

MWI-2017 Software Instruction Manual



Advanced Connectivity Solutions

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MWI-2017 Software Instruction Manual

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

MWI-2017 Software Instruction Manual

Installing:

- After downloading the mwi2017.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 "mwi2017.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

Dielectric Constant
"Design Dk"

Dissipation Factor

Thermal Coefficient of Dk

Thermal conductivity of the substrate

When floating the mouse over the material name, additional information will be shown.

The screenshot displays the MWI-2017 software interface. On the left, a diagram of a microstrip is shown with dimensions W, T, and H. Below it, the text "Microstrip" is visible. The main window is titled "Rogers Corporation, MWI-2017" and contains a "Program Design Type Information" tab. The "Material List" is displayed, showing a table of materials with columns for Material Name, Bulk Dk, Df, TC Dk, and Therm Cond. A tooltip is shown over the material "RT/duroid 6035HTC", providing additional information: "RT/duroid 6035HTC is PTFE material with ceramic and has high thermal conductivity", "Moisture absorption = 0.06 %", "Coefficient of Thermal Expansion = 39 ppm/C in Z-axis", and "UL Flame rating = 94V-0". The "Material Properties" section shows the selected material "RO4350B" with its properties: Dk = 3.66, Df = 0.0037, Thermal Cond. = 0.62 W/K*m. The "Conductor Parameters" section shows the selected material "RO4350B" with its properties: Thickness (T) = 0.0006 in., Surface Area Index = 3.8, Conductivity = 5.813 X 10^7 S/m, Surface Roughness (RMS) = 2.8 microns. The "Circuit Parameters" section shows the selected material "RO4350B" with its properties: Length = 0.009 in., Width = 1 in., Roughness loss model = Hall-Huray, Copper roughness values = Optimum for accuracy. The "Generate Tables and Files" section shows the selected material "RO4350B" with its properties: Frequency = 1 GHz, Freq. Range = 1 to 30 GHz. The "Calculate" button is visible. The "Display results of only one calculation" checkbox is checked.

Material Name	Bulk Dk	Df	TC Dk	Therm Cond
RT/duroid 5870	2.33	0.0012	-115	0.22
RT/duroid 5880	2.2	0.0009	-125	0.2
RT/duroid 5880LZ	1.96	0.0019	22	0.2
RT/duroid 6002	2.94	0.0012	12	0.6
RT/duroid 6010LM	10.7	0.0023	-425	0.78
RT/duroid 6035HTC	3.6	0.0013	-66	1.44
RT/duroid 6202	2.94	0.0015	13	0.68
TMM3				
TMM4				
TMM6				
TMM10	9.8	0.0022	-38	0.76
TMM10B	9.8	0.002	42	0.76

Material Properties

Material: RO4350B Thickness (H): 0.020 in.

Dk: 3.66 Df: 0.0037 Thermal Cond.: 0.62 W/K*m

☒ use z-axis Bulk Dk values
☐ Dk values for a specific frequency
☐ Dk values for characteristic Impedance

Conductor Parameters

Thickness (T): 0.0006 in.
1/2oz ED

Surface Area Index: 3.8

Conductivity: 5.813 X 10^7 S/m

Surface Roughness (RMS): 2.8 microns

Avg Nodule Size (microns): 0.28

Roughness loss model: Hall-Huray

Copper roughness values:
☒ Optimum for accuracy
☐ Actual measurement

Generate Tables and Files: None

Frequency: 1 GHz

Freq. Range: 1 to 30 GHz

Calculate

☒ Display results of only one calculation

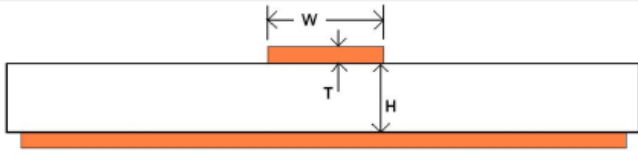
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Software Operations, material thickness

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

Rogers Corporation, MWI-2017

Program Design Type Information



Microstrip

Transmission Line Information

MWI-2017 Rev.3
Last updated September 10, 2016

Display results of only one calculation ☒

All material names are licensed, registered trademarks of Rogers Corporation

Material Name	Bulk Dk	Df	TC Dk	Therm Con
RT/duroid 5870	2.33	0.0012	-115	0.22
RT/duroid 5880	2.2	0.0009	-125	0.2
RT/duroid 5880LZ	1.96	0.0019	22	0.2
RT/duroid 6002	2.94	0.0012	12	0.6
RT/duroid 6010LM	10.7	0.0023	-425	0.78
RT/duroid 6035HTC	3.6	0.0013	-66	1.44
RT/duroid 6202	2.94	0.0016	13	0.68
TMM3	3.45	0.002	37	0.7
TMM4	4.7	0.002	-15.3	0.7
TMM6	6.3	0.0023	-11	0.72
TMM10	9.8	0.0022	-38	0.76
TMM10s	9.9	0.002	42	0.76

Material Properties

Material: RO4350B Thickness (H): 0.020 in.

Dk: 3.66 Df: 0.0037 Thermal Cond.: 0.62 W/K*m

☒ use z-axis Bulk Dk values
☐ Dk values for a specific frequency
☐ Dk values for characteristic Impedance

Conductor Parameters

Thickness (T): 0.0006 in.

1/2oz ED

Conductivity: 5.813×10^{-7} S/m

Surface Roughness (RMS): 2.8 microns

Surface Area Index: 3.8

Avg Nodule Size (microns):

