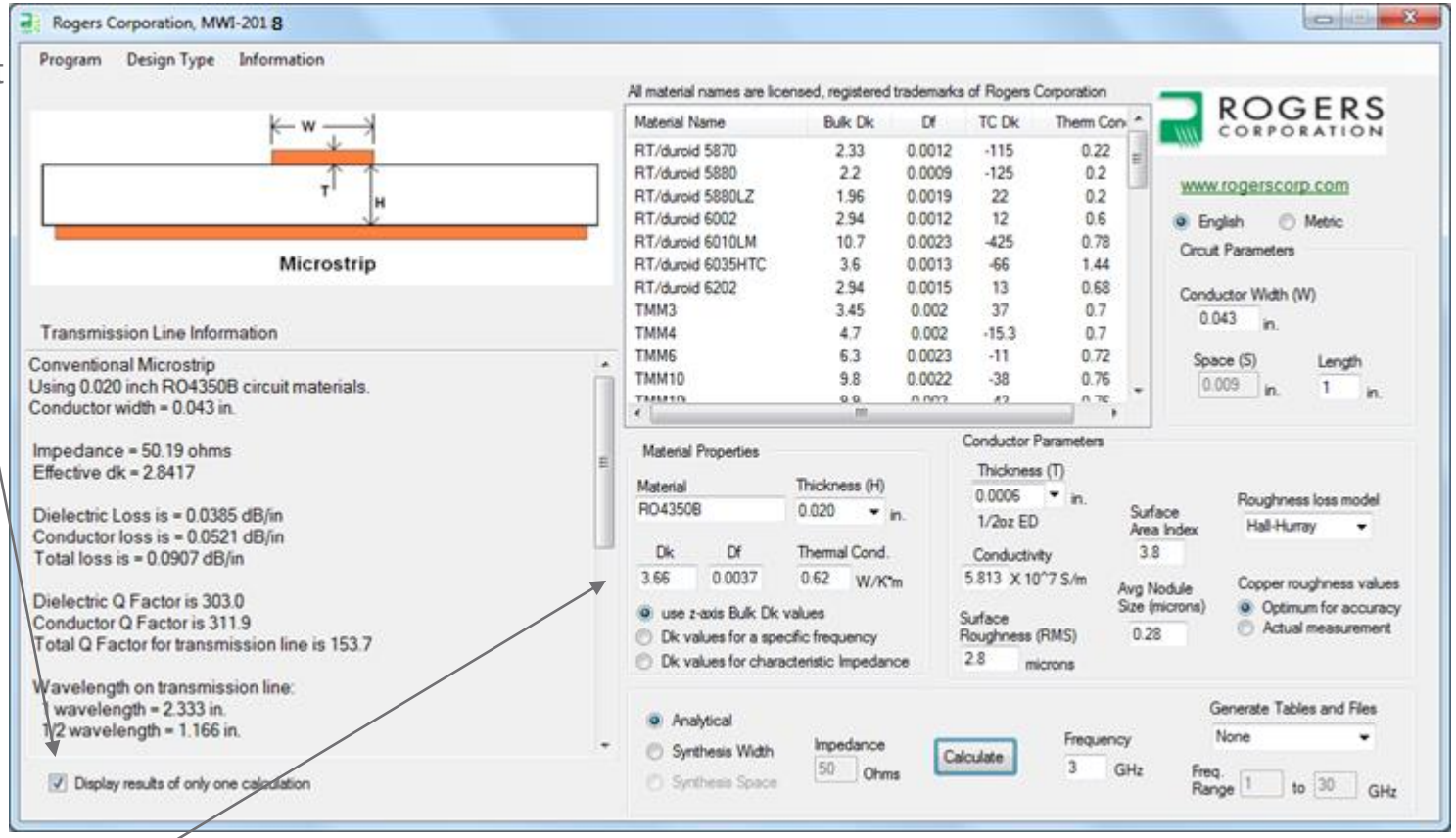
Software Operations, Summary window

If this is checked, the text window will clear each time the calculate button is pressed.

If not checked, all of the models ran will accumulate in the text window; with no known limit.

With additional information, the window will default to the top, so the user will need to scroll down to see the most recent information.



