

AS2Pack

Fast Start Tool Documentation

1. [Wire Bond Explorer](#)

[Advanced Tools:](#)

[Stacked Device Editor](#)

[Split Ring Editor](#)

[Bond Site Editor](#)

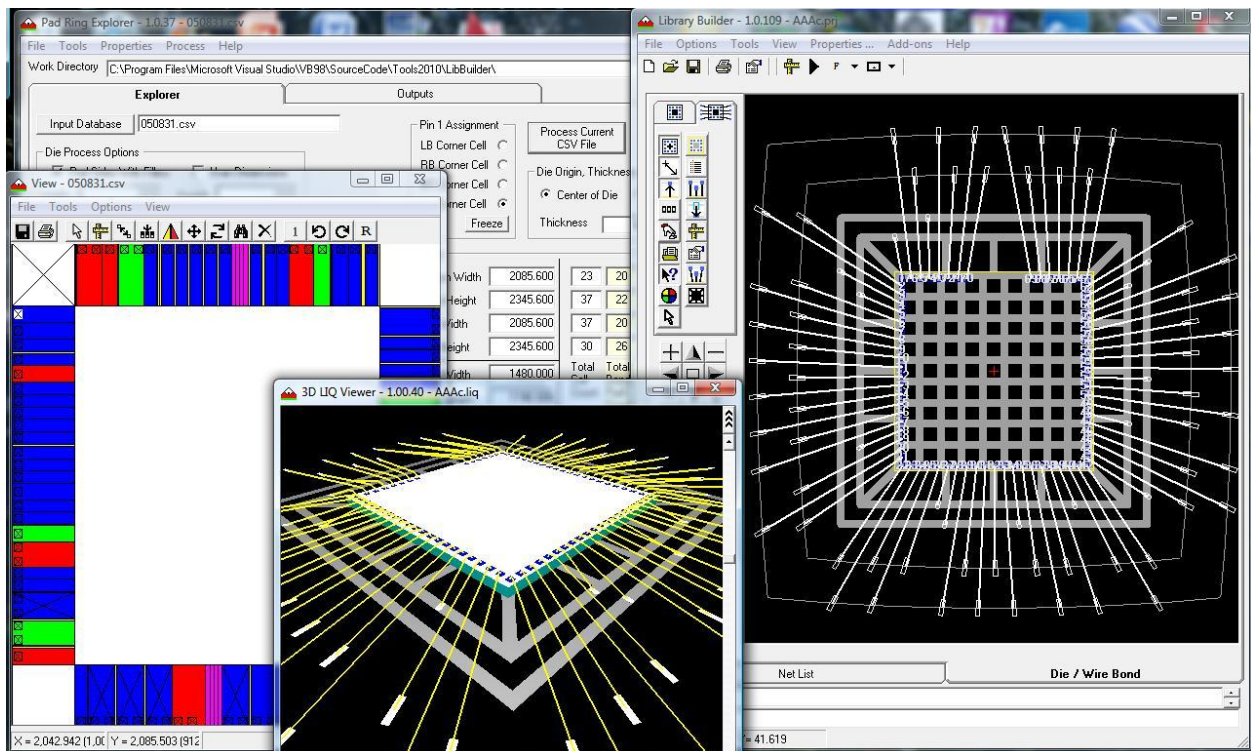
2. [3D LIQ Viewer](#)

[Wire Bond Setup](#)

[LR Estimator](#)



[Wire List](#)

3. [Pad Ring Explorer](#)



Wire Bond Explorer

The Wire Bond Explorer is a multipurpose tool for developing Wire Bond Fan Out patterns and has combined 3 former programs into one.

- The Net List Processor is the Net List tab. This part of the program reads in a net list and generates several [output files](#) including sorted by net (.wrl_SBN), sorted by refdes (.wrl_SBR) and Net List Statistics (.wrl_NLS).
- The Die Processor is the Die / Wire Bond tab with the Die tab selected  This is where the die pads are added or edited. If a die picture has been loaded and properly framed by the die outline and size information entered, a visual check can be done to verify die pad locations. Pad properties can be edited either manually or by exporting to Excel if Excel is pointed to in the properties dialog box under Systems section.
- The Wire Bond Fan Out is the Die / Wire Bond tab with the Wire Bond Tab selected . The wire bond fan out is generated using the [Fan Out tool](#) and edited by entering various parameters in the Properties Dialog box or using several of the editing tools.
- Data entry in any of the dialog box data fields is completed when either the Enter or Tab key is pressed or another data field is selected. If data field is not changed than no log entry is generated.
- Index:
 - [Project and System Set Up](#)
 - [Demo1](#): Uses the Pin List flow to reads in a Pin List followed by a Net and Die.
 - [Demo2](#): This demo picks up from Demo1 and highlights basic editing functions.
 - [Demo3](#): Moves into the Wire Bond Pad generation and highlights basic editing functions.
 - [Demo4](#): This demo will introduce some of the WBP editing features.
 - [Demo5](#): We will look closer at the Fan out tool.
 - [Files](#): Input and Output files used and generated by the program.
 - [Menus](#)
 - [Properties](#)
 - [Tool Bars](#): There are two tool bars in the Die / Wire Bond tab.
 - [Die Attach Editor](#)
 - [Tier Assignment dialog box](#)

- [Hyper link list](#)
- [Die Rotation](#)
- [Flip Chip](#)
- [Navigation Tool Box](#)
- [Function Keys](#)
- [World View](#)
- [Sample File Formats](#)
- [Bug Report](#)







Project and System Set Up


1. Setup the working directory. This is where all the input files and output files will be read and written too. Files that must exist in this directory for the program to operate properly are:
 - a. WireBondExplorer.ini file which holds all the system file information
 - b. BlankDie.bmp is the base bit map file used to create a die with no bit map image.

For these tutorials:

- a. AAAA.wrl Netlist
- b. AAAC.PinList
- c. Dummy.bmp
- d. 4ac0000.bmp extra bit map for practice
- e. Demo1.kmd Sample script generated by the program.
- f. AAAC.prj Sample of a project file
- g. English.ini Used to display tool tips. Other Languages on request.

All these files are located in the Application directory for these Demos. You might want to copy them to a back up directory for easy recover if you need to reference them.

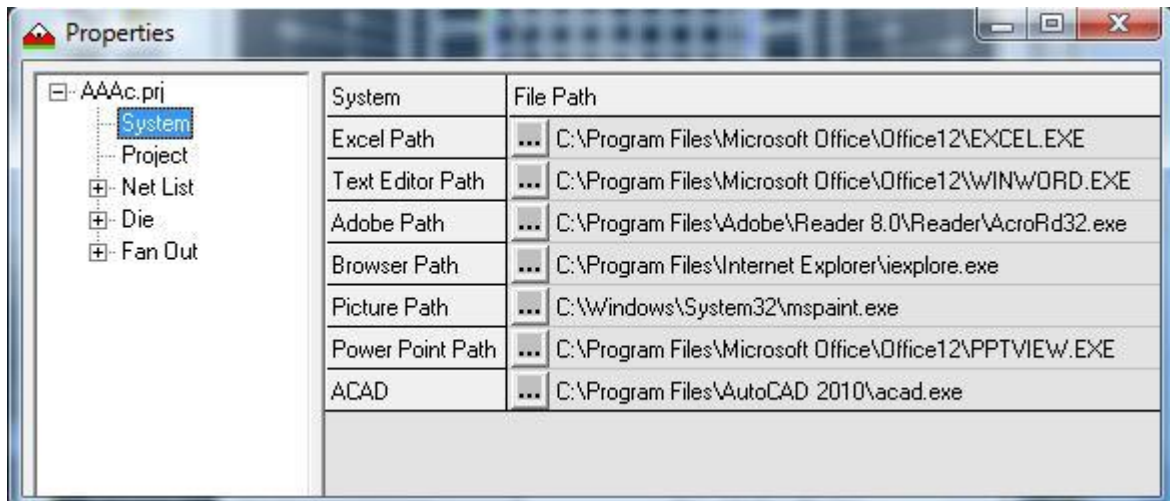
2. Load the program. The first time the program is run it will attempt to find other supporting programs. These include Word, Excel, Power Point, mspaint, iexplorer, and Adobe Reader to display the Fast Start document for help.
3. Several Project setting can be made at this point by clicking them in the far left tool bar when in the Die / Wire Bond tab or by using the Properties dialog box Top option. For this I defaulted to:
 - Origin = Center [OO=Center] 
 - Click and Drag = Yes [OCND=Yes] 
 - Dynamic Snap = Yes [ODS=Yes] 
 - Precision = 0.00 [OP=0.000] 
 - Load Last = No [OLL=No] 
 - Tool Tips = Yes [OTT=Yes] 

- Pad Color = Yes [OPC=Yes] 




4. The program also needs to know where certain files are located on your computer. These files are found in the Properties dialog box under the Systems option and are the executables that are used for data display and editing. :










- Excel Path
- Text Editor preferably Word or other processor that displays Rich Text Files.
- Adobe Path or other PDF reader.
- Web Browser.
- Picture display program for BMP, JPG, GIF such as Paint.
- Power Point
- Auto Cad for viewing DXF files



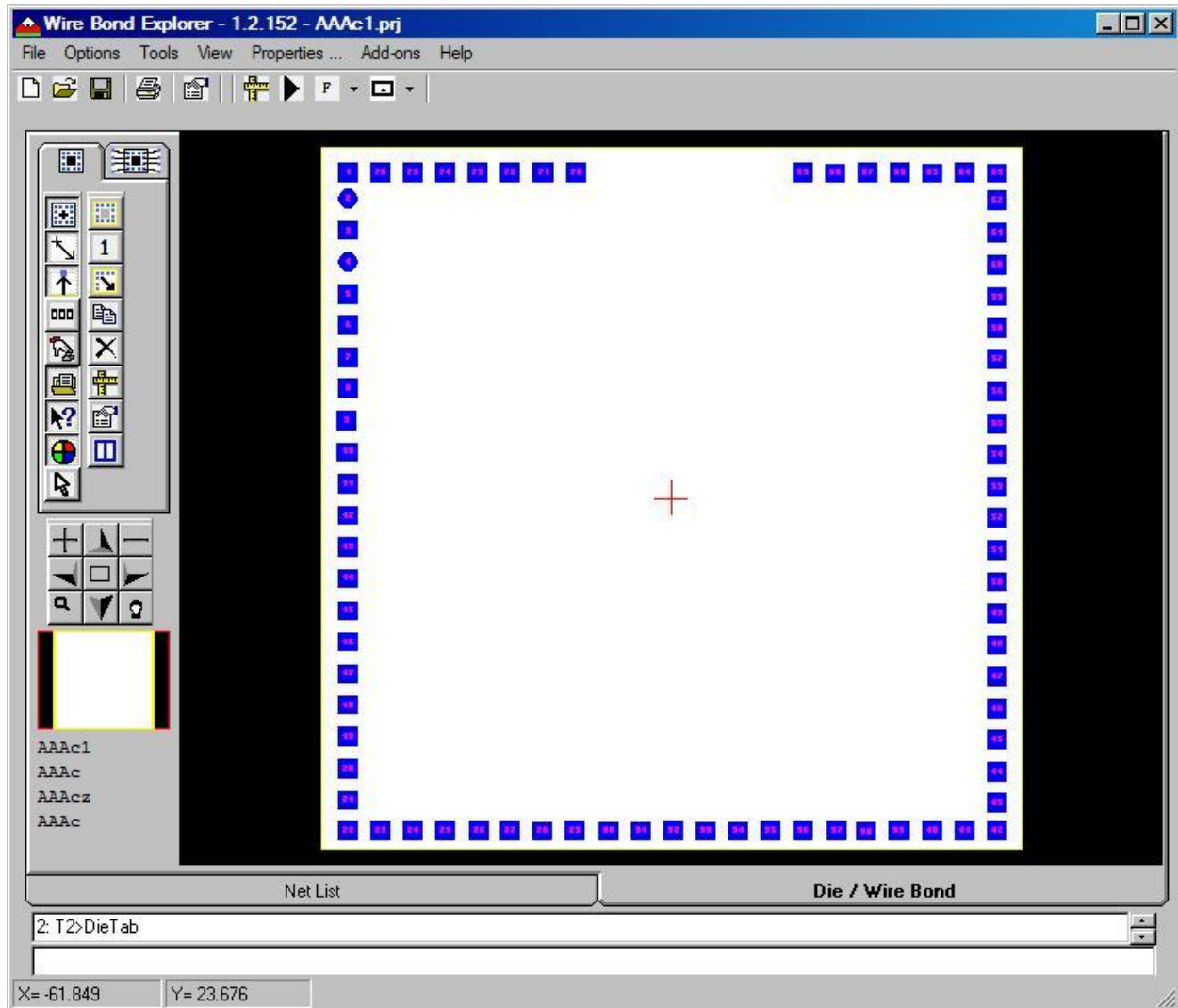
These properties are saved when the program is exited and are stored in the Sys.ini file in the application director.

Demo 1: Uses the Pin List flow to reads in a Pin List followed by a Net and Die.


This is the preferred method of getting the die database setup and ready for the wire bonding process. The following steps are used to create a Demo1.kmd file which can be run by selecting Tools:Run .kmd File or press the  button on the tool bar and select Demo1.kmd in the dialog box.



1. When you first start the program you might want to set up some basic settings in the toolbar at the left of the screen. Select Center Origin , Click and Drag , Dynamic Snap to Tier , Tool Tips , and Colors  as a starting point. You may wish to change these settings to suit your needs.
2. Select File:New or enter FN in the command prompt and click Yes.
3. Select File:Load:PinList... or enter FLPL=File Path \AAAc.PinList
4. When the Net List Generator dialog box opens select Yes. This will automatically generate a single node net list of all the pins in the Pin List File. You can optionally load a net list which will update any net names for pads in the Pin List.
5. Press Yes at the next dialog box if the file already exists.
6. At the load Die dialog box press No to generate a blank die. Again you can optionally load a Die picture (DUMMY.bmp).
7. When the Die Data dialog box is displayed enter the Die Height (100) and Die Width (100). Leave the Origin option (Center) selected. This places the coordinate origin at the center of the die. Selecting (LLC) will place the Origin at the lower left corner. These values are read in from the AAACPinList File.
8. Click OK in the dialog box.
9. The files will be loaded and the die will be displayed in the **Die / Wire Bond** tab..
10. If a die Bit Map is loaded and is skewed in rotation use the  tool to rotate the die picture CW or CCW up to 180 degrees in either 1 degree changes or .1 degree changes using a slider bar. This is found in the **Tools** Menu option under the **Die Edit Mode option**. It can also be found in the Toolbar at the left of the screen. This only affects a bit map if one is loaded and does not rotate the pad locations or rotations.
11. If the die picture has a margin that goes beyond the actual edge you can edit the outline by clicking  then . Handles will be displayed so the shape can be changed. Once the die outline has been edited, the margin can be cropped by using the Crop tool . You will be prompted for a file name or you can overwrite the original bitmap. If you want to keep the original file, name this file to another name or make a back up copy of the original before you crop the original.

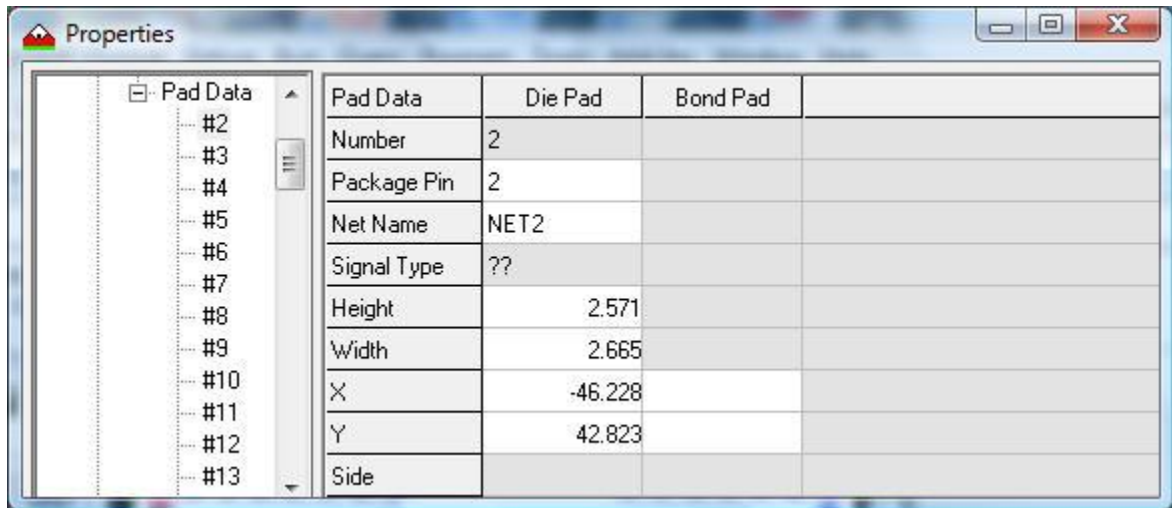
12. Save the Project as Demo1.prj in the work path which is automatically pointed to when you load the input files. FSPA=WorkPath\Demo1.prj. When the file has been saved the project file name will appear at the top of the screen next to the product version number.
13. Exit the program to save the system and project properties and values
14. Close the program after you are finished.



Demo2: This demo picks up from Demo1 and highlights basic editing functions.




When you start the program the Demo1.prj is automatically loaded if you have the Load Last option selected. . If not, after starting the program, open the project Demo1.prj.






1. Select the Edit Tool  which will bring up a submenu. Select the  or use the menu selection Tools>Edit:Die Pad.
2. This will bring up the Properties dialog box opened to the Pads selection.




3. As you move the cursor over a pad on the die the cross-referenced pad in the properties is highlighted. This indicates that that pad is selected and ready for editing and has 9 handles around it and in the center.
4. Likewise, you can select a pad in the list and it will be highlighted in the die picture.
5. Parameters in the Properties that can be changed are white and enabled. Each change is made when the enter or tab key is pressed or another data field is selected.
6. You can also edit the size and placement of the pad by using the handles.
7. You can zoom in /out and pan around the die using the navigation buttons.



8. If you want to move a group of pads you can do a widow select of pads by holding down the shift key, clicking to set the start point of the window and again to set the end point of the window. All selected pads within the window will be highlighted and ready for a move.
9. To move the selected pads click anywhere on the die and move to a new location and click again to end the move.
10. At any time you can press ESC or the  button to end a command.
11. To create a Pad select the Edit Tool  this brings up a sub menu. Select the  or use the menu selection Tools>Edit>Create Pad. This pad is placed at the end of the pad list.


12. Most of the editing commands can also be accessed using the right mouse button to bring up a popup menu with edit options.
13. If you want to renumber the pads you have 2 options. Manual or Auto. The manual method  requires you to hand select each pad in the sequence you want. The Auto method  rennumbers the pads either CW or CCW. You can also select if the pkgpin is to be the same as the diepad. Click the Select Pin #1 button on the dialog box and move the mouse to the pad you want to be pin #1 and click on it. This starts the auto renumbering process.
14. If you want to copy a pad repeatedly you can use the step and repeat tool . You will be asked to select the source pad. When selected another dialog box pops up where you can enter an x and y offset for the copy and the number of copies or steps to make. Select OK to complete the process.
15. To delete a selected pad(s) use the block select to select a group of pads or edit pad command  to select the pad by moving the mouse over it. Then from the right mouse popup menu select  to delete the selected pad(s)
16. If you have the path to Excel set then you can export the die pads to Excel for editing and reloading back into the design to update changes made in excel. Files:Export:Data Sheet
17. [Other files](#) that can be generated, saved, or exported are:
 - LIQ file which is a data exchange format for sending data to a PCB layout tool and back annotating changes made in the lay out tool.
 - CSV or TSV files which are similar to the LIQ but are comma or tab delimited files (depending on your countries data format) of the pad data.
 - DXF The data base can be currently saved as an R12 version.
 - Pin List (Basic die information and pad data used to create a basic pad layout.
 - Project data base
 - Net List related Files .wrlNSN, wrlNSR, .wrl_NLS
 - .kmd which is the log of the last program execution with a time stamp added
18. [Files](#) that can be loaded or imported are:
 - Project Files .prj
 - LIQ files .liq
 - Pin List .pinlist
 - CSV or TSV files .csv / .tsv
 - Die picture .bmp / .jpg / .gif
 - **Load** Net List .wrl EdWinXP
 - **Import** Net List .net EDIF 2.0, Orcad/PCB II, Orcad Wirelist and PadsPBC
19. As commands are executed they are added to the command log which can be seen at the bottom of the tool with line numbers and a scroll bar to look at the history. Commands can be repeated by using the up and down keys while on the command line. Select a command to

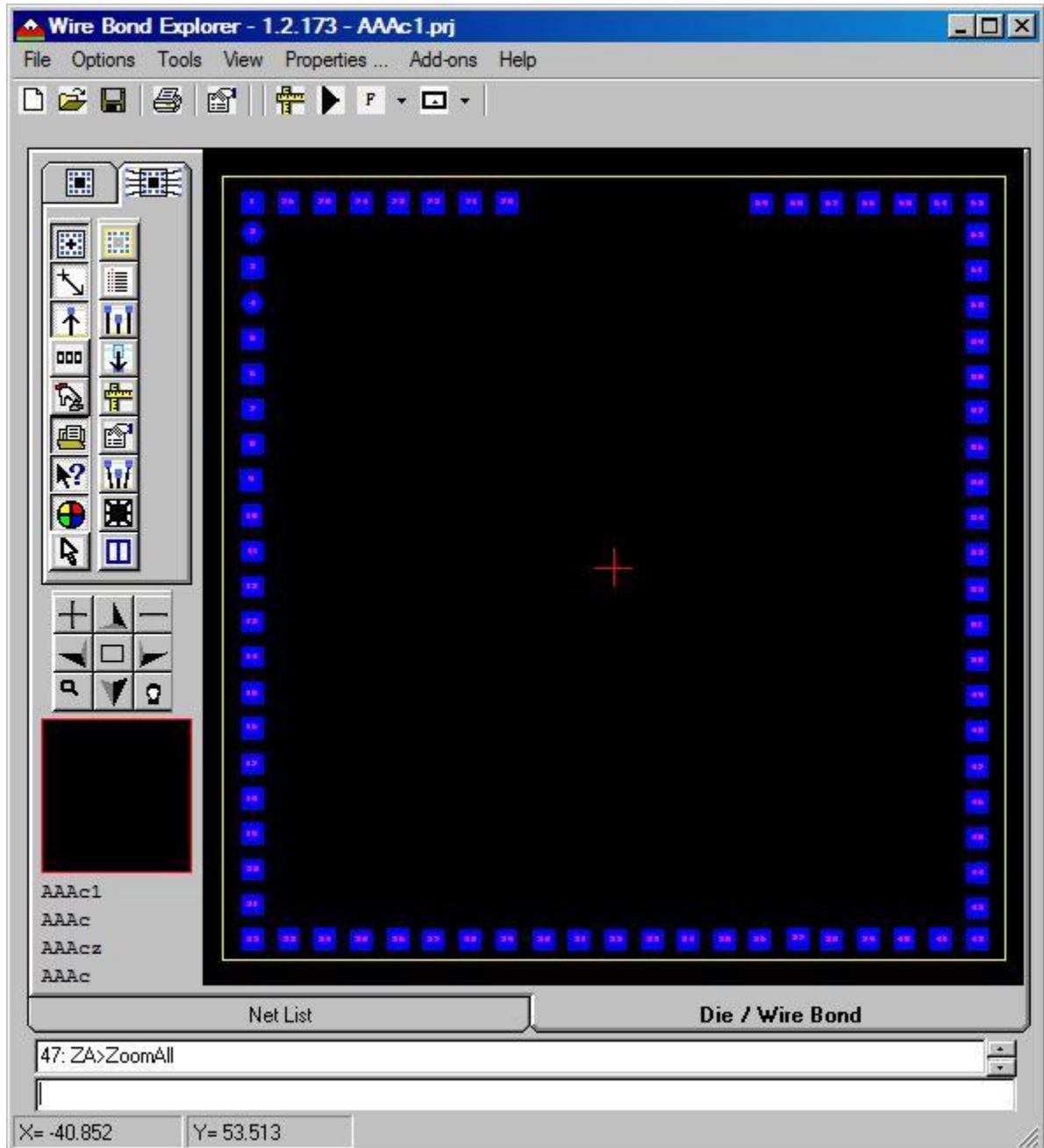
repeat then press enter. Commands can also be accessed using the ! Function if you know the line number to be executed. Eg !35 will execute line 35 in the run log.


20. Command files can be executed by using the Run command or the  button
21. Save the project again as Demo1.
22. Close Program.

Demo3: Moves into the Wire Bond Pad generation and highlights basic editing

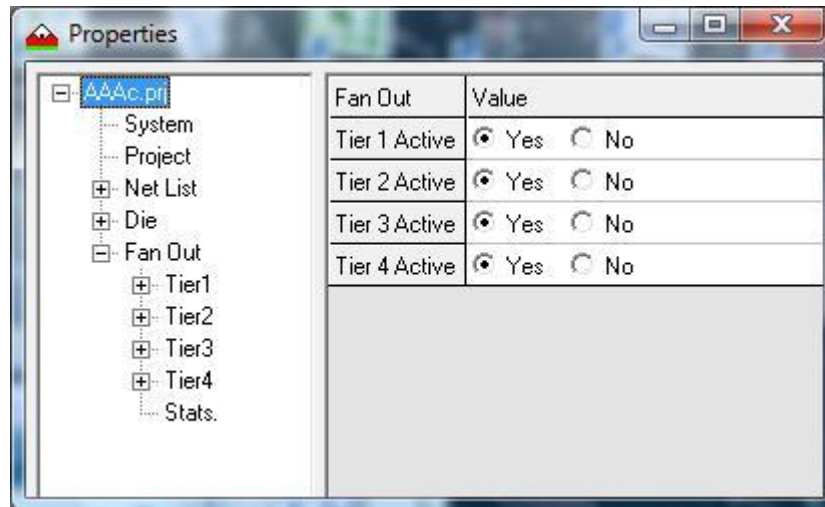
functions. When you start the program the Demo1.prj is automatically loaded if you have the Load Last option selected. If not, after starting the program, open the project Demo1.prj.

1. Click on the Bond Pad tab  in the tools area at the left of the window.

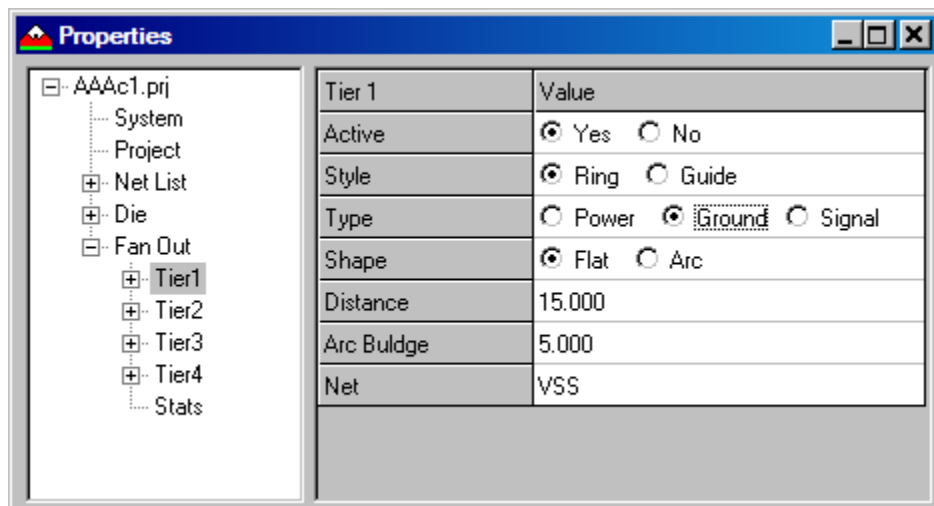


2. Before you can do anything with the bond pad section you need to set up some properties in the properties dialog box 

- In the Fan Out section you select the tiers which are active. Make sure all 4 are selected.