Roughness loss model: Hall-Hurray

Copper roughness values
☒ Optimum for accuracy
☐ Actual measurement

Analytical ☒ Synthesis Width ☐ Synthesis Space

Impedance: 50 Ohms

Calculate

Frequency: 1 GHz

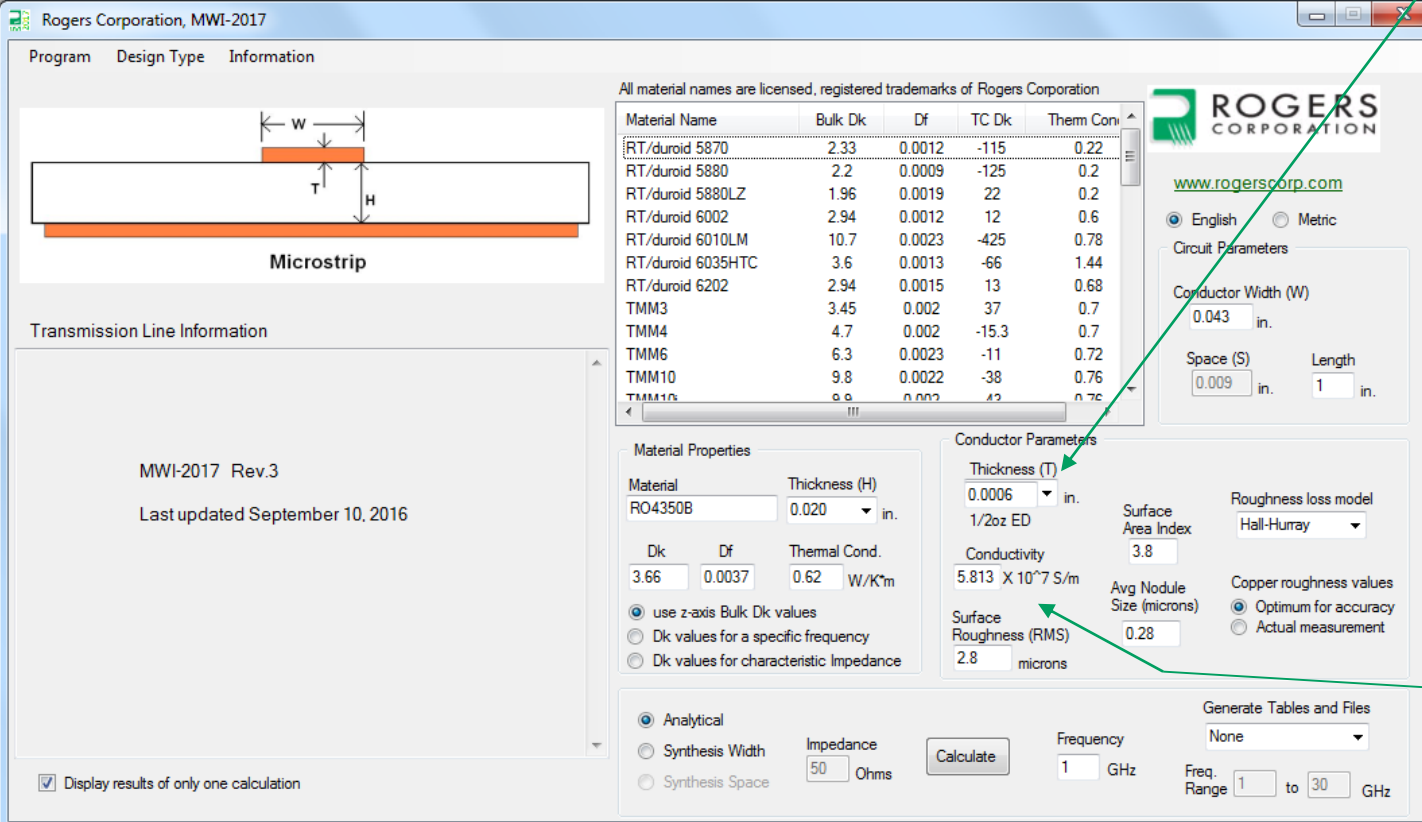
Generate Tables and Files: None

Freq. Range: 1 to 30 GHz

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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.



Microstrip

Transmission Line Information

MWI-2017 Rev.3
Last updated September 10, 2016

All material names are licensed, registered trademarks of Rogers Corporation

Material Name	Bulk Dk	Df	TC Dk	Therm Con
RT/duroid 5870	2.33	0.0012	-115	0.22
RT/duroid 5880	2.2	0.0009	-125	0.2
RT/duroid 5880LZ	1.96	0.0019	22	0.2
RT/duroid 6002	2.94	0.0012	12	0.6
RT/duroid 6010LM	10.7	0.0023	-425	0.78
RT/duroid 6035HTC	3.6	0.0013	-66	1.44
RT/duroid 6202	2.94	0.0015	13	0.68
TMM3	3.45	0.002	37	0.7
TMM4	4.7	0.002	-15.3	0.7
TMM6	6.3	0.0023	-11	0.72
TMM10	9.8	0.0022	-38	0.76
TMM10	9.8	0.002	43	0.76

Material Properties

Material: RO4350B Thickness (H): 0.020 in.

Dk: 3.66 Df: 0.0037 Thermal Cond.: 0.62 W/K*m

☒ use z-axis Bulk Dk values
☐ Dk values for a specific frequency
☐ Dk values for characteristic Impedance

Conductor Parameters

Thickness (T): 0.0006 in.
1/2oz ED

Conductivity: 5.813×10^7 S/m

Surface Roughness (RMS): 2.8 microns

Surface Area Index: 3.8

Roughness loss model: Hall-Huray

Avg Nodule Size (microns): 0.28

Copper roughness values:
☒ Optimum for accuracy
☐ Actual measurement

☒ Analytical
☐ Synthesis Width
☐ Synthesis Space

Impedance: 50 Ohms

Frequency: 1 GHz

Generate Tables and Files: None

Freq. Range: 1 to 30 GHz

☒ Display results of only one calculation

Calculate

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

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Software Operations, copper definition

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

The screenshot displays the MWI-2017 software interface. At the top, there's a title bar 'Rogers Corporation, MWI-2017' and tabs for 'Program', 'Design Type', and 'Information'. Below the tabs is a diagram of a microstrip with dimensions W, T, and H, labeled 'Microstrip'. To the right of the diagram is a table of material properties. Below the table are sections for 'Material Properties' and 'Conductor Parameters'. A green box highlights the 'Conductor Parameters' section, specifically the 'Surface Roughness (RMS)' field which is set to 2.8 microns. Another green box highlights the 'Material Properties' section, specifically the 'Material' field which is set to RO4350B. At the bottom, there are buttons for 'Calculate' and 'Generate Tables and Files', and a checkbox for 'Display results of only one calculation'.

Material Name	Bulk Dk	Df	TC Dk	Therm Con
RT/duroid 5870	2.33	0.0012	-115	0.22
RT/duroid 5880	2.2	0.0009	-125	0.2
RT/duroid 5880LZ	1.96	0.0019	22	0.2
RT/duroid 6002	2.94	0.0012	12	0.6
RT/duroid 6010LM	10.7	0.0023	-425	0.78
RT/duroid 6035HTC	3.6	0.0013	-66	1.44
RT/duroid 6202	2.94	0.0015	13	0.68
TMM3	3.45	0.002	37	0.7
TMM4	4.7	0.002	-15.3	0.7
TMM6	6.3	0.0023	-11	0.72
TMM10	9.8	0.0022	-38	0.76
TMM11	9.9	0.002	42	0.76

Material Properties

Material: RO4350B Thickness (H): 0.020 in.

Dk: 3.66 Df: 0.0037 Thermal Cond.: 0.62 W/K*m

☒ use z-axis Bulk Dk values
☐ Dk values for a specific frequency
☐ Dk values for characteristic Impedance

