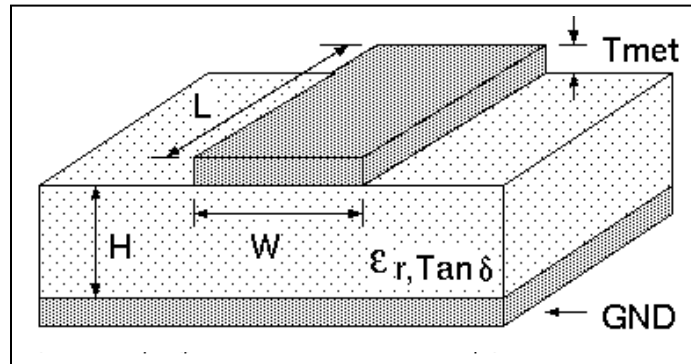


Quick Start User Manual: Microstrip



1.0 Getting Ready:

The software product you purchased is located inside a ZIP file that you can open, by following these steps:

1. Double-click on the ZIP file you purchased. This action starts the ZIP Wizard application, which contains the software product.
2. The ZIP Wizard automatically opens the software product you purchased and stores it inside your computer.
3. Once the software product is unzipped, right-click on the application's *filename* and single-click: "Extract". This action will extract all files located inside the software product and store them inside your computer:
 - a. *Microstrip.exe*: The executable software product.
 - b. *Microstrip.DEF*: Default Data File read by *Microstrip.exe*
 - c. *Quick Start User Manual*: This User Manual.
 - d. *License*: License Agreement for the software product.
4. NOTE: All files unzipped inside your computer must be located in the same file folder, since several Data Files are read by the executable software product.
5. Open the License Agreement so you know the terms & conditions for using the software product. Return the software product for a full refund if you do not agree with those terms & conditions, as stated in the License Agreement.
6. Open the Default Data File: *Microstrip.DEF* using Notepad and read the description contained inside.

Once the above software files are extracted and stored inside your computer, just double-click on the executable file to start using the product.

2.0 How I Works:

Software product: *Microstrip.exe* performs Electrical Synthesis, Dimensional Synthesis and Frequency Analysis of Microstrip Transmission Lines, with or without a Top Cover.

The executable file: *Microstrip.exe* reads the Default Data File: *Microstrip.DEF* each time you start the program. As such, you can change Data Entries inside *Microstrip.DEF* to suite your most common Microstrip Transmission Line designs, using the guidelines written in *Microstrip.DEF*.

When you start using the software product, you are asked to enter key design parameters for your Microstrip Transmission Line. If you press <ENTER> on your computer's keyboard, the software product uses the Data Entry from your Default Data File: *Microstrip.DEF* for that design parameter. As such, you can change any/all Data Entries in *Microstrip.DEF* suite your most common Microstrip designs, without having to enter those values when asked by the executable file: *Microstrip.exe*. Just press <ENTER> on your computer's keyboard and your Default Data values are used for that Data entry by the software product.

Figure 2-1 shows the baseline data entries for Default Data file: *Microstrip.DEF*.

Certain design parameters have a "default answer", shown as an asterisk (*), which enables you to press <ENTER> on your keyboard, if that "default answer" (= *) is your selection.

Lastly, all Data entries (including Default Data entries) are included in the Output Data format so you know the basis for your Synthesis and for your Analysis of Microstrip Transmission Lines.

Most data entries are straight-forward and easy to understand for those skill-at-the-art of RF/microwave design.....and those not-so-skilled. So, let us know where improvements are needed as you operate the software product.

3.0 Screen Shots: Input Data

Screen-shots for User Input Data entry are shown in Figures 3-1 and Figure 3- 2 for Dimensional Synthesis and for Impedance Analysis of your Microstrip Transmission Lines, respectively.

4.0 Screen Shots: Output Data

Screen-shots of Output Data calculated by the software product are shown in Figures 4-1 and Figure 4-2 for Dimensional Synthesis and for Impedance Analysis of your Microstrip Transmission Lines, respectively.

The Output Data from the software product can be stored in a User-defined filename:

- A. Enter a *filename.xls* for storage in a spreadsheet.
- B. Enter *filename.doc* for Output Data storage in a word processor.
- C. Enter *filename.txt* for Output Data storage as a text file.

The Output Data files can be used for presentations to your Customers, e-mails to your colleagues, and for graphical plots of your Output Data.

5.0 User Data Files:

For the Analysis Option, the software product reads a User's Input Data filename to analyze the Frequency response of physical dimensions planned for manufacture of your Microstrip Transmission Line.

You can create any number of User Input Data files, each of which defines the actual physical dimensions of your Microstrip Transmission Lines. Once created, you can enter that Input Data filename when asked by the software product, for Frequency Analysis and for comparison with actual measured swept-frequency data for that design.