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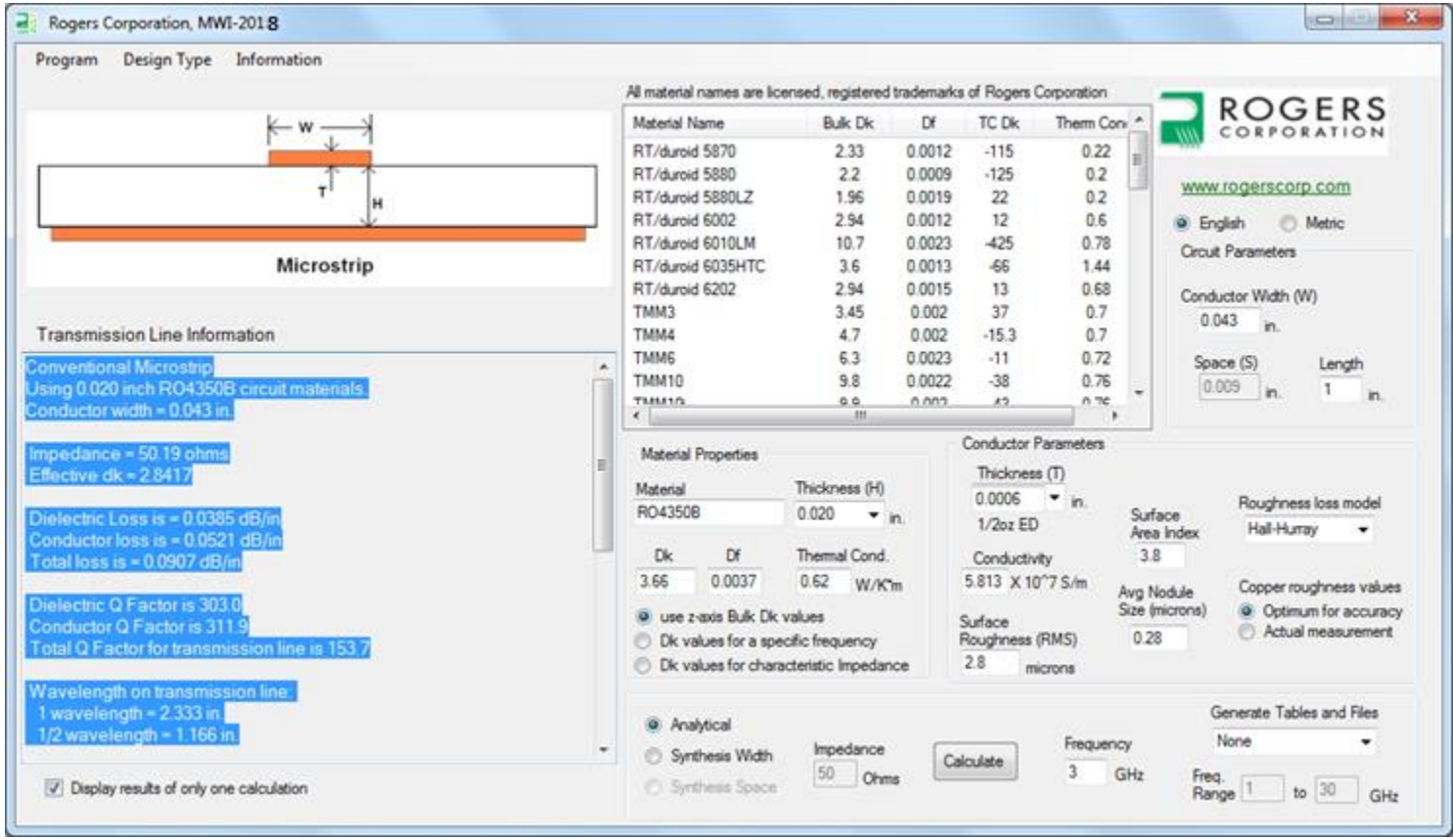
Software Operations, Summary window

After pressing the Calculate button, the information can be highlighted and copied into other Windows® software such as a word processor.



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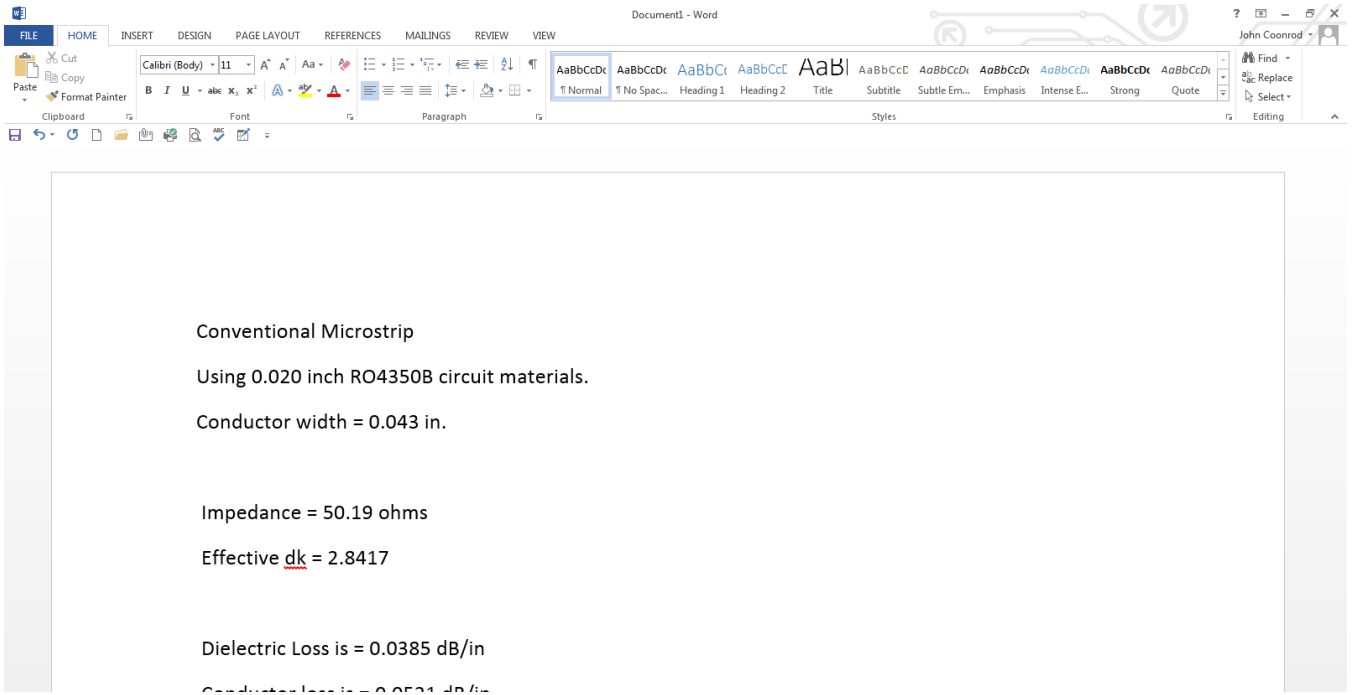
Software Operations, Copy to other programs

