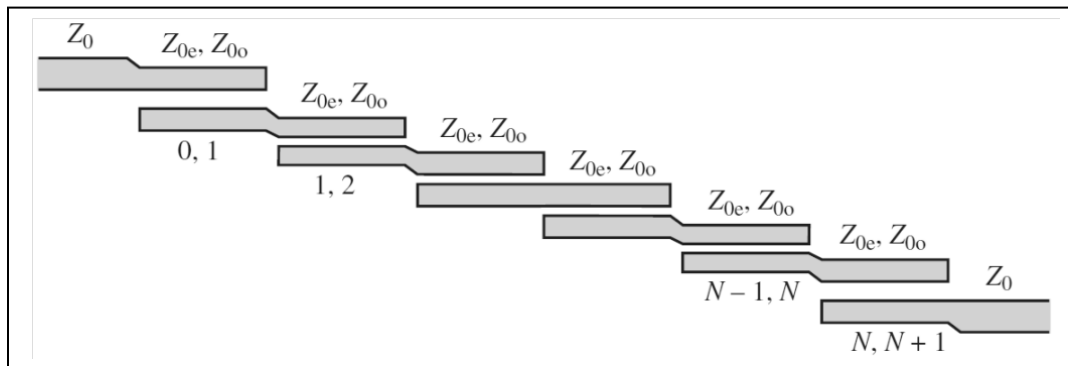


## Quick Start User Manual: PCfilter



### 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. *PCfilter.exe*: The executable software product.
  - b. *PCfilter.DEF*: Default Data File read by *PCfilter.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: *PCfilter.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: *PCfilter.exe* performs Electrical Synthesis, Dimensional Synthesis and Frequency Analysis of Bandpass Filters designed with Parallel Edge-Coupled topology, when constructed in microstrip or stripline medium. That is: Parallel Edge-Coupled Bandpass Filters. This software product synthesizes the electrical circuit and physical dimensions for those parallel edge-coupled resonators.

The executable file: *PCfilter.exe* reads the Default Data File: *PCfilter.DEF* each time you start the program. As such, you can change Data Entries inside *PCfilter.DEF* to suite your most

common Parallel Edge-Coupled Bandpass Filter designs, using the guidelines written in *PCfilter.DEF*.

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

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 Distributed Circuit Synthesis and for Dimensional Synthesis of your Parallel Edge-Coupled Bandpass Filters, 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 Distributed Circuit Synthesis and for Dimensional Synthesis of your Parallel Edge-Coupled Bandpass Filters, 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 for your Parallel Edge-Coupled Bandpass Filter planned for manufacture, prior to fabrication.

You can create any number of User Input Data files, each of which defines the actual physical dimensions of your Parallel Edge-Coupled Bandpass Filters. Once created, you can enter that Input Data filename when asked by the software product, for Frequency Analysis and for comparison with actual measured 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!

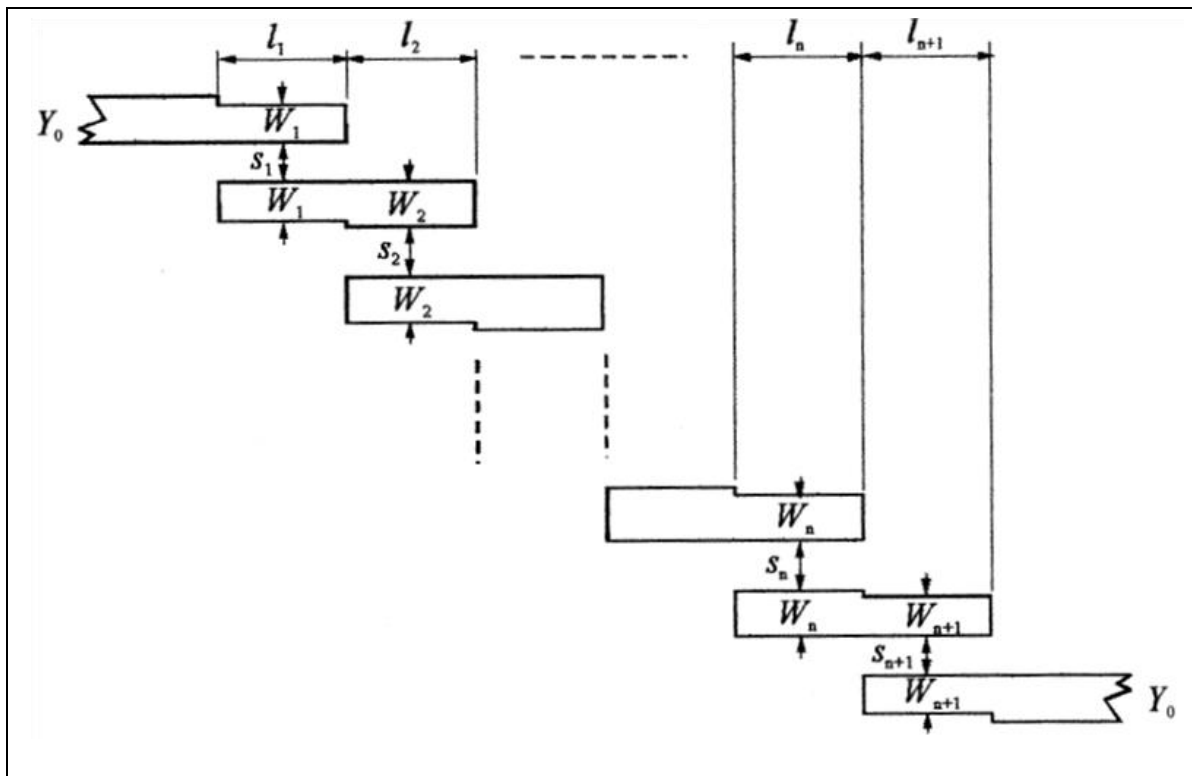
Inside the software product, you will find "User-friendly Error Traps", which identify errors in your Data Entry. The software product notifies you when an error is detected and asks for a different Data Entry, so the software product performs within the proper technical bounds for the technology.