6.0 Software Bugs

Every effort has been applied to minimize "software bugs" inside the software product. Yet, we invite all Users to notify us if you find one. Many thanks!

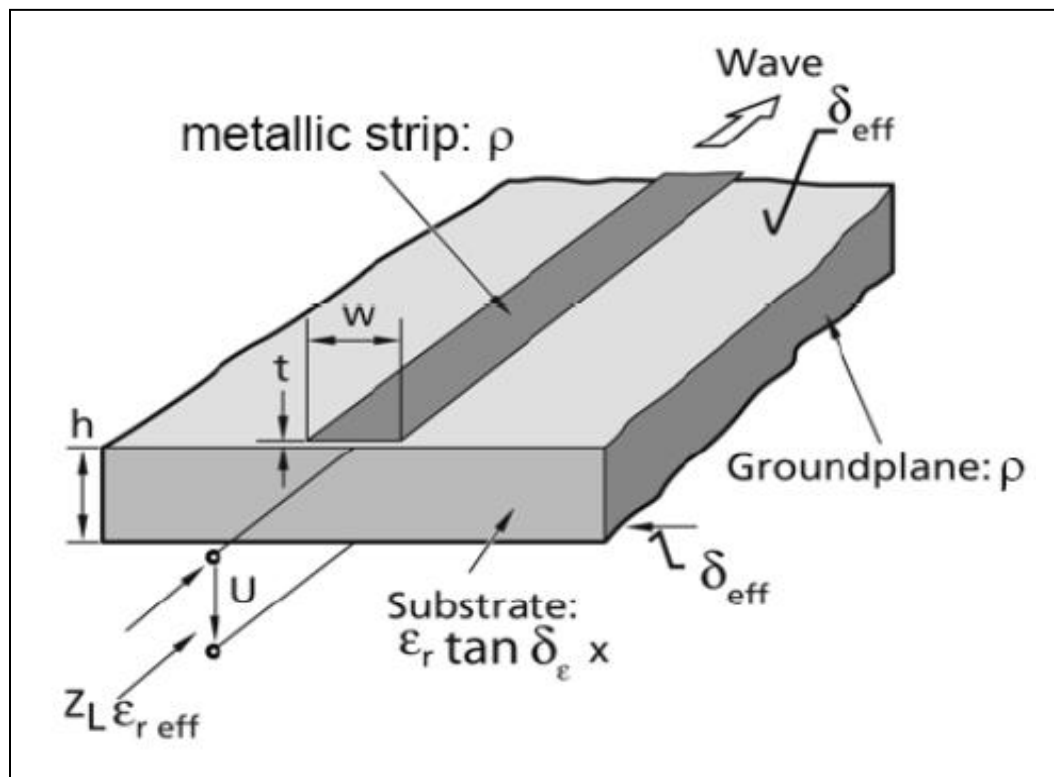
Inside the software product, you will find "User-friendly Error Traps", which identify errors in your Data Entry. The software product notifies you when an error is detected and asks for a different Data Entry, so the software product performs within the proper technical bounds for the technology.

7.0 Customer Satisfaction:

Many thanks for purchasing our RF/microwave CAE software product. We hope you find the product useful in your high frequency designs, both in Synthesis of your designs and in Analysis of your designs. Please let us know where our software product can be improved, and what your needs are for another software product you could use. perhaps we can develop that software product for you.

Our best regards.

AtlantaRF



Microstrip.DEF contains all Default Data values read by Program: Microstrip.exe

10.0	:F	= Analysis Frequency.....GHz
20.0	:Fmax	= Maximum Analysis Frequency.....GHz
0.0	:Fmin	= Minimum Analysis Frequency.....GHz
0.5	:Fstep	= Analysis Frequency Step Size.....GHz
10.0	:ER	= Substrate's Relative Dielectric Constant
0.025	:H	= Substrate's Dielectric Thickness.....Inches
10.0	:H2	= Substrate to Top Cover Height.....Inches
0.0003	:T	= Center Conductor's Strip Thickness.....Inches
2.828	:RES1	= Conductor's Resistivity.....Micro-Ohm-cm
32.0	:SR1	= Conductor's Surface Roughness.....Micro-inch
0.0005	:DLTAN	= Substrate's Dielectric Loss Tangent.
0.025	:W	= Analysis Strip Width.....Inches
0.1	:Wmax	= Maximum Strip Width (Analysis).....Inches
0.01	:Wmin	= Minimum Strip Width (Analysis).....Inches
0.005	:Wstep	= Strip Width Step Size (Analysis).....Inches
120.0	:Zmax	= Maximum Impedance (Synthesis).....Ohms
20.0	:Zmin	= Minimum Impedance (Synthesis).....Ohms
5.0	:Zstep	= Impedance Step Size (Synthesis).....Ohms
Microstrip.DAT	:FN	= Default Filename for your Output Data storage.

|
|____ The first 20 characters are read by Microstrip.exe

Default Data File: Microstrip.DEF is read by RF/microwave software product: Microstrip.exe when you start the program. As such, the executable file (Microstrip.exe) and this Default Data File (Microstrip.DEF) must be located in the same Folder or Subfolder in your computer.