Example: copy from MWI-2018 and paste into Windows® Word



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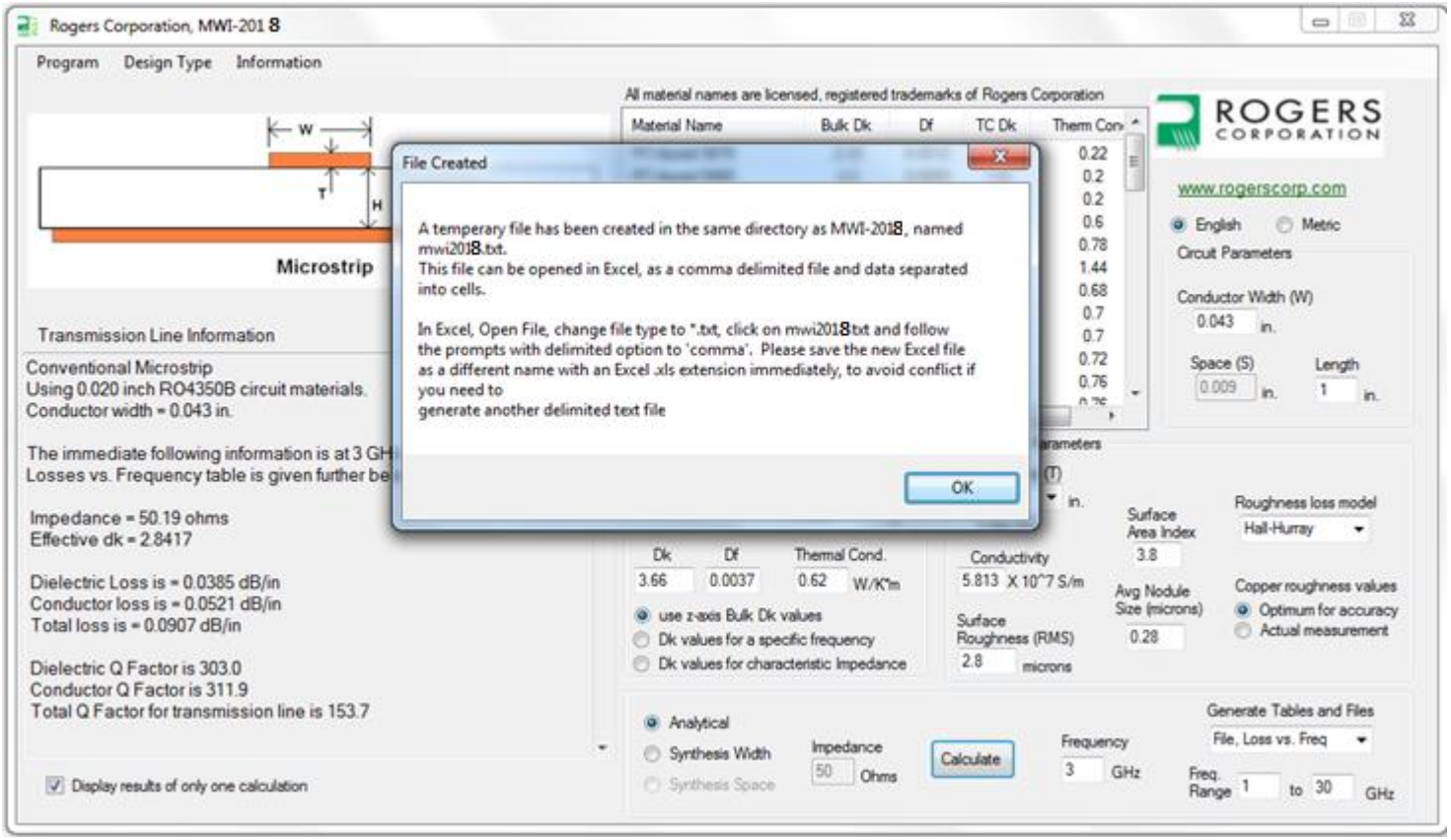
Software Operations, Generating comma delimited file

A comma delimited file can be generated with a table of information.

A file will be saved in the same directory as the MWI-2018 software and named "mwi2018.txt".

The user can open this file with Excel and follow the prompts for importing the file as a comma delimited file. This will allow the user to manipulate the data and generate graphs.



