



## 217Plus Application Note 4: Importing Component Data into the 217Plus Component Library

### Overview

The RIAC **217Plus** software tool has the ability to define and maintain a database of components and their parameters. Since a manufacturing organization tends to reuse the same parts in many designs, the ability to save and reuse component data can help to make the reliability analysis task more labor efficient.

From the Assembly/System level, parts can be added to the **217Plus** Component Library through the **217Plus** menu (**Tools>Add All Components To Library**). Parts can also be added one-at-a-time by clicking on the **Add To Library** 'button' shown on the component's **Information** tab. A potentially more efficient way to add data to the Component Library (especially when **217Plus** is first being used) is to **Import component data from a file**. Within a few minutes, the **Component Library Import** feature allows for the import of hundreds or thousands of components and (optionally) their associated parametric data, all in one operation.

The Component Library is based on a database table. Component data elements must conform to a specific format and/or name requirement to ensure that the import of data will be successful:

1. **Part Identification** – Each component must be associated with a valid name for the **217Plus Part Category** and **217Plus Part Type**
2. **Part Number** - The component must have *one or more* of the following forms of 'Part Number':
  - OEM Part Number
  - Industry Part Number (Commercial Catalog or Generic Number)
  - National Stocking Number (NSN)
3. **Manufacturer Name** - *If* the name of the manufacturer is to be imported, the exact name must already have been defined in the **217Plus** listing of manufacturers
4. **Data Limits** – Data and numeric values for component parameters must be in the proper 217Plus-defined range

To facilitate Importing component data into the **217Plus** Component Library, one can use a spreadsheet, such as Quanterion's Excel<sup>1</sup>-based spreadsheet, **217Plus\_BOM\_Tool-Rev2.xls**. This supplemental tool contains a pre-formatted sheet, **Components**, to help ensure that requirement 1, above, is satisfied. It contains columns for each of the data elements defined in the Component Library, including component-parameters. Except for the dedicated columns for **217Plus Part Category** and **217Plus Part Type**, users may rearrange the other columns to suit their format. It is recommended that the user not delete any of the columns. Leaving all of the columns in the spreadsheet ensures that the spreadsheet can support current requirements, as well as future needs.

The '**Limits**' sheet in **217Plus\_BOM\_Tool-Rev2.xls** is a guideline which shows the data limits for certain forms of data associated with component parameters. These are for reference only.

The following assumes that the **217Plus\_BOM\_Tool-Rev2.xls** spreadsheet is used. Of course, a user may devise their own spreadsheet solution, but it should be designed to support all of the 217Plus component data fields.

---

<sup>1</sup> Excel is a trademark of Microsoft Corporation

## Data Supported

Table 1 identifies the data elements defined in the **217Plus** Component Library.

**Table 1: Component Library Data Import Columns**

Date Column	Data Description
<b>217Part</b>	A <b>217Plus Part Category</b> (Example: Resistor). This must be a valid <b>217Plus</b> 'name'. A pull-down list of names ensures that the name is valid.
<b>217PartType</b>	A <b>217Plus Part Type</b> (Example: Metal Film, Wire-wound). It must be a valid <b>217Plus</b> 'name'. A pull-down list of names, based on the <b>217Part</b> selection, facilitates selecting valid part type names.
<b>Description</b>	<b>Description</b> allows the user to add additional part identification descriptors. Example: <b>RES,ThkFlm,10.0K,1%,1/8W,0603</b>
<b>Manufacturer</b>	Component <b>Manufacturer</b> . <b>217Plus</b> will not import a record if the manufacturer name does not match exactly with a manufacturer name in the <b>217Plus</b> list of manufacturers. The user can manually add the Manufacturer name(s) prior to Import, or they can leave this field blank to avoid Import errors.
<b>OEM Part Number</b>	A number that a company assigns to parts it builds/procures/inventories. Example: <b>XYZ-R5834-12</b>
<b>Industry Part Number</b>	The commercial name/number used in the industry to refer to a part (generic or package-specific). Example: <b>SN74LS125ACP</b>
<b>National Stock Number</b>	A 13-digit number assigned by the Government for items purchased to the US General Services Administration (GSA). Example: <b>5962010690419</b>
<b>Specification Number</b>	A part control specification (of a company, the industry, etc.)
<b>RIAC Failure Rate (Failures per 10<sup>6</sup> Calendar hrs)</b>	The RIAC Failure Rate is a merged failure rate derived from the 217Plus database based on the RIAC Nonelectronic Part Reliability Data (NPRD) and Electronic Part Reliability Data (EPRD) publications. To be consistent with the built-in 217Plus database, convert Operating Hour failure rate to Calendar Hour failure rate per the following: $\lambda_{CAL} = 0.3 * \lambda_{OPER}$
<b>RIAC Data Source</b>	Identifies the source of the RIAC Failure Rate data
<b>User-Defined Failure Rate (Failures per 10<sup>6</sup> Calendar hrs)</b>	Failure rate data may be provided by a manufacturer or derived from users' field experience. Since data is typically in operating hours, it must be converted to failures per calendar hour (or per 10 <sup>6</sup> Calendar hours) using: $\lambda_{CAL} = 0.3 * \lambda_{OPER}$
<b>User-Defined Failure Rate Source</b>	Identifies the source of the failure rate data, the basis used (such as Ground Benign @ 25C), as well as how the data was converted to calendar hour data.
<b>Cap Value</b>	A capacitor numeric value between: 0.01 to 500000
<b>Cap Multiplier</b>	Must be one of the following four: pF nF uF F
<b>Volt Rated (V)</b>	A numeric value in Volts. For <b>capacitors</b> , the range is: 0.01 to 50000 For <b>diodes, thyristors</b> and <b>bipolar transistors</b> , the range is: 0.01 to 5000
<b>Power Rated (W)</b>	A positive numeric value in Watts. For <b>resistors</b> , the range is: 0.01 to 300
<b><math>\theta_{EA}, \theta_{JA}</math> (°C/W)</b>	A positive numeric value ranging from: 0.01 to 1000
<b><math>\theta_{EC}, \theta_{JC}</math> (°C/W)</b>	A positive numeric value ranging from: 0.01 to 1000
<b>Current Rated (Amps)</b>	A positive numeric value ranging from: 0.0001 to 200
<b>Hermetic</b>	A text character (for IC's only): H or N