The executable program (Microstrip.exe) reads the first 20 characters in each line from Microstrip.DEF, so keep those first 20 characters for data, and do not shorten any line in this Default Data File: Microstrip.DEF.

The User is invited to change any/all data values in Microstrip.DEF to data values you commonly use for your RF/microwave designs of Microstrip Transmission Lines, so you do not have to enter data values when prompted by Microstrip.exe (just press ENTER on your computer's keyboard and your Default Data values will be assigned to that data entry).

Thank you for choosing Atlanta RF for your RF/microwave CAE software products.

Figure 2-1 shows the baseline data entries for **Default Data file: Microstrip.DEF**.

Copyright 2012 Atlanta RF Software (www.AtlantaRF.com)
 RF/Microwave Computer-Aided Engineering Software.
 Program: Microstrip (v. 1.0) Date 10/18/2012

This program performs Impedance ANALYSIS and Dimensional SYNTHESIS for single-strip MICROSTRIP transmission lines.

Please select a Program FUNCTION:

- *1 : ANALYSIS of Impedances from known Strip Widths.
- 2 : SYNTHESIS of Strip Widths from known Impedances.

Program FUNCTION selected = **2**

Please enter the following DIMENSIONAL DATA:

- Substrate's Dielectric Thickness (H1), Inches = **0.025**
- Top Cover Height above Substrate (H2), Inches = **10.0**
- Substrate's Relative Dielectric Constant (ER) = **10.0**
- Center Conductor's Strip Thickness (T), Inches = **0.0003**
- Substrate's Dielectric Loss Tangent (DLTAN) = **0.0005**
- Conductor Resistivity(RES), Micro-Ohm-cm:
 - 1 = Silver-plated (RES=1.6)
 - 2 = Copper (RES=1.7)
 - *3 = Gold-plated (RES=2.5)
 - 4 = 6061 Aluminum(RES=4.0)
 - 5 = Brass (RES=7.0)
 - 6 = Steel (RES=11.8)

Conductor Resistivity selected = **3**

-RMS Surface Roughness (SR),Micro-Inches:

- 1 = 250 micro-inch (Milling)
- 2 = 125 micro-inch (Extrusion)
- 3 = 63 micro-inch (Grinding)
- *4 = 32 micro-inch (Polished)

RMS Surface Roughness selected = **4**

Please enter range of Impedances for SYNTHESIS :

- Minimum Impedance (Zmin), Ohms = **20.0**
- Maximum Impedance (Zmax), Ohms = **120.0**
- Impedance Step Size (Zstep),Ohms = **5.0**

Select one of the following Synthesis OPTIONS:

- *Option 1: Strip Width Synthesis with Dispersive Impedance.
- Option 2: Strip Width Synthesis with Sensitivity Analysis.

Synthesis OPTION Selected = **1**

Enter FREQUENCY where DISPERSION effects are calculated, GHz = **10.0**

Is Output Data STORAGE desired? (1=YES) = **1**

Enter a FILENAME (up to 20 characters) for Output Data storage:

- Enter: Filename.xls for storage in a spreadsheet
- Enter: Filename.doc for storage in a word processor
- Enter: Filename.txt for storage as a text document

Enter your FILENAME for Output Data Storage: **Microstrip-SYN.DAT**

User Data
 Entries are
 shown in
RED text

Figure 3-1: Typical Input Data entry for **Dimensional Synthesis** in Microstrip.exe

Copyright 2012 Atlanta RF Software (www.AtlantaRF.com)
RF/Microwave Computer-Aided Engineering Software.
Program: Microstrip (v. 1.0) Date 10/18/2012

This program performs Impedance ANALYSIS and Dimensional SYNTHESIS for single-strip MICROSTRIP transmission lines.

Please select a Program FUNCTION:

- *1 : ANALYSIS of Impedances from known Strip Widths.
- 2 : SYNTHESIS of Strip Widths from known Impedances.