Conductor Parameters

Thickness (T): 0.0006 in. 1/2oz ED

Conductivity: 5.813 X 10⁷ S/m

Surface Roughness (RMS): 2.8 microns

Surface Area Index: 3.8

Roughness loss model: Hall-Huray

Avg Nodule Size (microns): 0.28

Copper roughness values:
☒ Optimum for accuracy
☐ Actual measurement

☒ Analytical
☐ Synthesis Width Impedance: 50 Ohms
☐ Synthesis Space

Calculate

Frequency: 1 GHz

Generate Tables and Files: None

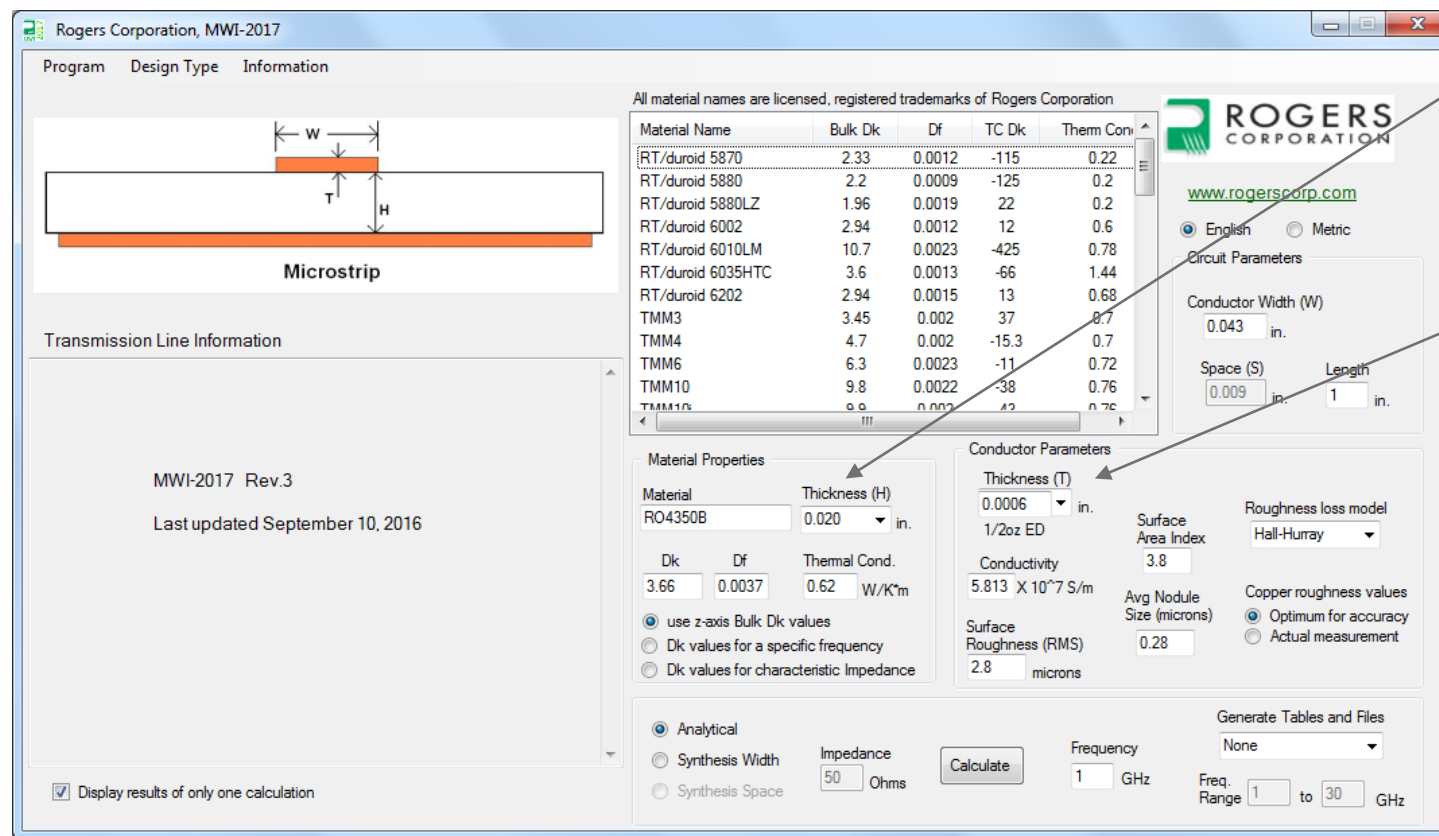
Freq. Range: 1 to 30 GHz

☒ Display results of only one calculation

Copper roughness information

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Software Operations, changing materials



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Software Operations, Design Dk values

The screenshot displays the MWI-2017 software interface. On the left, a diagram of a microstrip is shown with dimensions W (width), T (thickness), and H (height). Below it, the text "Microstrip" is visible. The main window is divided into several sections:

- Material Properties:** A table listing various materials with their Bulk Dk, Df, TC Dk, and Therm Con values. The materials listed are RT/duroid 5870, RT/duroid 5880, RT/duroid 5880LZ, RT/duroid 6002, RT/duroid 6010LM, RT/duroid 6035HTC, RT/duroid 6202, TMM3, TMM4, TMM6, TMM10, and TMM10D.
- Material Properties (RO4350B):** A section showing specific material properties for RO4350B, including Thickness (H) of 0.020 in., Dk of 3.66, Df of 0.0037, and Thermal Cond. of 0.62 W/K*m.
- Conductor Parameters:** A section showing conductor parameters for the microstrip, including Thickness (T) of 0.0006 in., 1/2oz ED, Conductivity of 5.813×10^{-7} S/m, Surface Roughness (RMS) of 2.8 microns, Surface Area Index of 3.8, and Avg Nodule Size (microns) of 0.28.
- Design Parameters:** A section showing design parameters, including Conductor Width (W) of 0.043 in., Space (S) of 0.009 in., and Length of 1 in.
- Material Properties (RO4350B):** A section showing specific material properties for RO4350B, including Thickness (H) of 0.020 in., Dk of 3.66, Df of 0.0037, and Thermal Cond. of 0.62 W/K*m.
- Design Parameters:** A section showing design parameters, including Conductor Width (W) of 0.043 in., Space (S) of 0.009 in., and Length of 1 in.

At the bottom, there are checkboxes for "use z-axis Bulk Dk values", "Dk values for a specific frequency", and "Dk values for characteristic Impedance". The "use z-axis Bulk Dk values" option is selected. There are also checkboxes for "Analytical", "Synthesis Width", and "Synthesis Space". The "Analytical" option is selected. A "Calculate" button is present. The frequency is set to 1 GHz. The "Generate Tables and Files" section has a dropdown menu set to "None". The "Freq. Range" is set to 1 to 30 GHz. A checkbox for "Display results of only one calculation" is checked.