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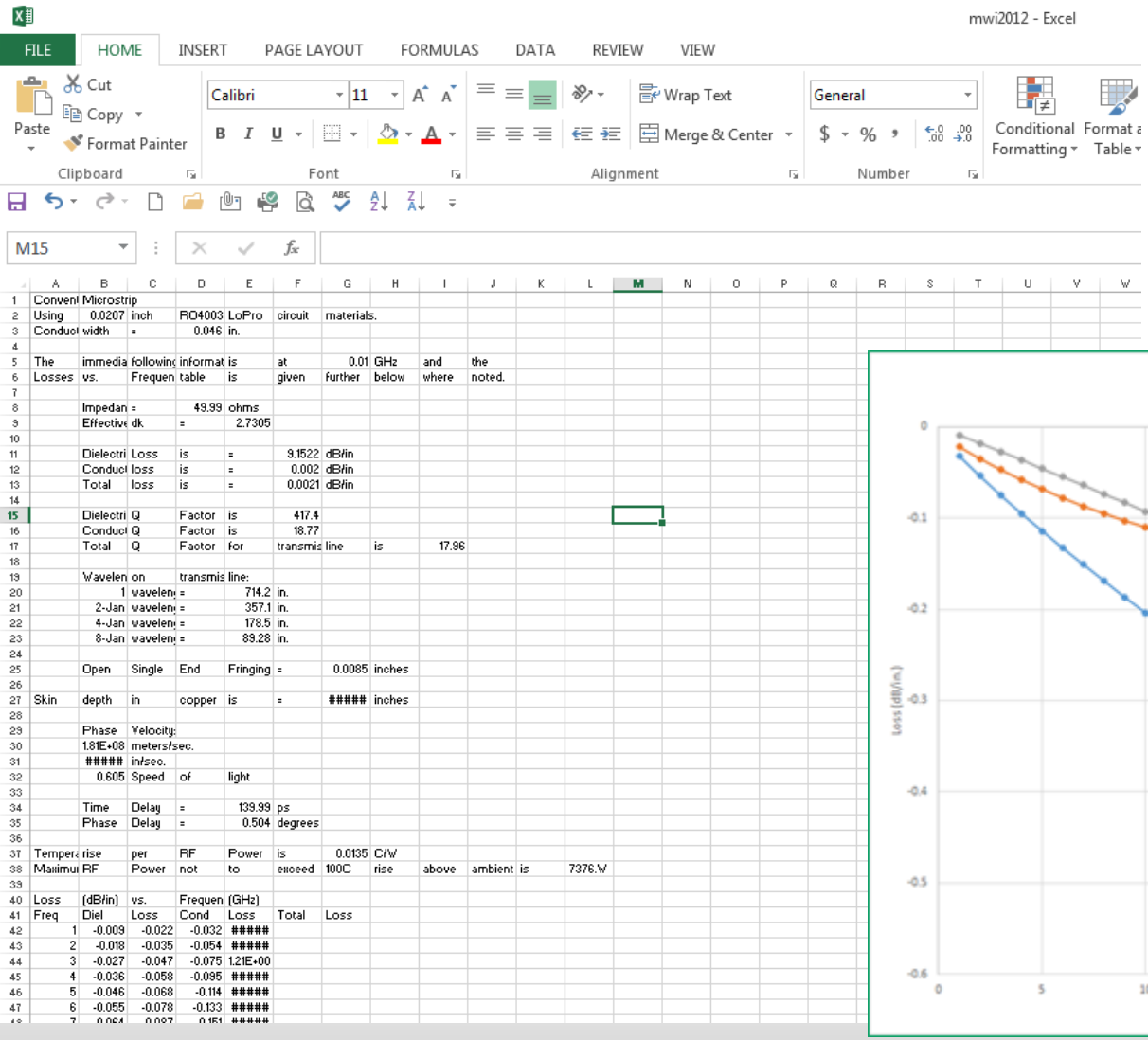
Software Operations, Generating Charts

Open Excel® spreadsheet, change file type to "All Files" and open "mwi2018.txt".

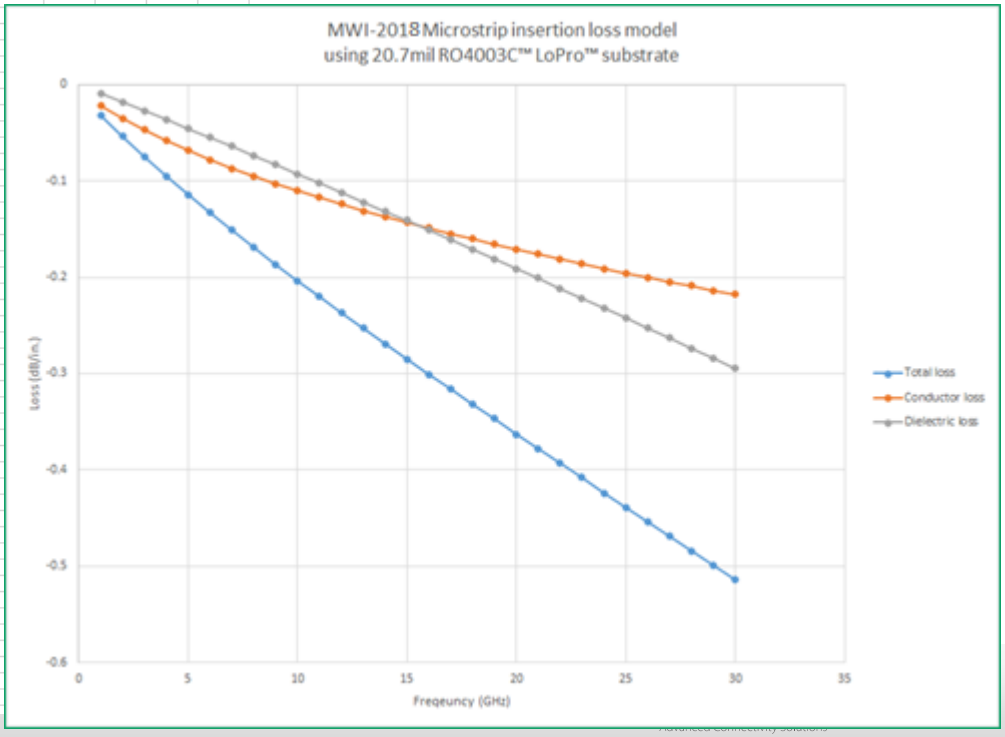
Click on delimited, click on Next, click on comma delimited, click Next and Finish.

With the table of information, you can easily generate a graph.

To avoid complications, the user should rename this new Excel file immediately, to something other than "mwi2018.txt" and with the ".xls" extension.