Program FUNCTION selected = **1**

Please enter the following DIMENSIONAL DATA:

- Substrate's Dielectric Thickness (H1), Inches = **0.025**
- Top Cover Height above Substrate (H2), Inches = **10.0**
- Substrate's Relative Dielectric Constant (ER) = **10.0**
- Center Conductor's Strip Thickness (T), Inches = **0.0003**
- Substrate's Dielectric Loss Tangent (DLTAN) = **0.0005**
- Conductor Resistivity(RES), Micro-Ohm-cm:
 - 1 = Silver-plated (RES=1.6)
 - 2 = Copper (RES=1.7)
 - *3 = Gold-plated (RES=2.5)
 - 4 = 6061 Aluminum(RES=4.0)
 - 5 = Brass (RES=7.0)
 - 6 = Steel (RES=11.8)

Conductor Resistivity selected = **3**

-RMS Surface Roughness (SR),Micro-Inches:

- 1 = 250 micro-inch (Milling)
- 2 = 125 micro-inch (Extrusion)
- 3 = 63 micro-inch (Grinding)
- *4 = 32 micro-inch (Polished)

RMS Surface Roughness selected = **4**

Select one of the following Analysis OPTIONS:

- *Option 1: Impedance Analysis versus Strip Widths.
- Option 2: Sensitivity Analysis of Zo vs. Strip Widths.
- Option 3: Frequency Analysis of Microstrip line.

Analysis OPTION selected = **1**

Enter FREQUENCY where DISPERSION effects are calculated, GHz = **10.0**

Please enter range of Strip Widths for Impedance ANALYSIS:

- Minimum Strip Width (Wmin) ,Inches = **0.01**
- Maximum Strip Width (Wmax) ,Inches = **0.1**
- Strip Width Step Size (Wstep), Inches = **0.005**

Is Output Data STORAGE desired? (1=YES) = **1**

Enter a FILENAME (up to 20 characters) for Output Data storage:

- Enter: Filename.xls for storage in a spreadsheet
- Enter: Filename.doc for storage in a word processor
- Enter: Filename.txt for storage as a text document

Enter your FILENAME for Output Data Storage: **Microstrip-ANA.DAT**

User Data
Entries are
shown in
RED text

Figure 3-2: Typical Input Data entry for **Impedance Analysis** in Microstrip.exe

 Microstrip (v. 1.0) Date:10/18/2012 at 17:19:25Hours
 Copyright 2012 Atlanta RF Software (www.AtlantaRF.com)
 RF/Microwave Computer-Aided Engineering Design Data
 for Single-Strip Microstrip Transmission Lines.

H1 = 0.0250" Strip Width Synthesis T = 0.00030"
 H2 = 10.0000" ===== SR = 32.0u"
 Er = 10.00 (OPTION 1) RES = 2.5000
 DLTAN = 0.00050

Strip Width:W (Inches)	W/H1	Static Parameters		Dispersion & Loss at 10.00GHz			
		Zo (Ohms)	Er (Eff)	Zo(Air) (Ohms)	Zo(F) (Ohms)	Er(F) (Eff)	Total Loss (dB/Inch)
0.1066	4.266	19.686	7.794	54.961	20.000	8.441	0.1434
0.0780	3.122	24.662	7.519	67.625	25.000	8.110	0.1529
0.0593	2.373	29.641	7.289	80.027	30.000	7.824	0.1639
0.0462	1.849	34.626	7.093	92.221	35.000	7.576	0.1770
0.0366	1.464	39.611	6.924	104.232	40.000	7.360	0.1909
0.0293	1.174	44.576	6.778	116.050	45.000	7.171	0.2062
0.0237	0.947	49.551	6.651	127.787	50.000	7.007	0.2230
0.0192	0.767	54.540	6.541	139.489	55.000	6.864	0.2427
0.0155	0.622	59.536	6.447	151.169	60.000	6.740	0.2652
0.0126	0.505	64.531	6.366	162.816	65.000	6.633	0.2931
0.0102	0.409	69.530	6.294	174.438	70.000	6.539	0.3240
0.0083	0.332	74.534	6.230	186.040	75.000	6.456	0.3603
0.0067	0.268	79.532	6.172	197.589	80.000	6.381	0.4037
0.0054	0.216	84.520	6.119	209.075	85.000	6.313	0.4539
0.0043	0.173	89.523	6.070	220.557	90.000	6.250	0.5123
0.0035	0.139	94.520	6.025	232.000	95.000	6.194	0.5770
0.0028	0.111	99.525	5.983	243.433	100.000	6.142	0.6406
0.0022	0.088	104.529	5.943	254.822	105.000	6.093	0.7116
0.0017	0.069	109.523	5.905	266.141	110.000	6.048	0.7924
0.0014	0.054	114.516	5.868	277.396	115.000	6.004	0.8838
0.0011	0.042	119.521	5.831	288.604	120.000	5.962	0.9860

 Output Data stored in User filename: Microstrip-SYN.DAT

Microstrip calculations completed. Select next OPERATION:

1. Select new OPTION.
2. RECYCLE and CONTINUE.
- *3. EXIT to operating system.

OPERATION selected =

Figure 4-1: Typical Output Data for **Dimensional Synthesis** from Microstrip.exe