## Procedure

- 1) **Obtain** an Excel-compatible listing of the appropriate components, extracted from the inventory-control system (or whatever system a company uses to identify and control parts.)
- 2) **Edit** the list by deleting columns not supported by the **217Plus** Component Library (see *Table 1*)
- 3) **Delete** rows of data or part types that should not be included in the Import
- 4) **Decide** whether it is best to use the data column definitions of **217Plus\_BOM\_Tool-REV2.xls**, or the format of the component file.
  - a. **If the format of the 217Plus-BOM-Tool-Rev2.xls “Components” sheet is to be used**, rearrange the columns of data in the component file to match the **217Plus-BOM-Tool** format.
  - b. **If the format of the Component file is to be used**, rearrange the columns C through S in the **217Plus-BOM-Tool** “Components” sheet to match those of the component file

**Note 1:** Whichever format is selected, write down or print out how the columns are assigned. It will likely be necessary to refer to the assignments during the Import process.

**Note 2:** If a **217Plus** Column is not presently used, it is highly suggested that it should not be deleted, as it may be needed for use in the future.

- 5) **Copy** the Component file data, and **Paste** it into the **217Plus-BOM-Tool** “Components” sheet at cell C2.
- 6) **Assign 217Plus Part Category and 217Plus Part Type Names** – Referencing Column A in *Figure 1 (217Part)*, use the pull-down to select the appropriate **217Plus** Part category for each part in the list. Then, in Column B, **217PartType**, use the pull-down to select the appropriate **217Plus** part type for each part in the list.

	A	B	C	D	E
	217Part	217PartType	Description	Manufacturer (Read comment)	OEM Part Num
1					
2	CAPACITOR	FIXED,CERAMIC,MULTILAYER CHIP	p,MLCC, 1pf, 10%, 50V, XR7, 0603	Capcompany	XYX-C1000100-K-51
3	CAPACITOR	FIXED,CERAMIC,MULTILAYER CHIP	p,MLCC, 4.7pf, 10%, 50V, 0603, XR7	Capcompany	XYX-C1000470-K-51
4	CAPACITOR	FIXED,ELECTROLYTIC	p,MLCC, 6.8pf, 10%, 50V, 0603, XR7	Capcompany	XYX-C1000680-K-51
5	CAPACITOR	FIXED,ELECTROLYTIC,ALUMINUM	p,MLCC, 8.2pf, 10%, 50V, 0603, XR7	Capcompany	XYX-C1000820-K-51
6	CAPACITOR	FIXED,ELECTROLYTIC,TANTALUM	p,MLCC, 10pf, 10%, 50V, 0603, XR7	Capcompany	XYX-C1000101-K-51
7	CAPACITOR	FIXED,ELECTROLYTIC,TANTALUM,FOIL	p,MLCC, 12pf, 10%, 50V, 0603, XR7	Capcompany	XYX-C1000121-K-51
8	CAPACITOR	FIXED,ELECTROLYTIC,TANTALUM,SOLID	p,MLCC, 15pf, 10%, 50V, 0603, XR7	Capcompany	XYX-C1000151-K-51
9	CAPACITOR	FIXED,GLASS	Cap,MLCC, 18pf, 10%, 50V, 0603	Capcompany	XYX-C1000181-K-51
10	CAPACITOR		Cap,MLCC, 22pf, 10%, 50V, 0611	Capcompany	XYX-C1000221-K-51
11	CAPACITOR		Cap,MLCC, 27pf, 10%, 50V, 0612	Capcompany	XYX-C1000271-K-51
12	CAPACITOR		Cap,MLCC, 33pf, 10%, 50V, 0613	Capcompany	XYX-C1000331-K-51
13	CAPACITOR		Cap,MLCC, 39pf, 10%, 50V, 0614	Capcompany	XYX-C1000391-K-51
14	CAPACITOR		Cap,MLCC, 47pf, 10%, 50V, 0615	Capcompany	XYX-C1000471-K-51
15	CAPACITOR		Cap,MLCC, 56pf, 10%, 50V, 0616	Capcompany	XYX-C1000561-K-51

**Figure 1: Assigning 217Plus Part Category and Part Type**

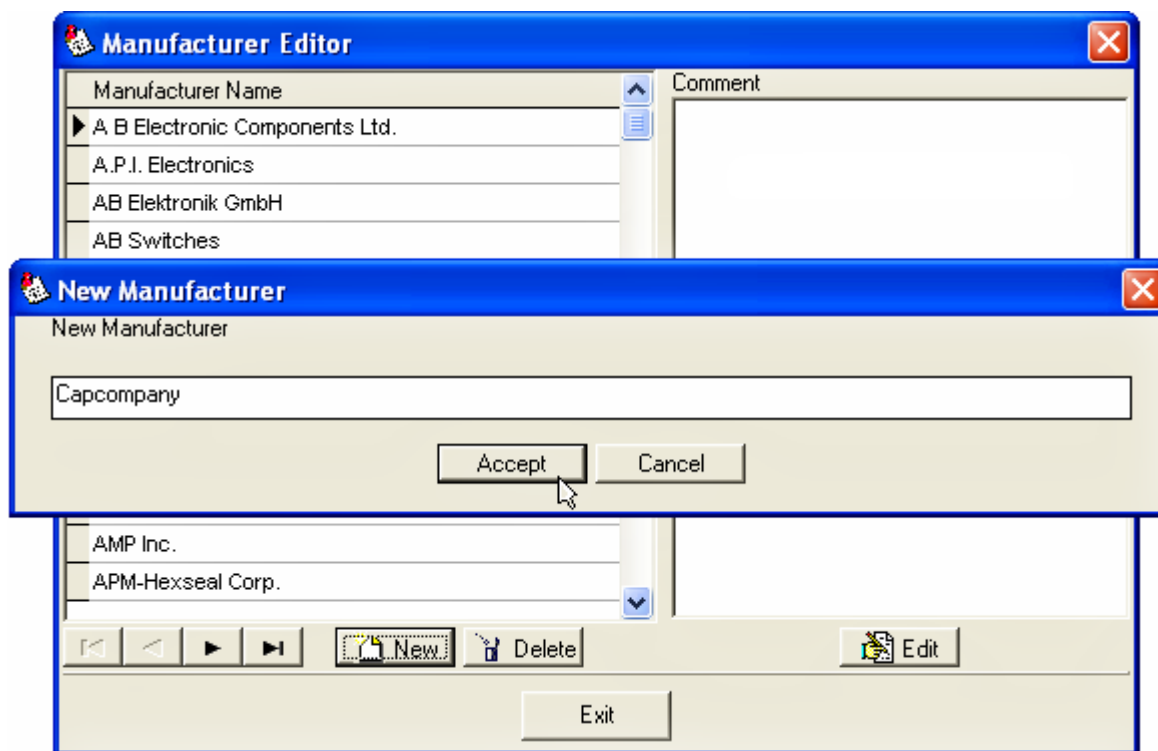
**Exception:** For “Other” Parts, enter a concise name, or leave the Part Type blank.