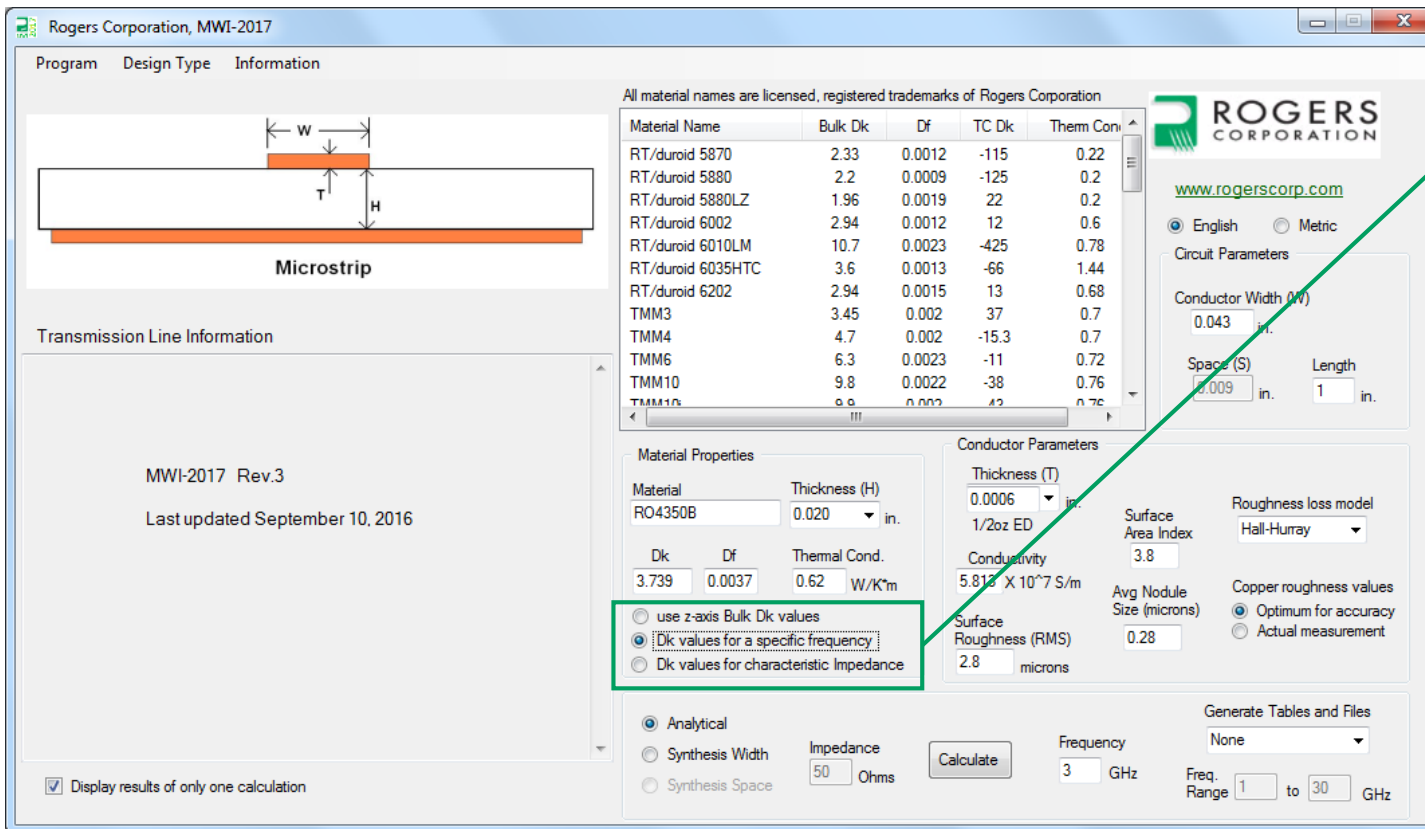
Design Dk is built into this software

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

The screenshot displays the MWI-2017 software interface. On the left, a diagram of a microstrip is shown with dimensions w , t , and h . Below it, the text "Microstrip" is visible. The main window is titled "Rogers Corporation, MWI-2017" and has tabs for "Program", "Design Type", and "Information". The "Design Type" tab is active, showing a table of material properties. The table has columns for "Material Name", "Bulk Dk", "Df", "TC Dk", and "Therm Con". The materials listed include RT/duroid 5870, RT/duroid 5880, RT/duroid 5880LZ, RT/duroid 6002, RT/duroid 6010LM, RT/duroid 6035HTC, RT/duroid 6202, TMM3, TMM4, TMM6, TMM10, and TMM10. The "Material Properties" section shows the selected material "RO4350B" with a thickness of "0.020 in.". The "Design Dk values" section is highlighted with a green box, showing three radio button options: "use z-axis Bulk Dk values", "Dk values for a specific frequency", and "Dk values for characteristic impedance". The "Dk values for characteristic impedance" option is selected. The "Conductor Parameters" section shows "Thickness (T)" as "0.0006 in.", "Conductivity" as "5.813 X 10⁷ S/m", and "Surface Roughness (RMS)" as "2.8 microns". The "Roughness loss model" is set to "Hall-Huray". The "Copper roughness values" section shows "Optimum for accuracy" selected. The "Generate Tables and Files" section shows "None" selected. The "Calculate" button is visible. The "Frequency" is set to "3 GHz". The "Freq. Range" is set to "1 to 30 GHz". The "Display results of only one calculation" checkbox is checked.

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.

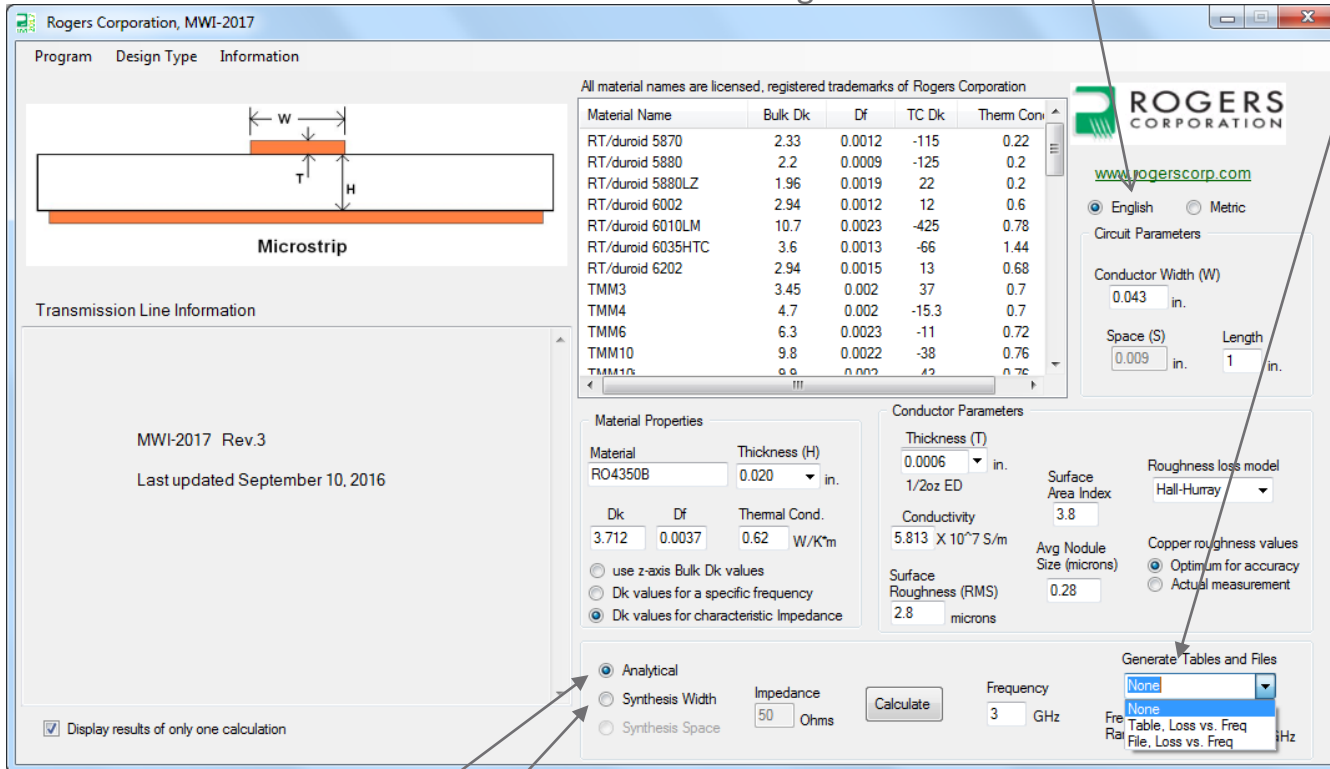
For some circuit geometries and/or designs, the synthesis may be unstable.

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.



