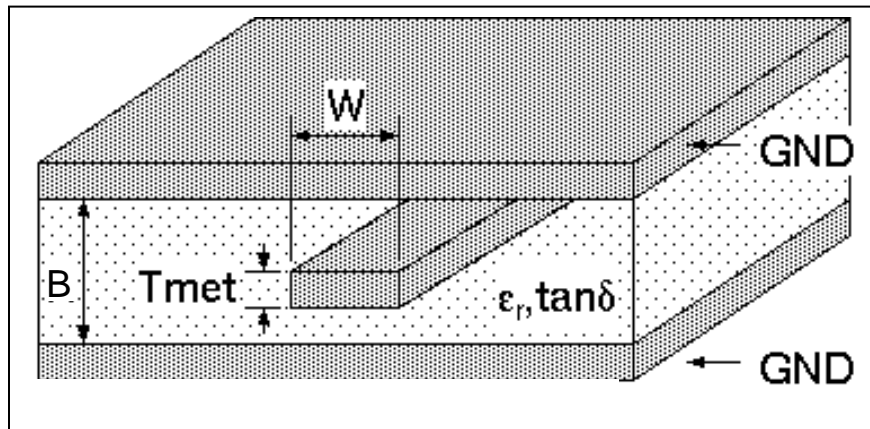# Quick Start User Manual: Stripline

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. *Stripline.exe*: The executable software product.
   b. *Stripline.DEF*: Default Data File read by *Stripline.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: *Stripline.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: *Stripline.exe* performs Electrical Synthesis, Dimensional Synthesis and Frequency Analysis of any balanced Stripline Transmission Line.

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

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

You can create any number of User Input Data files, each of which defines the actual physical dimensions of your Stripline 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

Stripline.DEF contains all Default Data values read by Program; Stripline.exe
```
 10.0          :F    = Analysis Frequency………..……………….GHz
 18.0          :Fmax = Maximum Frequency for Analysis……..…..GHz
  0.0          :Fmin = Minimum Frequency  for Analysis…….……GHz
  0.5          :Fstep = Frequency Step Size for Analysis……..……GHz
  4.0          :RES  = Conductor's Resistivity...........................Micro-Ohm-cm
125.0          :SR   = Conductor's RMS Surface Roughness.....Micro-Inches
  2.33         :ER   = Substrate's Relative Dielectric Constant
  0.0625       :B    = Ground Plane Spacing...............................Inches
  0.0014       :T    = Strip Thickness of center conductor…........Inches
  0.0005       :TLOS = Substrate's Dielectric Loss Tangent
  0.05         :W    = Analysis Strip Width...................................Inches
  0.1          :Wmax = Maximum Strip Width for: Analysis vs. W...Inches
  0.02         :Wmin = Minimum Strip Width for: Analysis vs. W.....Inches
  0.02         :Wstep = Step in Strip Width for: Analysis vs. W…......Inches
100.0          :Zmax = Maximum Impedance for Synthesis...........Ohms
 30.0          :Zmin = Minimum Impedance for Synthesis............Ohms
  2.0          :Zstep = Impedance Step Size for Synthesis………..Ohms
Stripline.DAT  :FN   = Default filename for your Output Data Storage
                 |
                 |____ The first 20 characters are read by Stripline.exe
```

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

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

The User is invited to change any/all data values in Stripline.DEF to data
values you commonly use for your RF/microwave designs of Stripline Transmission
Lines, so you do not have to enter data values when prompted by Stripline.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: Baseline data entries (and Instructions) in **Default Data file**: Stripline.DEF

Copyright 2012 Atlanta RF Software (www.AtlantaRF.com)
RF/Microwave Computer-Aided Engineering Software.
Program: Stripline (v. 1.0)   Date: 10/16/2012

This program performs Impedance ANALYSIS and Dimensional
SYNTHESIS for single-strip STRIPLINE 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 :
   -Stripline`s Ground Plane Spacing (B), Inches = **0.0625**
   -Center Conductor`s Strip Thickness (T),Inches = **0.0014**
   -Substrate`s Relative Dielectric Constant (ER) = **2.33**
   -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,   Ohms = **100.0**
   -Maximum Impedance,   Ohms = **30.0**
   -Impedance Step Size,   Ohms = **2.0**

Select one of the following Synthesis OPTIONS:
   *Option 1: Strip Width Synthesis with Transmission Loss.
    Option 2: Strip Width Synthesis with Sensitivity Analysis.
Synthesis OPTION selected = **1**

Enter Frequency where Insertion Loss is 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**: Stripline-SYN.DAT**

> User Data
> Entries are
> shown in
> **RED text**

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

Copyright 2012 Atlanta RF Software (www.AtlantaRF.com)
RF/Microwave Computer-Aided Engineering Software.
Program: Stripline (v. 1.0)   Date: 10/16/2012