## 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



PCfilter.DEF contains all Default Data values read by Program; PCfilter.exe

10000.0	:Fo	= Filter's Center Frequency.....MHz
300.0	:BW	= Filter's Passband Bandwidth.....MHz
1.0	:TORB	= 1.0 for Tchebyshev; =2.0 for Butterworth
0.05	:RIPPLE=	Passband Amplitude Ripple.....dB
9500.0	:F1	= Out-of-band Skirt Freq where A1 is needed.....MHz
50.0	:A1	= Minimum Attenuation needed at Skirt Freq.....dB
9.0	:N	= Number of Sections/Poles in the Filter
50.0	:Zo	= Impedance level of the System.....Ohms
2.0	:MSorSL=	1.0 for Microstrip; = 2.0 for Stripline
0.025	:H	= Microstrip`s Substrate Height: H.....Inches
9.6	:ERm	= Microstrip`s Relative Dielectric Constant
0.0005	:Tm	= Microstrip`s Conductor Strip Thickness.....Inches
0.125	:B	= Stripline`s Ground Plane Thickness: B.....Inches
2.3	:ERs	= Stripline`s Relative Dielectric Constant
0.0014	:Ts	= Stripline`s Conductor Strip Thickness.....Inches
PCfilterE.DAT	:FNE	= Default filename for your Electrical Data Storage
PCfilterD.DAT	:FND	= Default filename for your Dimensional Data Storage

| \_\_\_\_\_ The first 20 characters are read by PCfilter.exe

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

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

The User is invited to change any/all data values in PCfilter.DEF to data values that you commonly use for your RF/microwave designs of Parallel Edge-Coupled Bandpass Filters constructed in Microstrip or Stripline,so you do not have to enter data values when prompted by PCfilter.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**: PCfilter.DEF

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

This program performs Electrical SYNTHESIS, Dimensional SYNTHESIS and Frequency ANALYSIS of multi-section Parallel Edge-Coupled Bandpass Filters exhibiting a Tchebyscheff or Butterworth response across its passband, with construction in Microstrip or Stripline.

Please enter the following Design Data:

-Filter's Center Frequency, MHz = **10000.0**

-Filter's Passband Bandwidth, MHz = **300.0**

-Desired Bandwidth for Filter = 3.00 %

-Select RESPONSE profile for your Filter:

\*1 = Tchebyscheff (Equi-ripple) Passband Response.

2 = Butterworth (Maximally Flat) Passband Response.

RESPONSE profile selected = **1**

-Enter Passband RIPPLE Level in dB:

- Enter 0.01 for VSWR = 1.10:1

-\*Enter 0.05 for VSWR = 1.24:1

- Or a value of your choice.

Passband RIPPLE Level = **0.05**

-Select METHOD for entering Number of Cavities:

\*1: User enters Number of Cavities, N

2: User enters Attenuation at Skirt Frequency

METHOD selected = **1**

-Number of Resonators/Poles, N = **9**

-Impedance of the System, Ohms = **50.0**

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: **PCfilter-SYN.DAT**

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

Figure 3-1: Typical Input Data entry for **Electrical Synthesis** in PCfilter.exe

Select a Physical CONSTRUCTION for your Filter:

1. Microstrip Filter, or
- \*2. Stripline Filter

Desired Physical CONSTRUCTION = **2**

- Stripline`s Ground Plane Spacing (B), Inches = **0.125**
- Substrate`s Relative Dielectric Constant, Er = **2.3**
- Center Conductor Strip Thickness (T), Inches = **0.0014**

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: **PCfilter-DIM.DAT**

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

Figure 3-2: Typical Input Data entry for **Distributed Circuit Synthesis** in PCfilter.exe

-----  
 PCfilter (v. 1.0) Date:10/18/2012 at 13:38: 3Hours  
 Copyright 2012 Atlanta RF Software (www.AtlantaRF.com)  
 RF/Microwave Computer-Aided Engineering Design Data For  
 Multi-Section Parallel Edge-Coupled Bandpass Filters.