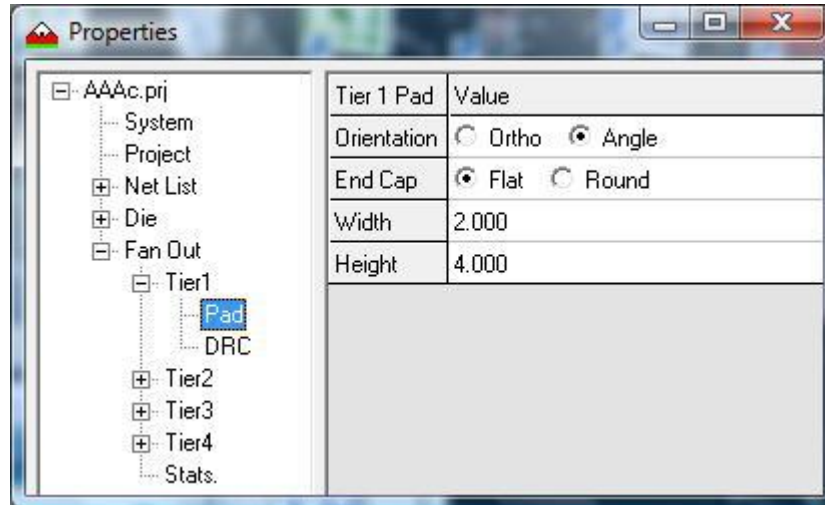


- For each tier in the Tier section :
 - Style Tier 1 and Tier 2 = Ring. Tier 3 and Tier 4 Style = Guide.
 - Type Tier 1 = Ground. Tier 2 Type = Power. Tier 3 and Tier 4 = Signal.
 - Shape Tier 1 and Tier 2 = Flat. Tier 3 and Tier 4 = Arc
 - Distance Tier 1 = 15. Tier 2 = 25. Tier 3 40. Tier 4 = 60.
 - Arc Bulge All Tiers = 5
 - Tier 1 Net = VSS, Tier 2 Net = VCC



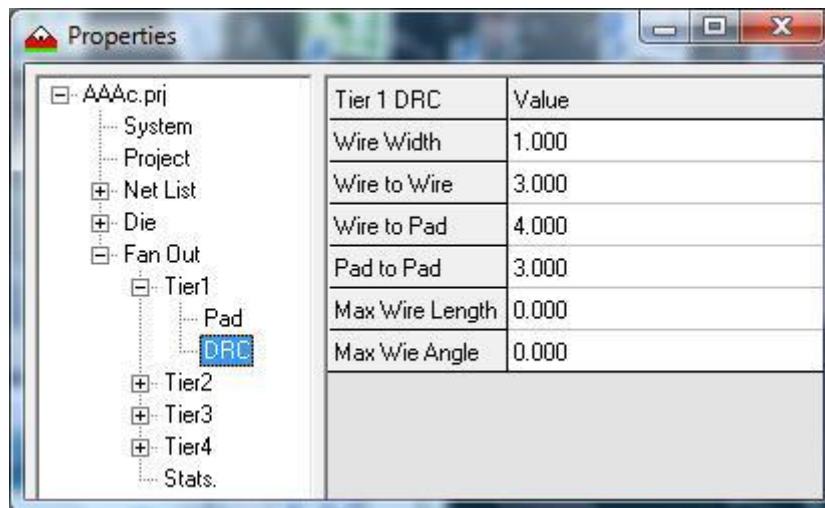
- For each pad in the tier section:

- a. Orientation = Angle for all tiers.
- b. End Cap = Round for all tiers.
- c. Width = 2 for all tiers
- d. Height Tier 1, Tier 2 and Tier 3 = 4. Tier 4 = 6. (This also defines the width of a Ring)

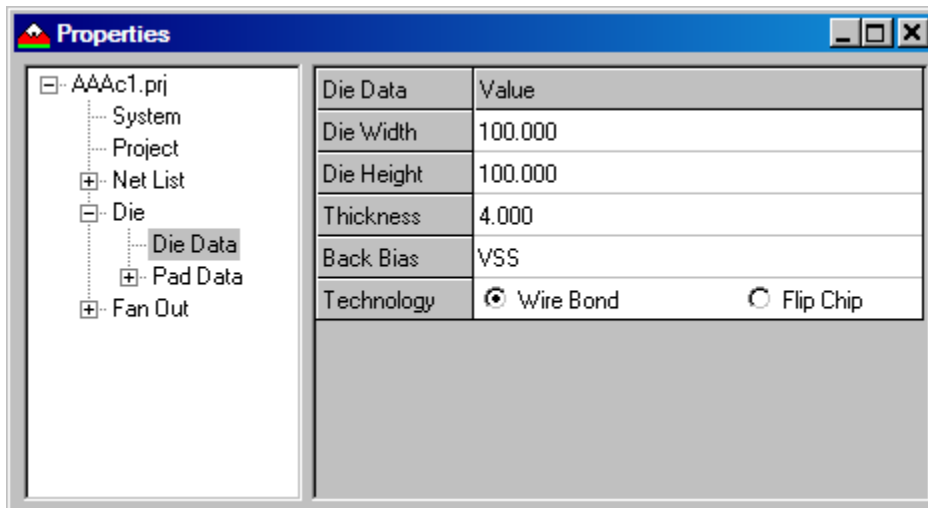


- For each DRC in the Tier section:
 - a. Wire Width = 1 for all tiers.
 - b. Wire to Wire = 3 for all tiers.
 - c. Wire to Pad Tier 1 and Tier 2 = 4. Tier 3 = 6. Tier 4 = 3



Pad to Pad Tier 1 and Tier 2 = 3. Tier 3 = 8. Tier 4 = 6

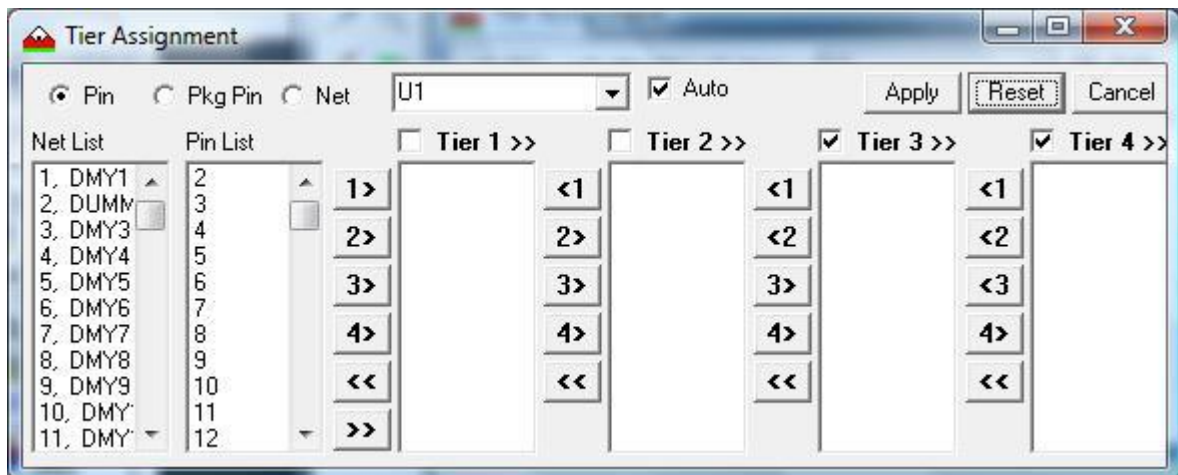


In the Die Data section you can enter the Die Thickness and Back Bias

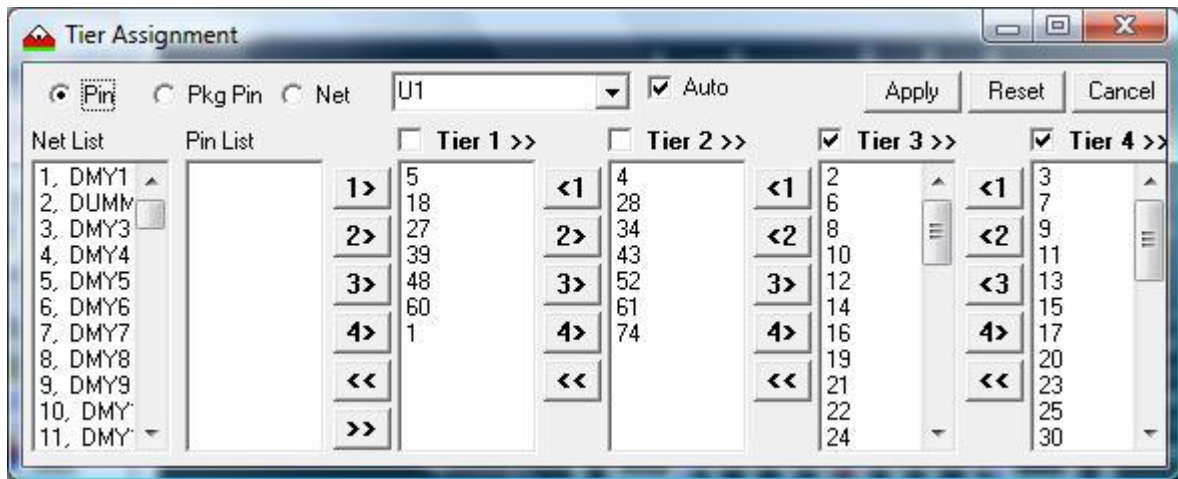


Close the Properties Dialog Box.

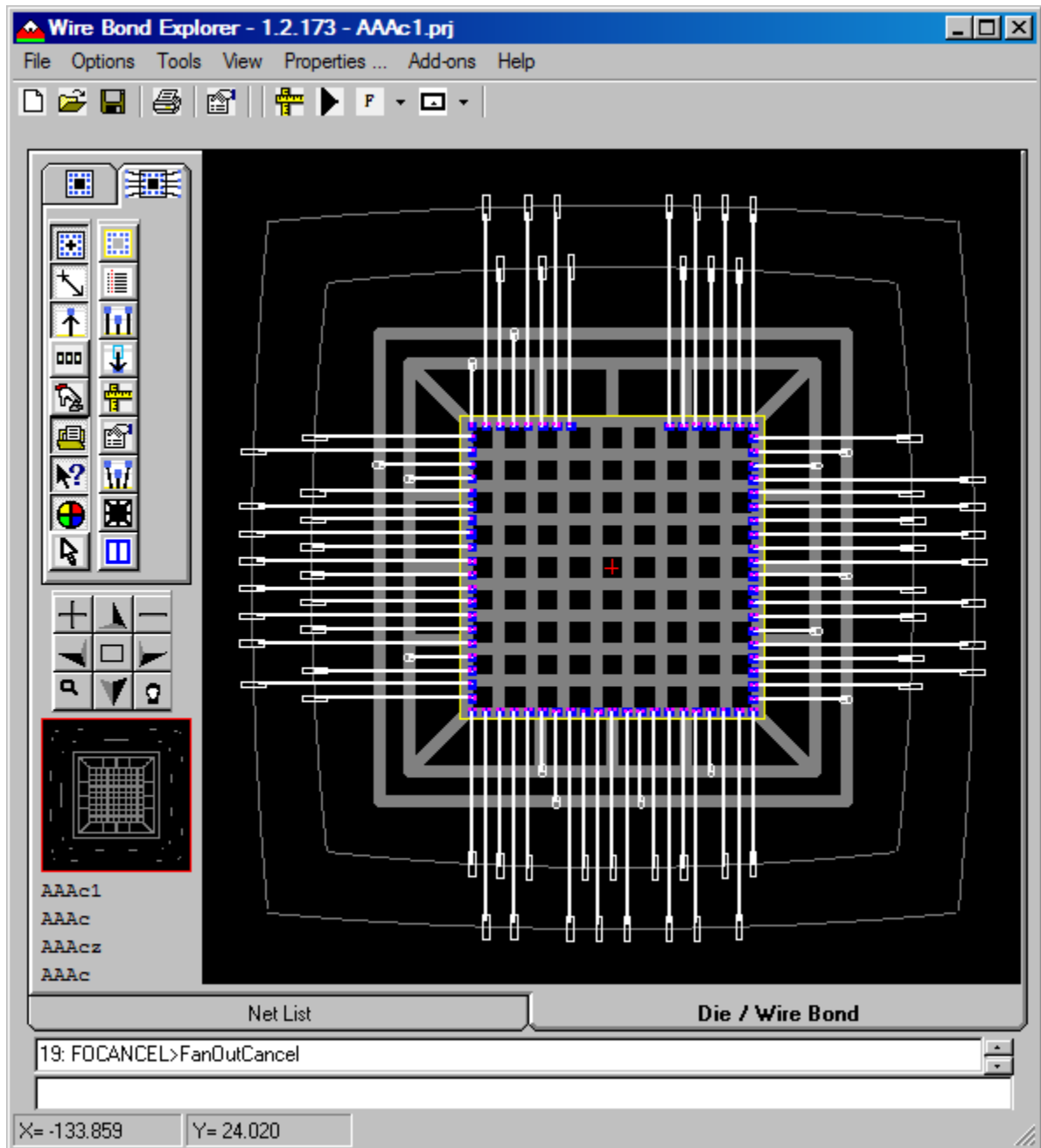
- Now that you have done this there is a short cut to make life easier. All this can be automated by setting up a run script which is nothing more than the .kmd file that was generated while doing this setup procedure. Running the SetUp1.kmd will accomplish the same results. This file can be edited and values replaced but it is a good place to start. To run the script use the ▶ feature to load and execute the SetUp1.kmd file. When you run the command you will see the die rings appear as they are added.
3. Click the (Die / Wire Bond) , Tab WB Tab  Then the Tier Assignment tool  or right mouse click Tier Assignment ..



4. Make sure that U1 is in the pull down list window, Pin is selected, Auto selected, Tier 1 and Tier 2 are unchecked, Tier 3 and Tier 4 are checked.
5. Select the following pads in the Pin List by holding down the Shift or Ctrl key while selecting pads(5,18,27,39,48,60,1)
6. Press the 1> button in the first column of buttons. This will assign those pads to tier 1.
7. Select pads (4,28,34,43,52,61,74) and from the first column of buttons press the 2> button.
8. Select all the remaining pads in the Pin List from the first column of buttons press the >> button. This will split the remaining pads between tier 3 and tier 4 alternating tiers.




9. As tiers are assigned they are move to their assigned positions.



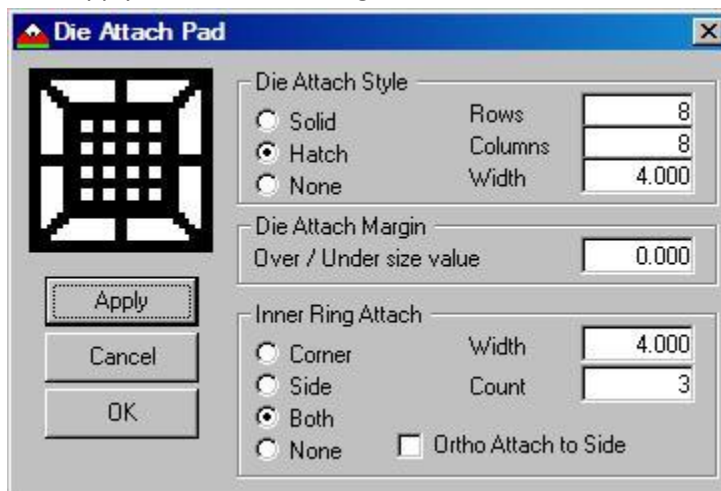
Close the Assignment Dialog Box.

10. Again a short cut is to run another script called PinAssignment1.kmd. Like the last .SetUp1.kmd file this one automatically assigns the pins to the proper tier.

11. Click on the Die Attach tool  or Tools:DieAttach ... This is the [Die Attach Editor](#).


Here you design the Die Attach pad. As you move the mouse over the labels you get a graphical view of what feature you can edit. Clicking on options or changing a parameter can be seen in the design when either the Apply or OK button is pressed. For this demo enter:

- Die Attach Style = Hatch
- Die Attach Rows = 8
- Die Attach Columns = 8
- Die Attach Width = 4
- Die Attach Margin = 0
- Inner Ring Attach = Both
- Inner Ring Attach Width = 4
- Inner Ring Attach Count = 3
- Click Apply or OK to see Change



Close the Die Attach Pad Dialog Box

- In keeping with the automated theme you can run the DeiAttach1.kmd to execute the above sequence.

12. Click on the [Fan Out tool](#)  or select it from Tools:Fan Out ... Enter the following:

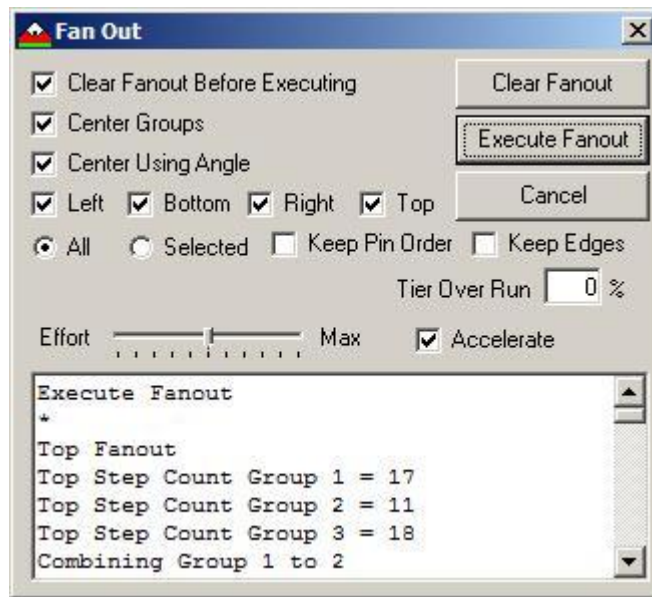
- Clear Fanout Before Executing = Checked
- Center Groups = Checked
- Center Using Wire Angle = Checked
- Left, Bottom, Right, Top = Checked
- All = Selected
- Effort = In the middle
- Click Execute FanOut.

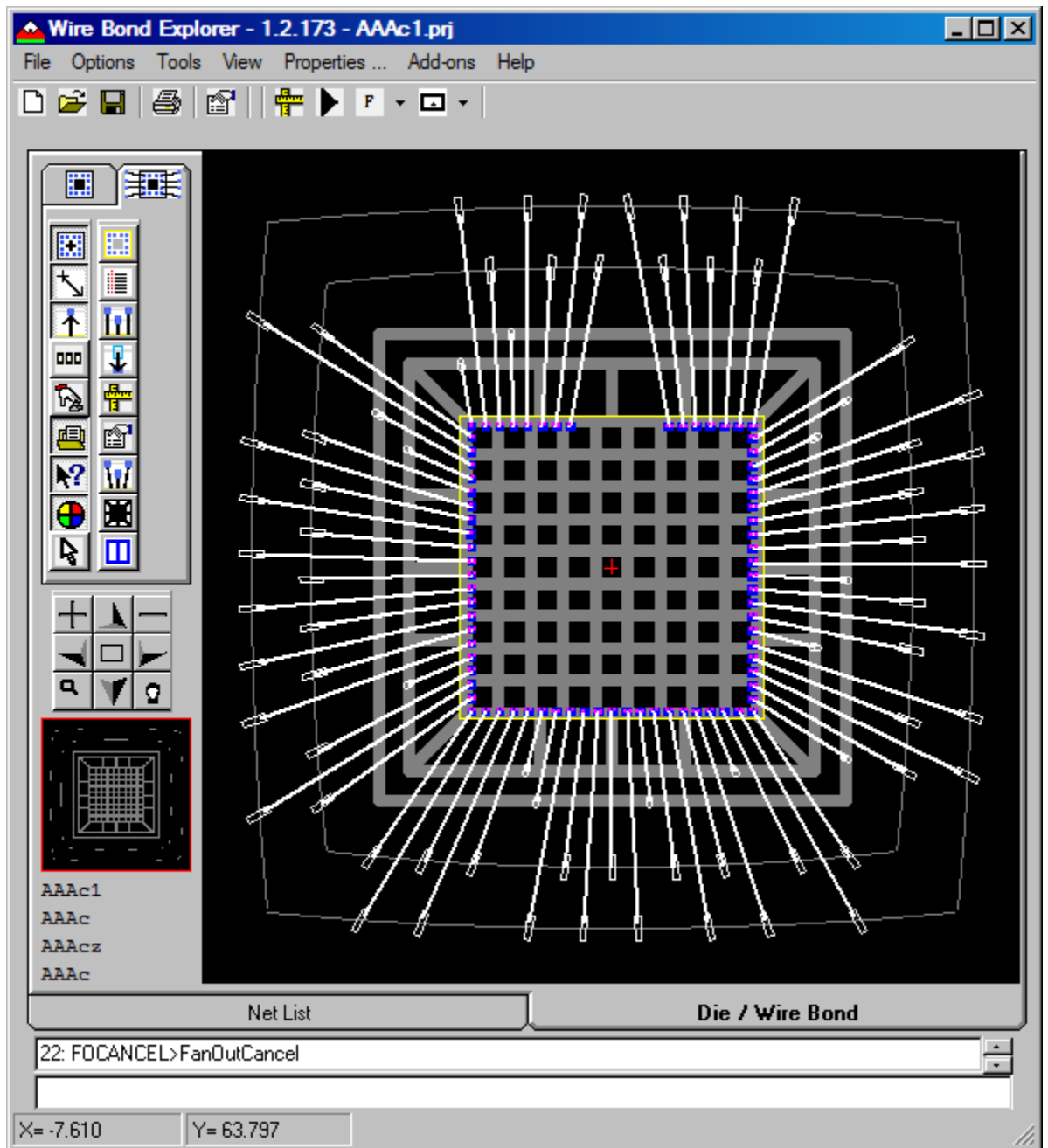
13. The FanOut1.kmd will produce the same results. When editing a .kmd file and lines with an * at the beginning of them is considered a comment line and is ignored. This way you can have several options in the .kmd file but only enable the ones you want to use.

Notes:

- Once you have executed the fan out you can uncheck the Clear Fanout Before Executing option and Execute the fanout again to get better results if the Effort is not set to the Max position.
- If the Accelerate option is checked than an additional margin is added to the spacing rules to speed up the process. This is done at the expense of some accuracy but is good for a quick what does it look like run. For the best results uncheck this option and move the slider bar to the Max. Position. This will assure that the full run is executed and the most accuracy but again at the expense of time.
- When the slider is set to Max. it forces the program to execute the maximum of iterations of the fan out process.
- The Keep Pin Order option allows you to retain the pin position and order when moving Stacked Device pins to get a better fan out pattern.
- The Keep Edges option works similar to the Keep Pin Order option and should be checked whenever the Keep Pin Order option is checked. This guarantees that the stacked pin editing will be retained.
- Tier Over Run is used to prevent the fan out from progressing to a point of no return if the DR parameters are set incorrectly or spacing is too large between pad to pad or pad to wire.

- Save the Project As Demo3.prj












14. Exit program

Note on fan out. Once you have run fan out for the first time you can uncheck the **Clear Fanout Before Executing** option. This speeds up the process since it used the previous pad positions as seed positions. Running a fanout more than once can increase the accuracy of the fan out.


Demo4: This demo will introduce some of the WBP editing features.

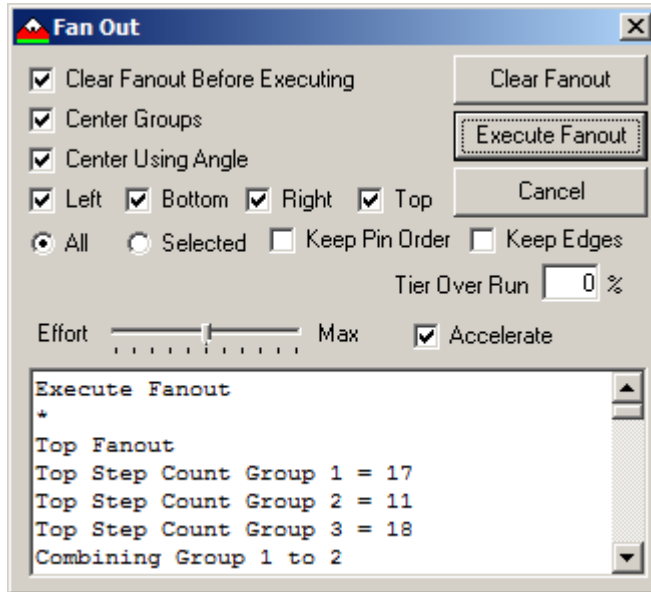
1. Load the Demo 3 Project
2. Click the Edit tool  and the Properties dialog box is displayed.
3. Move the mouse over a WBP and it will be selected for moving and the parameters in the Properties will be updated.
4. To move a pad while the mouse is over the selected pad and the 4arrow mouse is displayed click the pad. This will attach the WBP to the mouse and moves along the tier if Dynamic Snap is enabled.
5. While a WBP is selected you can edit parameters that are enabled in the Parameters dialog box.
6. Selecting WBPs is the same as selecting Die Pads by using the shift key to add pads and the Ctrl key to invert a selection.
7. When more than one pad is selected you are put into the Block edit mode.
8. To move a block of selected WBPs click anywhere on the Die, move the cursor to a new location and click again to finish the move. The pads will follow the mouse.
9. To end any command press ESC.
10. For the next step disable Dynamic Snap .
11. Select a block of pads and move them off tier inward or outward.
12. Click the Snap to Tier tool  then  to snap the selected pads to their assigned tier.
13. Now enable the Dynamic Snap .
14. Press ESC.
15. Click on the Move to Tier tool . This will display Layer Buttons.
16. Select Several WBPs
17. Press the Layer Button that the selected pads are to be moved to.
18. To do measurements click on the Ruler tool . Click anywhere in the window and the displacement will be showed at the bottom of the window in the command line. The final measurement is saved in the Run Log as a comment. You can pan and zoom when doing measurements.



19. Save project as Demo4.prj
20. Exit program.

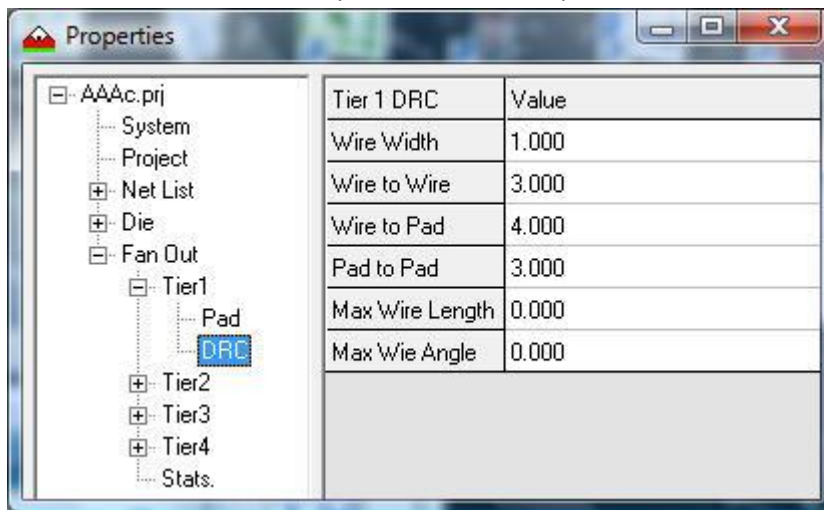
Demo 5: We will look closer at the Fan out tool.