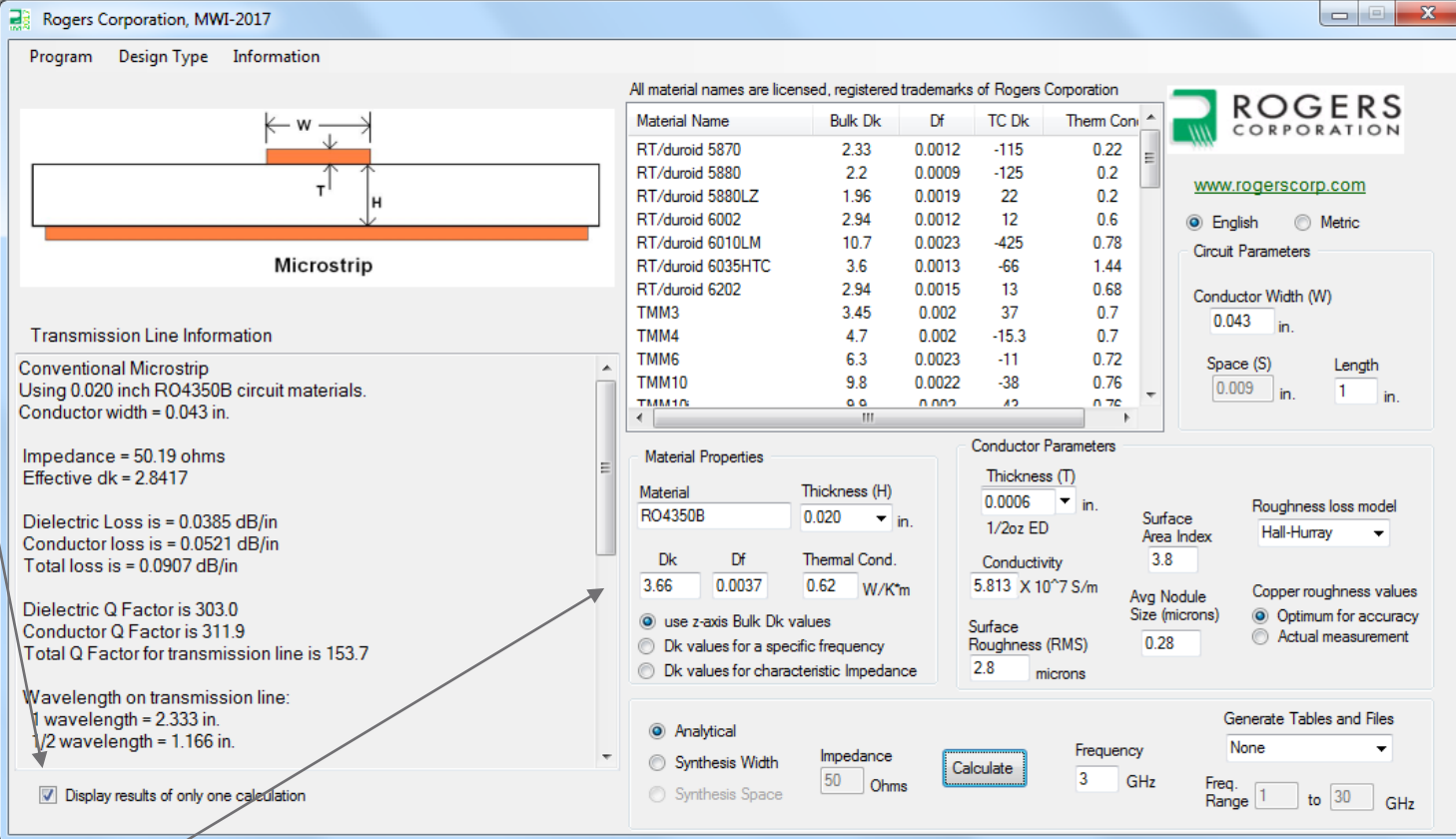
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Software Operations, Summary window

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.



Rogers Corporation, MWI-2017

Program Design Type Information

All material names are licensed, registered trademarks of Rogers Corporation

Material Name	Bulk Dk	Df	TC Dk	Therm Con
RT/duroid 5870	2.33	0.0012	-115	0.22
RT/duroid 5880	2.2	0.0009	-125	0.2
RT/duroid 5880LZ	1.96	0.0019	22	0.2
RT/duroid 6002	2.94	0.0012	12	0.6
RT/duroid 6010LM	10.7	0.0023	-425	0.78
RT/duroid 6035HTC	3.6	0.0013	-66	1.44
RT/duroid 6202	2.94	0.0015	13	0.68
TMM3	3.45	0.002	37	0.7
TMM4	4.7	0.002	-15.3	0.7
TMM6	6.3	0.0023	-11	0.72
TMM10	9.8	0.0022	-38	0.76
TMM16	9.9	0.002	42	0.76

Microstrip

Transmission Line Information

Conventional Microstrip
Using 0.020 inch RO4350B circuit materials.
Conductor width = 0.043 in.

Impedance = 50.19 ohms
Effective dk = 2.8417

Dielectric Loss is = 0.0385 dB/in
Conductor loss is = 0.0521 dB/in
Total loss is = 0.0907 dB/in

Dielectric Q Factor is 303.0
Conductor Q Factor is 311.9
Total Q Factor for transmission line is 153.7

Wavelength on transmission line:
1 wavelength = 2.333 in.
1/2 wavelength = 1.166 in.

☒ Display results of only one calculation

Material Properties

Material: RO4350B Thickness (H): 0.020 in.

Dk	Df	Thermal Cond.
3.66	0.0037	0.62 W/K*m

☒ use z-axis Bulk Dk values
☐ Dk values for a specific frequency
☐ Dk values for characteristic impedance

Conductor Parameters

Thickness (T): 0.0006 in.
1/2oz ED

Conductivity: 5.813 X 10⁻⁷ S/m

Surface Roughness (RMS): 2.8 microns

Surface Area Index: 3.8

Roughness loss model: Hall-Huray

Avg Nodule Size (microns): 0.28

Copper roughness values:
☒ Optimum for accuracy
☐ Actual measurement

Analytical ☒
Synthesis Width ☐
Synthesis Space ☐

Impedance: 50 Ohms

Calculate

Frequency: 3 GHz

Generate Tables and Files: None

Freq. Range: 1 to 30 GHz

MWI-2017 Software Instruction Manual

Software Operations, Summary window

The screenshot displays the MWI-2017 software interface. At the top, a diagram illustrates a microstrip on a substrate with dimensions w (width), T (thickness), and H (height). Below this, the 'Transmission Line Information' section provides calculated values for a conventional microstrip using RO4350B materials.

Transmission Line Information

- Conventional Microstrip
- Using 0.020 inch RO4350B circuit materials.
- Conductor width = 0.043 in.
- Impedance = 50.19 ohms
- Effective $dk = 2.8417$
- Dielectric Loss is = 0.0385 dB/in
- Conductor loss is = 0.0521 dB/in
- Total loss is = 0.0907 dB/in
- Dielectric Q Factor is 303.0
- Conductor Q Factor is 311.9
- Total Q Factor for transmission line is 153.7
- Wavelength on transmission line:
 - 1 wavelength = 2.333 in.
 - 1/2 wavelength = 1.166 in.

A checkbox at the bottom left is labeled 'Display results of only one calculation'.

The right side of the window features a material selection table, material properties, conductor parameters, and calculation options.