SYNTHESIS of the Distributed Electrical Circuit for your Parallel  
 Edge-Coupled Bandpass Filter results in the following Prototype  
 Lowpass Element Values and Even-Mode & Odd-Mode Impedances:

Flow = 9850.000 MHz      Response = Tchebyscheff  
 Fo = 10000.000 MHz      # of Poles = 9  
 Fhigh= 10150.000 MHz      Ripple (Am) = 0.050 dB  
 BW = 300.000 MHz      Zo of System= 50.00 Ohms

I	Prototype** Low-Pass** Elements **	Coupled Section K,K+1	Even-Mode & Odd-Mode Impedances, Ohms					
			Per S.Cohn Zoe    Zoo		Per G. Matthaei Zoe    Zoo		Per E. Cristal Zoe    Zoo	
0	1.00000 **	0 1	62.84	41.65	60.36	39.64	60.36	39.64
1	1.04993 **	1 2	51.97	48.17	49.71	46.07	49.67	46.03
2	1.46109 **	2 3	51.41	48.66	49.19	46.55	49.17	46.54
3	2.00653 **	3 4	51.32	48.75	49.10	46.64	49.08	46.62
4	1.66975 **	4 5	51.29	48.77	49.08	46.66	49.06	46.64
5	2.08578 **	5 6	51.29	48.77	49.08	46.66	49.06	46.64
6	1.66975 **	6 7	51.32	48.75	49.10	46.64	49.08	46.62
7	2.00653 **	7 8	51.41	48.66	49.19	46.55	49.17	46.54
8	1.46109 **	8 9	51.97	48.17	49.71	46.07	49.67	46.03
9	1.04993 **	9 10	62.84	41.65	60.36	39.64	60.36	39.64
10	1.00000 **	Required Load Impedance = 50.00 Ohms						

-----  
 Output data stored in User filename: PCfilter-SYN.DAT

SYNTHESIS of the Distributed Electrical Circuit for your Filter completed.  
 Select the next OPERATION:

1. SYNTHESIS of Physical Dimensions for your Bandpass Filter.
2. Design a NEW Parallel Edge-Coupled Bandpass Filter.
- \*3. EXIT to operating system.

OPERATION selected =

Figure 4-1: Typical Output Data for **Distributed Circuit Synthesis** from PCfilter.exe

-----  
 PCfilter (v. 1.0) Date:10/18/2012 at 13:38: 3Hours  
 Copyright 2012 Atlanta RF Software (www.AtlantaRF.com)  
 RF/Microwave Computer-Aided Engineering Design Data For  
 Multi-Section Parallel Edge-Coupled Bandpass Filters.

SYNTHESIS of Physical Dimensions for your Parallel Edge-  
 Coupled Bandpass Filter results in the following design data:

Flow = 9850.000 MHz	Response = Tchebyscheff
Fo = 10000.000 MHz	# of Poles = 9
Fhigh= 10150.000 MHz	Ripple (Am) = 0.050 dB
BW = 300.000 MHz	Zo of System= 50.00 Ohms
Er = 2.300	Construction= Stripline
H = 0.125 "	Strip Thick = 0.0014 "

Section (K)	Line Width: W(K), Inches**			Section (K,K+1)	Gap Spacing: S, Inches		
	Cohn	Matthaei	Cristal**		Cohn	Matthaei	Cristal
1	0.0850	0.0907	0.0907 **	0 1	0.0187	0.0170	0.0170
2	0.0960	0.1030	0.1031 **	1 2	0.0782	0.0764	0.0763
3	0.0963	0.1032	0.1032 **	2 3	0.0909	0.0891	0.0891
4	0.0963	0.1032	0.1033 **	3 4	0.0935	0.0918	0.0918
5	0.0963	0.1032	0.1033 **	4 5	0.0943	0.0925	0.0925
6	0.0963	0.1032	0.1033 **	5 6	0.0943	0.0925	0.0925
7	0.0963	0.1032	0.1033 **	6 7	0.0935	0.0918	0.0918
8	0.0963	0.1032	0.1032 **	7 8	0.0909	0.0891	0.0891
9	0.0960	0.1030	0.1031 **	8 9	0.0782	0.0764	0.0763
10	0.0850	0.0907	0.0907 **	9 10	0.0187	0.0170	0.0170

For a System Impedance = 50.00 Ohms, Line Width, W = 0.0961 ".

For a Center Frequency = 10000.000MHz, Quarter-Wave = 0.1946 ".

-----  
 Output data stored in User filename: PCfilter.DIM.DAT

SYNTHESIS of Physical Dimensions for your Filter completed.

Select the next OPERATION:

1. Perform a Frequency ANALYSIS of your Bandpass Filter.
2. Change Physical CONSTRUCTION of your Bandpass Filter
3. Design a NEW Parallel Edge-Coupled Bandpass Filter.
- \*4. EXIT to operating system.

OPERATION selected =

Figure 4-2: Typical Output Data for **Dimensional Synthesis** from PCfilter.exe