1. Start the program, Load the Demo 4 project if not auto loaded and click the Fan Out tool  or select it from the right mouse option Fan Out. *Stacked Devices will be discussed in the Staked Device Editor section.*

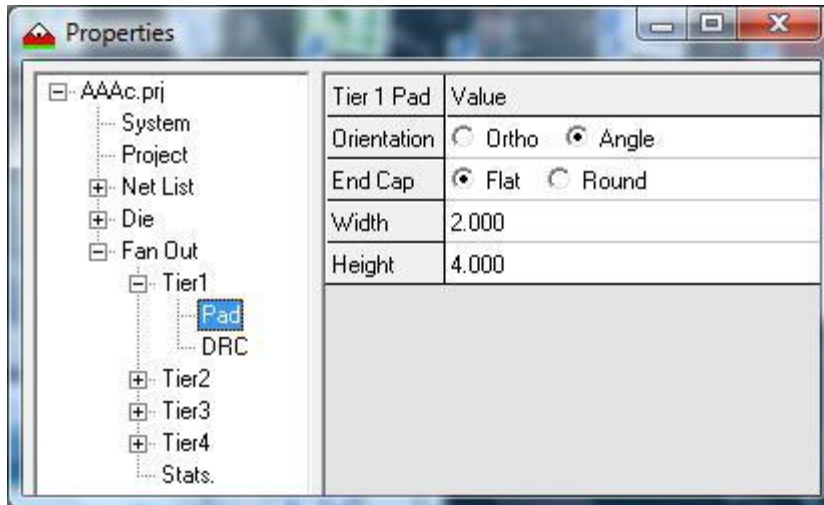


2. If the **Clear Fanout Before Execution** box is checked the previous fan out pattern will be lost and the fan out is executed as a new fan out. If not checked the previous Fan Out will be preserved as a starting point for the fan out process.
3. If the **Center Group** check box is checked that the groups will be centered if unchecked they will be placed with no centering.
4. If the **Center Using Wire Angle** is checked the program will try to make the max – angle and the max +angle of a group are close if not equal.
5. **Left, Bottom, Right, Top** are used to select the sides for processing. Checked edges will be modified.
6. For each side that is enabled you can choose to act on **All** elements on the edge or just the **Selected** WBPs.
7. **Keep Pin Order** option is used if you swap pin locations when a stacked device is used and you have manually changed the order of the pins.
8. **Keep Edges** is used in conjunction with the Keep Pin Order option and used to maintain the edge assignment of the pads.
9. If the **Accelerate** option is checked an additional margin is added to the gap measurements when running the fan out process. This has the affect of accelerating the process a little but at the expense of accuracy but for most cases gives you a good first look at the design.

10. The **Effort** ranges from 1 to 10 and represent the number of iterations the process will take as a maximum to finish. An effort of 10 will force the program to run for 111 iterations. Different algorithms are employed based on the effort applied and the setting of the Accelerate option.
11. As the fan out progresses the text box is updated with the current state of processing. When the fan out is complete more data is added to the text box giving the statistics of the fan out
12. The **Clear Fanout** button will clear the previous fan out pattern and move the pad to their assigned tier straight out from the die.
13. The **Execute Fanout** button will run the fan out process and display the final fan out.
14. The text box is updated with all the statistics about the fan out process. The Max wire Length and Angle errors are also displayed. To list all wires set the max wire length to 0 and max wire angle to 0. This data is also written to the work directory using the project name with “_FanOutStatistics.doc” appended to it. In this case “AAAc_FanOutStatistics.doc”
15. Related is the properties dialog box in the Fan Out section. Of main interest is the DRC section for each tier. This is where you enter the DRC parameters.

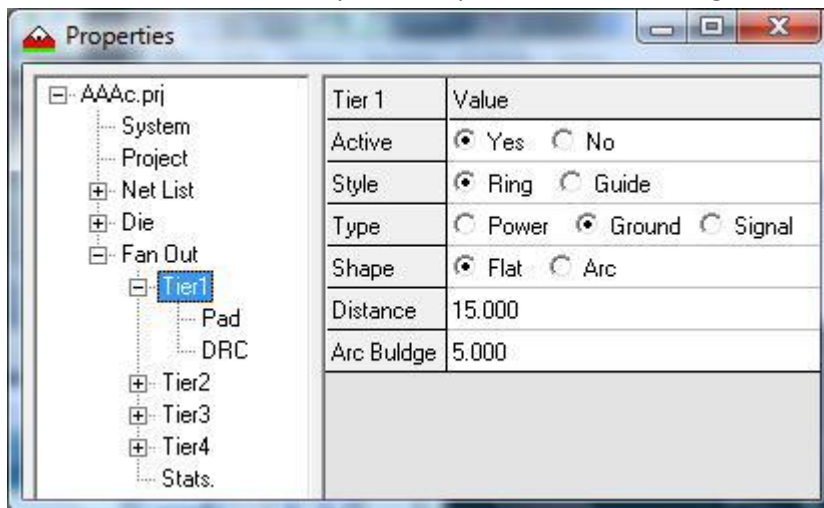


- Wire Width defines the width of the Bond Wire.
 - Wire to Wire is the DRC check for wire to wire clearance. Currently not used.
 - Wire to Pad is the DRC check for Wire to Pad clearance.
 - Pad to Pad is the DRC check for Pad to Pad clearance.
 - Max. Wire Length Post process DRC check for Maximum wire length.
 - Max. Wire Angle Post process DRC check for Maximum wire Angle.
16. Related is the properties dialog box in the Fan Out section. Of main interest is the PAD section for each tier. This is where you enter the DRC parameters.



- If Ortho is selected the WBPs are placed facing the edge at a 90deg. Angle to that edge. If Angle is selected the WBPs are Angled with the Bond Wire.
- If End Caps is Flat then rectangles will be drawn for the WBPs. If End Caps is Round then the WBP are capped with round ends. This is the default if you have a tier selected as a Ring.
- Width sets the width of the WBPs for a given tier. This is used for DRC Checks.
- Height sets the Height if the WBPs fort a given tier. This is used in DRC Checks and also the width of a tier if it is type Ring.



17. Related is the properties dialog box in the Fan Out section. Of main interest is the Tier section for each tier. This is where you enter parameters describing each tier.




- Active will alternately turn a tier on or off

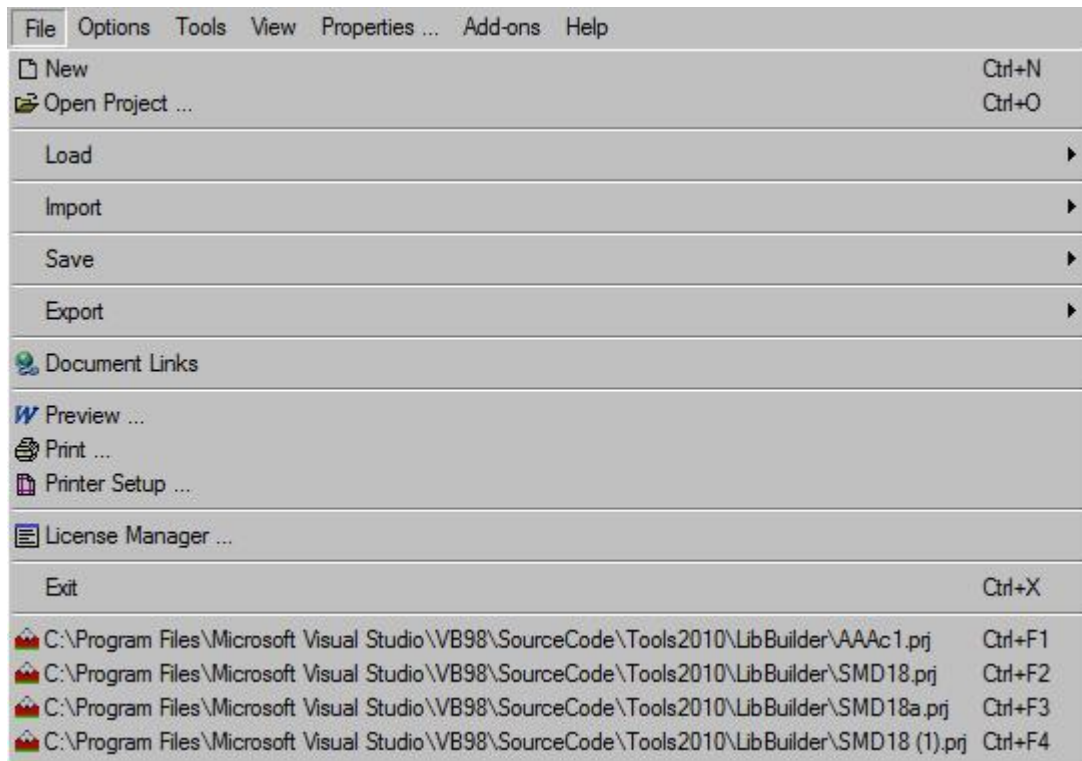
- If Style is Ring then the ring width is determined by the Pad Height parameter and displayed with that width. If Style is Guide the tier has no width and is displayed as a line for viewing the placement line.
 - Type Defines how the tier is used
 - If Shape is Flat then no Bulge is applied to the tier and the tier will be a rectangle If Shape is Arc then if the Bulge is greater than 0. The tier will have a center bulge as defined by the Arc Bulge Parameter
 - The distance is the distance of a tier is from the edge of the die. If it is an Arc then the distance is to the same as it is when it is flat. The bulge is then applied to the center if the Shape is Arc.
18. As changes are made in the properties dialog box they are reflected in the main window. All changes are saved when you save the project.

Files: Input and Output files used and generated by the program.

1. [WireBondExplorer.INI](#) contains information that is common to the program including window sizes and locations, Pointers to the various interface programs used to edit and view various documents and database elements and up to 4 pointers to the last loaded projects. The Load Last flag indicates if the previously opened project will be loaded on start up.
2. [AAAC.prj](#) is the main database for the project and contains all the parameters found in the Properties Dialog box along with all the geometries for the die and pads. Hyperlinks are also listed here and can be accessed, viewed, and edited in the Hyperlinks tool.  These links can point to files on the hard drive or on the web if you have pointed to a browser in the system section of the Properties dialog box. To select a link click on the line. If it is a file path you will need to hold down the shift key when you make your selection. Right click to pop up a menu with options for viewing, adding, deleting and editing these links.
3. [Half AdderA.Wrl](#) is the net list file used in this Demo. It is a garbage net list and meant to be used only for this demo. The current net list is that is supported is the EdWinXP formerly EED3 PCB Layout tool. This format is also used when a net list is created from a pin list. Other formats will be added as requested. When a net list is read in a database is created for the selected part. If a Pin List has already been loaded and a database exists any pins in the Pin List that appear in the net list of a given part, the database is updates the Net name from the net list.
4. **Dummy.bmp** is the bit map used in this Demo and again is a fictitious part. Another bitmap (4ac0000.bmp) is included for you to play with which is a low pin die. It is good when learning the editor features and getting the feel of the Die Editor  tool.
5. [AAAc.PinList](#) is the basic data input which defines the die size and die pad sizes and location. If no database exists, a database is built using the data from the Pin List file. This is also the start of the Pin List flow which is followed by a net list read or generation process and finally with a bit map read or creation.
6. [AAAc.wrl SBR](#) is the output file generated when a net list is loaded with the net list sorted by Reference Designator.
7. [AAAc.wrl SBN](#) is the output file generated when a net list is loaded with the net list sorted by Net Name.
8. [AAAc.wrl NLS](#) is the output file generated when a net list is loaded with all the statistics about the net list.
9. [AAAc.csv](#) or *.tsv Files are comma or tab separated value files used to interface with external software for the purpose of updating a data base with changes. These files are both Exported and Imported.
10. [AAAc.LIQ](#) is another data exchange format that is similar to the csv file but contains all the geometries in the database. This includes Die Pad data, WBP data, WIRE from / to list, Rings and Die Attach Pad. These files are either Exported or Imported.

11. [Demo1a.kmd](#) and [Demo1b.kmd](#) Are the run log files. These files can be run from within the using the Run  command. The name is derived from a prefix of "RunLog" plus the date ddmmmyy plus the time hh:mm. These names can be changed for future use.
12. Data Sheet Both [Die](#) and [Wire Bond](#) Data sheets can be generated.
13. Wire Bond Statistics lists the results of the fanout process.
14. The following files are sample file formats that are currently supported. Other formats can be added upon request. Some formats have several variations and can also be addressed if the import function doesn't work for your file format.
 - a. [EDIF 2 0 0](#)
 - b. [ORCAD/PCB II](#)
 - c. [ORCAD Wirelist](#)
 - d. [PADS PCB](#)

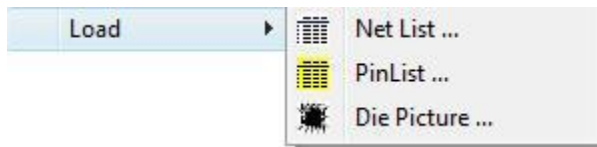
Menus:



This is the main menu with the Files option selected.

- **New** clears the current project and variables.
- **Open Project** opens the dialog box for selecting a project to be loaded.
- **Load** expands to display Load options.
- **Import** expands to display Import options.
- **Save** expands to display Save options
- **Export** expands to display Export options
- **Document Links** opens the Document Link dialog box.
- **Preview** lets you view text documents in the word processor specified in the properties dialog box if it has been initialized.
- **Print** will print the current Document that is viewed in the Preview window.
- **Printer Setup** allows you to configure the printer.
- **License Manager** is used to uninstall a license in you wish to move the software to another machine.
- **Exit** ends the program.
- **Last Loads** the last 4 loaded designs are listed at the bottom of the menu and can be loaded by clicking on them.

Load Expanded:

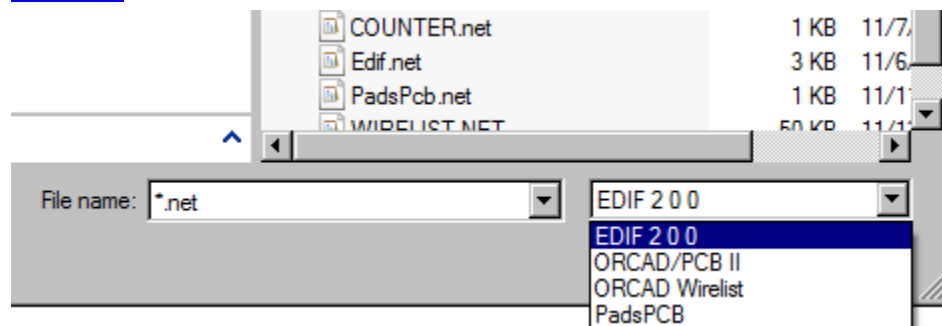


- **Net List ...** loads a netlist into the design and is one of the first steps in creating a design.
- **PinList ...** loads a .PinList file and is the start of the pinlist flow. If a netlist is not presented when the pinlist is loaded you can create a single component net list from the pinlist.
- **Die Picture ...** optionally allows you to load the bitmap of a die if one is available.

Import Expanded:



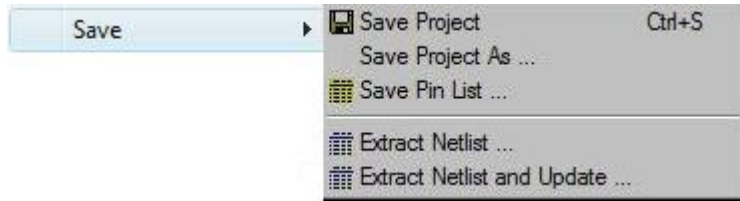
- **Net List ...** Imports other netlist formats. When imported these are translated into the default netlist format and loaded. Select the desired format from the Import File dialog box
 - [EDIF 2 0 0](#)
 - [OrcadPCB II](#)
 - [Orcad Wirelist](#)
 - [PadsPCB](#)



- **CSV ...** and optionally TSV, depending on the data format for the country, loads the CSV or TSV file into the database.
- **LIQ ...** reads in an LIQ file and extracts the Die information to create a die with the die pads in proper locations.

- **LIQ as Pin List ...** loads an LIQ file and extracts the Die pad information creating a .PinList file that can be read into the program to create a die with pads.

Save Expanded:



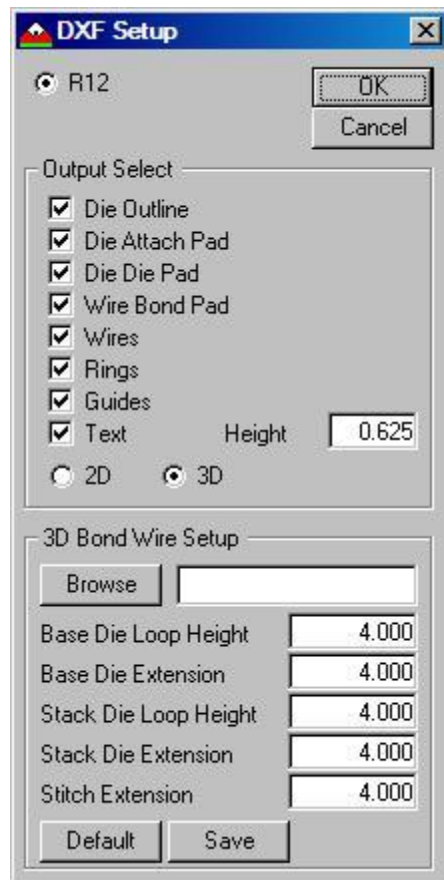
- **Save Project** writes the current design to the disk using the same file name that was used to open the project.
- **Save Project As ...** saves the current design to the disk as another name than what was opened or in the case of a new design to a name of your choice.
- **Save Pin List ...** extracts the die pin information from the design and writes it to a .PinList file.
- **Extract Net List ...** is used to extract a new net list after a stacked device has been added and bonded out or changes have been made to the current design.
- **Extract Netlist Update ...** is used to extract a net list as above but also updates the database with these changes. U1 is assigned to the base die. U2 is assigned to Substrate Bond Pads. U3 is assigned to a stacked device should one be in the design. This is useful if you want to cross probe all the pins in the design with current information.
- When the net list is extracted and a stack device is present, the net name for the stacked device is replaced by the net name of the base die if it is stitched to the base die. If a stacked pin is a single node net, the net name will be changed from NetName to _NetName. This rule also applies to stacked pads that are also bonded out to SBPs. This is done to avoid duplicate net name should both stacked device and base die have the same net names.

Export Expanded:



- **CSV ...** saves the data base in a CSV or optionally TSV file format depending on the country data format.

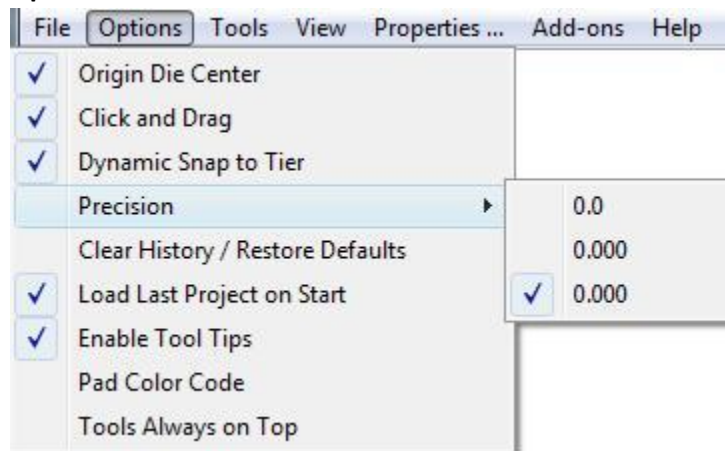
- **LIQ ...** Saves the database in an LIQ file format including all the Die pads, Substrate Bond Pads, From To data, Die Attach pad and rings if any are present. This represents the physical layout of the design and is used by PCB tools to create a foot print for the PCB, MCM, Hybrids or Package.
- **To Excel** sends the current design to Excel for editing. These edits can be imported back into the design. In order for this function to work the Excel path must be specified in the properties dialog box.
- **Data Sheet ...** exports a data sheet of either the Die if the die view is presented or the entire fanout if the fan out is presented.
- **DXF ...** exports the current design to a DXF file for reading into AutoCAD or other DXF viewers.



When executing a DXF export either by menu selection or command line method, the DXF Setup dialog box controls the data output in the DXF file. By default all layers are output in 3D mode with all wire bond parameters set to the die thickness. When using the command line method all parameters can be modified with other command line arguments. See the Command List documentation for more details. Also note that if exporting using the command line method, if the DXF Setup dialog box is not

active all the values will be automatically set to the default state before the DXF file is exported. If the DXF Setup dialog box is active and values changed before the FEXDFA command is executed than the values in the dialog box will be used. If a preset file has been saved it can be loaded using the Browse button. This can also be a .lr file that was generated when you did a 3D view using the LIQ Viewer. When saving a DXF Setup file the file extension defaults to “.DXFsu”. If the 2D mode is selected the 3D Bond Wire Setup part of the dialog box disappears.

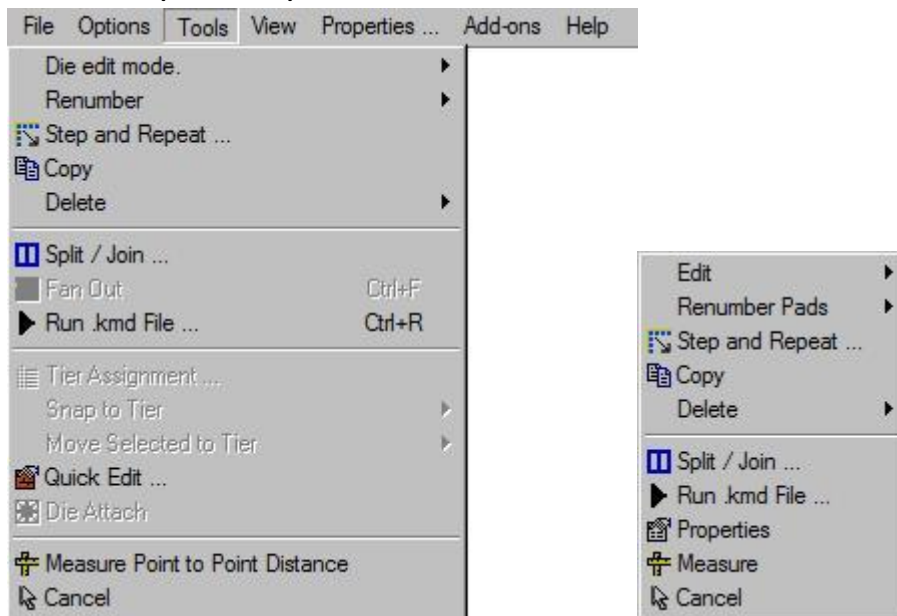
Options Menu:



Allows you to customize the basic environment of the design.

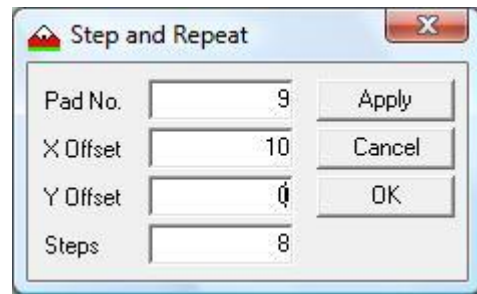
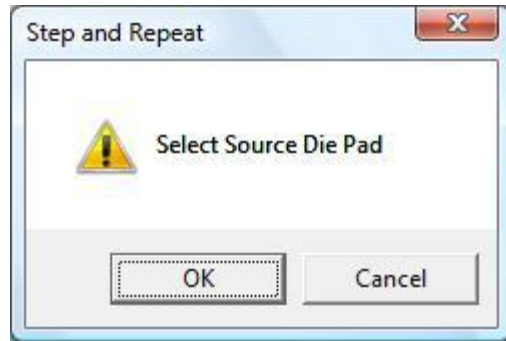
- **Origin Die Center** if checked places the (0,0) coordinate of the design at the center of the die. If unchecked it places the (0,0) point at the lower left corner of the die.
- **Click and Drag** determines how edits are done. If checked the first mouse click starts an edit and the second click finishes the edit. If unchecked the mouse down starts an edit and the mouse up ends the edit.
- **Dynamic Snap to Tier** if checked the SBP follow the tier outline when manually editing the fanout. If unchecked the pads can be placed anywhere in the design. It is recommended to keep this option checked for best results and auto generation.
- **Precision** select the accuracy of the output data data when it is written to various files.
- **Clear History** will clear the last loaded list and reset all the setup parameters to a default setting. This essentially outs you back into the initial state when the program was first loaded.
- **Enable Tool Tips** will display tool tops for controls when checked.
- **Pad Color Code** displays the Die Pads filled with the color indicating the pin function. Blue is for Signals, Red is for Powers, and Green is for Grounds.
- **Tools Always on Top** if checked will make sure that the current tool or dialog box remains on top of the main window.

Tools Menu (Die Editor):



The tool menu is divided into 3 sections. The top part is dedicated to editing the Die. The middle section is dedicated to editing the Wire Bond Pads. The last 2 items are common to both. The **Run .kmd File** is also common to both the Die editor and the Substrate Bond Pad editor and is used to select a .kmd file for execution. The top section is also a popup menu in the Die editor.

- **Die edit mode** expands to display edit options.
- **Renumber** expands to display renumbering options.
- **Step and repeat** allows you to add pads in an array with X and Y offsets. When selected the Step and Repeat dialog box opens telling you to select the Die Pad that you want to use as the pad to copy. After you press OK go to the desired pad and click on it making it the edit pad indicated by the pad handles showing up. The second Step and Repeat dialog box is now displayed with the pad number in the Pad No. window. Enter the offsets for the X and Y dimension as well as the steps (number of times to repeat). In this case 8 pads will be added in the X direction 10 microns apart. Clicking on Apply or OK will execute the Step and Repeat. Cancel will close the dialog box with no action.



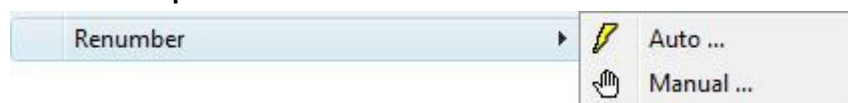
- **Copy** allows you to copy a pad and place it in a new location.
- **Delete** expands to show the delete options.
- **Quick Edit** allows you to change the pad type of selected pads. *Also see Quick Edit in the Wire Bond Editor menu for more options.*

Die edit mode expanded:

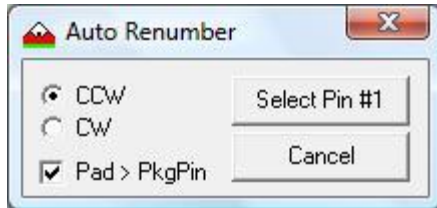


- **Die Outline** allows you to edit the Die outline. When selected the Die edit handles appear.
- **Crop Tie Outline ...** allows you to crop the die bit map to the Die Outline.
- **Rotate Die** brings up the die rotation scroll bar which allows you to rotate the die if it is skewed in rotation.
- **Flip Die** will flip the die over making it a Flip Chip Design without wire bonds.
- **Die Pad** allows you to edit a selected die using the handles to stretch the sides or move the pad.
- **Create Pad** will allow you to create a new pad and auto number it based on the highest number of pad in the design.

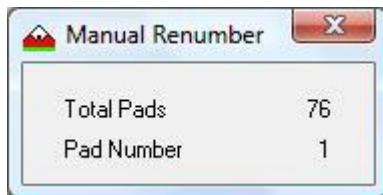
Renumber Expanded:



Auto ... brings up the Auto Renumber dialog box. The CCW option will renumber the pads Counter Clock Wise around the die and the CW in the Clock Wise direction. If you want the Package Pins to be renumbered to be the same as the Die Pad then check the Pad>PkgPin option. Once you have set the options click Select Pin #1. At this point the dialog box disappears and as you move the mouse over the pads they are highlighted. Click on the pad that you want to make the new #1 pad and the renumbering sequence will begin.



Manual ... brings up the Manual Renumbering dialog box. This dialog box remains visible while you click from one pad to the next. As you select a pad the Pad Number increments. When all the pads have been renumbered the dialog box disappears indicating the end of the renumbering process.



Delete Expanded:

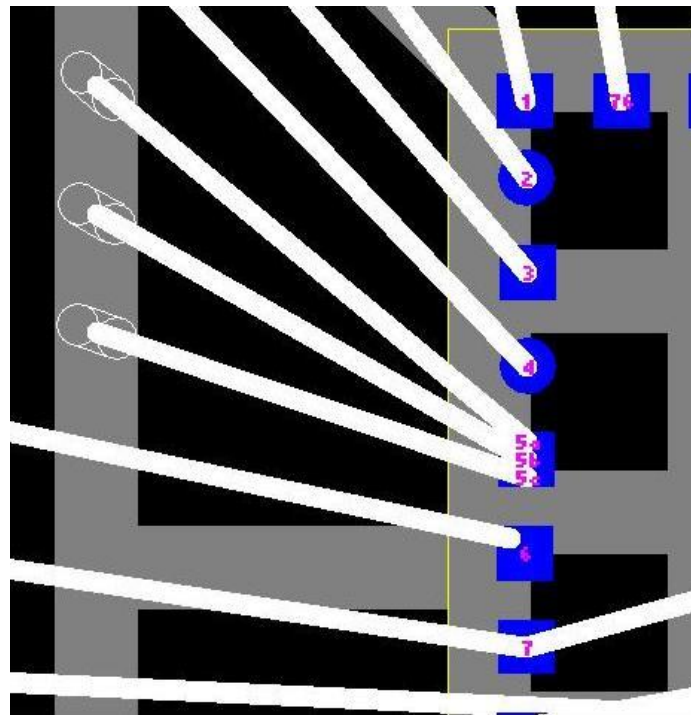


- **Die Outline** will delete the Die Outline.
- **Selected Pads** will delete the selected pad or pads if multiple pads are selected.