	A	B	C	D	E	F	G	H	I	J	K	L
1	Convent	Microstrip										
2	Using	0.0207	inch	RO4003	LoPro	circuit	materials.					
3	Conduct	width	=	0.046	in.							
4												
5	The	immedia	following	informat	is	at	0.01	GHz	and	the		
6	Losses	vs.	Frequen	table	is	given	further	below	where	noted.		
7												
8		Impedan	=	49.99	ohms							
9		Effective	dk	=	2.7305							
10												
11		Dielectri	Loss	is	=	9.1522	dB/in					
12		Conduct	loss	is	=	0.002	dB/in					
13		Total	loss	is	=	0.0021	dB/in					
14												
15		Dielectri	Q	Factor	is	417.4						
16		Conduct	Q	Factor	is	18.77						
17		Total	Q	Factor	for	transmis	line	is	17.96			
18												
19		Wavelen	on	transmis	line:							
20		1	wavelen	=	714.2	in.						
21		2-Jan	wavelen	=	357.1	in.						
22		4-Jan	wavelen	=	178.5	in.						
23		8-Jan	wavelen	=	89.28	in.						
24												
25		Open	Single	End	Fringing	=	0.0085	inches				
26												
27	Skin	depth	in	copper	is	=	#####	inches				
28												
29		Phase	Velocity									
30		1.81E+08	meters/sec.									
31		#####	in/sec.									
32		0.605	Speed	of	light							
33												
34		Time	Delay	=	139.99	ps						
35		Phase	Delay	=	0.504	degrees						
36												
37	Tempera	rise	per	RF	Power	is	0.0135	C/W				
38	Maximu	RF	Power	not	to	exceed	100C	rise	above	ambient	is	7376.W
39												
40	Loss	(dB/in)	vs.	Frequen	(GHz)							
41	Freq	Diel	Loss	Cond	Loss	Total	Loss					
42	1	-0.009	-0.022	-0.032	#####							
43	2	-0.018	-0.035	-0.054	#####							
44	3	-0.027	-0.047	-0.075	1.21E+00							
45	4	-0.036	-0.058	-0.095	#####							
46	5	-0.046	-0.068	-0.114	#####							
47	6	-0.055	-0.078	-0.133	#####							
48	7	-0.064	-0.087	-0.151	#####							



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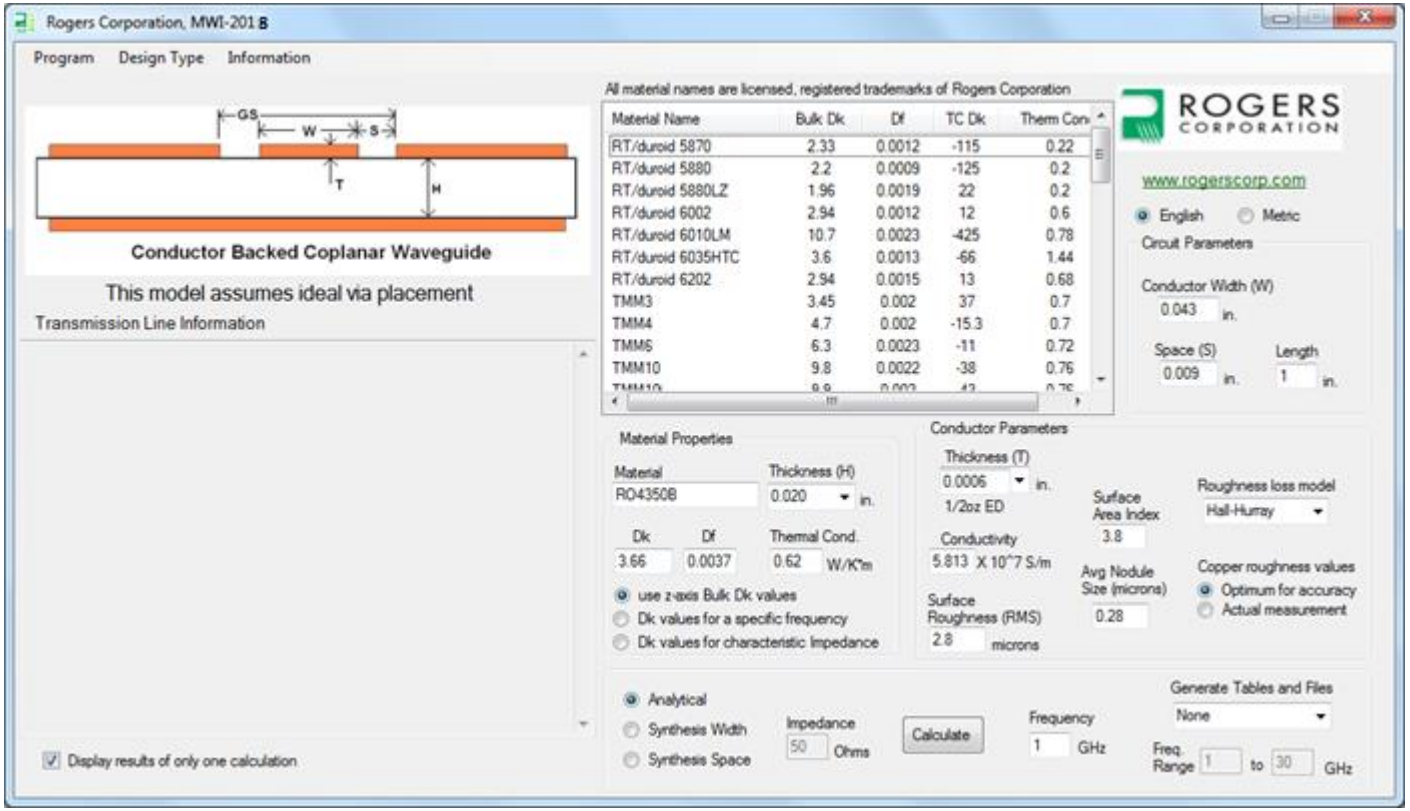
Software Operations, Grounded Coplanar Waveguide



Click on Design Type, then Coplanar, then Conductor Backed

Typically this model has some accuracy issues with thinner constructions and copper thickness variance.