This program performs Impedance ANALYSIS and Dimensional
SYNTHESIS for single-strip STRIPLINE 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 :
    -Stripline`s Ground Plane Spacing (B), Inches = **0.0625**
    -Center Conductor`s Strip Thickness (T),Inches = **0.0014**
    -Substrate`s Relative Dielectric Constant (ER)   = **2.33**
    -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: Frequency Analysis of Stripline with Loss.
    Option 2: Sensitivity Analysis of Z0 vs. Strip Widths.
Analysis OPTION selected = **1**

Please enter Frequency Range for Impedance ANALYSIS:
    -Analysis Start Frequency, GHz = **0.0**
    -Analysis Stop Frequency, GHz = **18.0**
    -Analysis Step Frequency, GHz = **0.5**

Please enter one Strip Width for Frequency Analysis:
    -Strip Width (W), Inches = **0.05**

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: **Stripline-ANA.DAT**

User Data Entries are shown in **RED text**

Figure 3-2: Typical Input Data entry for **Frequency Analysis** in Stripline.exe

```
----------------------------------------------------------------------------------------
 Stripline (v. 1.0)                    Date:10/16/2012 at 17:11: 5Hours
         Copyright 2012 Atlanta RF Software (www.AtlantaRF.com)
         RF/Microwave Computer-Aided Engineering Design Data
            for Single-Strip Stripline Transmission Lines.

 B =  0.0625"         Strip Width Synthesis          SR =  32.000
 Er =  2.33       =======================            RES =  2.500
 T =  0.00140"          (OPTION 1)               DLTAN =  0.00050

                              Transmission Loss at  10.00 GHz (dB/In)
 Strip                   TE   ---------------------------------------------
 Width:W  W/B     Zo   Cutoff Unloaded Conduc. Dielec.  Total
 (Inches)              (Ohms)  (GHz)    Q      Loss    Loss    Loss
 ----------------------------------------------------------------------------------------
 0.0958  1.5325  30.00  26.63  359.0  0.0806  0.0176  0.0983
 0.0880  1.4077  32.00  28.14  353.6  0.0821  0.0176  0.0998
 0.0811  1.2977  34.00  29.63  347.8  0.0838  0.0176  0.1014
 0.0750  1.1999  36.00  31.08  343.5  0.0851  0.0176  0.1027
 0.0695  1.1125  38.00  32.51  338.3  0.0866  0.0176  0.1043
 0.0646  1.0338  40.00  33.91  333.6  0.0881  0.0176  0.1058
 0.0602  0.9626  42.00  35.29  328.9  0.0896  0.0176  0.1073
 0.0561  0.8979  44.00  36.64  324.3  0.0912  0.0176  0.1088
 0.0524  0.8388  46.00  37.97  320.0  0.0926  0.0176  0.1102
 0.0490  0.7847  48.00  39.28  315.8  0.0941  0.0176  0.1117
 0.0459  0.7350  50.00  40.56  311.6  0.0956  0.0176  0.1132
 0.0431  0.6891  52.00  41.82  307.6  0.0970  0.0176  0.1147
 0.0404  0.6466  54.00  43.05  303.4  0.0986  0.0176  0.1163
 0.0380  0.6073  56.00  44.27  299.1  0.1003  0.0176  0.1180
 0.0357  0.5707  58.00  45.46  295.0  0.1020  0.0176  0.1196
 0.0335  0.5366  60.00  46.62  290.9  0.1037  0.0176  0.1213
 0.0315  0.5048  62.00  47.77  286.8  0.1054  0.0176  0.1230
 0.0297  0.4751  64.00  48.89  282.9  0.1071  0.0176  0.1247
 0.0280  0.4472  66.00  49.99  278.4  0.1091  0.0176  0.1267
 0.0263  0.4211  68.00  51.07  274.4  0.1109  0.0176  0.1285
 0.0248  0.3966  70.00  52.12  270.3  0.1129  0.0176  0.1305
 0.0234  0.3736  72.00  53.15  265.8  0.1151  0.0176  0.1327
 0.0220  0.3520  74.00  54.16  261.8  0.1171  0.0176  0.1348
 0.0207  0.3316  76.00  55.14  257.4  0.1194  0.0176  0.1370
 0.0195  0.3124  78.00  56.10  253.3  0.1216  0.0176  0.1393
 0.0184  0.2943  80.00  57.04  249.0  0.1240  0.0176  0.1417
 0.0173  0.2772  82.00  57.95  244.5  0.1266  0.0176  0.1443
 0.0163  0.2611  84.00  58.84  240.2  0.1292  0.0176  0.1468
 0.0154  0.2458  86.00  59.71  235.9  0.1319  0.0176  0.1495
 0.0145  0.2314  88.00  60.55  231.4  0.1348  0.0176  0.1525
 0.0136  0.2178  90.00  61.37  226.9  0.1378  0.0176  0.1555
 0.0128  0.2049  92.00  62.16  222.4  0.1410  0.0176  0.1586
 0.0120  0.1928  94.00  62.93  218.0  0.1442  0.0176  0.1618
 0.0113  0.1813  96.00  63.68  213.6  0.1475  0.0176  0.1652
 0.0106  0.1704  98.00  64.40  209.1  0.1511  0.0176  0.1687
 0.0100  0.1601 100.00  65.10  204.6  0.1548  0.0176  0.1724
 ----------------------------------------------------------------------
 Output Data stored in User filename: Stripline-SYN.DAT
```