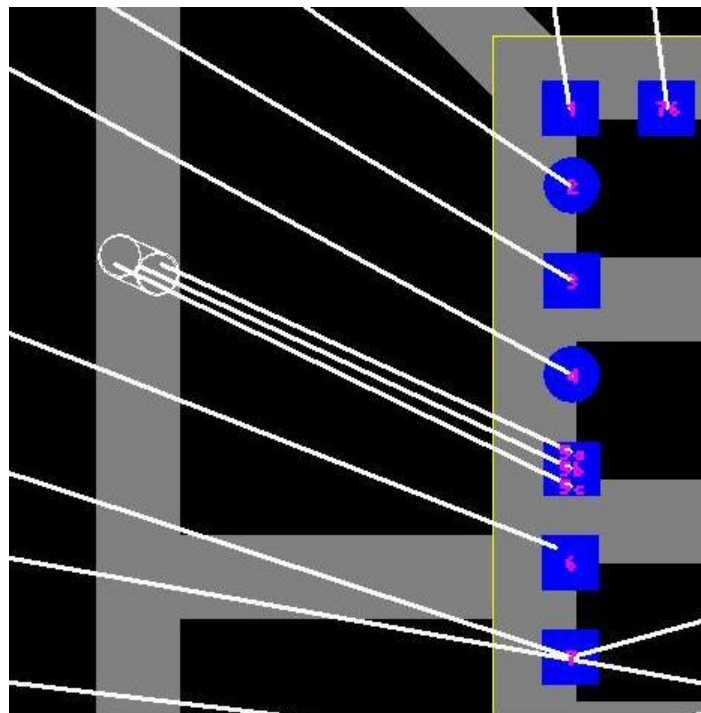
Split / Join: Allows you to split an SBP into multiple pads for multiple wire bonds and likewise join a split an SBP pad back into one pad. If Split you can also Merge the SBPs into 1 SBP.



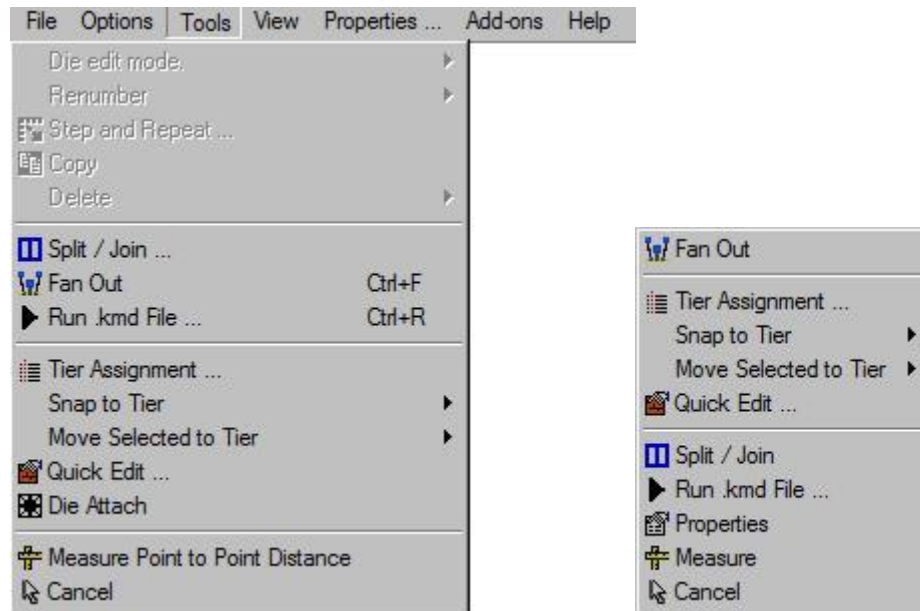
Split CBP with SBP Not Merged



Split CBP with SBP Merged and SBP Bond Site Offsets



Tools Menu (Wire Bond Editor):



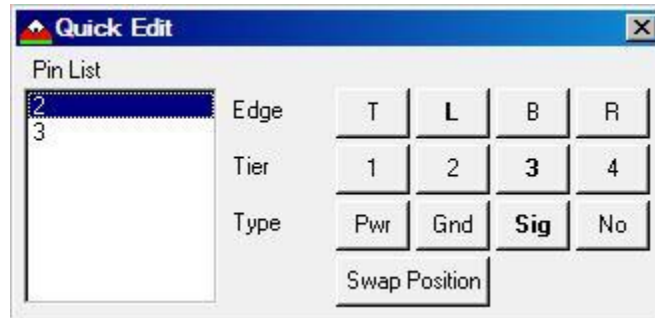
The bottom half of the Tools Menu is dedicated to the Substrate Bond Pads. This is also a popup menu in the Substrate Bond Pad editor.

- **Split / Join** Allows you to split an SBP into multiple pads for multiple wire bonds and likewise join a split an SBP pad back into one pad. If Split you can also Merge the SBPs into 1 SBP.



- **Fan Out** displays the Fan Out dialog box and is the tool used to generate the wire bond fan out based on all the fan out parameters and DRC rules set in the Properties dialog box. See [Domo 5](#) for more details.
- **Run .kmd File ...** is common to both the Die editor and the Substrate Bond Pad editor. This allows you to execute a .kmd file.
- **Tier Assignment** brings up the [Tier Assignment dialog box](#).
- **Snap to Tier** expands to show the Snap to Tier options.
- **Move Selected to Tier** expands to show the Move to Tier options.

- **Quick Edit** is a tool that allows you to modify some parameters of a group of selected pins.



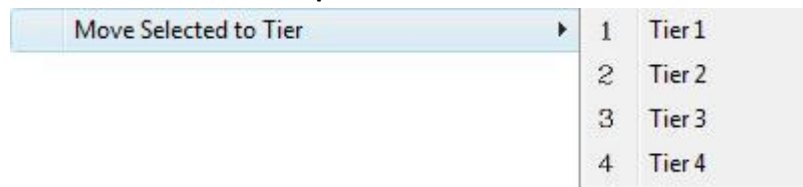
- **Pin List** is the list of the selected pins to be modified. 1 or more pins can be selected but only 2 can be selected for the Swap Position function. If a pin is selected in the list, the button text is made bold showing you the current property values for that pin.
 - **Edge** will move the selected pins to the specified edge.
 - **Tier** will move the selected pins to the specified tier.
 - **Type** allows you to change the pad or signal type of the selected pins.
 - **Swap Position** will swap the position of 2 selected pins to untangle any crossed wires when a stacked device is added or corner pin(s) are moved to an adjacent side causing wire crossing.
- **Die Attach** opens the [Die Attach editor dialog box](#).
- **Measure Point to Point Distance** will allow you to measure both the X delta, Y delta and the actual distance from a starting point to an ending point using the mouse to set the start and end. The measurements are displayed at the bottom of the screen as the mouse is moved.
- **Cancel** exits any edits in progress and returns you to the Select mode. In the select mode use the Shift Key to select multiple items for editing. You can also use the CTRL down option to likewise select or deselect pads. Shift select is additive. CTRL select inverts the selection.

Snap to Tier Expanded:



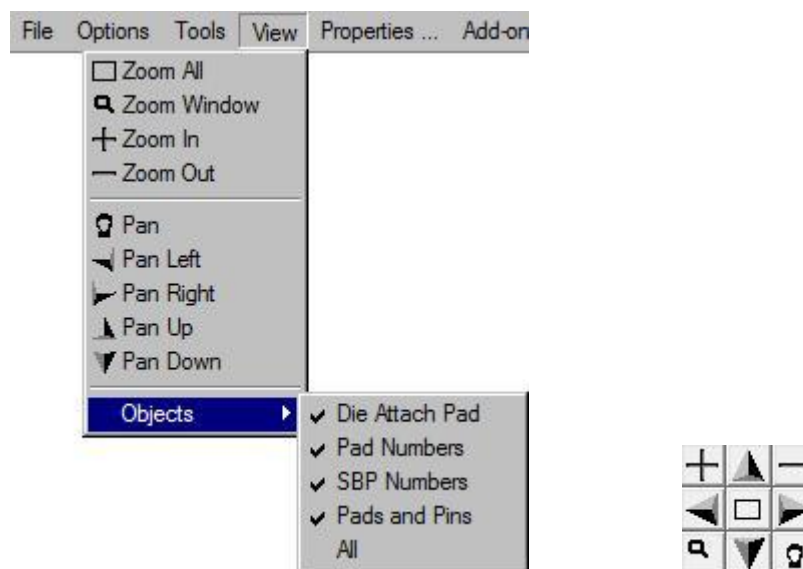
- **All** will snap all the Substrate Bond Pads to their assigned tier.. This assures the proper placement of the pads. The Dynamic Snap to Tier option does the same thing during active manual editing of a pad or multiple pads.
 - **Selected** option will snap only those pads that are selected.

Move Selected To Tier Expanded:



- Tier1:Tier4 allows you to move the selected Substrate Bond Pads from one tier to another.

View Menu:



The view menu options are the same as the tool bar view options in the lower left corner of the main window with the addition of the Objects menu selection.

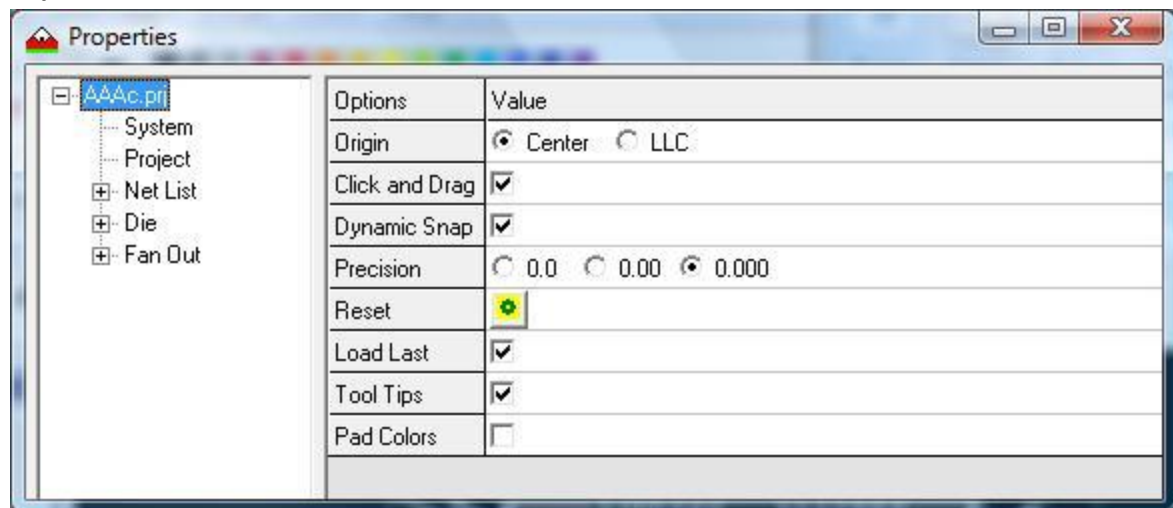
- **Zoom All** pans out to show the extents of the design.
- **Zoom Window** lets you select the area to zoom into. If you select too small an area the maximum zoom will be executed.
- **Zoom in** will zoom in by 2x until the maximum zoom level has been reached.
- **Zoom Out** will zoom out by 2x.
- **Pan** allows you to pick a starting position and then an ending position. The image will be moved by the delta described from the beginning position to the ending position.
- **Pan Left** moves the viewport ¼ the screen width to the left (image to the right).
- **Pan Right** moves the viewport ¼ the screen width to the right (image to the left).
- **Pan Up** moves the viewport ¼ the screen the height upward (image downward).

- **Pan Down** moves the viewport $\frac{1}{4}$ the screen height downward (image upward).
- **Objects** lets you select what to view.
 - **Die Attach Pad** if checked will display the Die Attach Pad.
 - **Pad Numbers** if checked will display the Die Pad numbers.
 - **SBP Numbers** if checked will display the SBP (PkgPin) and CBP nos. E.g. (C3) 12
 - **Pads and Pins** if checked will display the Die Pads, Substrate Bond Pads and Wire bonds.
 - **All** will select all the options and check them to view the entire design.
- **Mouse Wheel Zoom**
 - **In** is a combination of a pan to the position where the mouse is and a zoom in. The mouse is then moved to the center of the screen.
 - **Out** is a combination of a pan to the position where the mouse is and a zoom Out. The mouse is then moved to the center of the screen.

Properties:

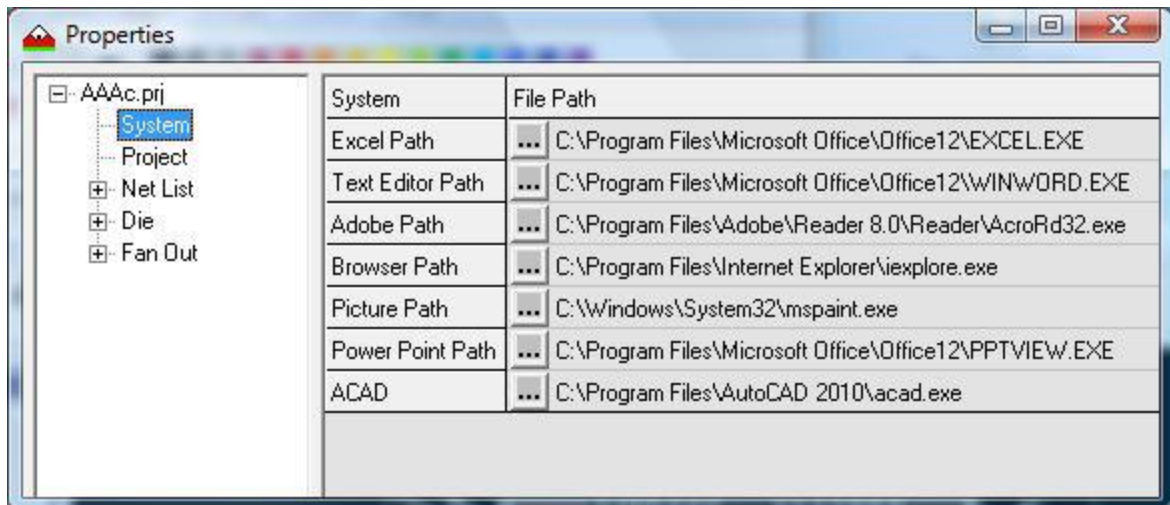
The properties dialog box is where all the setup parameters are kept, edited and viewed. Many of the settings interact directly with the design or cross probed to the design in both directions. Below is a brief description of each window in the Properties dialog box.

Top Level:



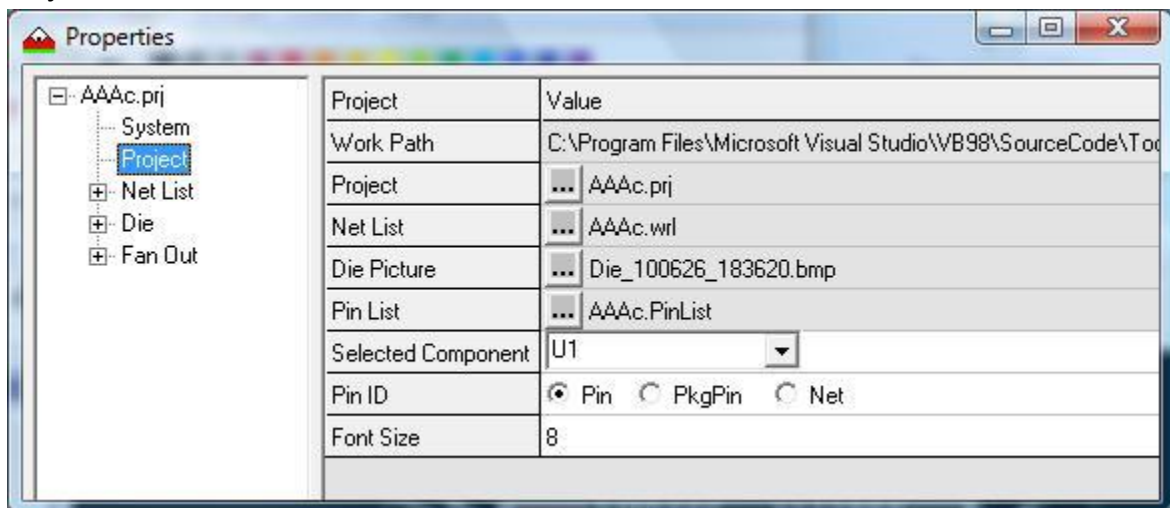
When the .prj top level option is selected you get an overall view of the environment options and reflect the settings in the left most vertical tool bar on the main window when in the Die/Wire Bond tab.

System:



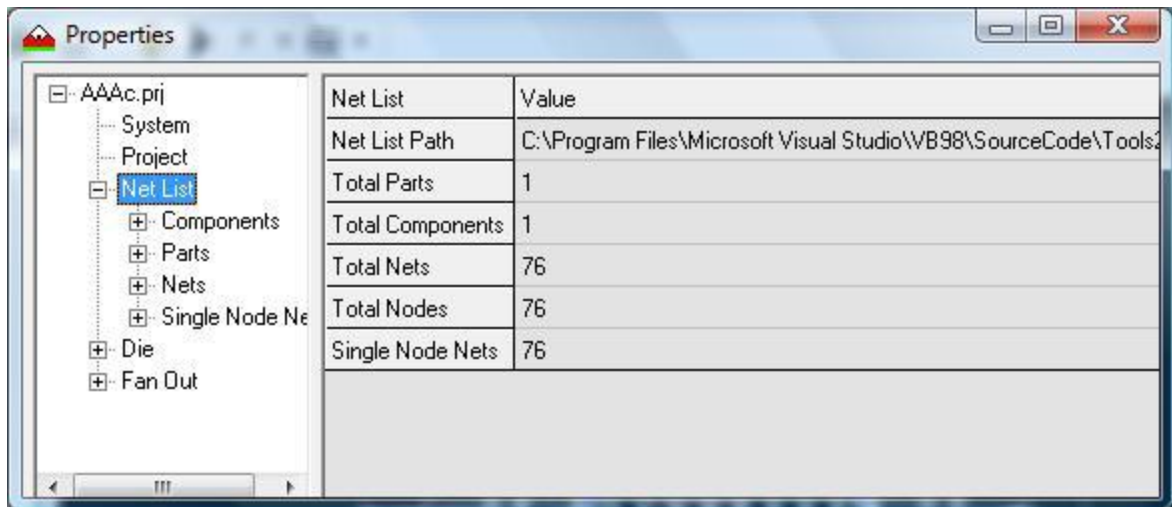
These are the system settings that are stored in the system.ini file and are the pointers to external programs. These are needed in order to externally view and edit files generated by the Wire Bond Explorer.

Project:



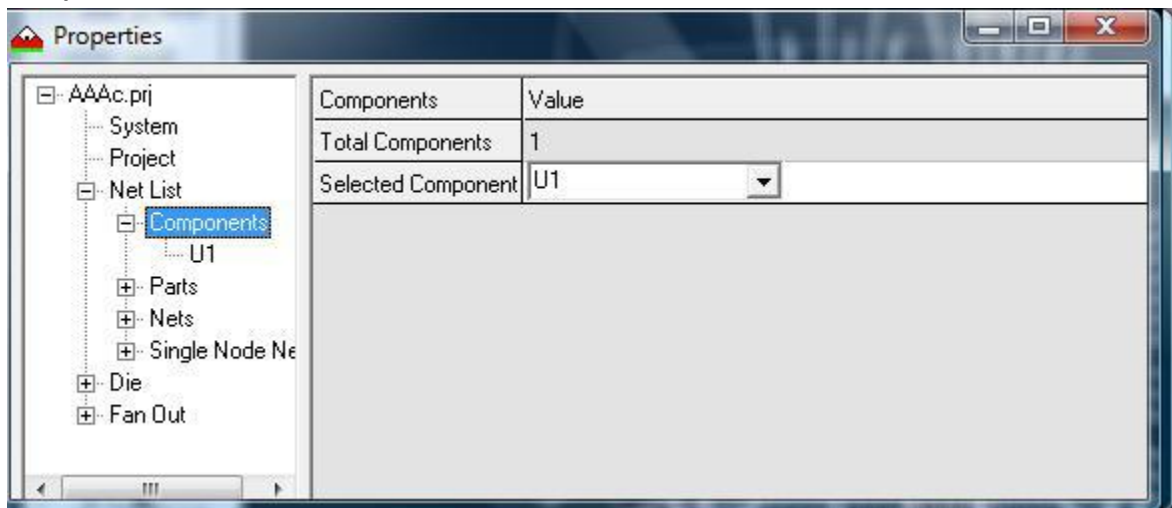
This lists the input files for the project, the component used in the design, the Pin ID by default is Pin (Die pad) and font size to be used in the display.

Net List:



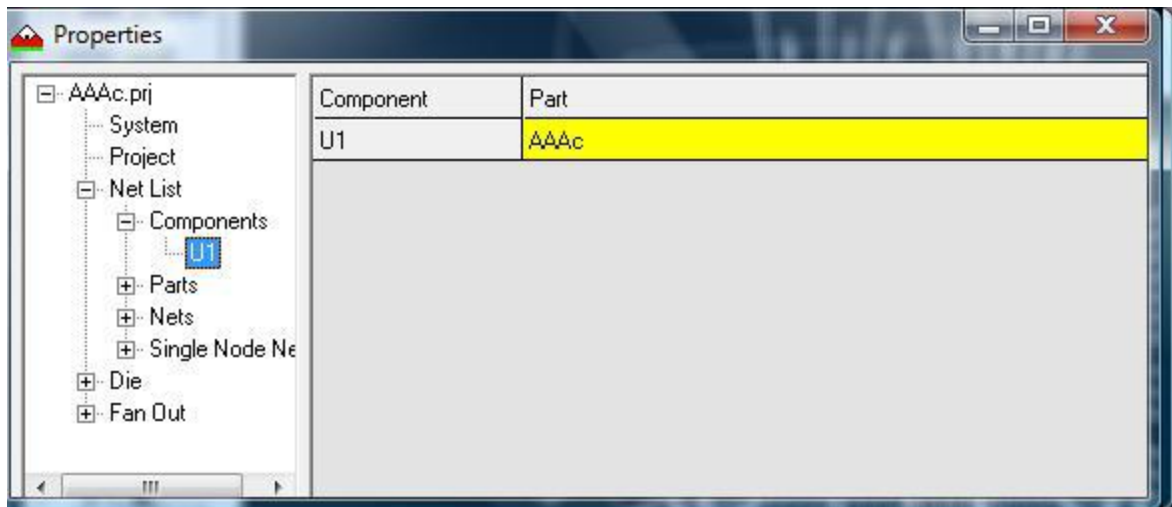
This gives you all the stats about the input net list.

Components:



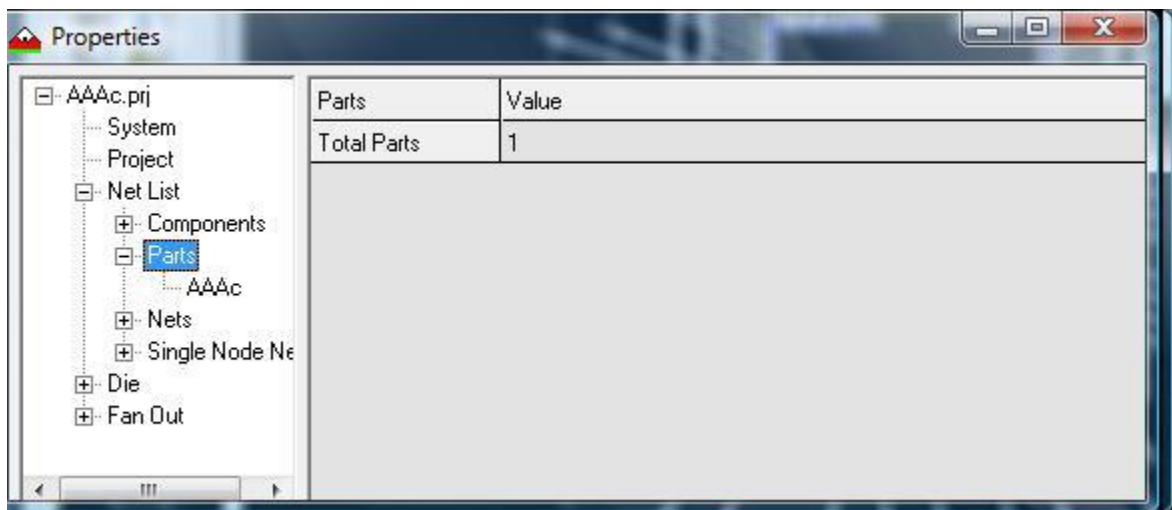
This is where you can select the component form the list of components in the net list. This should be the first step in the design process and once the design is in progress this should not be changed since the project will be built on this choice.

U1:



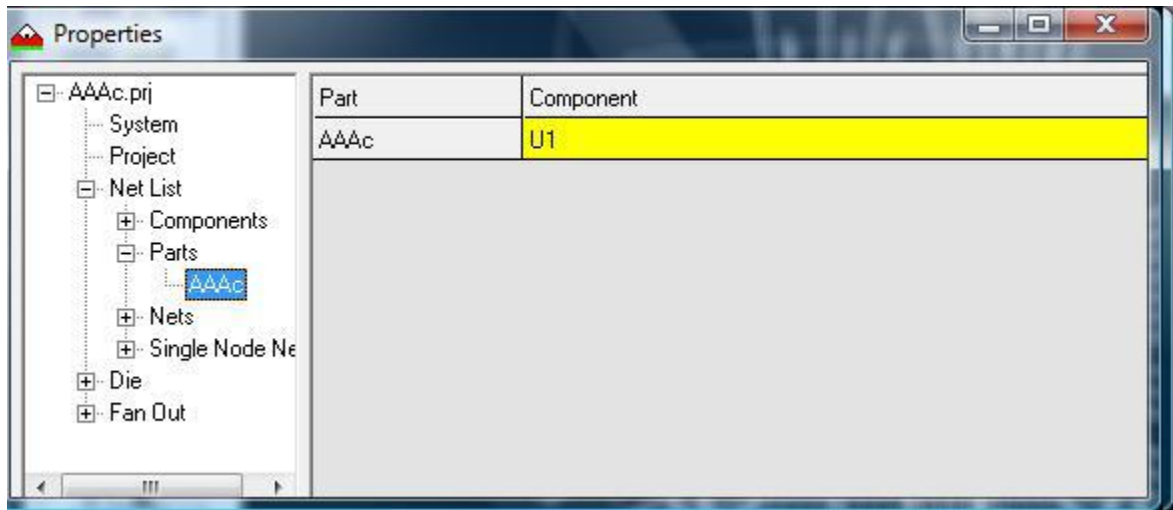
This is the list of components in the design. Since this is a single component net list only one component is listed. If more were in the netlist they would also be listed here. The selected component (part) is highlighted in yellow.