Since this model cannot determine the effects of grounding via's on impedance and loss, some differences may occur between an actual circuit and this model

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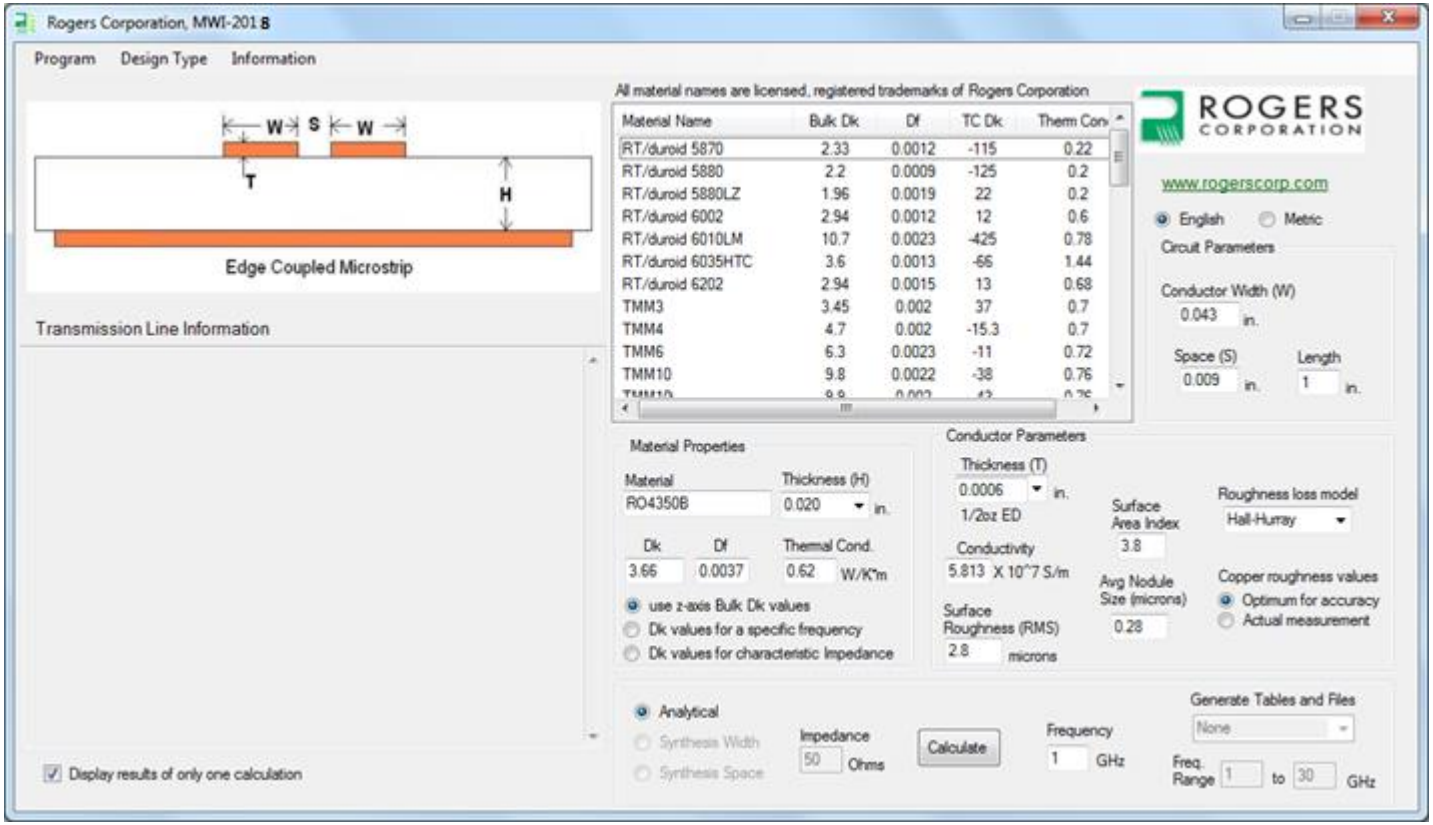
Software Operations, Microstrip Edge Coupled