- 7) **Component Parameter Data (Optional).** Enter component parameter data (e.g., Cap Value, Rated Voltage, etc.) to each part, *if desired* (*Figure 2*). The data must be within the appropriate range (Refer to *Table 1*).

	M	N	O	P
Rate	Cap Value	Cap Multiplier (pF, nF, uF, F)	Volt Rated (V)	Power (W)
	1	pF	50	
	4.7	pF	50	
	6.8	pF	50	
	8.2	pF	50	
	10	pF	50	
	12	pF	50	
	15	pF	50	
	18	pF	50	
	22	pF	50	
	27	pF	50	
	33	pF		
	39	pF		
	47	pF		
	56	pF		

**Figure 2: Adding Parameter Data**

- 8) **Manufacturer Name.** To avoid 'Manufacturer name import errors', either manually add all new manufacturer names in the file in **217Plus** prior to the Import (**Libraries, Manufacturers, New**) (See Figure 3)...

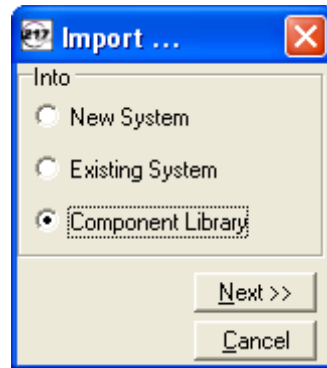


**Figure 3: Adding Manufacturer's to the 217Plus Manufacturer list**

...or, the user could leave the data in the **Manufacturer** column blank, except for its heading...

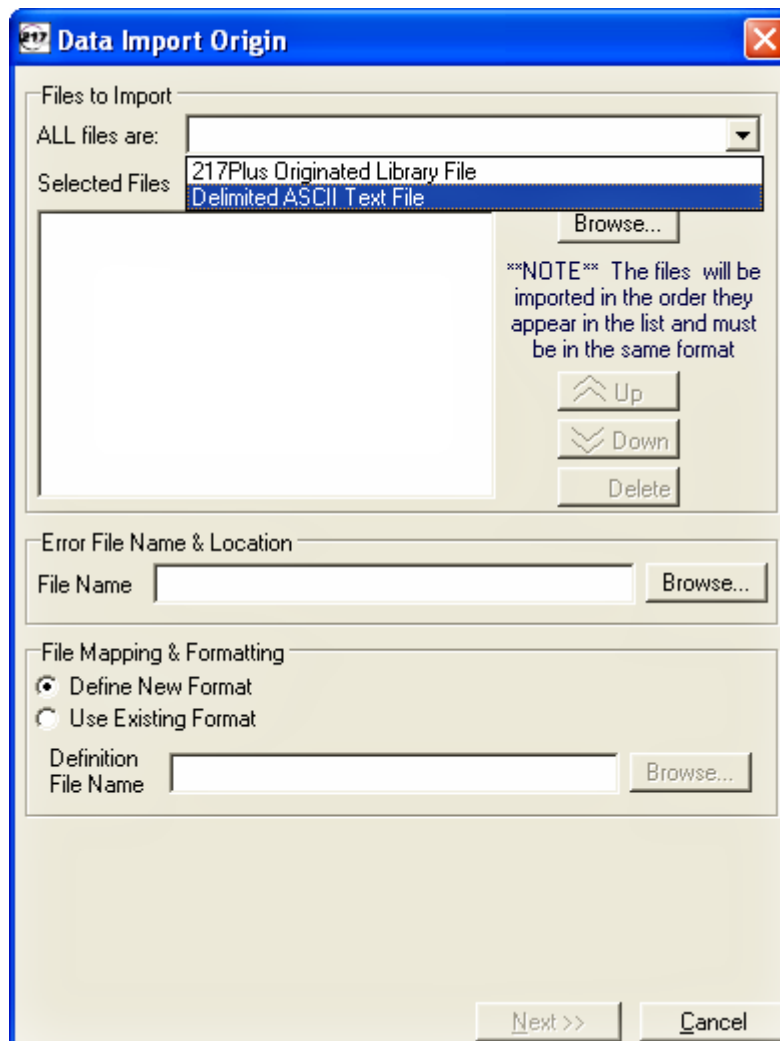
...or, the user can "Skip" the Manufacturer name field during the Import process.

- 9) **Save the File** by selecting **Save-As**. At the **Save As Type** pull-down, chose **Tab Delimited Text**.
- 10) **Library Import.** Start the **217Plus** software. After initialization, select **File**, then select **Import...** A dialog box will open with the Import options (Figure 4). Select **Component Library**, and click on **Next >>**.