Parts:



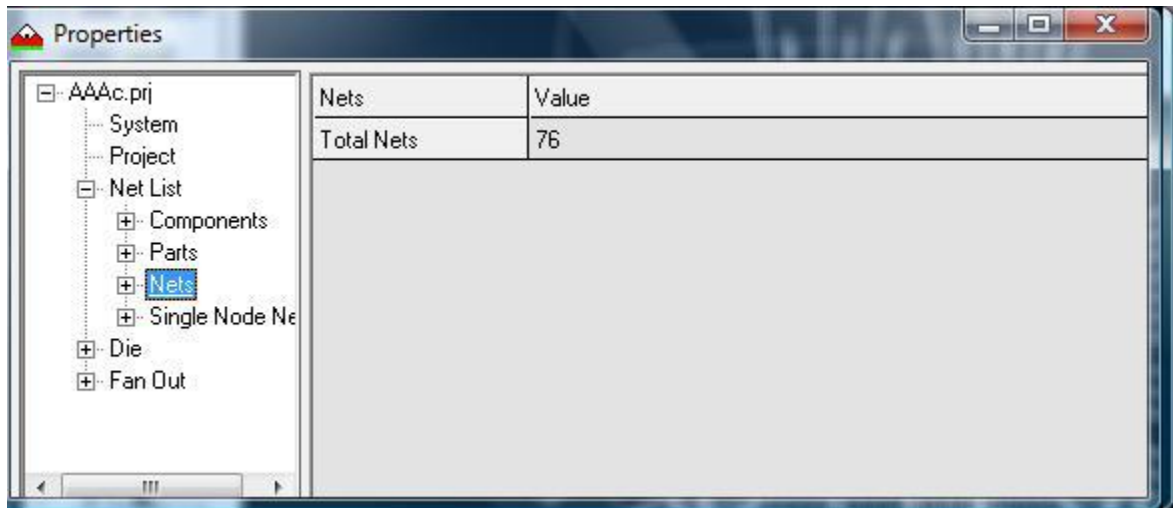
Lets you know how many parts there are in the design. This is a one part netlist created from a Pin List.

AAAc:



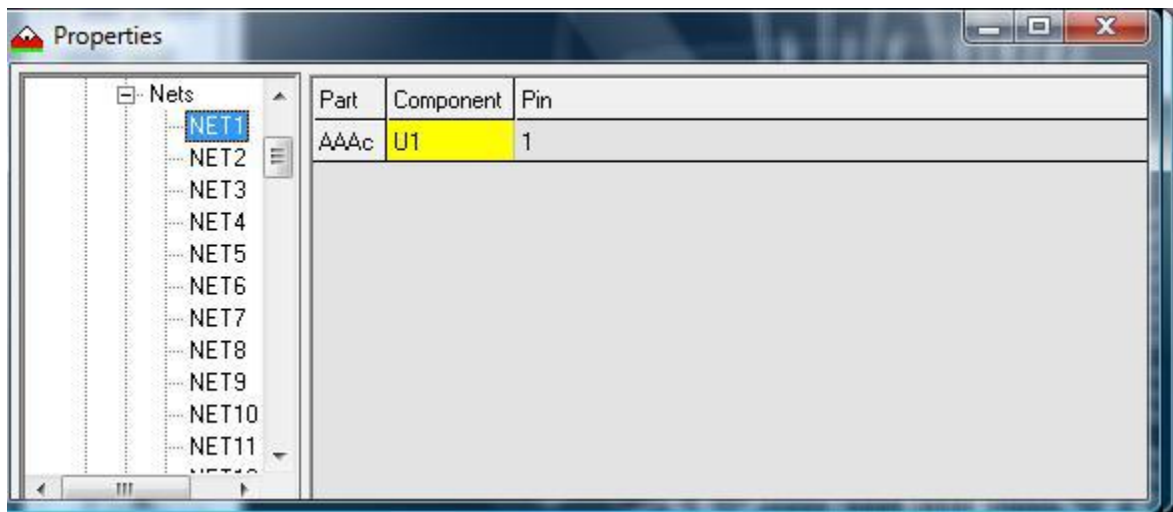
This is the selected part in the design. If more than one part is in the net list than multiple parts would be displayed. The selected part (component) is highlighted in yellow. This is the inverse of the Components list.

Nets:



This gives you the total number of nets in the design.

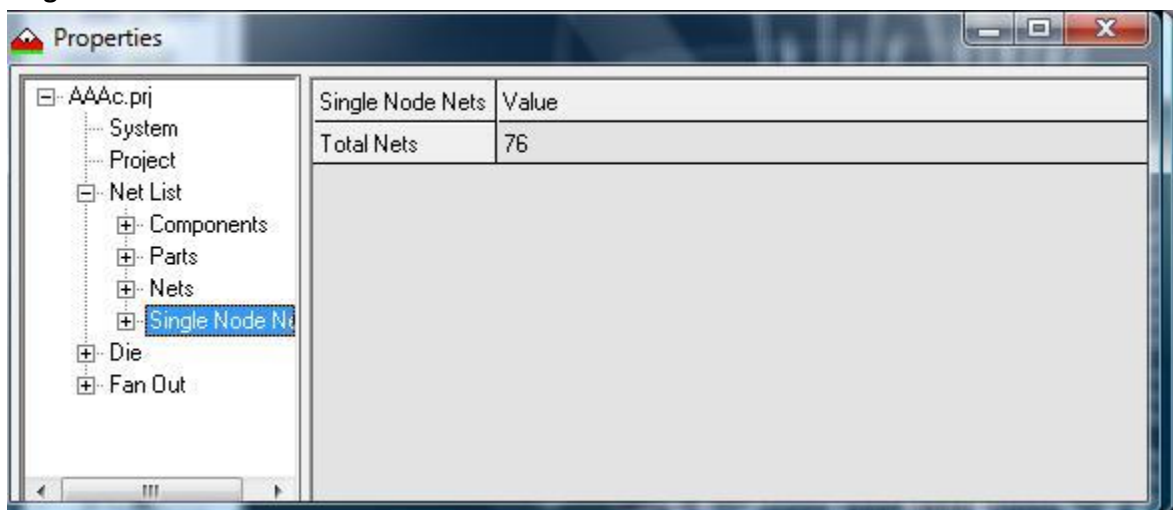
NET1:



When one of the nets is selected it is displayed in the dialog box and if it is attached to the selected component it is highlighted in yellow. If the Net list tab is enabled displaying the net list the corresponding net in the design is highlighted (cross probed) as well.

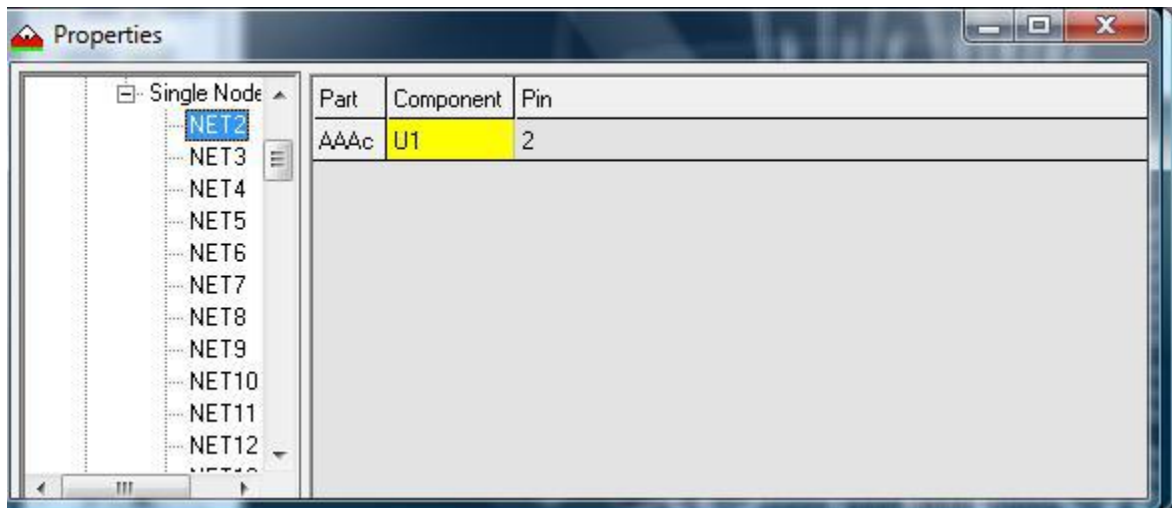
```
(NET76
U1,76
)
(NET1
U1,1
)
```

Single Node Nets:



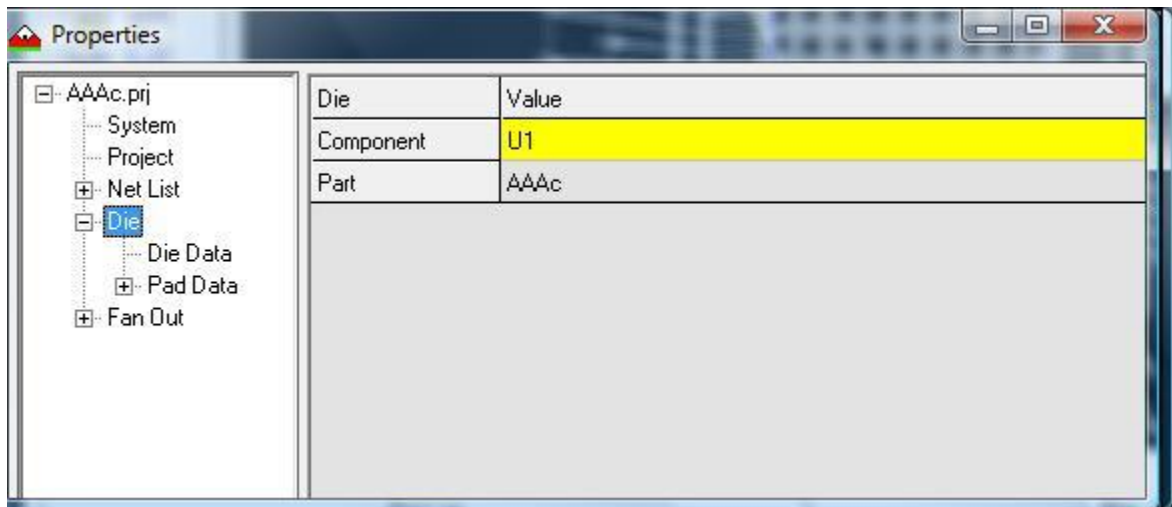
This indicates how many single node nets there are in the design. In this case all nets are single node nets since this net list was generated from a pin list.

NET2:



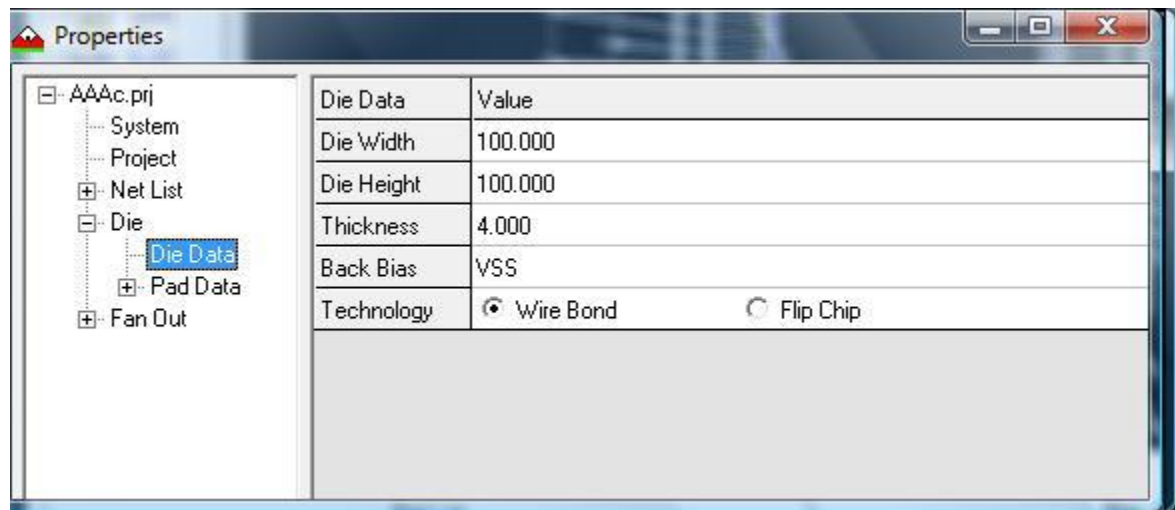
Selecting one of the nets again displays the net and component information. Cross probing is also preformed if the Net List tab is selected.

Die:



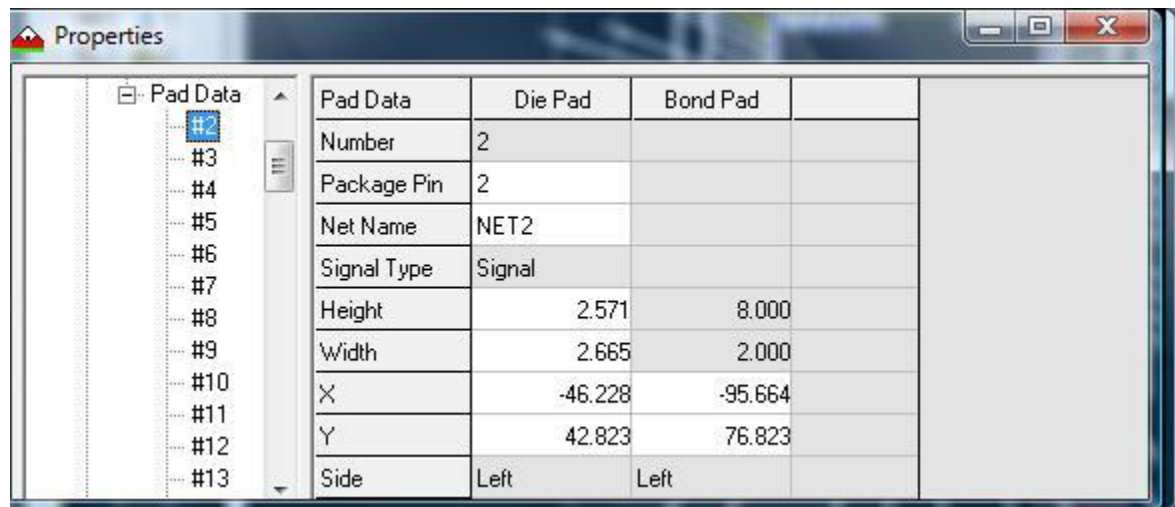
This shows basic information about the die in the project indicating which Component and part is being used.

Die Data:

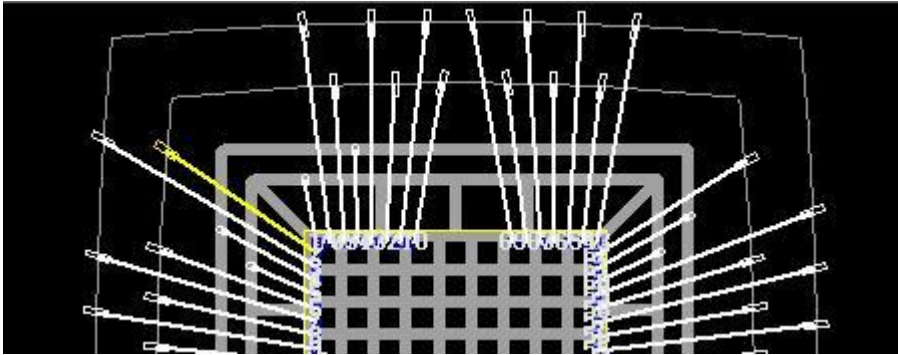


This is the list of dimensions, Back bias applied to the die and the technology used.

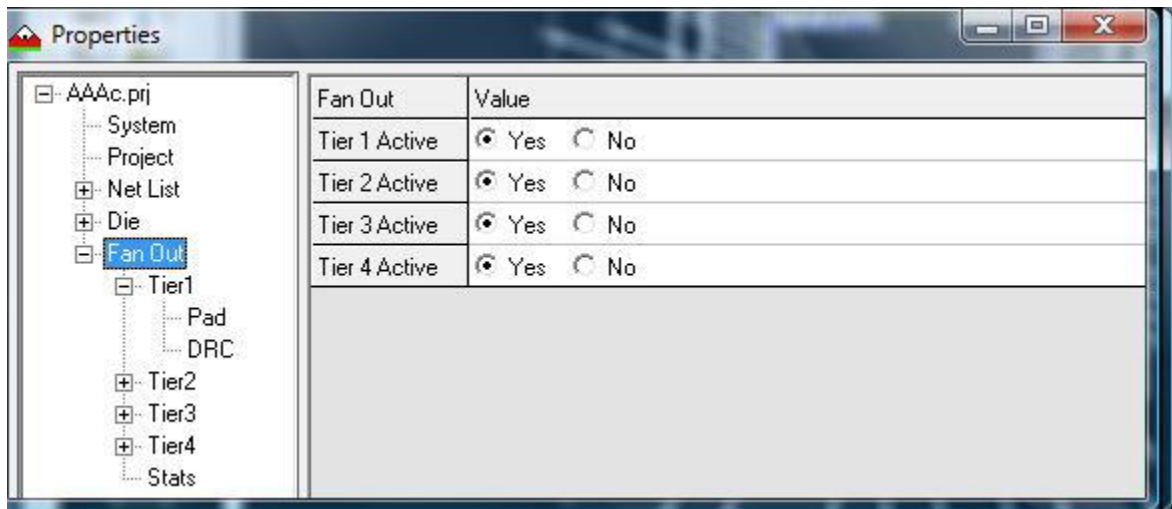
Pad Data:



This is a list of the pad information for a selected pad. If the Die/Wire Bond tab is selected this is cross probed to the design and the selected pin is highlighted in yellow. Likewise if a pad is selected in the Die/Wire Bond tab it will be highlighted in the Pad Data list.

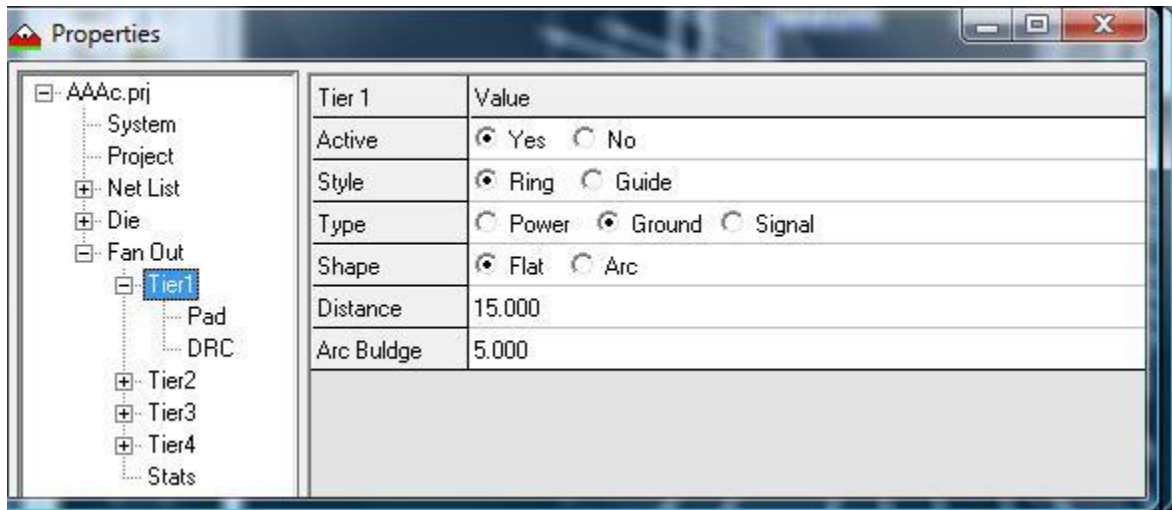


Fan Out:



This is one of the places where you can select which Fan Out Tier is active. Each tier has the same information but different values. Below is a description for Tier 1.

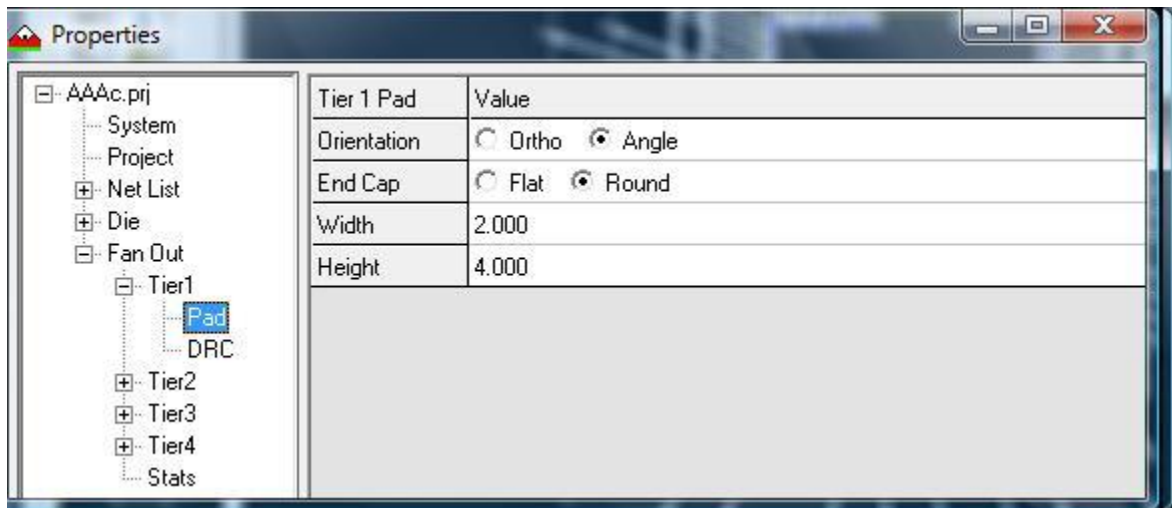
Tier(1:4)



This defines what the Tier looks like.

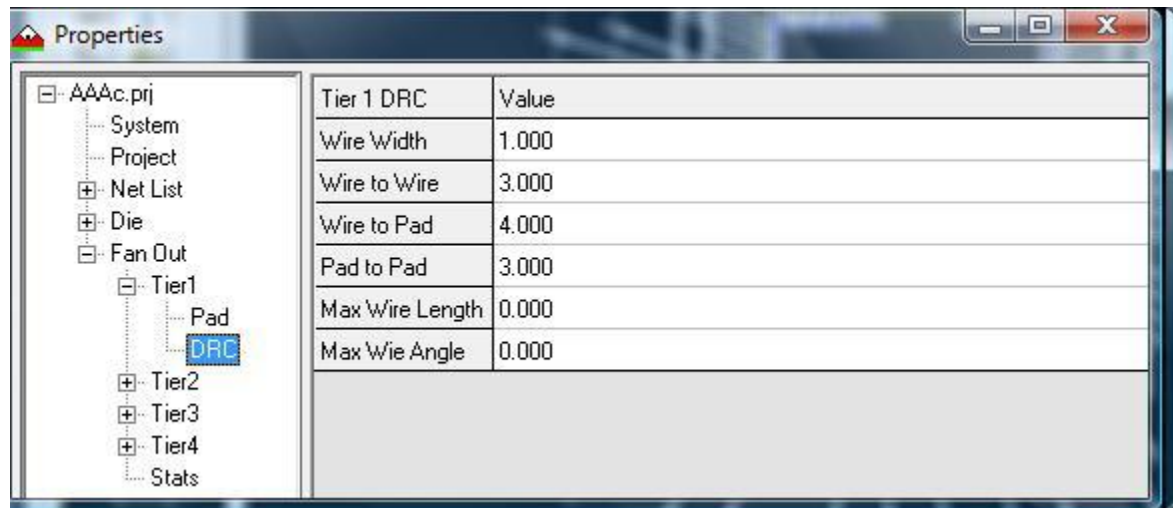
- **Active** indicates whether a tier is active or not.
- **Style** if the tier is used for a power or ground ring then select Ring otherwise select guide.
- **Type** used to identify the type of signals used for a given tier.
- **Shape** determines if the tier is flat or has an arc applied to it.
- **Distance** is the distance from the edge of the die in microns.
- **Arc Bulge** sets the bulge of an arced tier in microns.

Pad:



Defines the pad shape and dimensions. The Height of the pad is also used to generate the Ring width in the case of power and ground rings.

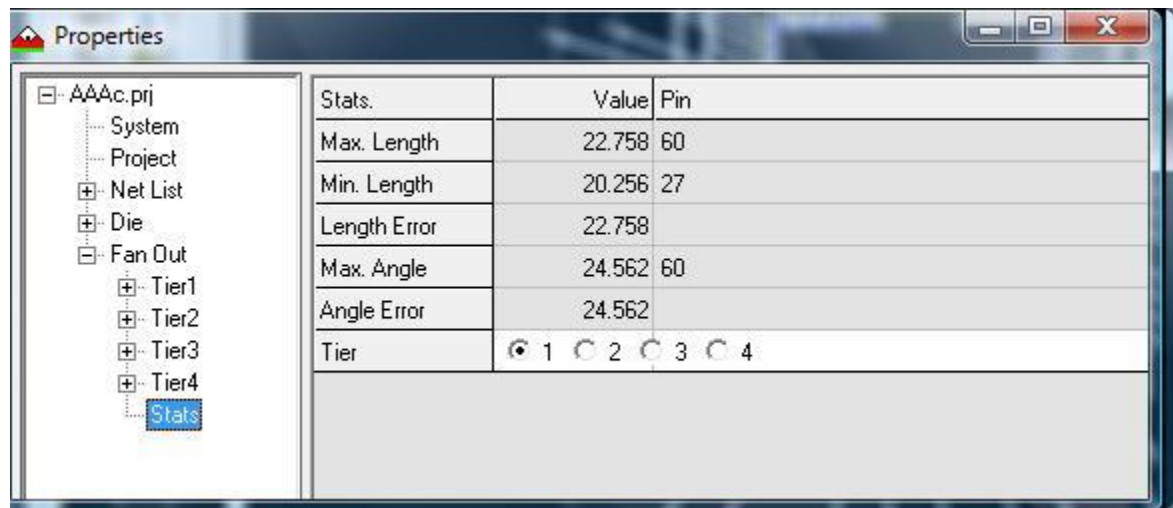
DRC:



These values are used in the fan out generation process as analysis.

- **Wire Width** is the thickness of the bond wire.
- **Wire to Wire** spacing is not currently being used but is a place keeper for future functions.
- **Wire to Pad** spacing is used for pads on inner tiers when placed next to a wire.
- **Pad to Pad** spacing is used to pads on the same tier that are adjacent to each other.
- **Max Wire Length** is a DRC after fan out rule check.
- **Max Wire Angle** is also a DRC after fan out rule check.

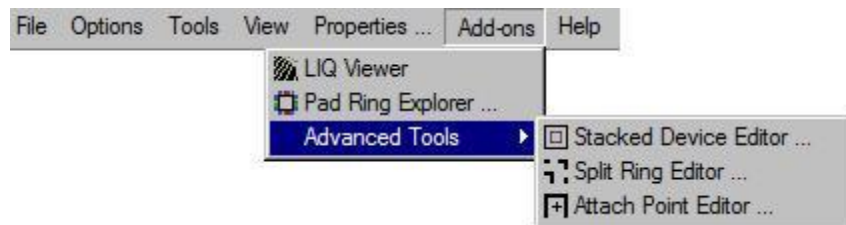
Stats:



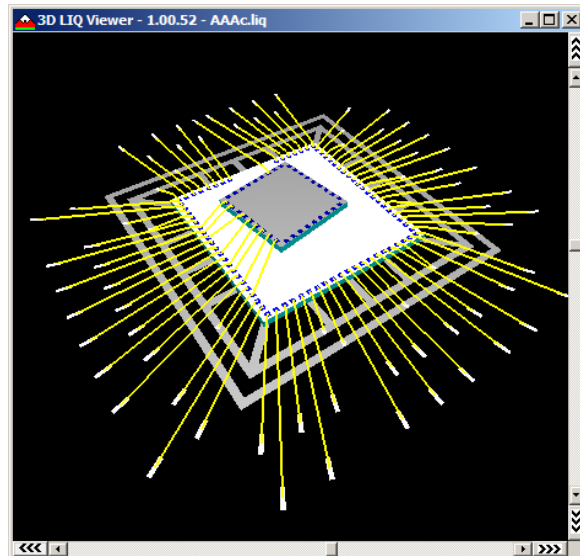
Reports the statistics for a given Tier.

- **Max. Length** is the maximum wire length of a wire on the selected tier and the associated pin number.
- **Min. Length** is the minimum wire length of a wire on a selected tier and the associated pin number.
- **Length Error** is the difference between the Max Length DRC rule and the Max. Length value.
- **Max. Angle** is the maximum angle for a wire on the selected tier and the associated pin number.
- **Angle Error** is the difference between the Max. Angle DRC rule and the Max. Angle value.
- **Tier** is the active tier being investigated.