Material Name	Bulk Dk	Df	TC Dk	Therm Con
RT/duroid 5870	2.33	0.0012	-115	0.22
RT/duroid 5880	2.2	0.0009	-125	0.2
RT/duroid 5880LZ	1.96	0.0019	22	0.2
RT/duroid 6002	2.94	0.0012	12	0.6
RT/duroid 6010LM	10.7	0.0023	-425	0.78
RT/duroid 6035HTC	3.6	0.0013	-66	1.44
RT/duroid 6202	2.94	0.0015	13	0.68
TMM3	3.45	0.002	37	0.7
TMM4	4.7	0.002	-15.3	0.7
TMM6	6.3	0.0023	-11	0.72
TMM10	9.8	0.0022	-38	0.76
TMM10S	9.9	0.002	42	0.76

Material Properties

Material: RO4350B, Thickness (H): 0.020 in.

Dk	Df	Thermal Cond.
3.66	0.0037	0.62 W/K*m

Conductor Parameters

Thickness (T): 0.0006 in., Surface Area Index: 3.8, Conductivity: 5.813×10^7 S/m, Avg Nodule Size (microns): 0.28, Surface Roughness (RMS): 2.8 microns.

Calculation Options

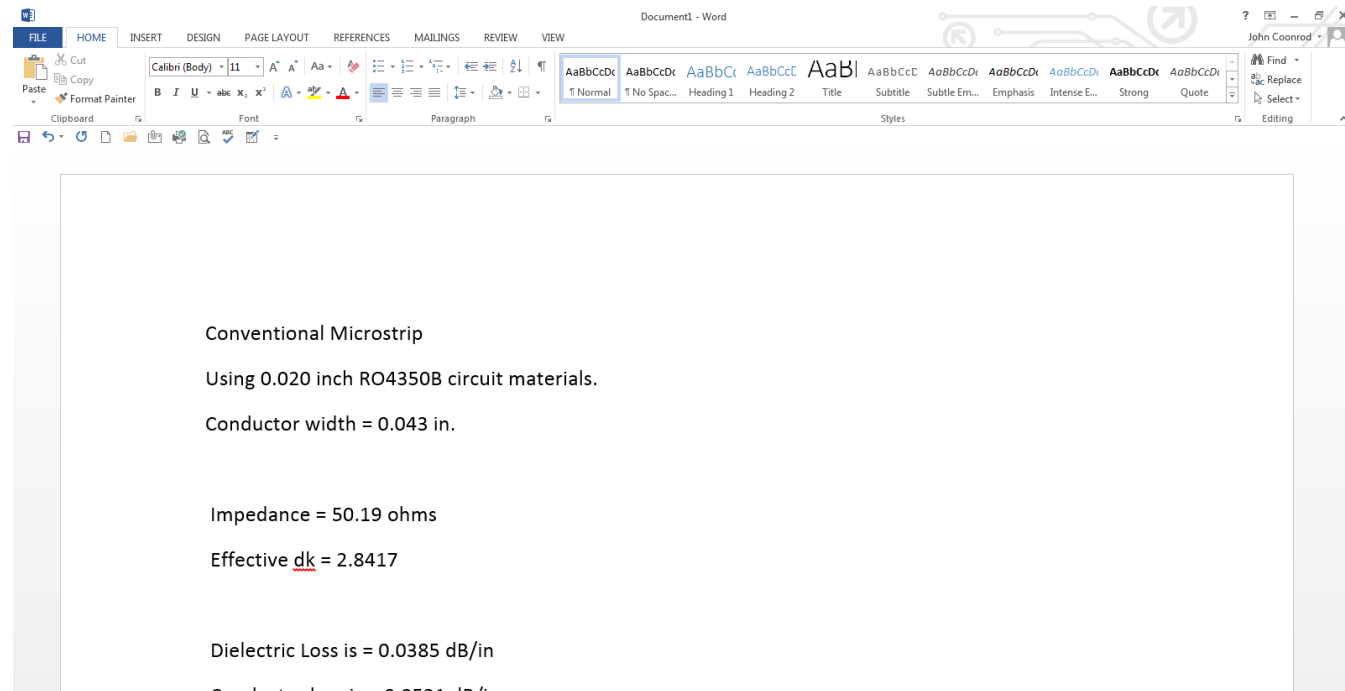
☒ Analytical, ☐ Synthesis Width, ☐ Synthesis Space. Impedance: 50 Ohms, Frequency: 3 GHz. Generate Tables and Files: None. Freq. Range: 1 to 30 GHz.

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-2017 and
paste into Windows®
Word



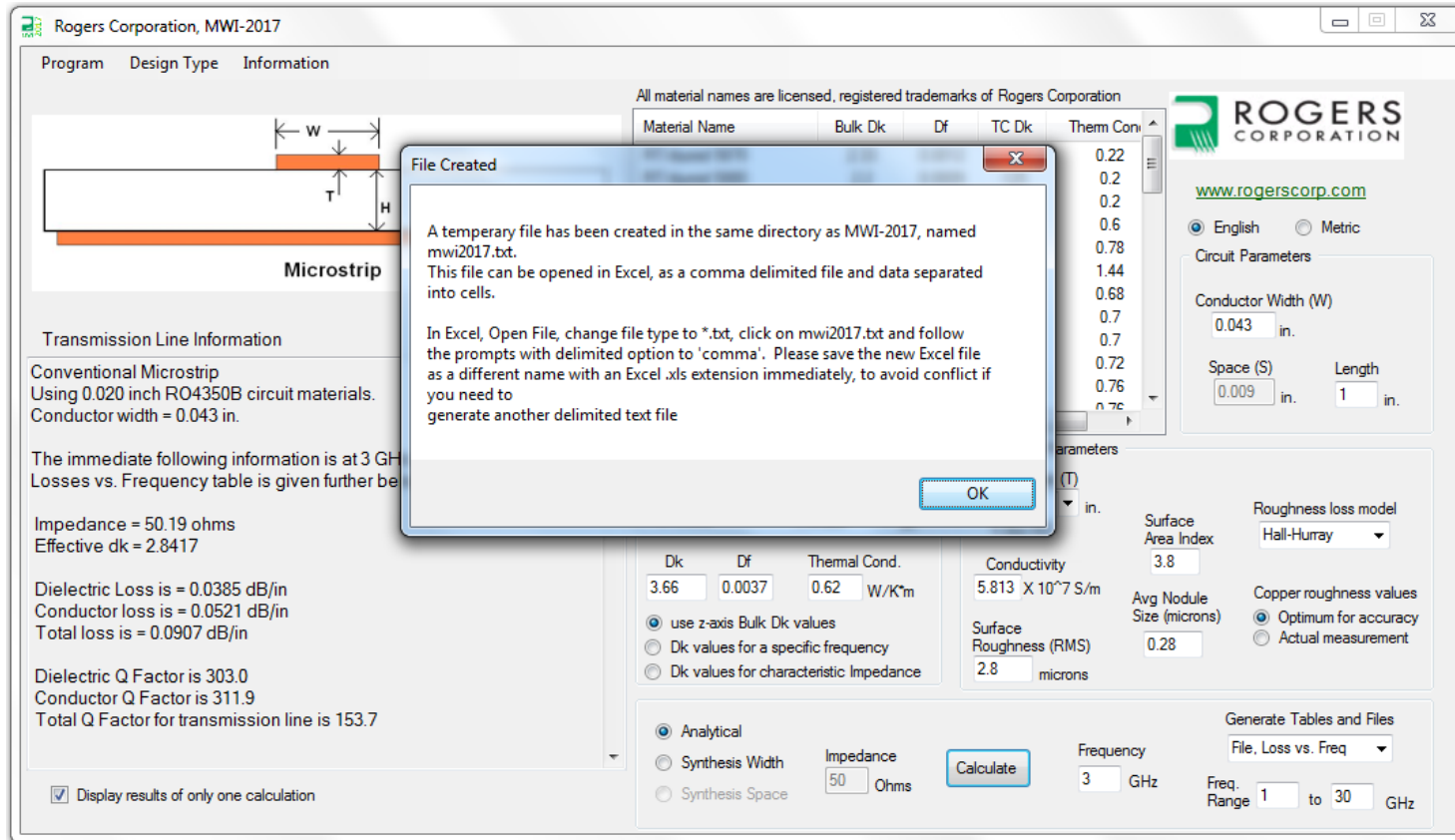
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Software Operations, Generating comma delimited file