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

```
---------------------------------------------------------------------------
 Stripline (v. 1.0)              Date:10/16/2012 at 17: 9:56Hours
        Copyright 2012 Atlanta RF Software (www.AtlantaRF.com)
        RF/Microwave Computer-Aided Engineering Design Data
          for Single-Strip Stripline Transmission Lines.

   B =  0.0625"        Impedance Analysis          SR = 32.000
   Er =  2.33        ====================          RES =  2.500
   T =  0.00140"          (OPTION 1)              DLTAN = 0.00050
   W =  0.0500"                                    Z0 =  47.42 Ohms

           Wavelength     Transmission Loss (dB/Inch)
           Free-         ---------------------------------------------
   Freq    Space  "Guide" Unloaded  Conduc.  Dielec.  Total
   (GHz)  (Inches) (Inches)   Q      Loss     Loss    Loss
 ---------------------------------------------------------------------------
   0.000  999.999  999.999    0.0   0.0000   0.0000  0.0000
   0.500   23.606   15.465  122.3   0.0135   0.0009  0.0144
   1.000   11.803    7.732  162.2   0.0200   0.0018  0.0218
   1.500    7.869    5.155  188.1   0.0255   0.0026  0.0281
   2.000    5.902    3.866  207.0   0.0306   0.0035  0.0341
   2.500    4.721    3.093  221.6   0.0354   0.0044  0.0398
   3.000    3.934    2.577  233.5   0.0400   0.0053  0.0453
   3.500    3.372    2.209  243.5   0.0445   0.0062  0.0507
   4.000    2.951    1.933  252.1   0.0489   0.0071  0.0560
   4.500    2.623    1.718  259.7   0.0532   0.0079  0.0611
   5.000    2.361    1.546  266.6   0.0574   0.0088  0.0662
   5.500    2.146    1.406  272.9   0.0614   0.0097  0.0711
   6.000    1.967    1.289  278.7   0.0654   0.0106  0.0759
   6.500    1.816    1.190  284.2   0.0692   0.0115  0.0807
   7.000    1.686    1.105  289.4   0.0730   0.0123  0.0853
   7.500    1.574    1.031  294.4   0.0766   0.0132  0.0899
   8.000    1.475    0.967  299.3   0.0802   0.0141  0.0943
   8.500    1.389    0.910  303.9   0.0837   0.0150  0.0987
   9.000    1.311    0.859  308.4   0.0871   0.0159  0.1029
   9.500    1.242    0.814  312.8   0.0904   0.0168  0.1071
  10.000    1.180    0.773  317.1   0.0936   0.0176  0.1113
  10.500    1.124    0.736  321.2   0.0968   0.0185  0.1153
  11.000    1.073    0.703  325.3   0.0999   0.0194  0.1193
  11.500    1.026    0.672  329.3   0.1029   0.0203  0.1232
  12.000    0.984    0.644  333.3   0.1059   0.0212  0.1270
  12.500    0.944    0.619  337.1   0.1088   0.0220  0.1308
  13.000    0.908    0.595  340.9   0.1116   0.0229  0.1345
  13.500    0.874    0.573  344.6   0.1144   0.0238  0.1382
  14.000    0.843    0.552  348.3   0.1171   0.0247  0.1418
  14.500    0.814    0.533  351.9   0.1198   0.0256  0.1454
  15.000    0.787    0.515  355.4   0.1224   0.0265  0.1489
  15.500    0.761    0.499  358.9   0.1250   0.0273  0.1524
  16.000    0.738    0.483  362.3   0.1276   0.0282  0.1558
  16.500    0.715    0.469  365.7   0.1301   0.0291  0.1592
  17.000    0.694    0.455  369.0   0.1325   0.0300  0.1625
  17.500    0.674    0.442  372.3   0.1349   0.0309  0.1658
  18.000    0.656    0.430  375.6   0.1373   0.0318  0.1691

   TE11 Cutoff Frequency =   38.90 GHz.
---------------------------------------------------------------------------
 Output Data stored in User filename: Striplne-ANA.DAT
```

Figure 4-2: Typical Output Data for **Frequency Analysis** from Stripline.exe