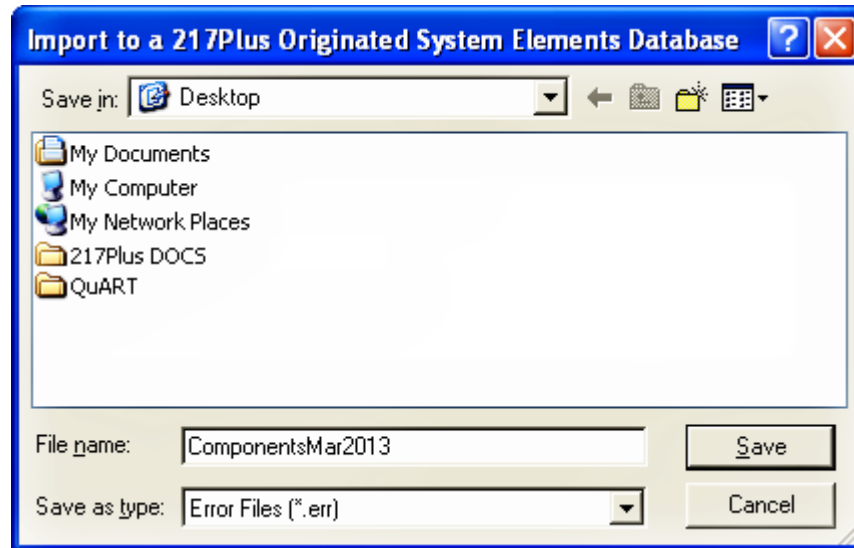
**Figure 4: Component Library Import Select**

- 11) The **Data Import Origin** window opens (Figure 5). At **ALL files are:**, select *Delimited ASCII Text File* and then **Browse...** to the Component text file that was saved in Step 9), and **Select** it.



**Figure 5: File Type Select**

- 12) At **Error File Name & Location**, select **Browse...** A window opens allowing one to browse to a location on the computer (Figure 6). Enter a name to be used as an error log file and then click on **Save**. If errors are encountered during Import, they will be logged in this file.



**Figure 6: Naming the Error Log File**

*If the user does not select and name a file, **217Plus** will create one in the **217Plus** System folder.*

13) At **File Mapping & Formatting**, select either **Use Existing Format**, or **Define New Format**.

- a. If the user has previously Imported data to the Components Library, and if that component mapping format was saved, select **Use Existing Format** and then **Browse...** to that format file and select it.
- b. If this is a new format, select **Define New Format**. Later in the process, the user will have the option to save the new format for use with future Imports to the Component Library.

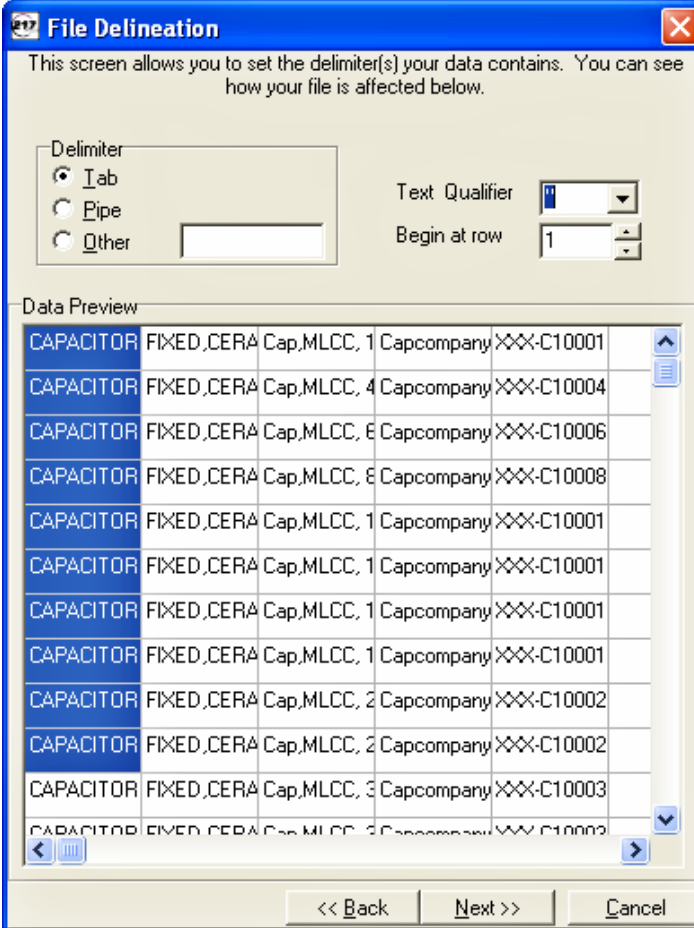
Select **Next >>**.

14) The *File Delineation* window appears (Figure 7). The **Delimiter** selection allows one to identify the ASCII character used to separate data fields. Since the Excel-based file was saved as Tab delimited, select **Tab**.

The Excel application also applies the **Quotation Mark** characters to surround text fields in an Excel-generated text file. Use the **Text Qualifier** option to select the Quotation mark character.

Set **Begin at row** to identify the first row where data begins, this will usually be "1". Row 0 is assumed to be, and usually is, the header. However if a "custom" file was used to generate the text file, it is possible that there will be more (or less) than one row of header data.

Click on **Next>>**.



This screen allows you to set the delimiter(s) your data contains. You can see how your file is affected below.