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

A file will be saved in the same directory as the MWI-2016 software and named "mwi2017.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.

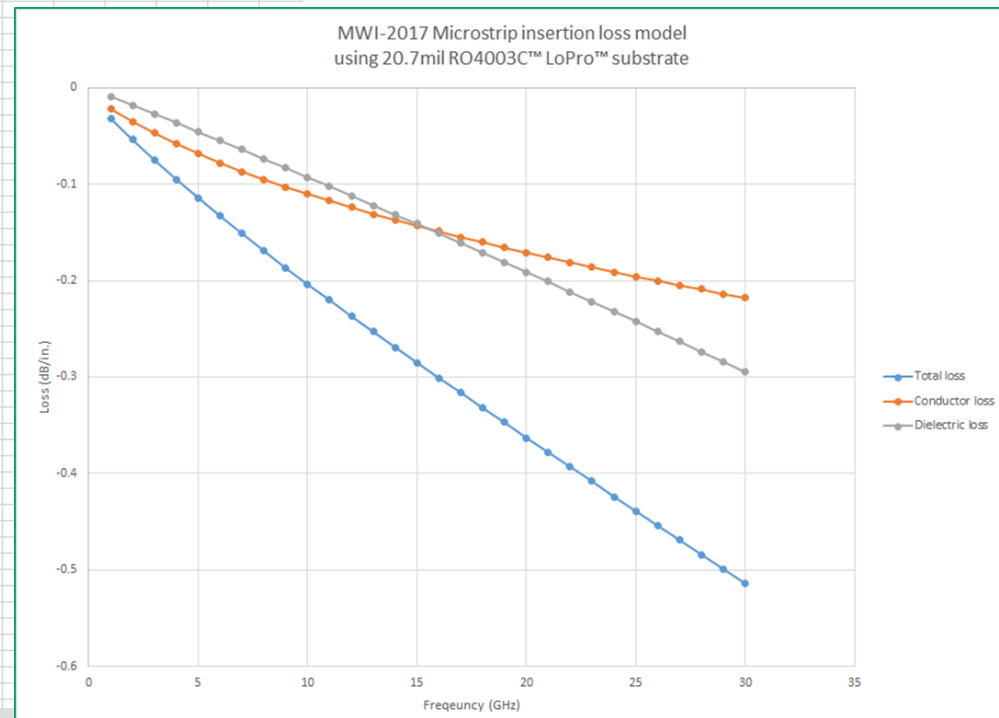


Software Operations, Generating Charts

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 "mwi2016.txt" and with the ".xls" extension.



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Software Operations, Grounded Coplanar Waveguide

The screenshot shows the MWI-2017 software interface. The top menu bar includes 'Program', 'Design Type', and 'Information'. The 'Design Type' tab is active, displaying a diagram of a 'Conductor Backed Coplanar Waveguide' with dimensions: GS (gap), W (conductor width), S (space), T (thickness), and H (height). Below the diagram, it states 'This model assumes ideal via placement' and 'Transmission Line Information'. The 'Material Properties' section shows 'Material: RO4350B', 'Thickness (H): 0.020 in.', 'Dk: 3.66', 'Df: 0.0037', and 'Thermal Cond.: 0.62 W/K*m'. The 'Conductor Parameters' section shows 'Thickness (T): 0.0006 in.', 'Conductivity: 5.813 X 10⁷ S/m', 'Surface Roughness (RMS): 2.8 microns', 'Surface Area Index: 3.8', and 'Avg Nodule Size (microns): 0.28'. The 'Circuit Parameters' section shows 'Conductor Width (W): 0.043 in.', 'Space (S): 0.009 in.', and 'Length: 1 in.'. The 'Material List' table is also visible, listing various materials and their properties.

Material Name	Bulk Dk	Df	TC Dk	Therm Con
RT/duroid 5870	2.33	0.0012	-115	0.22
RT/duroid 5880	2.2	0.0009	-125	0.2
RT/duroid 5880LZ	1.96	0.0019	22	0.2
RT/duroid 6002	2.94	0.0012	12	0.6
RT/duroid 6010LM	10.7	0.0023	-425	0.78
RT/duroid 6035HTC	3.6	0.0013	-66	1.44
RT/duroid 6202	2.94	0.0015	13	0.68
TMM3	3.45	0.002	37	0.7
TMM4	4.7	0.002	-15.3	0.7
TMM6	6.3	0.0023	-11	0.72
TMM10	9.8	0.0022	-38	0.76
TMM10	9.8	0.002	42	0.76

Material Properties:

Material: RO4350B Thickness (H): 0.020 in.

Dk: 3.66 Df: 0.0037 Thermal Cond.: 0.62 W/K*m

☒ use z-axis Bulk Dk values
☐ Dk values for a specific frequency
☐ Dk values for characteristic Impedance

Conductor Parameters:

Thickness (T): 0.0006 in.
1/2oz ED
Conductivity: 5.813 X 10⁷ S/m
Surface Roughness (RMS): 2.8 microns
Surface Area Index: 3.8
Avg Nodule Size (microns): 0.28

Roughness loss model: Hall-Huray

Copper roughness values:
☒ Optimum for accuracy
☐ Actual measurement

Generate Tables and Files: None

Frequency: 1 GHz

Freq. Range: 1 to 30 GHz

Calculate

Impedance: 50 Ohms

Display results of only one calculation

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

MWI-2017 Software Instruction Manual

Software Operations, Microstrip Edge Coupled

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Program Design Type Information

Edge Coupled Microstrip

Transmission Line Information

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Last updated September 10, 2016

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Material Name	Bulk Dk	Df	TC Dk	Therm Con
RT/duroid 5870	2.33	0.0012	-115	0.22
RT/duroid 5880	2.2	0.0009	-125	0.2
RT/duroid 5880LZ	1.96	0.0019	22	0.2
RT/duroid 6002	2.94	0.0012	12	0.6
RT/duroid 6010LM	10.7	0.0023	-425	0.78
RT/duroid 6035HTC	3.6	0.0013	-66	1.44
RT/duroid 6202	2.94	0.0015	13	0.68
TMM3	3.45	0.002	37	0.7
TMM4	4.7	0.002	-15.3	0.7
TMM6	6.3	0.0023	-11	0.72
TMM10	9.8	0.0022	-38	0.76
TMM10s	9.8	0.002	42	0.76

ROGERS CORPORATION
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English Metric
Circuit Parameters
Conductor Width (W)
0.043 in.
Space (S) Length
0.009 in. 1 in.