Click on Design Type, then Microstrip and then Edge Coupled

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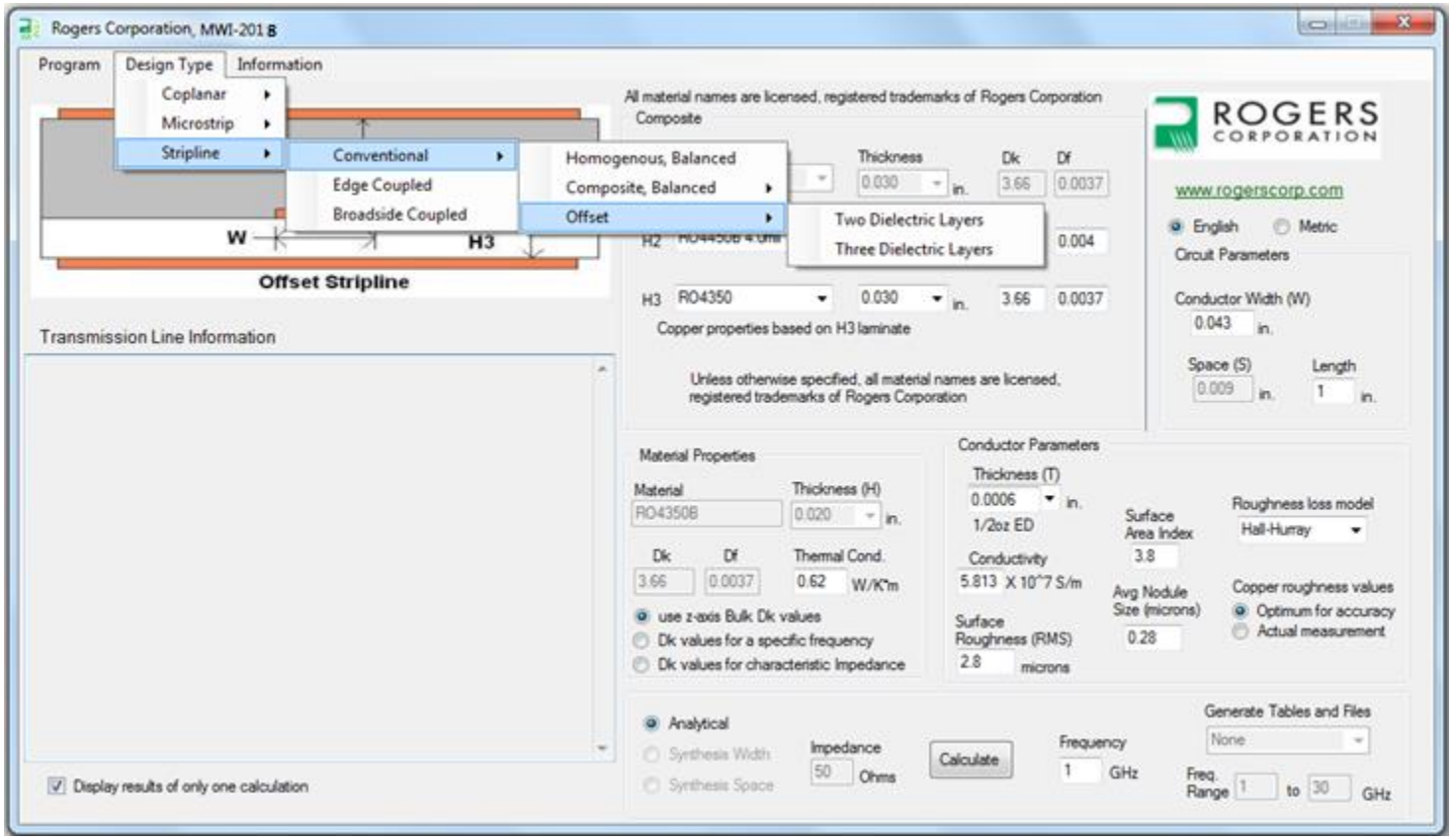
Software Operations, Stripline line models

There are multiple methods to build stripline circuits and additional models have been added to consider the most common constructions.



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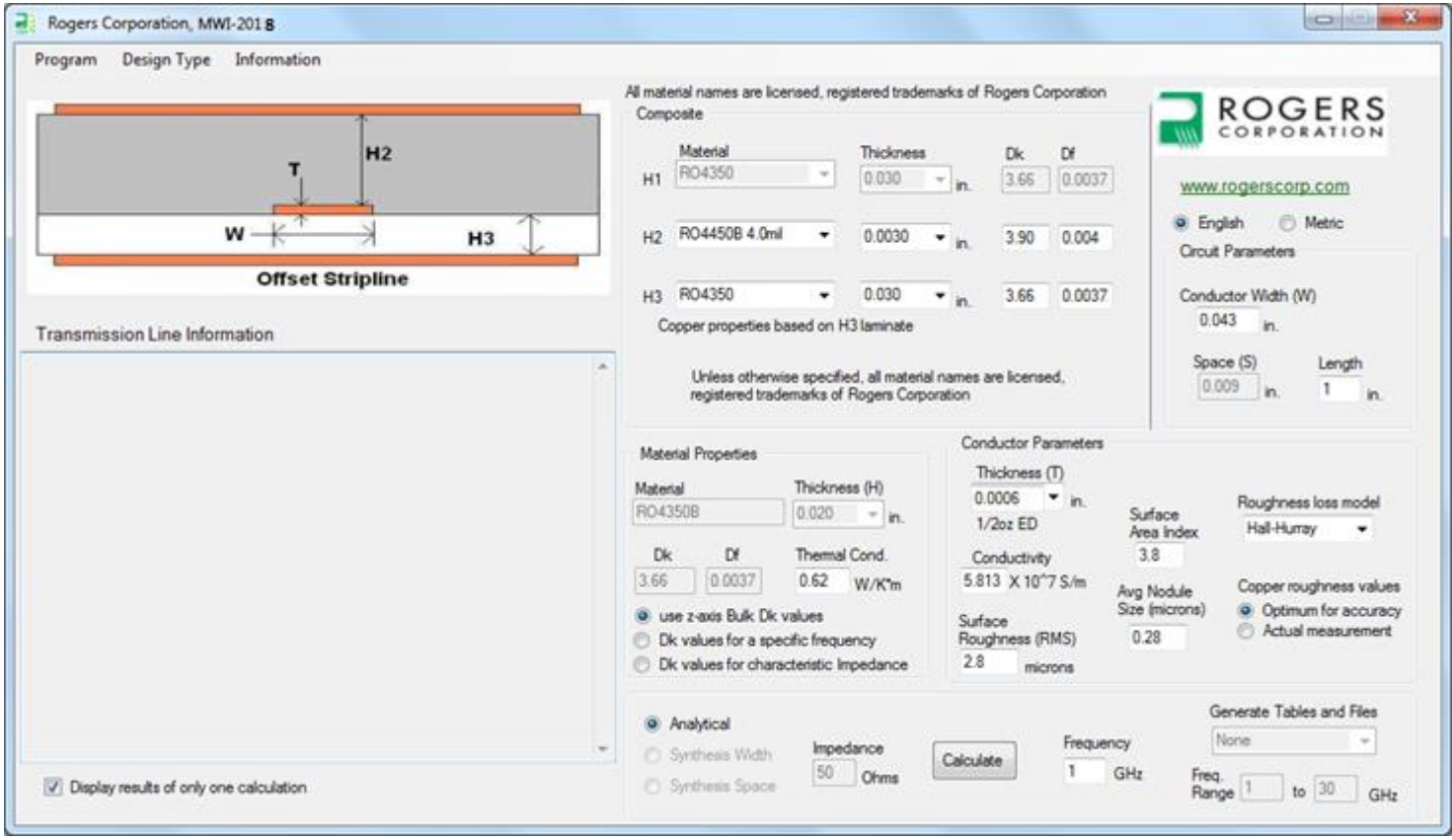
Software Operations, Stripline line models