Delimiter:  
☒ Tab  
☐ Pipe  
☐ Other

Text Qualifier

Begin at row

Data Preview

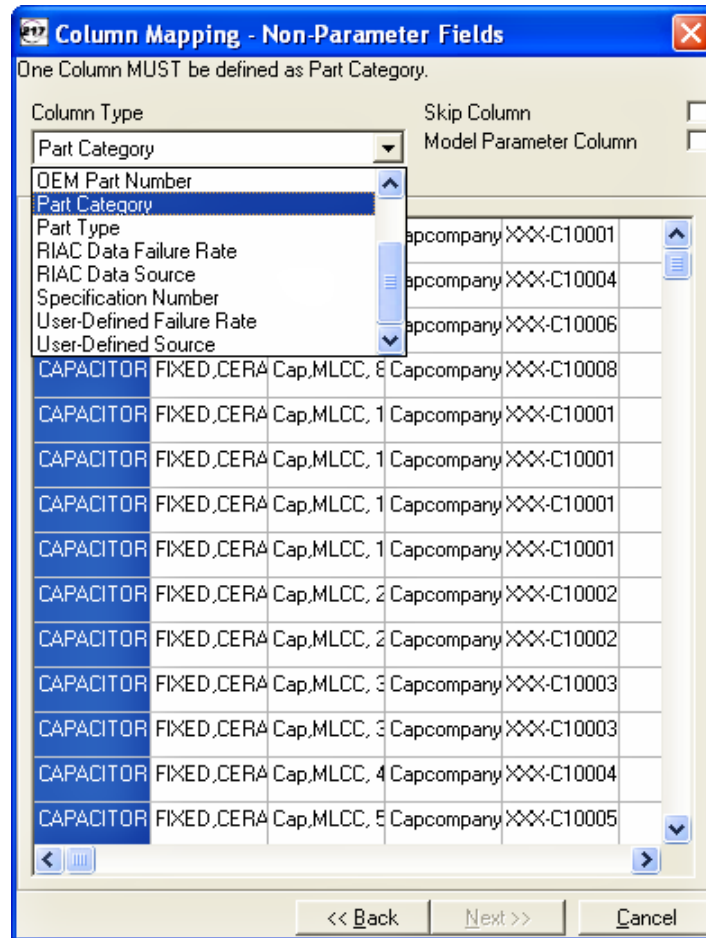
CAPACITOR	FIXED,CERA	Cap,MLCC, 1	Capcompany	XXX-C10001
CAPACITOR	FIXED,CERA	Cap,MLCC, 4	Capcompany	XXX-C10004
CAPACITOR	FIXED,CERA	Cap,MLCC, 6	Capcompany	XXX-C10006
CAPACITOR	FIXED,CERA	Cap,MLCC, 8	Capcompany	XXX-C10008
CAPACITOR	FIXED,CERA	Cap,MLCC, 1	Capcompany	XXX-C10001
CAPACITOR	FIXED,CERA	Cap,MLCC, 1	Capcompany	XXX-C10001
CAPACITOR	FIXED,CERA	Cap,MLCC, 1	Capcompany	XXX-C10001
CAPACITOR	FIXED,CERA	Cap,MLCC, 1	Capcompany	XXX-C10001
CAPACITOR	FIXED,CERA	Cap,MLCC, 1	Capcompany	XXX-C10001
CAPACITOR	FIXED,CERA	Cap,MLCC, 2	Capcompany	XXX-C10002
CAPACITOR	FIXED,CERA	Cap,MLCC, 2	Capcompany	XXX-C10002
CAPACITOR	FIXED,CERA	Cap,MLCC, 3	Capcompany	XXX-C10003
CAPACITOR	FIXED,CERA	Cap,MLCC, 3	Capcompany	XXX-C10003

<< Back    Next >>    Cancel

**Figure 7: File Delineation**

- 15) *If the data is being Imported according to a predefined mapping format, the Import will proceed and complete according to the selected format. When completed, **217Plus** will open to its normal operational screen. (Go to Step 0.*
- 16) *If the data is being imported according to a new format, the **Column Mapping –Non-Parameter Fields** window will open. The first column of data will be highlighted (Figure 8). The user has three options as to how they want to identify each column of data.*
  - If the data correlates to one of the **217Plus** data types, use the **Column Type** pull-down to select the appropriate data field.
  - If the data correlates to a Model Parameter (e.g. Rated Voltage), check the **Model Parameter Column** selection.
  - If the column of data is not to be imported, check the **Skip Column** option.





**Figure 8: Column Mapping – Non Parameters**

Note that one of the columns must correlate to a **217Plus Part Category**, one of the columns must correlate to a **217Plus Part Type**, and there must be data that correlates to a part number (OEM, Industry or NSN). The user may the **Skip Column** option for Manufacturer if the exact manufacturer name does not yet exist in **217Plus**.

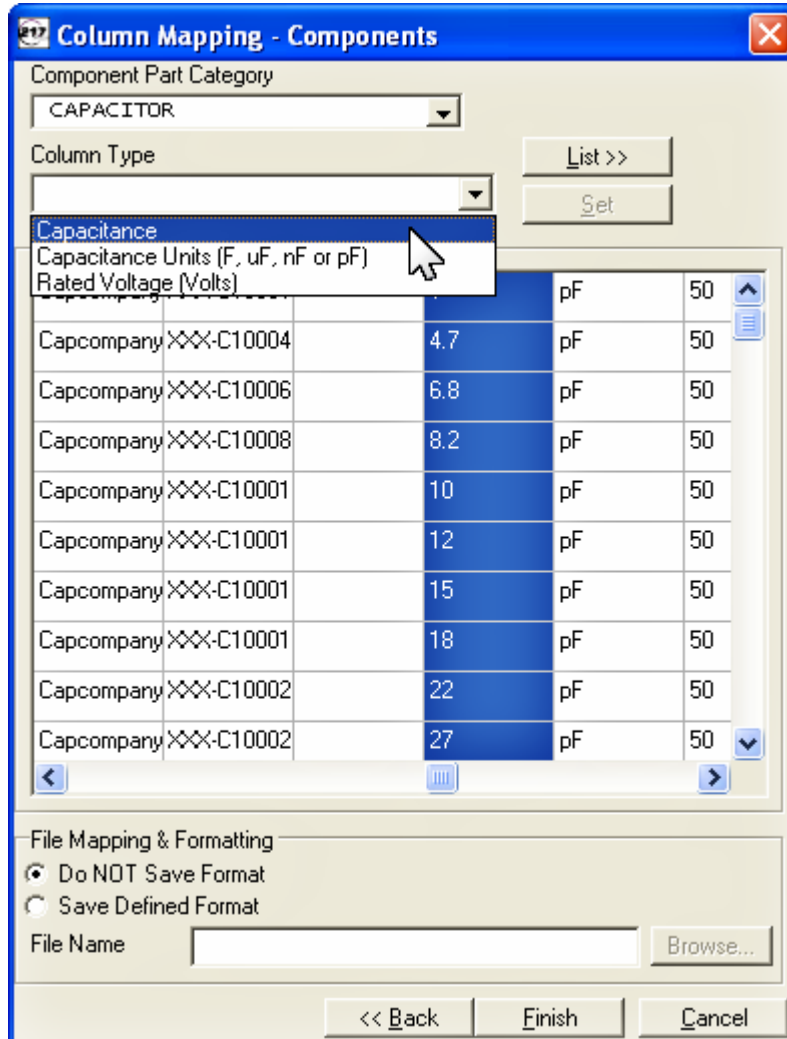
Once the present column's assignment has been selected, click on the next column of data.