Add-ons Menu:



- [LIQ Viewer](#) Shells out to the 3D LI! Viewer for viewing in a 3D environment. See the Fast Start for the [3D LIQ Viewer](#) for more information on this feature.



- [The Pad Ring Explorer](#) is a tool for Exploring and designing a pad ring for an ASIC. See the Pad Ring Explorer Fast Start for more information.

Pad Ring Explorer - 1.0.37 - 050831.csv

File Tools Properties Process Help

Work Directory [C:\Program Files\Microsoft Visual Studio\VB98\SourceCode\Tools2010\LibBuilder\]

Explorer

Input Database [050831.csv]

Die Process Options

☒ Pad Sides With Fillers ☐ User Dimensions

Width [2800] Height [2800]

Using [FSPCPD*] ☐ Ends ☒ Center

☒ Auto Renumber Spacers

☒ Auto Renumber Bond Pads

☒ Renumber Based On Corner 1 Location

☐ Remove Filler Cells Before Processing Process

Bond Pad Parameter

Bond Pad Width/Height [40]

ICED Pin Text Parameters

ICED Pin Text Size [5]

ICED PinText Layer [CPTX]

Program loaded with no errors.

Outputs

Pin 1 Assignment

LB Corner Cell ☐

RB Corner Cell ☐

RT Corner Cell ☐

LT Corner Cell ☒

Freeze

Process Current CSV File

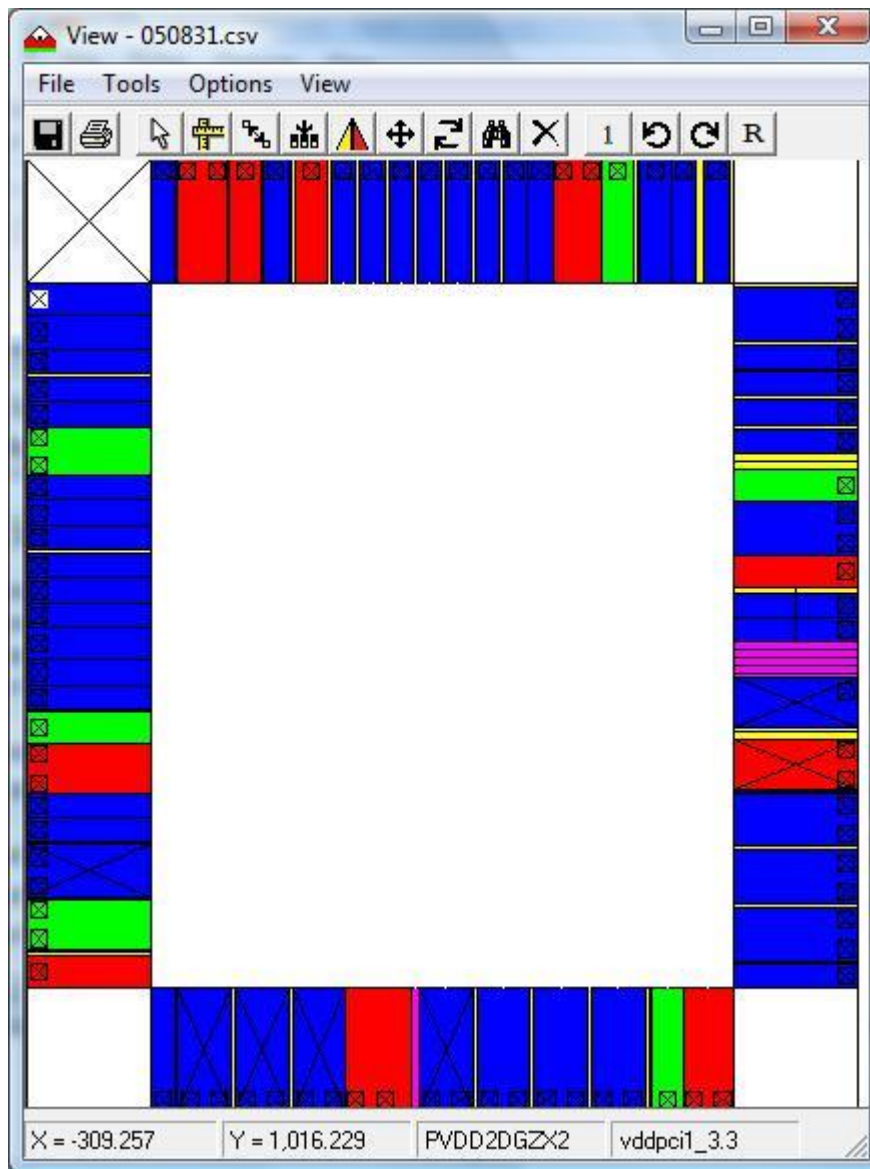
Die Origin, Thickness and Back Bias

☒ Center of Die ☐ Lower Left Corner of Die

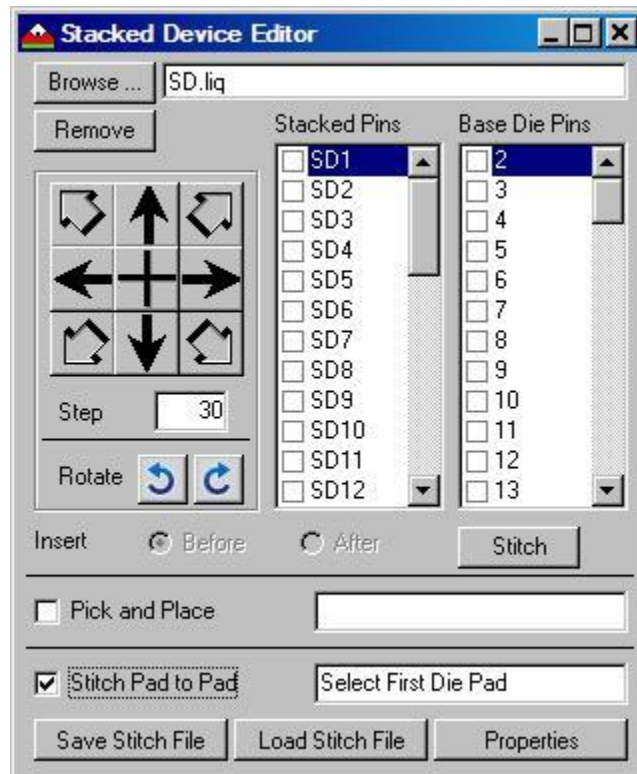
Thickness [4] Bias [VSS]

Stats

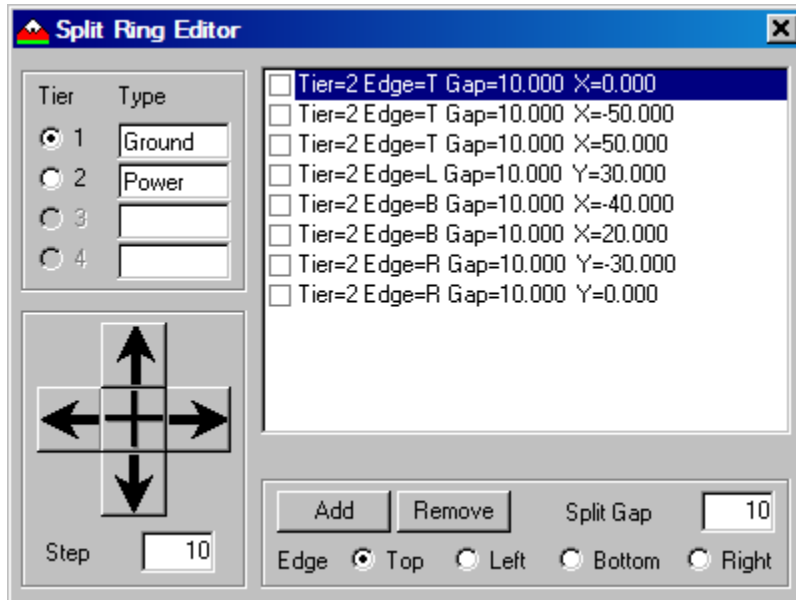
Bottom Width	2085.600	23	20	18	2	20	12
Right Height	2345.600	37	22	19	1	20	21
Top Width	2085.600	37	20	20	0	20	20
Left Height	2345.600	30	26	21	5	26	7
Core Width	1480.000	Total Cell Count	Total Bond Pad Count	Used Bond Pad Count	Double Bond Pad Count	Total Pin Count	Spacer Cell Count
Core Height	1740.000	127	88	78	8	86	60
Totals							



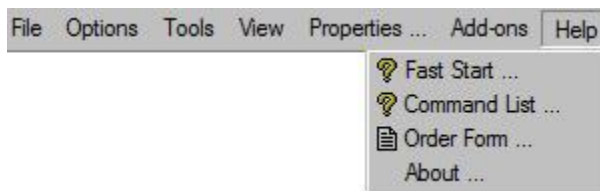
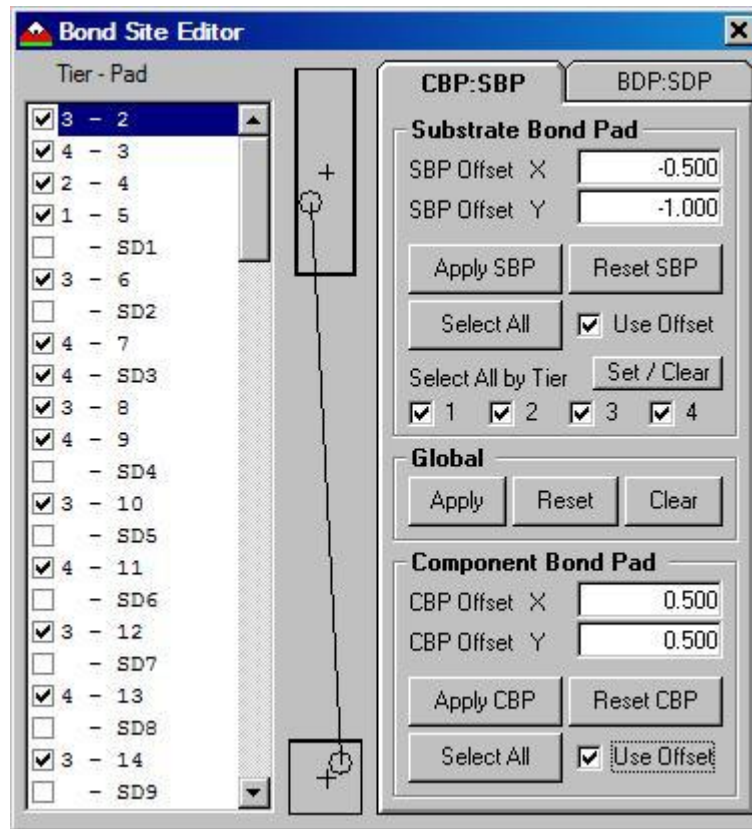
- **Stacked Device Editor**: opens the stacked device editor allowing you to add a stacked device and manipulate its location and rotation as well as controlling pin locations for the Fan Out process.



- [Split Ring Editor](#): allows you to add splits to pad rings to you can accommodate multiple powers and grounds in the design by splitting the rings into separate segments.



- **Bond Site Editor:** Allows you to move the Die or Substrate bond pad attach point.



- **Fast Start ...** will invoke Adobe Reader to display the Fast Start document for help.
- **Command List ...** will invoke Adobe Reader to display the Command List document.
- **Order Form ...** will display an order form which you can edit, save or print. This is used to get your license for the AS2Pack tools.

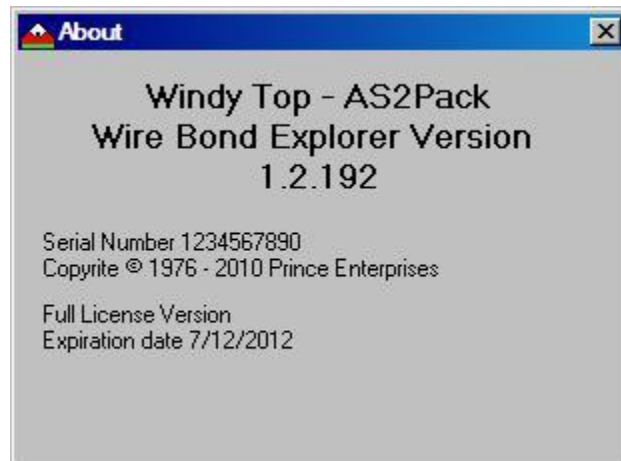
- AS2Pack Order Form
-
- Name:
- Company:
- Address1:
- Address2:

- o City:
- o State (Province):
- o Zip Code:
- o Country:
- o Phone:
- o Email Address:
- o Web Site:
- o
- o Version: Basic Advanced Expert
- o
- o Send this form along with the Generated License File to:
- o Windytop_ph@yahoo.com



Sample Generated License file:





```
EE,C2,A0,13,63,1F,B7,8D
0F,DC,CE,C5,65,66,A1,2E,09,DB,01
D5,BA,4C,98,5E,AF,CB,26,C2,7B,2C,2B,3E,00,76,BE,78,FC
```

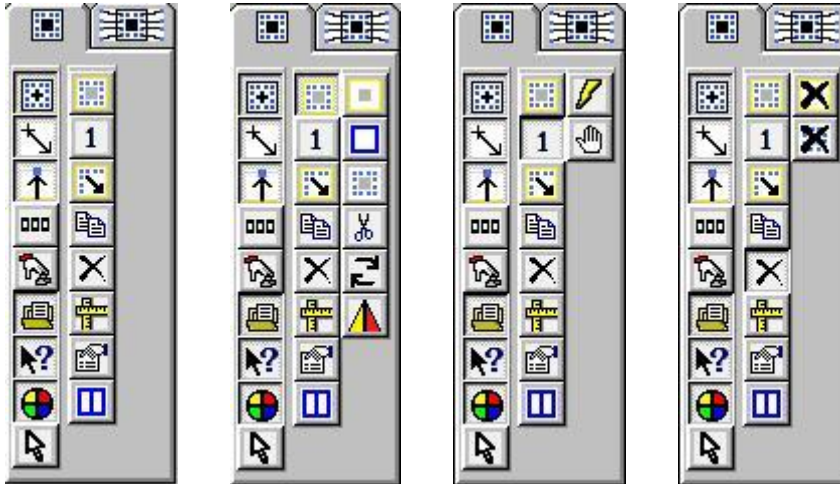
- **About ...** Displays the About screen showing the program name and version number.
























Tool Bars: There are two tool bars in the Die / Wire Bond tab.

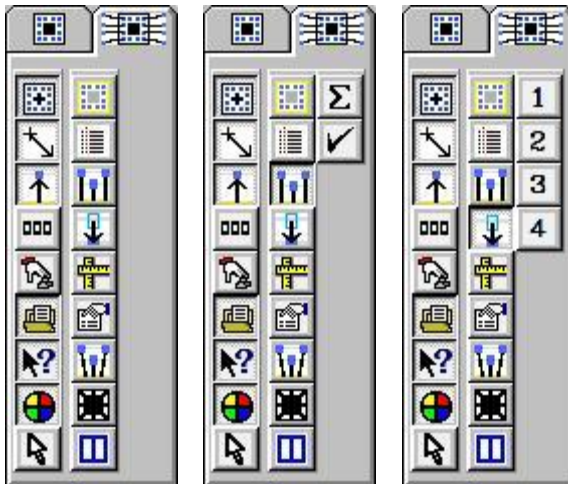
The left tab  is used to edit the Die and Die pads and the right tab  is used to generate and edit a Wire Bond Fan Out.


The Die tab  has the common Options on the far left column and the Die Editing Commands in the second column. The Edit button  has a sub menu that displays 3 options. The Renumber button  has a sub menu that displays 2 options. The Delete  has a sub menu that displays 2 options.

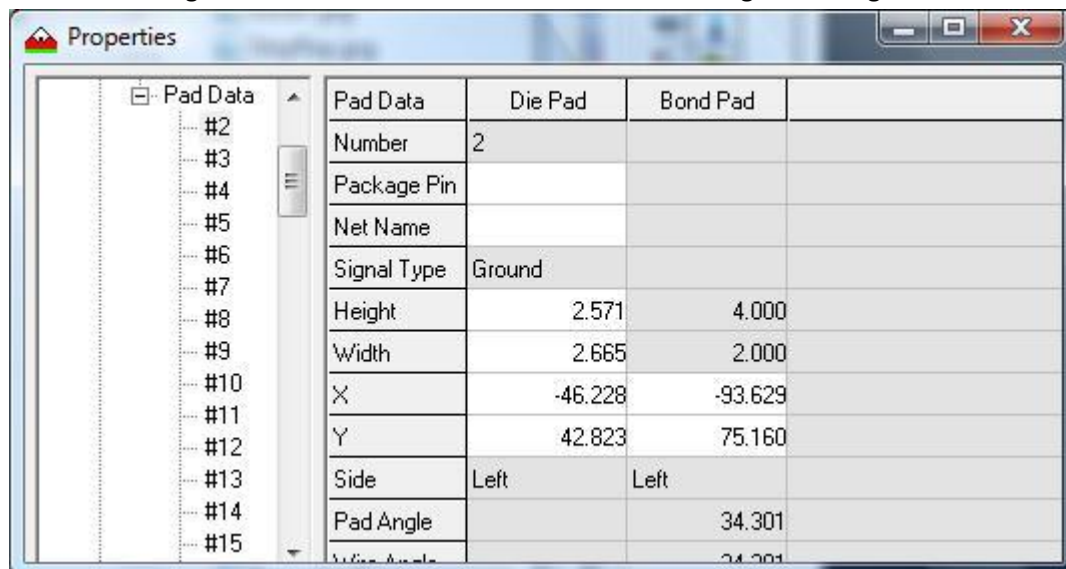



-  Die Edit >  die outline,  create a pad,  edit pads,  Crop Die,  [Rotate Die](#) and  Flip Die.
-  Renumber Pads >  Auto Renumber or  Manual Renumbering.
-  Step and Repeat will copy a selected pad using parameters entered in the Dialog Box.
-  Copy a selected pad at a new location.
-  Delete >  Delete Die Outline or  Delete Pads.
-  To do Point to Point measurements.
-  Display the properties Dialog box.
-  Split a CBP into multiple segments or Join a CBP with multiple segments into 1 pad.

The Wire Bond tab  has the common Options on the far left column and the Wire Bond Editing Commands in the second column. The Edit button  has a sub menu that displays 2 options. The Move to Tier button  has a sub menu that displays 4 options.

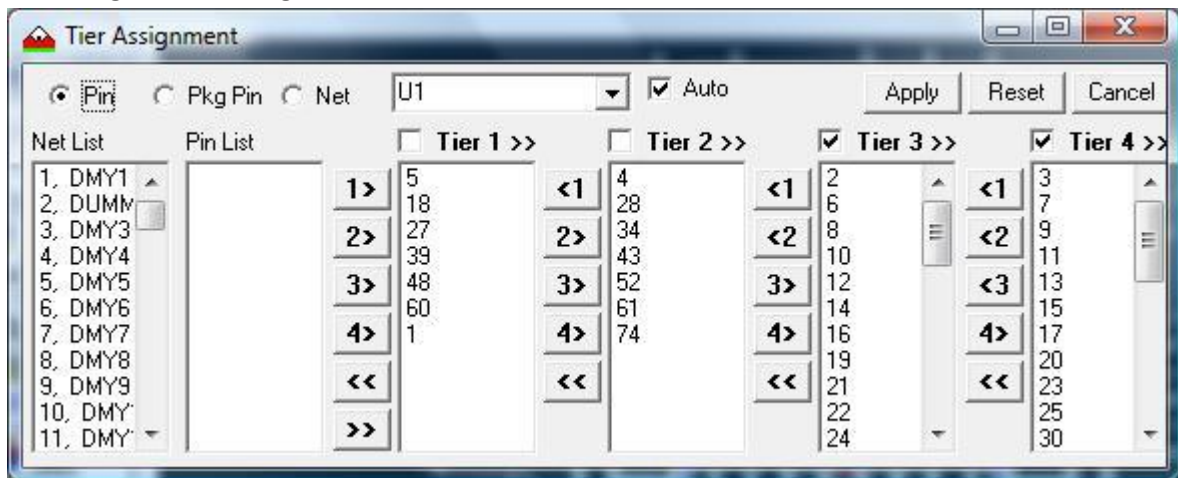





-  Will enter the WBP edit mode. The properties dialog box is displayed opened to the Pads section. Moving the mouse over a WBP will select it for editing or moving.








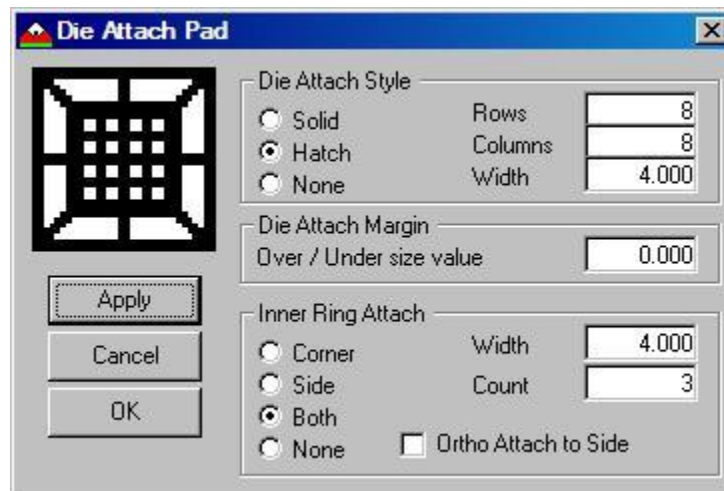
-  Opens the Tier assignment dialog box. This is the tool that allows you to assign selected pads to a tier.

Tier Assignment Dialog box :



1. The selected component is displayed in the pull down list which holds all the parts in the Net List
 2. The radio buttons select which Reference is to be used when assigning pins to tiers. Normally Pin will be used.
 3. If the Auto Box is checked than when a move is done it is reflected in the layout immediately. If not checked than no changes will take place until you click the Apply Button.
 4. Selecting pads to move is done by clicking on selected pads with the shift key down to or moving the mouse across the selected. Same as windows selection process.
 5. To move pads from one list to the other use the numbered arrow buttons. The destination tier is the number before the >.
 6. If you want to split the selected pads in the Pin List between multiple tiers you can do this by making sure the check boxes above the destination tier lists is checked. This indicates which tiers are to be used for the distribution. Now click the >> button to initiate the placement process.
 7. Selected pads can be move from one tier to the next by using the various numbered arrow buttons or back to the Pin List when you use the << buttons.
 8. The Reset button will move all assigned pads back to the Pin List for reassignment.
 9. The Cancel Button ends the assignment process and closes the dialog box.
 10. When pads are assigned or moved from one List to another the Type property is updated based on the Net name (type) assigned to the tier (Power, Ground, Signal).
-  Snap to tier has to options.  To snap all the pads to their assigned tier.  To snap selected pads to their assigned tier.

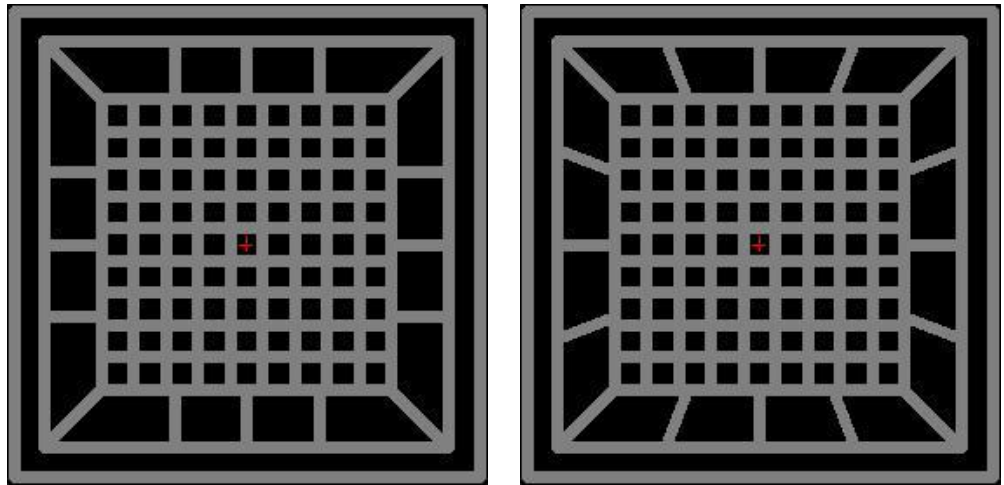
-  Moves selected pads from one tier to another by clicking one of the Layer Number buttons. **1 2 3 4** The Type property is updated based on the net name assigned to the tier (Power, Ground, Signal).
-  To do Point to Point measurements.
-  Display the properties Dialog box.
-  To open the [Fanout](#) Dialog Box
-  To open the Die Attach Editor.



1. Die Attach Styles:
 - a. Solid for a solid Attach Pad.
 - b. Hatched for a hatched Attach Pad.
 - c. None for no Attach Pad generation.
 - d. If The Hatched is selected that the Rows and Columns define the hatch pattern.
The Width property is the width of the hatch bars.
2. Die Attach Margin:

Over / under size value for the Die attach pad. A value of 0 makes the die attach pad the same size as the die. A Plus value grows the die attach pad and a Minus value shrinks the die attach pad.
3. Inner Ring Attach:
 - a. Corner attaches the attach pad to the inner most ring at the corners of the die. The width is the value in the Width field.
 - b. Side attaches the attach pad to the inner most ring at the edges if the die. The number of ties is defined in the Count field.
 - c. Both will add inner ring attaches to the corners and sides using the width property for the metal trace width and the count for the number of inner ring attaches.
 - d. None if you don't want any inner ring attaches.

4. Ortho Attach to Side determines if the die attach pad is connected to the inner ring either orthogonally (90°) to the die side or angled.

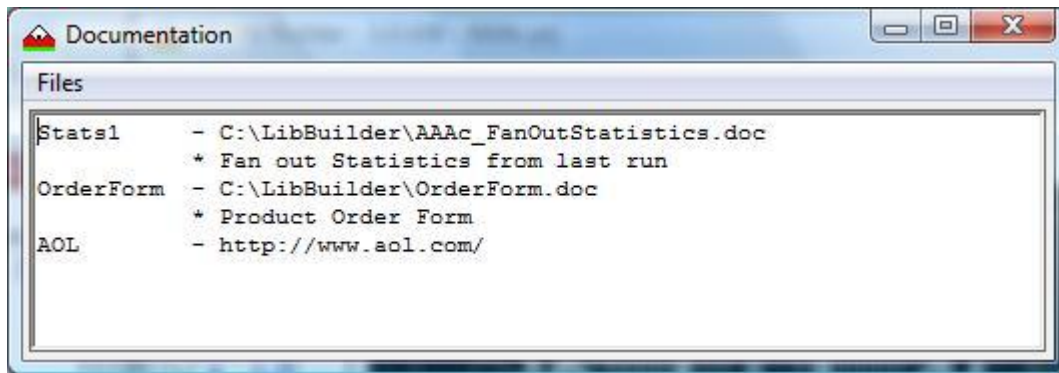


5. No changes take place until either the Apply or OK button is clicked. When either is clicked the changes can be seen in the main window.
6. Moving the mouse over a label will change the die picture in the tool to highlight what is being edited as a visual confirmation of the action.
7. When the mouse is not over a label the resulting selections is shown in the die picture.

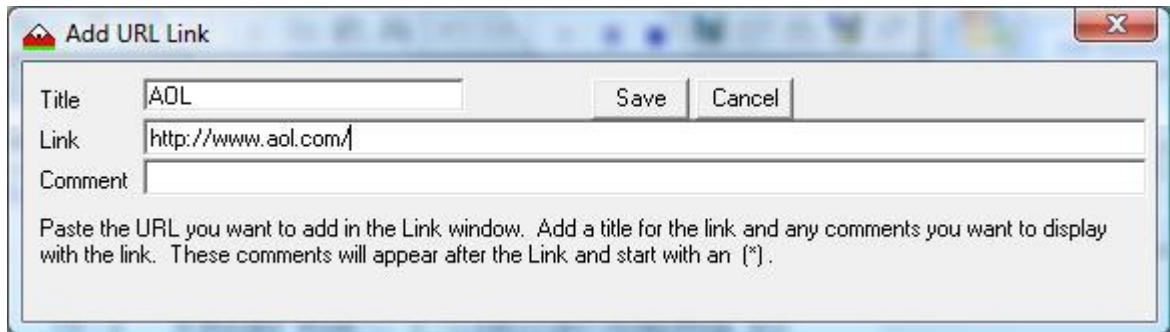
Hyper Link List: A list of hyper links to web sites and files located on the hard drive.