For a composite or offset composite stripline circuit, the conductor roughness number is taken from the bottom substrate properties.

In this example the RO4000® family of materials are used. However any of Rogers' laminates can be chosen.



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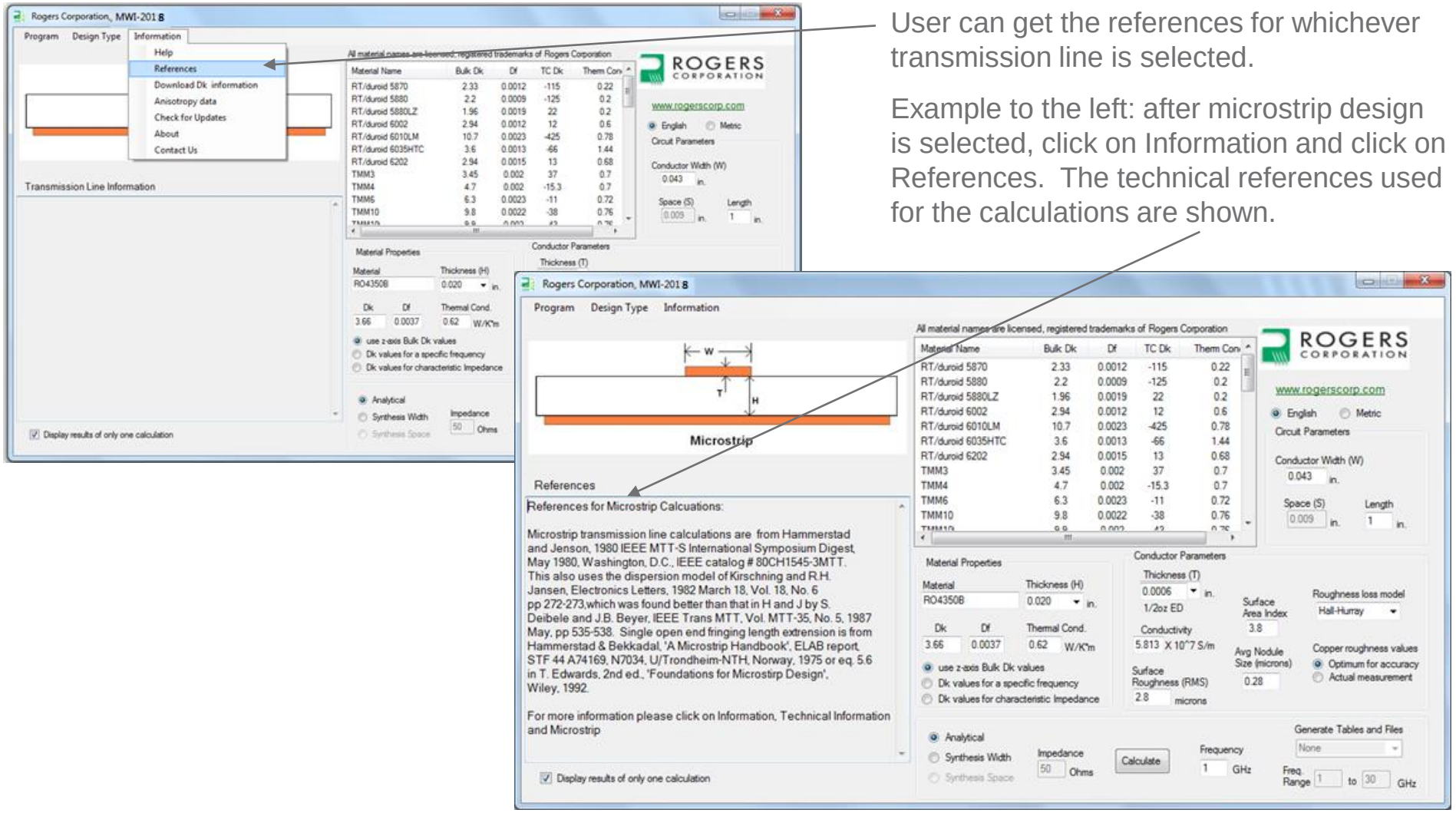
Software Operations, Reference information



User can get the references for whichever transmission line is selected.

Example to the left: after microstrip design is selected, click on Information and click on References. The technical references used for the calculations are shown.

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