- 17) Repeat Step 16) until all columns have either been assigned to a **Column Type**, designated as a **Model Parameter Column**, or designated as a **Skip Column**. *If any column is not set to one of these three options, the entire Import will fail.*

Once all of the columns have been assigned or designated, click on **Next>>**

- 18) The window that appears next (*Figure 9*) is the **Column Mapping – Components** window. **217Plus** will highlight the first data column that the user designated as a Model Parameter Column. The user may need to use the horizontal scroll control to bring the highlighted column into view. If no column was designated as a **Model Parameter Column**, proceed to Step 20).





**Column Mapping - Components**

Component Part Category: CAPACITOR

Column Type: Capacitance

Capacitance Units (F, uF, nF or pF): pF

Rated Voltage (Volts): 50

Component	Capacitance	Units	Voltage
Capcompany XXX-C10004	4.7	pF	50
Capcompany XXX-C10006	6.8	pF	50
Capcompany XXX-C10008	8.2	pF	50
Capcompany XXX-C10001	10	pF	50
Capcompany XXX-C10001	12	pF	50
Capcompany XXX-C10001	15	pF	50
Capcompany XXX-C10001	18	pF	50
Capcompany XXX-C10002	22	pF	50
Capcompany XXX-C10002	27	pF	50

File Mapping & Formatting

☒ Do NOT Save Format

☐ Save Defined Format

File Name:  Browse...

<< Back Finish Cancel

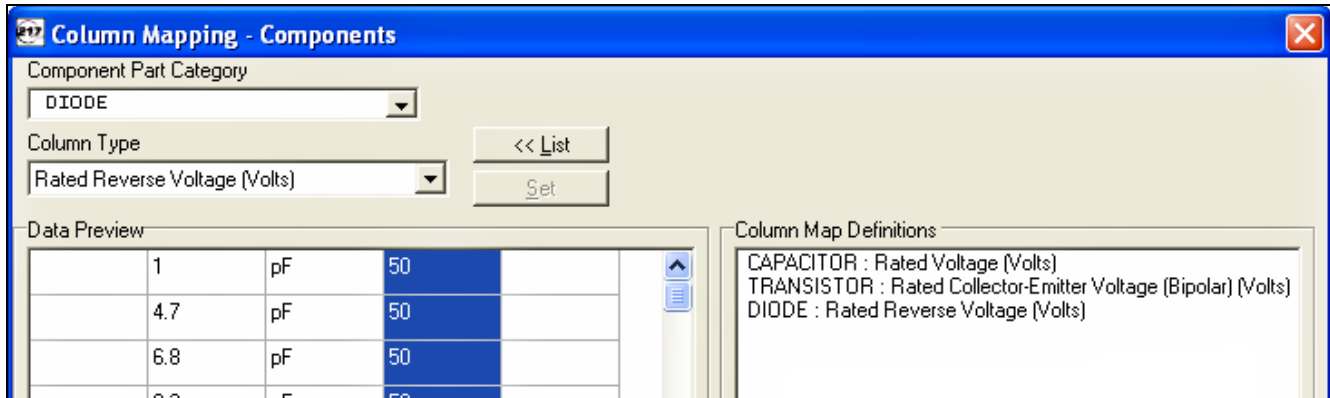
**Figure 9: Column Mapping Parameters**

At the **Component Part Category** pull-down, select the first component associated with the data column. In this example, the column contains “capacitance value” data, therefore CAPACITOR is selected for the Component Category. Then, using the **Column Type** pull-down, select the component parameter associated with the column. Again, since this example has the ‘capacitance value’ in the column, the user would select “Capacitance”.

After making the selections, click on **Set**. This causes the selections to be ‘remembered’ and added to a running list of selections.

Some columns, such as “Rated Voltage”, may be associated with multiple component types (capacitor, diode, bipolar transistors, etc.). The user should be sure to assign such a column to each applicable device and device parameter.

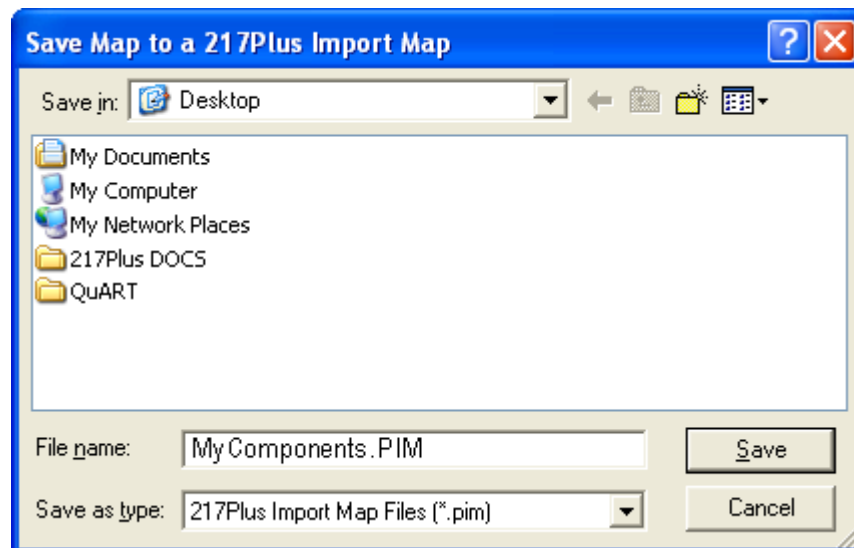
As an aid, the **List>>** button opens a window next to the Mapping window to display the components and parameters that the user has assigned to the highlighted column. Clicking << **LIST** will close the window. It is recommended to leave the List window open; it provides feedback that the proper selections have been made for the data column, or may show if an errant assignment was made.