Opened with the Files: Documentation menu. This will show the hyper link editor and lists any hyperlinks that are stored and accessible. Web based hyperlinks will only work if a web browser was pointed to in the properties:system section. Likewise Document links can only be viewed if a word processor has been pointed to in the

properties:system section.

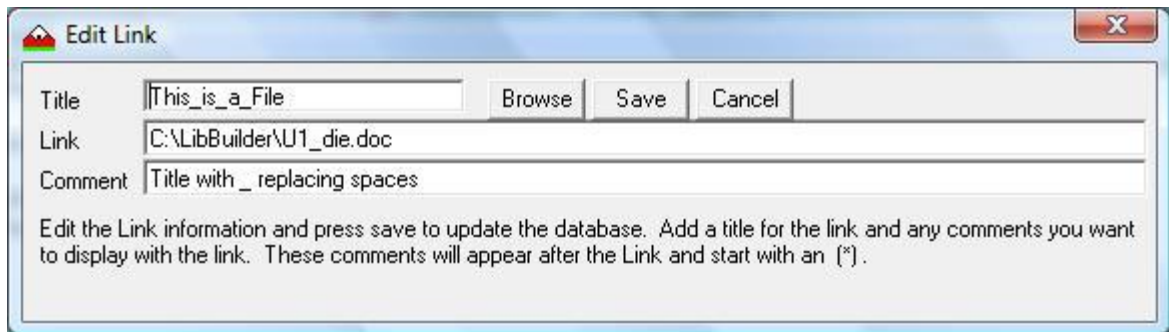


To add a web Hyperlink right mouse click on the screen and select the Add URL option or use the Files:Add URL option. This will bring up the Add URL Link dialog box.

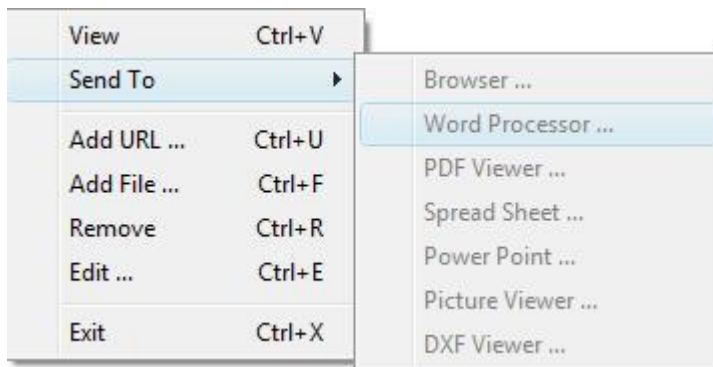


Enter a Title for the link and paste the link you want to link to into the Link line. If you want to add a comment you can enter it in the Comment line. This will appear after the link in the link list once added. The Title should not contain any spaces or tabs. If spaces or tabs are used then they will be replaced with an _ before saving.

To add a document link select the Add File Link like you did the Add URL Link and the Add File Link dialog box will appear. In this case you can browse to the file location using the Browse button. Add a title and comment if you want to and press the save button to complete the addition. If you want to cancel the operation press the Cancel button or clear the Link field and close the Link Dialog box. If no Title is supplied one will be created from the date and time of addition (26/Jun/2010_11:07:25PM).




Document Links Menus

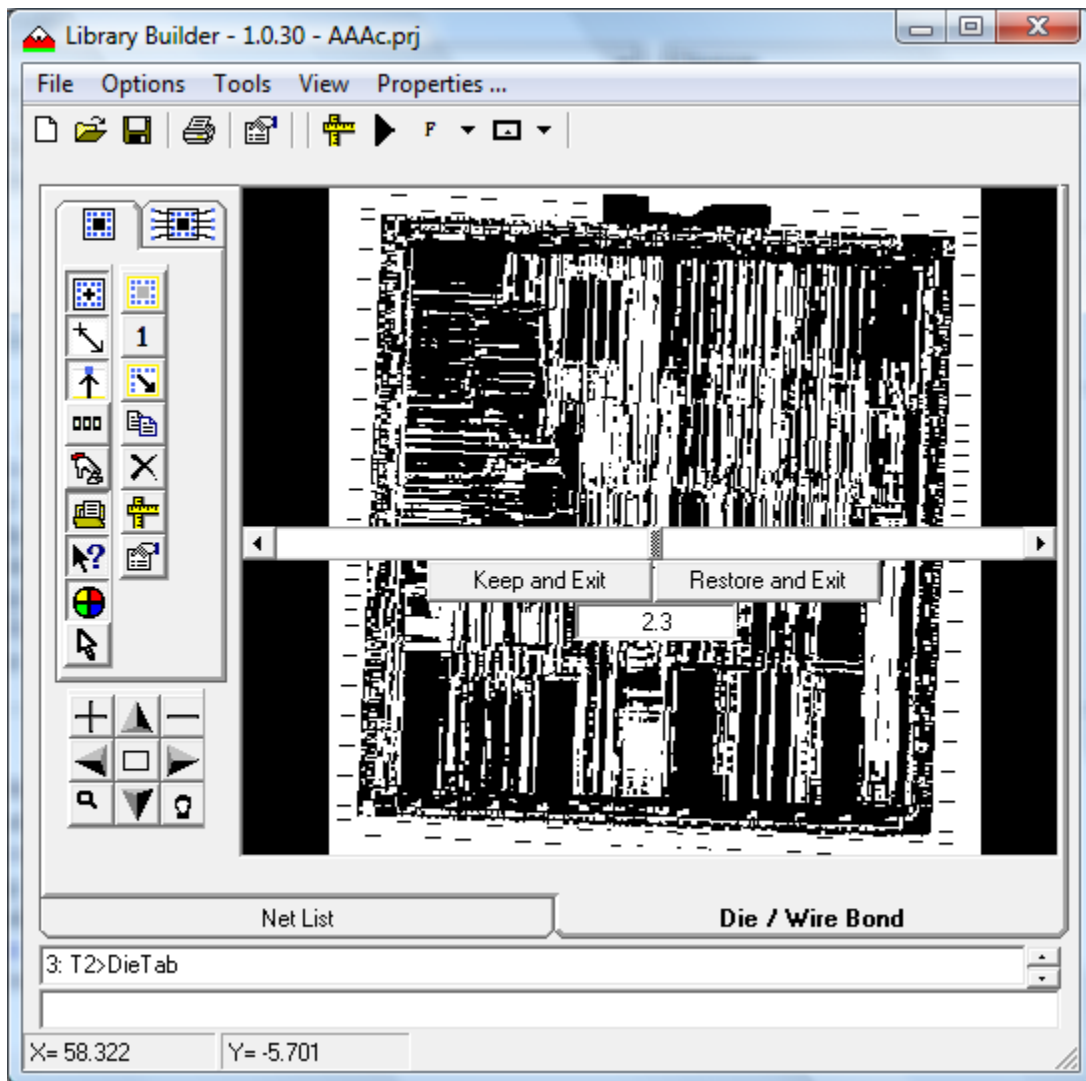


- View will analyze the link type as select the appropriate program to call provided that executable has been set in the Properties System set up.
- Send To has a sub menu that lists all the various executables that are pointed to in the Properties System set up.
- Add URL will bring up another dialog box that asks for the URL. You can paste in a URL from the web browser or hand entered. Comments can be added after a Web based Hyper Link by a space.
- Add File will bring up a common dialog box that is used to point to the file link to be added to the list. These links cannot have any comments after them.
- Remove will remove a selected link from the list.
- Edit will allow you to make changes to a Link.
- Exit to close the Hyper Link List to close.


Die Rotation

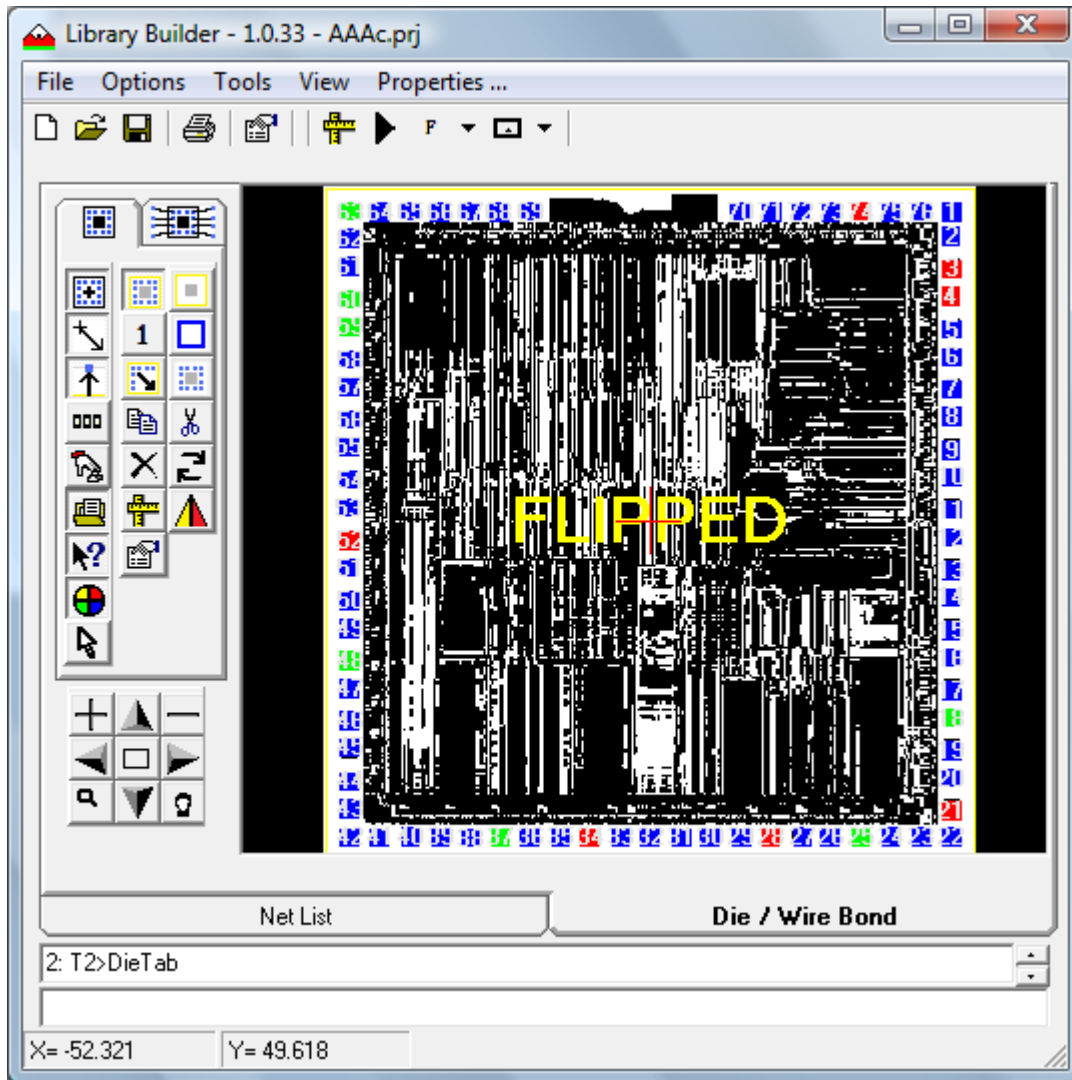
The Die Rotation tool  is a tool for rotating the die around the center point to correct for any rotation skew in the die picture. The slider bar can be used to rotate CW

or CCW up to 180 degrees. The amount of rotation is displayed in the text box near the center of the screen. Large increments are 1 degree and small increments = .1 degree. The rotation value can also be entered in the text window and pressing enter. This will rotate the die and update the slider bar. If the Keep and Exit button is pressed the new die image will be saved to the hard drive using the name of the original die and the tool closes. If the Restore and Exit button is pressed than the original image will be restored and the tool closes. In the picture below we see the die has been rotated by 2.3 degrees. The navigational tool bar can be used to move around the die.

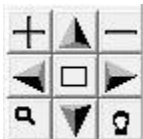


Flip Chip









The  tool will flip the die along the Y axis relocating the pads. When you are in the Flip Chip mode you can't enter the fan out tab. The word Flipped is displayed in the center of the die to indicate that you are in the Flip Chip mode.



Navigation Tool Box: Used to move around the die.



- Zoom In by 50% at the center of the screen  also + key.

- Zoom Out by 200% at the center of the screen  also - key
- Zoom All  also Home key.
- Zoom Window. Click start and click end of zoom window. 
- Pan Click start and click end of pan. 
- Pan up ¼ screen  also up arrow key.
- Pan Down ¼ screen  also down arrow key.
- Pan Left ¼ screen  also left arrow key.
- Pan Right ¼ screen  also right arrow key.

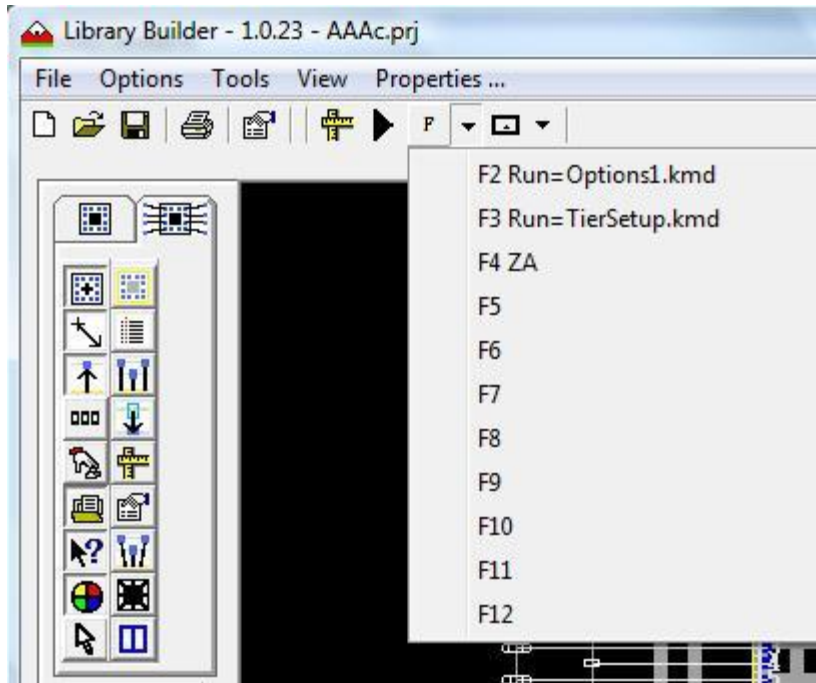
Function Keys

Function Keys F2 through F12 can be assigned a command to be executed when pressed. The Function key command assignment is done in the project set up file (*.prj). To add a new function key definition: Open the Project file in a word processor. Begin the line with the header "FKey((n)" where n is the function key number. The "=" separates the command header from the command to be executed.

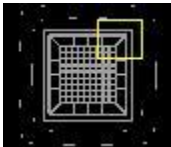
```
FKey2=Run=Options1.kmd
FKey3=Run=TierSetup.kmd
FKey4=ZA
```

These commands are placed in a function key queue and displayed in the Tool Bar "F" Button List. Selecting a function key from the "F" Button List will execute the command. The most recent executed command is displayed in the "F" Button. This command can be executed again by clicking on the "F" Button.

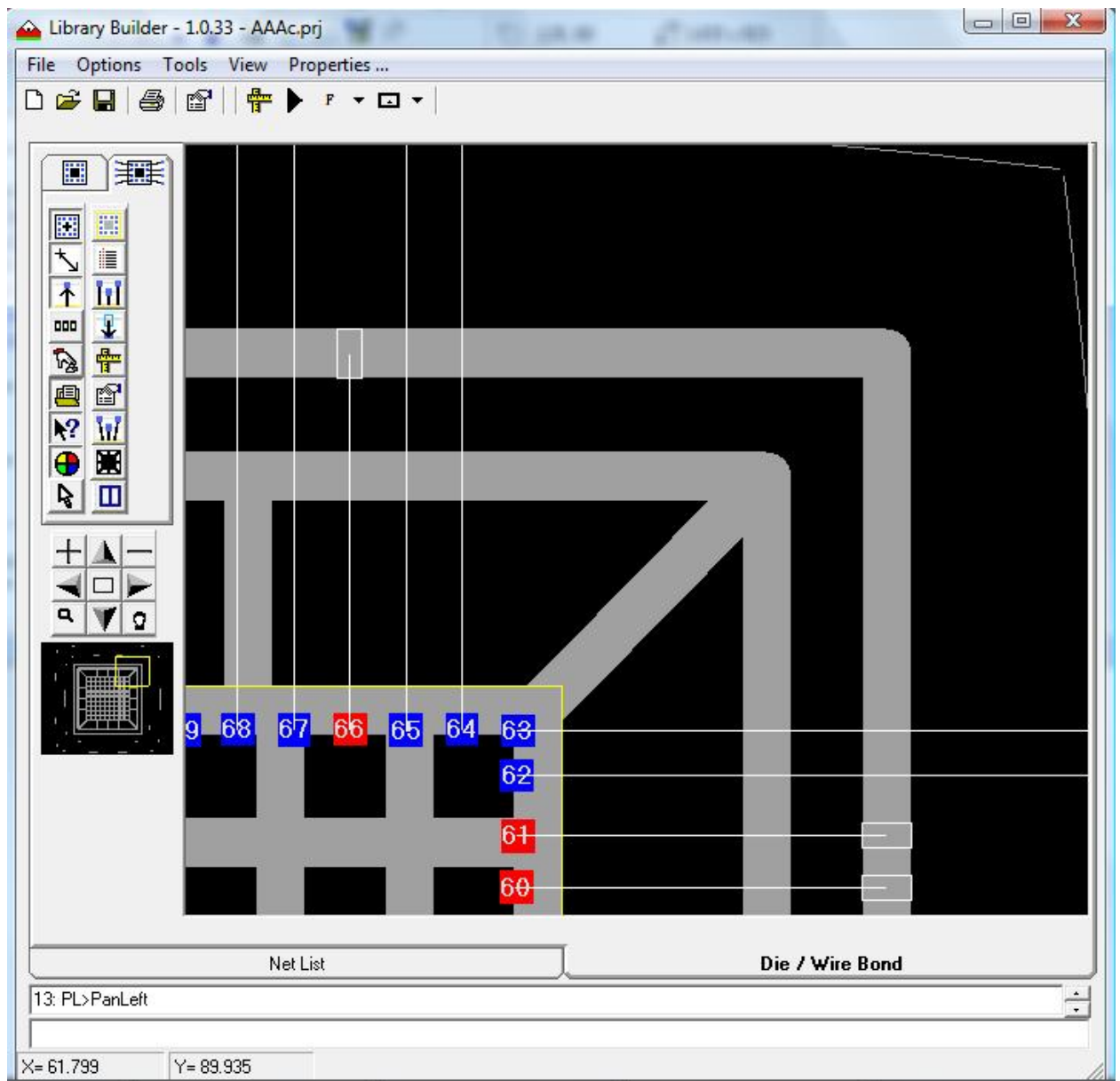
The Function Key can also be assigned using a command line entry "FKey(n)=(command)". Once the command has been accepted it is added to the Function Key command list and executed. F1 is reserved for Help.



World View



The World View displays the current work area and a yellow outline. Depending on the Click and Drag mode, if you either mouse down or click you can pan around the design while in the World View window. Any zooms or pans done on the main edit window will be updated in the world view. Double clicking on a location in the World View will move the center of the view window to the cursor position.



File Formats:

- [Pin List](#)
- [Wire List](#)
- [LibBuillder.ini](#)
- [Project](#)
- [LIQ](#)
- [KMD is a run log file.](#)
- [CSV or TSV file](#)
- [Net Sorted by Reference Designator.](#)
- [Net Sorted by Net.](#)
- [Net List Statistics.](#)
- [Die Data sheet](#)
- [WB Data sheet](#)
- [Fan Out Statistics](#)
- [EDIF 2 0 0](#)
- [ORCAD/PCB II](#)
- [ORCAD Wirelist](#)
- [PadsPCB](#)

[Files](#)

- **PinList:**

```

1. File Path: C:\Program Files\Microsoft Visual
   Studio\VB98\SourceCode\Tools2010\WireBondExplorer\AAAA.PinList
2. Created: 2/7/2010 2:59:51 PM

3. Component U1
4. Part DUMMY

5. Die Width 100.000
6. Die Height 100.000
7. Die Thickness ??

8. Origin Center


9. Back Bias ??

10. Pin          Height      Width      X          Y      PkgPin  Type      Net
11. 2            2.571      2.665      -46.228    42.823  ??      Ground    ??2
12. 3            2.571      2.665      -46.185    38.275  ??      Signal    ??3
13. 4            2.571      2.665      -46.171    33.754  ??      ??        ??4

```

-
1. Is the file path where the file was created.
 2. The date the file was created.
 3. Component Name.
 4. Part Name.
 5. Die Width in Microns.
 6. Die Height in Microns.
 7. Die Thickness in Microns. If none supplied the value is ??.
 8. Coordinate origin. In most cases this is Center. Other option is LLC.
 9. Back Bias for the Die. If none supplied the value is ??

10:13. Pin List Header:

- Pad Name.
- Pad Height in Microns.
- X Coordinate in Microns from the center of the die.
- Y Coordinate in Microns from the center of the die.
- PkgPin is the package pin that is associated with the pad. If none supplied the value is ??
- 3 Types: Power (**Red**), Ground (**Green**) and Signal (**Blue**). These are the fill colors for the die pads when the Pad Colors option is selected. 
- Net Name if none is supplied the value is ??n. When the program saves the file it appends a number to the ?? (eg. "??23") so each net is unique.

Wire List:

```
1. (PATH,Half_Adder(MAINHIER)
2. (COMPONENTS
3. U1,DUMMY1
4. U2,DUMMY2
5. J123,LIST6
6. )
7. (VALUES
8. U3,NONE
9. U4,NONE
10. J123,NONE
11. )
12. (NODES
13. (DMY1
14. U1,1
15. U2,1
16. )
17. (DUMMY2
18. U1,2
19. U2,2
20. )
21. (SPL1
22. U5,14
23. U3,14
24. )
25. )
26. ),Half_Adder
```

1.	File Header.
2.	Components Header.
3:5.	Component List.
6.	End Component section.
7.	Values Header.
8:10.	Component Values.
11.	End Values section.
12.	Node Header. This is the start of the Net List.
13, 17, 21.	Net Name.
14, 15.	Net 1 Component and connecting pin.
18, 19.	Net 2 Component and connecting pin.
22, 23.	Net 3 Component and connecting pin.
16, 20, 24.	End Node Marker.
25.	End of Node section.
26.	End of Wire List.

[Files](#) [File Format](#)

WireBondExplorer.INI:

1. Language=English
2. AssignLeft=2070
3. AssignTop=2070
4. AssignHeight=3555
5. AssignWidth=8805
6. FanOutLeft=0
7. FanOutTop=0
8. FanOutHeight=4080
9. FanOutWidth=4905
10. InputDatLeft=0
11. InputDatTop=0
12. InputDatHeight=1500
13. InputDatWidth=4245
14. AttachLeft=345
15. AttachTop=315
16. AttachHeight=3675
17. AttachWidth=5460
18. ExcelPath=C:\Program Files\Microsoft Office\Office12\EXCEL.EXE
19. WordPath=C:\Program Files\Microsoft Office\Office12\WINWORD.EXE
20. AdobePath=C:\Program Files\Adobe\Reader 8.0\Reader\AcroRd32.exe
21. BrowserPath=C:\Program Files\Internet Explorer\iexplore.exe
22. PicturePath=C:\Windows\System32\mspaint.exe
23. PowerPointPath=C:\Program Files\Microsoft Office\Office12\POWERPNT.EXE
24. **DoLoad0**=C:\Program Files\Microsoft Visual Studio\VB98\SourceCode\Tools2010\WireBondExplorer\AAAc.prj
25. DoLoad1=C:\Program Files\Microsoft Visual Studio\VB98\SourceCode\Tools2010\WireBondExplorer\AAAc.prj
26. DoLoad2=C:\Program Files\Microsoft Visual Studio\VB98\SourceCode\Tools2010\WireBondExplorer\Demo1.prj
27. DoLoad3=C:\Program Files\Microsoft Visual Studio\VB98\SourceCode\Tools2010\WireBondExplorer\Demo1.prj
28. LoadLast=False

1. Language is currently set to English but other languages can be added as requested.

2:17. Last location and size of the forms.

18:23 Pointers to external support programs. Eg. Excel, Word, Firefox...

24:27 Pointers to the last 4 projects opened.

28. The Last Load Flag if True the program will load the last saved project (**DoLoad0**)

on start up.

AAAC.prj:

```
1. NLFile=C:\Program Files\Microsoft Visual
   Studio\VB98\SourceCode\Tools2009\WireBondExplorer\Half_AdderA.Wrl
2. NLDateTime=10/9/2009 7:31:48 AM
3. PinList=C:\Program Files\Microsoft Visual
   Studio\VB98\SourceCode\Tools2010\WireBondExplorer\AAAA.PinList
4. PinListDateTime=11/27/2009 1:34:11 PM
5. DieFontSize=8
6. DieFileName=C:\Program Files\Microsoft Visual
   Studio\VB98\SourceCode\Tools2009\WireBondExplorer\Dummy.bmp
7. DieDateTime=10/17/2009 6:32:18 AM
8. BMPwidth=7800
9. BMPheight=8070
10. BMPratio=0.9665428
11. DieOutlineSX=17.50542
12. DieOutlineSY=17.50542
13. DieOutlineEX=7787.393
14. DieOutlineEY=7982.473
15. DieWidth=100
16. DieHeight=100
17. Center=True
18. ClickDrag=True
19. DynamicSnap=True
20. ToolTip=False
21. ColorCode=True
22. DiePrecision=0.000
23. Tier0Net=Ground
24. Tier0PadRing=Ring
25. Tier0FlatArc=Flat
26. Tier0OrthoAngle=Angle
27. Tier0BPEnds=Flat
28. Tier0Wire=1
29. Tier0W2W=3
30. Tier0W2P=4
31. Tier0P2P=3
32. Tier0Dist=15
33. Tier0Bulge=5
34. Tier0BPW=2
35. Tier0BPH=4
36. Tier0BPOffset=0
37. Tier0=Active
38. Tier0MaxLen=0
39. Tier0MaxAngle=0

40. Part=U1
41. PinOpt=0
42. DieAttachStyle=Hatch
43. DieAttachStyleRows=8
44. DieAttachStyleCols=8
45. DieAttachStyleWidth=4.000
46. DieAttachStyleMargin=0.000
47. DieAttachRing=Both
48. DieAttachRingWidth=4.000
49. DieAttachRingCount=3
50. URL=http://search.digikay.com/scripts/DkSearch/dksus.dll?Detail&name=IDT74LVC16344APAG
    8-ND
51. URL=http://www.irs.gov/pub/irs-pdf/fw4.pdf test pdf file abc
52. URL=http://www.irs.gov/pub/irs-pdf/fw4.pdf
53. URL=C:\Program Files\Microsoft Visual
    Studio\VB98\SourceCode\Tools2010\WireBondExplorer\DataSheet\DieAttachSolidCorner.jpg
```

54. URL=C:\Program Files\Microsoft Visual Studio\VB98\SourceCode\Tools2010\WireBondExplorer\fw4.pdf
 55. URL=C:\Program Files\Microsoft Visual Studio\VB98\SourceCode\Tools2010\WireBondExplorer\AAAc.prj
 56. URL=C:\Program Files\Microsoft Visual Studio\VB98\SourceCode\Tools2010\WireBondExplorer\4ac0000.bmp
 57. URL=C:\Program Files\Microsoft Visual Studio\VB98\SourceCode\Tools2010\WireBondExplorer\ppt\Wire Bond Explorer_PE_v5.ppt
 58. URL=C:\Program Files\Microsoft Visual Studio\VB98\SourceCode\Tools2010\WireBondExplorer\AAA.csv
 59. Pad=,2,,Ground,207.0913,486.7611,414.1221,691.5404,Left,-3372.426,-1986.447,0,34.30128,2,-3527.824,-3217.029,-2066.097,-1906.797,-3455.912,-2139.818,-3545.684,-2008.223,-3288.941,-1833.076,-3199.168,-1964.671,-3390.115,-2094.932,-3479.887,-1963.337,-3354.738,-1877.962,-3264.966,-2009.557

-
- 1:2. Net List path and time stamp.
 - 3:4. Pin List path and time stamp.
 - 5. Default Font Size.
 - 6:7. Die Picture path and time stamp.
 - 8:16. Die Geometry Data.
 - 17:22. Project Options.
 - 23:39. Tier definition and parameters.
 - 40. Selected Part for the project.
 - 41 Pin Name option default (Pin)
 - 42:49. Die attach Parameters.
 - 50:58. URL list. Both hard drive links as well as web links.
 - 59:... 59 to end of file are all the pads and parameters.