Material Properties
Material Thickness (H)
RO4350B 0.020 in.
Dk Df Thermal Cond.
3.66 0.0037 0.62 W/K*m
use z-axis Bulk Dk values
Dk values for a specific frequency
Dk values for characteristic Impedance

Conductor Parameters
Thickness (T)
0.0006 in.
1/2oz ED
Conductivity
5.813 X 10⁷ S/m
Surface Roughness (RMS)
2.8 microns
Surface Area Index
3.8
Roughness loss model
Hall-Huray
Avg Nodule Size (microns)
Copper roughness values
Optimum for accuracy
Actual measurement

Analytical
Synthesis Width
Synthesis Space
Impedance
50 Ohms
Calculate
Frequency
1 GHz
Generate Tables and Files
None
Freq. Range
1 to 30 GHz

Display results of only one calculation

Click on Design Type,
then Microstrip and then
Edge Coupled

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



MWI-2017 Software Instruction Manual

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.

Rogers Corporation, MWI-2017

Program Design Type Information

Offset Stripline

Transmission Line Information

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Display results of only one calculation

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Composite

	Material	Thickness	Dk	Df
H1	RO4350	0.030 in.	3.66	0.0037
H2	RO4450B 4.0mil	0.0030 in.	3.90	0.004
H3	RO4350	0.030 in.	3.66	0.0037

Copper properties based on H3 laminate

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Material Properties

Material	Thickness (H)	Dk	Df	Thermal Cond.
RO4350B	0.020 in.	3.66	0.0037	0.62 W/K*m

Conductor Parameters

Thickness (T)	Surface Area Index	Roughness loss model
0.0006 in.	3.8	Hall-Huray

Conductivity: $5.813 \times 10^{-7} \text{ S/m}$

Surface Roughness (RMS): 2.8 microns

Avg Nodule Size (microns): 0.28

Copper roughness values

- ☒ Optimum for accuracy
- ☐ Actual measurement

Generate Tables and Files

Frequency: 1 GHz

Range: 1 to 30 GHz

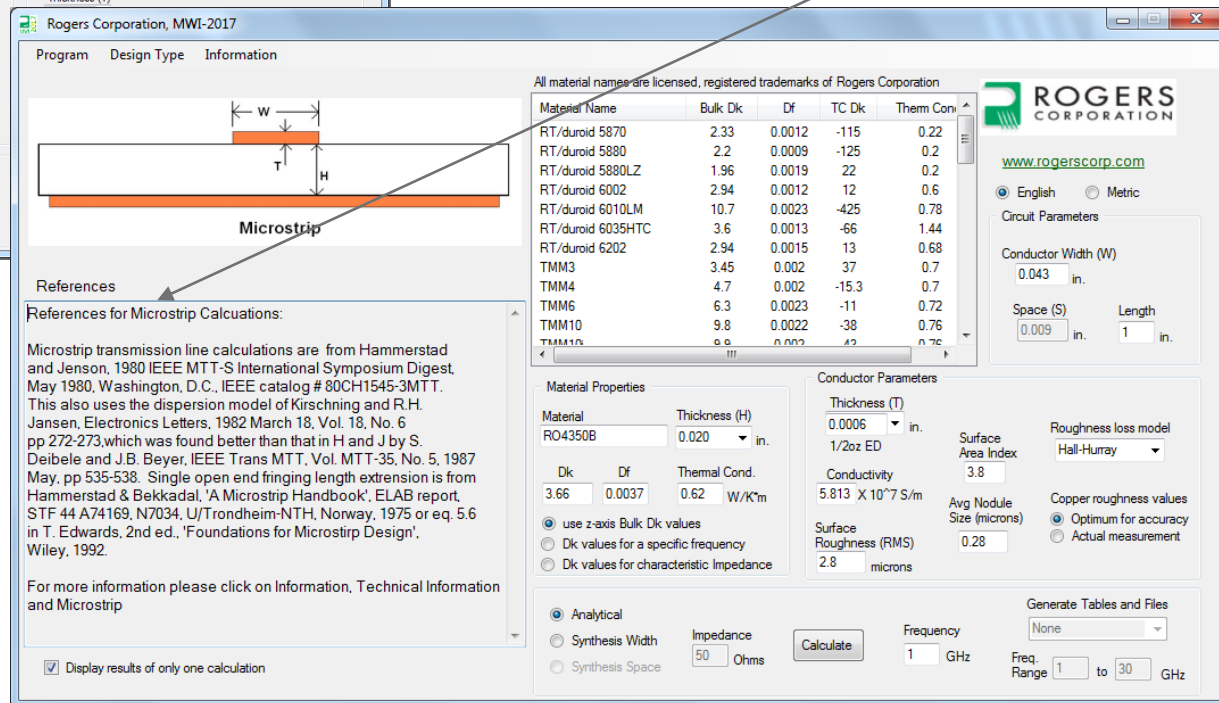
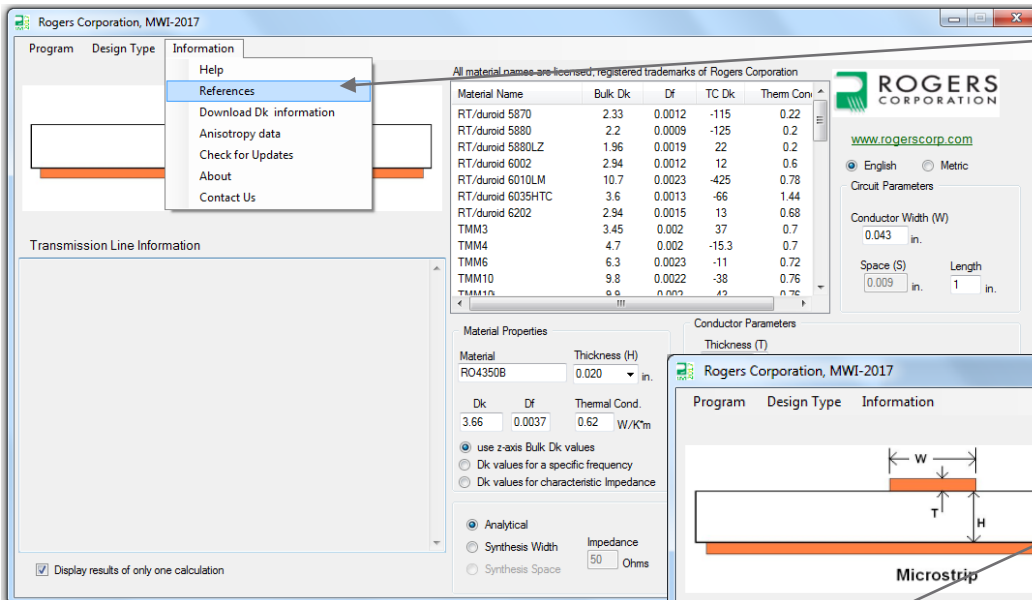
Calculate

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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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