**Figure 10: Using the LIST feature to View Mapping Selections**

When all assignments have been completed for a data column, click the next column to be assigned.

- 19) Repeat Step 18) until all desired components and parameters have been assigned.
- 20) **If the user plans to import components at a later date using the same file format, it is best to save the mapping that was just performed, so that it can be reused in the future.** This will eliminate Steps 16) through 19) on future Imports. Select **Save Defined Format**, and click on **Browse...** When the dialog box opens, **Browse...** to the location where the file is to be saved and enter a **File name**. Since the PIM extension is also used for BOM Import mapping files, it is recommended that the assigned name somehow identifies that this file as a "Component" mapping file (Figure 11).

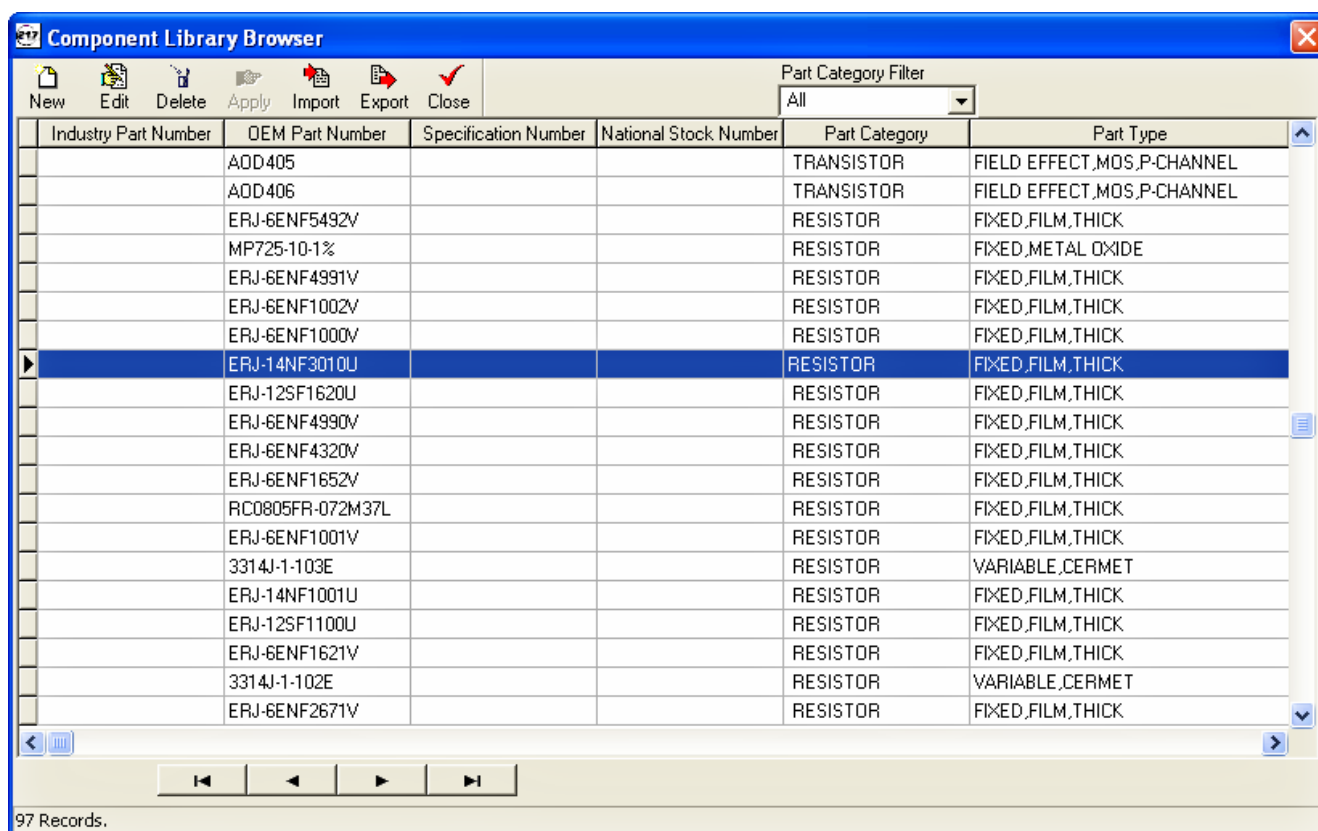


**Figure 11: Save the Mapping Format**

After the file format is saved, or if the user elects to not save the format, select **Finish**.

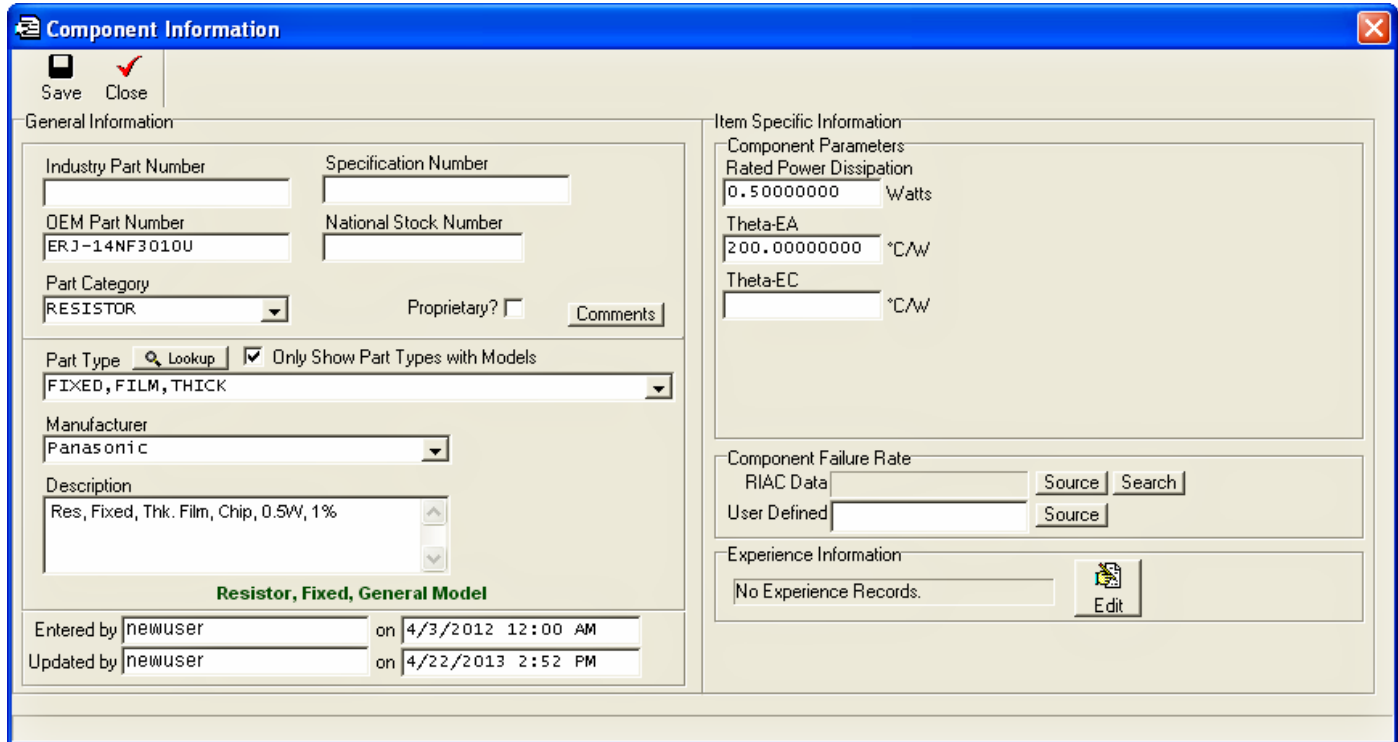
- 21) The Import will begin. Once complete, the **217Plus** application will open to its normal window.
- 22) If something was incorrect in the basic Import Format, the entire Import may fail. Such failures are usually due to data not being in the proper format, or an error was made while assigning columns.

- 23) If simple import errors were detected, they will appear in the **Error Log** file, as discussed in Step 12). To view the Error log file contents, open the Error log file with a utility that can read ASCII text (e.g. Notepad); the user may have to 'tell' the operating system which program they want to use to open the file. The Error log contains text information as to the error(s) encountered, identifying which records were affected. For example, if the record contained a Manufacturer name that **217Plus** does not yet have listed, or if the part is not associated with at least one part number, the type of error will be identified for each errant component record.
- 24) Assuming the Import was successful (or even partially successful), from the 217Plus Menu bar, select **Libraries**, then select **Component** to view the entire library. Scroll through the records just added to ensure that the Component ID data (part number, category, type) was assigned as desired. Note that the data can be 'filtered' using the **Part Category Filter** selection (e.g. view only Resistors, or only Capacitors, etc.). The navigation buttons in the lower left corner of the window can be used to step up or step down the listing, or go to the beginning or the end of the list. (Figure 12).



**Figure 12: Component LibraryBrowser Basic Window**

- 25) The normal *Component Library Browser* window shows only basic component Identification data. To view all data related to the component, highlight the desired component and select **Edit**. The **Component Information** window will open (Figure 13).



**Component Information**

Save Close

**General Information**

Industry Part Number:  Specification Number:

OEM Part Number:  National Stock Number:

Part Category:  Proprietary? ☐ Comments:

Part Type:  ☒ Only Show Part Types with Models

Manufacturer:

Description:

**Resistor, Fixed, General Model**

Entered by:  on:

Updated by:  on:

**Item Specific Information**

Component Parameters

Rated Power Dissipation:  Watts

Theta-EA:  °C/W

Theta-EC:  °C/W

Component Failure Rate

RIAC Data:

User Defined:

Experience Information

**Figure 13: Component Detail**

In the **Component Information** window, all data pertaining to the component is available for viewing or editing. From this window, one can check to see if the parameters were imported correctly or they may add or edit data.

The **Comments** 'button' opens a free-form text entry box to allow for the addition of comments related to the component.

The **Edit** button allows for entry of reliability experience data, as derived from field data or some other reliable source. It supports multiple records which may reflect different (or the same) operating conditions and environments. Failure rate data entered as Experience data *must* be in terms of failures per  $10^6$  Calendar hours. All failures should be ascertained via root cause analysis to ensure that the data is valid. *(In a 217Plus reliability prediction analysis, the user has the option of ignoring or applying experience data on a part-by-part basis).*

Any change made to the data will 'activate' the **Save** icon in the upper left corner. Clicking on **Save** will save the changes. Selecting **Close** will return to the **Component Library Browser**. Closing the Browser returns to the **217Plus** main screen.

## Conclusion

Importing data to the Component Library is a relatively quick way to populate the **217Plus** Component Library with data to be used in **217Plus** reliability predictions. It can save hours or days of labor by minimizing manual data entry. Component data importing is especially useful when **217Plus** is first being implemented. As with any database, the use of correct data formats is imperative. The **217Plus\_BOM\_Tool-Rev2.xls** tool facilitates preparing data for import. Once the main database of parts has been imported and established in the RIAC **217Plus** tool, 'new' parts can be added either (1) through additional imports, or (2) can be incrementally grown by saving parts from new BOMs, or (3) component-by-component as part of building a new system within **217Plus**.