[Files](#) [File Format](#)

AAAC.liq:

```
1. Library IQ File Version 3.1 Generated with Wire Bond Explorer Version 1.0.10
2. *
3. Output LIQ file = AAAC.liq (02/13/10 04:35 PM)
4. *
5. Input Net file = Half_AdderA.Wrl (10/09/09 06:31 AM)
6. Input Die file = Dummy.bmp (10/17/09 06:32 AM)
7. Input Pin file = AAAA.PinList (02/07/10 02:59 PM)
8. *
9. Origin (0,0) at Center of the Die
10. Back Bias ??
11. *
12. LIQ_PART_NAME U1
13. UNITS Microns
14. TECHNOLOGY Wire_Bond
15. [Component Size]
16. CompL 100.000
17. CompW 100.000
18. CompZ ?

19. [Component Bond Pads]
20. * CBP# Xcoord Ycoord Layer Length Width SignalName Edge Shape
21. CBP 2 -46.228 42.823 CBP-NS 2.571 2.665 NET2 L RECTANGLE
22. CBP 3 -46.185 38.275 CBP-NS 2.571 2.665 NET3 L RECTANGLE

23. [Substrate Bond Pads]
24. * SBP# Xcoord Ycoord Layer Length Width Rot Shape NetName Row
25. SBP 2 -93.629 75.160 SBP-NS 4.000 2.000 34.301 RECTANGLE NET2 2
26. SBP 3 -116.572 78.668 SBP-NS 8.000 2.000 29.850 OVAL NET3 3

27. [Wirebonds]
28. * Pad# Xcoord Ycoord Pin# Xcoord Ycoord PadZ PinZ
29. WB 2 -46.228 42.823 2 -93.629 75.160 0.000 0.000
30. WB 3 -46.185 38.275 3 -116.572 78.668 0.000 0.000

31. [Rings]
32. * No. Shape UpperLeftX UpperLeftY LowerRightX LowerRightY Width Bulg Net
33. RING 1 Flat -67.000 67.000 67.000 -67.000 4.000 0.000 Ground
34. RING 2 Flat -77.000 77.000 77.000 -77.000 4.000 0.000 ??

35. [Die Attach Pad]
36. * Shape StartX StartY EndX EndY Width
37. DAP Line -48.000 48.000 48.000 48.000 4.000
38. DAP Line -48.000 -48.000 48.000 -48.000 4.000
39. DAP Line -48.000 48.000 -48.000 -48.000 4.000
40. DAP Line 48.000 48.000 48.000 -48.000 4.000
41. End Hatched Attach Pad Margin
42. DAP Line -48.000 37.333 48.000 37.333 4.000
43. DAP Line -48.000 26.667 48.000 26.667 4.000
44. DAP Line -48.000 16.000 48.000 16.000 4.000
45. DAP Line -48.000 5.333 48.000 5.333 4.000
46. DAP Line -48.000 -5.333 48.000 -5.333 4.000
47. DAP Line -48.000 -16.000 48.000 -16.000 4.000
48. DAP Line -48.000 -26.667 48.000 -26.667 4.000
49. DAP Line -48.000 -37.333 48.000 -37.333 4.000
50. DAP Line -37.333 -48.000 -37.333 48.000 4.000
51. DAP Line -26.667 -48.000 -26.667 48.000 4.000
52. DAP Line -16.000 -48.000 -16.000 48.000 4.000
53. DAP Line -5.333 -48.000 -5.333 48.000 4.000
54. DAP Line 5.333 -48.000 5.333 48.000 4.000
55. DAP Line 16.000 -48.000 16.000 48.000 4.000
56. DAP Line 26.667 -48.000 26.667 48.000 4.000
57. DAP Line 37.333 -48.000 37.333 48.000 4.000
58. End Hatched Attach Pad
```

59. DAP Line	-48.000	48.000	-67.000	67.000	4.000
60. DAP Line	48.000	48.000	67.000	67.000	4.000
61. DAP Line	-48.000	-48.000	-67.000	-67.000	4.000
62. DAP Line	48.000	-48.000	67.000	-67.000	4.000
63. End Corner Ring Attach					
64. DAP Line	-48.000	24.000	-67.000	24.000	4.000
65. DAP Line	48.000	24.000	67.000	24.000	4.000
66. DAP Line	-48.000	0.000	-67.000	0.000	4.000
67. DAP Line	48.000	0.000	67.000	0.000	4.000
68. DAP Line	-48.000	-24.000	-67.000	-24.000	4.000
69. DAP Line	48.000	-24.000	67.000	-24.000	4.000
70. DAP Line	-24.000	48.000	-24.000	67.000	4.000
71. DAP Line	-24.000	-48.000	-24.000	-67.000	4.000
72. DAP Line	0.000	48.000	0.000	67.000	4.000
73. DAP Line	0.000	-48.000	0.000	-67.000	4.000
74. DAP Line	24.000	48.000	24.000	67.000	4.000
75. DAP Line	24.000	-48.000	24.000	-67.000	4.000
76. End Side Ring Attach					
77. [End U1]					

-
1. File Version.
 3. File name and time stamp.
 - 5:7. Project Input Files.
 9. (0,0) origin (Center or LLC).
 10. Back Bias. If none specified the value will be ??).
 12. LIQ_PART_NAME U1 Part name for the project.
 13. UNITS Microns Currently only microns are used.
 14. Technology Wire_Bond Flip Chip not supported yet.
 15. [Component Size] Component data header
 16. Compl Component length (Y axis).
 17. CompW Component Width (X axis).
 18. CompZ Component Thickness (Z axis)
 - 19:22. Component Bond Pad Section
 - a. CBP Entity Name.
 - b. CBP# The assigned number to the pad.
 - c. Xcoord The X coordinate for the pad (center / LLC).
 - d. Ycoord The Y coordinate for the pad (center / LLC).
 - e. Layer PCB Cad Layer.
 - f. Length Length of the pad (Y axis).
 - g. Width Width of the pad (X axis).
 - h. SignalName Net or Signal name.
 - i. Edge Assigned Eddge (L, B, R, T).
 - j. Shape For now only Rectangle is available.

[Component Bond Pads]								
*	CBP#	Xcoord	Ycoord	Layer	Length	Width	SignalName	Edge Shape
CBP	2	-46.228	42.823	CBP-NS	2.571	2.665	NET2	L RECTANGLE

23:26. Substrate Bond Pad Section

- a. SBP Entity Name.
- b. Xcoord The X coordinate for the pad (center / LLC).
- c. Ycoord The Y coordinate for the pad (center / LLC).
- d. Layer PCB Cad Layer.
- e. Length Length of the pad (Y axis).
- f. Width Width of the pad (X axis).
- g. Rotation if negative the rotation 0 CCW and if 0 or positive CW. The angle of rotation is calculated from the perpendicular to the edge.
- h. Shape Rectangle or Oval (Oval has round end caps).
- i. NetName Net or Signal name.
- j. Row The tier that was assigned to a WBP.

[Substrate Bond Pads]

* SBP#	Xcoord	Ycoord	Layer	Length	Width	Rot	Shape	NetName	Row
SBP 2	-93.629	75.160	SBP-NS	4.000	2.000	34.301	RECTANGLE	NET2	2

27:30. Wire Bond Section

- a. WB Entity Name.
- b. Xcoord The Die Pad X coordinate for the pad (center / LLC).
- c. Ycoord The Die Pad Y coordinate for the pad (center / LLC).
- d. Pin# The assigned pin number.
- e. Xcoord The WBP X coordinate for the pad (center / LLC).
- f. Ycoord The WBP Y coordinate for the pad (center / LLC).
- g. Pad Z Die thickness. In future versions used for stacked devices.

[Wirebonds]

* Pad#	Xcoord	Ycoord	Pin#	Xcoord	Ycoord	PadZ	PinZ
WB 2	-46.228	42.823	2	-93.629	75.160	0.000	0.000

[Files](#) [File Format](#)

27:30. Substrate Bond Pad Section

- a. RING Entity Name
- b. No. is the Die Pad assigned pad number.
- c. Shape Flat or Arc if Arc the Bulg value is used.
- d. UpperLeftX is the upper left corner X of the tier.
- e. UpperLeftY is the upper left corner Y of the tier.
- f. LowerRightX is the lower right corner X of the tier.
- g. LowerRightY is the lower right corner Y of the tier.
- h. Width is equal to the height of the pad for that tier.
- i. Bulg is used when the shape is Arc and defines the height of the tier arc at the X or Y axis.
- j. Net or Signal name.

```
[Rings]
*   No. Shape UpperLeftX UpperLeftY LowerRightX LowerRightY Width Bulg Net
RING 1 Flat -67.000 67.000 67.000 -67.000 4.000 0.000 Ground
RING 2 Flat -77.000 77.000 77.000 -77.000 4.000 0.000 ??
```

[Files](#) [File Format](#)

35:76. Die Attach Pad Section

- a. DAP Entity name.
- b. Shape Line or Rectangle.
- c. StartX X coordinate for the start of the line or upper left corner of a Rectangle
- d. StartY Y coordinate for the start of the line or upper left corner of a Rectangle
- e. EndX X coordinate for the end of the line or lower right corner of a Rectangle
- f. EndY Y coordinate for the end of the line or lower right corner of a Rectangle
- g. Width of the trace assigned in the Die Attach tool.

```
[Die Attach Pad]
*   Shape StartX StartY EndX EndY Width
DAP Line -48.000 48.000 48.000 48.000 4.000
```

[Files](#) [File Format](#)

Demo1a.kmd:

*Date=14Feb2010-10:38:10AM

T1>NetlistTab

T2>DieTab

FLPL>FileLoadPinList=C:\Program Files\Microsoft Visual
Studio\VB98\SourceCode\Tools2010\WireBondExplorer\AAAc.PinList

T2>DieTab

FLPL>FileLoadPinList=C:\Program Files\Microsoft Visual
Studio\VB98\SourceCode\Tools2010\WireBondExplorer\AAAc.PinList

FLNL>FileLoadNetList=C:\Program Files\Microsoft Visual
Studio\VB98\SourceCode\Tools2010\WireBondExplorer\AAAc.wrl

DIH>DieHeight=100

DIW>DieWidth=100

OO>OptionOrigin=Center

FLDP>FileLoadDiePicture=C:\Program Files\Microsoft Visual
Studio\VB98\SourceCode\Tools2010\WireBondExplorer\Die_100214_103934.b

mp

ZA>ZoomAll

T3>WBTab

T2>DieTab

[Files](#) [File Format](#) [Demo1b](#)

Demo1b.kmd: Created by running  Demo1a.kmd

*Date=14Feb2010-10:46:32AM

T1>NetlistTab

T2>DieTab

*Run .kmd File C:\Program Files\Microsoft Visual

Studio\VB98\SourceCode\Tools2010\WireBondExplorer\Demo1a.kmd

*Date=14Feb2010-10:38:10AM

T2>DieTab

FLPL>FileLoadPinList=C:\Program Files\Microsoft Visual

Studio\VB98\SourceCode\Tools2010\WireBondExplorer\AAAc.PinList

FLPL>FileLoadPinList=C:\Program Files\Microsoft Visual

Studio\VB98\SourceCode\Tools2010\WireBondExplorer\AAAc.PinList

FLNL>FileLoadNetList=C:\Program Files\Microsoft Visual

Studio\VB98\SourceCode\Tools2010\WireBondExplorer\AAAc.wrl

DIH>DieHeight=100.000

DIW>DieWidth=100.000

OO>OptionOrigin=Center

FLDP>FileLoadDiePicture=C:\Program Files\Microsoft Visual

Studio\VB98\SourceCode\Tools2010\WireBondExplorer\Die_100214_103934.b

mp

ZA>ZoomAll

ZA>ZoomAll

T3>WBTab

T2>DieTab

*End Run .kmd File

[Files](#) [File Format](#) [Demo1a](#)

AAAc.csv: If European numbers are use an AAAc.tsv will be created (Tab Seperated Value)

- a. DiePad this is the assigned Die Pad Number.
- b. PackagePin if one exists else left blank.
- c. 3 Types Power (**Red**), Ground (**Green**), Signal (**Blue**).
- d. X Die Pad center X coordinate .
- e. Y Die Pad center Y coordinate.
- f. Width Die Pad Width (X axis).
- g. Height Die Pad Height (Y axis).
- h. Edge The assigned edge of the Die Pad.
- i. Net Net or Signal name for the Die Pad.
- j. Tier Placement tier assigned to the WBP
- k. WBPX WBP center X coordinate.
- l. WBPY WBP center Y coordinate.
- m. WBPW WBP Width (X axis).
- n. WBPH WBP Height (Y axis).
- o. WBPROT Pad Rotation.

*DiePad,PckagePin,Typ,X,Y,Width,Height,Edge,Net,Tier,WBPX,WBPY,WBPW,WBPH,WBPRot
2,,Ground,-46.228,42.823,2.665,2.571,Left,,2,-93.629,75.160,2.000,4.000,34.301
3,,Signal,-46.185,38.275,2.665,2.571,Left,,3,-116.572,78.668,2.000,8.000,29.850

[Files](#) [File Format](#)

Half_AdderA.Wrl_SBR: Netlist Sorted by Reference Designator.

```
*****
* Wire Bond Explorer - Ver. 1.0.10
*
* Work Path - C:\Program Files\Microsoft Visual
Studio\VB98\SourceCode\Tools2010\WireBondExplorer\
*
* Output - Sorted By Ref - Half_AdderA.Wrl_SBR
* Created - 13, Feb, 2010 - 07:19:11 PM
*
* Input Net List - Half_AdderA.Wrl
* Created - 08Feb2010 - 02:26:23 PM
*****
```

Net List Name - Half_Adder

```
(U3, 7486)
1, A0
2, B0
3, UN20
4, A1
5, B1
6, UN21
7, SPL0
8, A2
9, B2
10, UN22
14, SPL1
```

```
(U4, 7408)
1, A0
1, A1
1, A2
2, B0
2, B1
2, B2
3, CARRY
7, SPL0
```

```
(U5, 7486)
14, SPL1
```

[Files](#) [File Format](#)

Half_AdderA.Wrl_SBN: Netlist Sorted by Net.

```
*****
* Wire Bond Explorer - Ver. 1.0.10
*
* Work Path - C:\Program Files\Microsoft Visual
Studio\VB98\SourceCode\Tools2010\WireBondExplorer\
*
* Output - Sorted By Net - Half_AdderA.Wrl_SBN
* Created - 13, Feb, 2010 - 07:19:11 PM
*
* Input Net List - Half_AdderA.Wrl
* Created - 08Feb2010 - 02:26:23 PM
*****
```

Net List Name - Half_Adder

```
(A0)
J123, 1
U3, 1
U4, 1
```

```
(A1)
J123, 4
U3, 4
U4, 1
```

```
(A2)
J123, 8
U3, 8
U4, 1
```

```
(B0)
J123, 2
U3, 2
U4, 2
```

```
(B1)
J123, 5
U3, 5
U4, 2
```

[Files](#) [File Format](#)

Half_AdderA.Wrl_NLS: Netlist Statistics

```
*****
* Wire Bond Explorer - Ver. 1.0.10
*
* Work Path - C:\Program Files\Microsoft Visual
Studio\VB98\SourceCode\Tools2010\WireBondExplorer\
*
* Output - Net List Stastics - Half_AdderA.Wrl_NLS
* Created - 13,Feb,2010 - 07:19:11 PM
*
* Input Net List - Half_AdderA.Wrl
* Created - 08Feb2010 - 02:26:23 PM
*****
```

Total Parts - 5

```
DUMMY1, 1
DUMMY2, 1
7486, 2
7408, 1
LIST6, 1
```

Total Components - 6

```
U1, DUMMY1
U2, DUMMY2
U3, 7486
U4, 7408
U5, 7486
J123, LIST6
```

,

Total Nets - 88

```
A0
A1
A2
B0
B1
B2
CARRY
DMY1
```

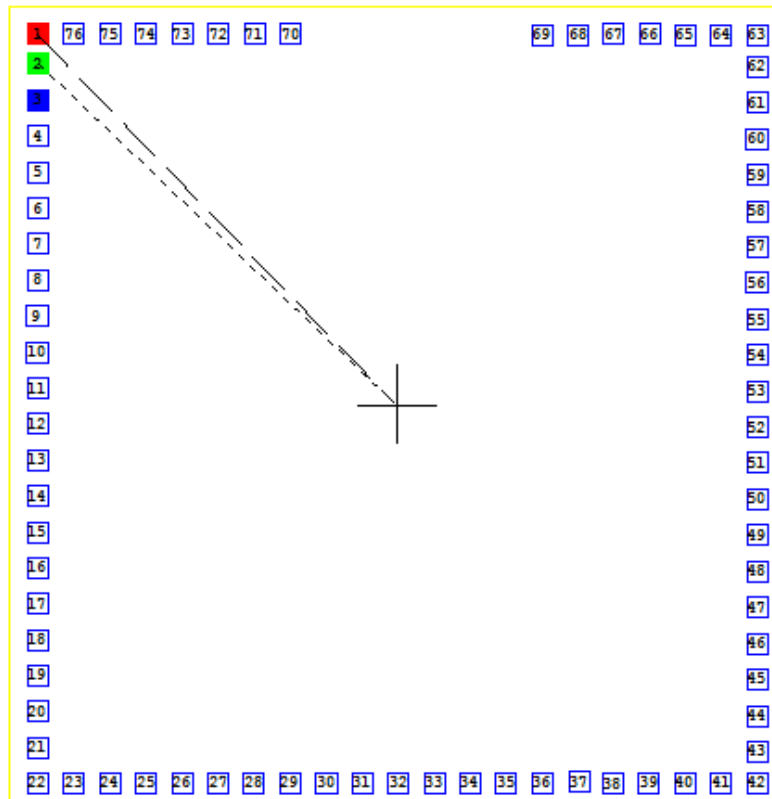
Total Nodes - 181

Single Node Nets - 3

```
DMY5 - U1, 5
DMY6 - U1, 6
DMY7 - U1, 7
```

[Files](#) [File Format](#)

U1_die.Doc: Die Data Sheet



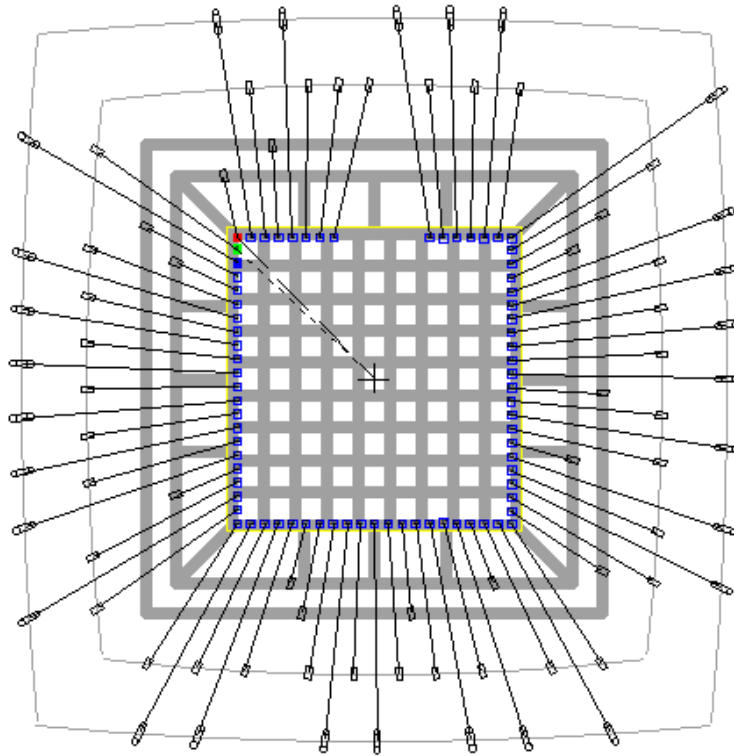
Component	U1	Created 13Feb2010
Part	DUMMY	Coordinate Origin Die Center
Back Bias		Units Microns
Die Height	100.000	Pin 1 Pointer — — — —
Die Width	100.000	Pin 2 Pointer
Die Thickness		

Copyright © 1976-2010 Prince Enterprises

Component	Bond	Pads					
CBP#	Xcoord	Ycoord	Length	Width	Edge	SignalName	
2	-46.228	42.823	2.571	2.665	Left	NET2	
3	-46.185	38.275	2.571	2.665	Left	NET3	
4	-46.171	33.754	2.571	2.665	Left	NET4	
5	-46.214	29.234	2.571	2.665	Left	NET5	
6	-46.270	24.713	2.571	2.665	Left	NET6	
7	-46.255	20.206	2.571	2.665	Left	NET7	
8	-46.313	15.713	2.571	2.665	Left	NET8	
9	-46.369	11.178	2.571	2.665	Left	NET9	
10	-46.340	6.630	2.571	2.665	Left	NET10	

[Files](#) [File Format](#)

U1_wb.Doc: Die Data Sheet



Component U1
Part DUMMY
Back Bias
Die Height 100.000
Die Width 100.000
Die Thickness

Created 13Feb2010
Coordinate Origin Die Center
Units Microns
Pin 1 Pointer — — — —
Pin 2 Pointer

Copyright © 1976-2010 Prince Enterprises

These 3 sections are the same as the [LIQ file format](#). Refer to that section for a definition of the fields.

[Component Bond Pads](#)

CBP#	Xcoord	Ycoord	Length	Width	Edge	SignalName
2	-46.228	42.823	2.571	2.665	Left	NET2
3	-46.185	38.275	2.571	2.665	Left	NET3

[Substrate Bond Pads](#)

SBP#	Xcoord	Ycoord	Length	Width	Rot	Shape
2	-93.629	75.160	4.000	2.000	34.301	RECTANGLE
3	-116.572	78.668	8.000	2.000	29.850	OVAL

[Wirebonds](#)

Pad#	Xcoord	Ycoord	Pin#	Xcoord	Ycoord	PadZ	PinZ
2	-46.228	42.823	2	-93.629	75.160	0.000	0.000
3	-46.185	38.275	3	-116.572	78.668	0.000	0.000

[Files](#) [File Format](#)

Wire Bond FanOut Statistics

Execute Fanout

*

Top Fanout

Top Step Count Group 1 = 18

Top Step Count Group 2 = 21

*

Left Fanout

Left Step Count Group 1 = 61

*

Bottom Fanout

Bottom Step Count Group 1 = 61

*

Right Fanout

Right Step Count Group 1 = 56

*

Left Statistics

Left Max. Angle = 34.324 Pad 21

Left Min. Wire Len. = 22.435 Pad 18

Left Max. Wire Len. = 81.771 Pad 3

Left Max. Wire Length Errors:

Pad	MaxWireLen	Tier
-----	------------	------

2	57.378	3
---	--------	---

3	81.771	4
---	--------	---

Left Max. Wire Angle Errors:

Pad	MaxWireAngle	Tier
-----	--------------	------

2	34.297	3
---	--------	---

3	30.582	4
---	--------	---

*

Bottom Statistics

Bottom Max. Angle = 33.484 Pad 42

Bottom Min. Wire Len. = 20.224 Pad 27

Bottom Max. Wire Len. = 79.501 Pad 41

Bottom Max. Wire Length Errors:

Pad	MaxWireLen	Tier
-----	------------	------

22	55.120	3
----	--------	---

23	79.324	4
----	--------	---

Bottom Max. Wire Angle Errors:

Pad	MaxWireAngle	Tier
-----	--------------	------

22	33.168	3
----	--------	---

23	29.446	4
----	--------	---

*

Right Statistics

Right Max. Angle = 34.776 Pad 63

Right Min. Wire Len. = 21.433 Pad 48
Right Max. Wire Len. = 84.250 Pad 63
Right Max. Wire Length Errors:
Pad MaxWireLen Tier
43 36.580 2
44 55.603 3

Right Max. Wire Angle Errors:
Pad MaxWireAngle Tier
43 33.185 2
44 30.457 3

*

Top Statistics
Top Max. Angle = 13.328 Pad 70
Top Min. Wire Len. = 20.915 Pad 1
Top Max. Wire Len. = 73.344 Pad 69
Top Max. Wire Length Errors:
Pad MaxWireLen Tier
64 49.648 3
65 72.103 4

Top Max. Wire Angle Errors:
Pad MaxWireAngle Tier
64 8.615 3
65 5.152 4

[Files](#) [File Format](#)

EDIF 2 0 0 (*There are several variations on the EDIF 2 0 0 format this is one.*)
(Sample File: Edif.net)

```
(edif &NETCHK1
(edifVersion 2 0 0)
(edifLevel 0)
(keywordMap (keywordLevel 0))
(status

(written
(timestamp 0 0 0 0 0 0)
(program "EDIF.DLL")
(comment "Original data from OrCAD CAPTURE schematic"))

(comment "Title field")
(comment "Saturday, November 03, 2007")
(comment "Doc (Dwg #) field")
(comment "Rev Code field")
(comment "OrgName field")
```

```

(comment "Addr 1")
(comment "Addr 2")
(comment "Addr 3")
(comment "Addr 4"))

(library MAIN_LIB
(edifLevel 0)
(technology

(numberDefinition
(scale 1 1 (unit distance))))

(cell &NETCHK1
(cellType generic)
(view NetlistView

(viewType netlist)
(interface)
(contents

(instance &C1
(viewRef NetlistView
(cellRef &CapSmall

(libraryRef OrCAD_LIB)))
(property PartValue (string "2.2"))
(property ModuleValue (string "CK06"))
(property TimestampValue (string "00000114"))))

(instance &H1
(viewRef NetlistView
(cellRef &2MINUSPin_Hdr

(libraryRef OrCAD_LIB)))
(property PartValue (string "2-Pin Hdr"))
(property ModuleValue (string "2x1Hdr100mil"))
(property TimestampValue (string "00000016"))))

(instance &H2
(viewRef NetlistView
(cellRef &2MINUSPin_Hdr

(libraryRef OrCAD_LIB)))
(property PartValue (string "2-Pin Hdr"))

```

```

(property ModuleValue (string "2x1Hdr100mil"))
(property TimeStampValue (string "000001B2"))

(instance &R1
(viewRef NetlistView
  (cellRef &Res_small

(libraryRef OrCAD_LIB)))
(property PartValue (string "1K"))
(property ModuleValue (string "QuarterWatComp"))
(property TimeStampValue (string "0000008A")))

(instance &R2
(viewRef NetlistView
  (cellRef &Res_small

(libraryRef OrCAD_LIB)))
(property PartValue (string "1K"))
(property ModuleValue (string "QuarterWatComp"))
(property TimeStampValue (string "000000AD")))

(net &GND

(joined
(portRef &1 (instanceRef &C1))
(portRef &2 (instanceRef &H2))
(portRef &2 (instanceRef &H1))))

(net &NET1

(joined
(portRef &1 (instanceRef &H1))
(portRef &1 (instanceRef &R1))))

(net &NET2

(joined
(portRef &2 (instanceRef &R1))
(portRef &2 (instanceRef &C1))
(portRef &1 (instanceRef &R2))))

(net &NET3

```



```
(joined  
(portRef &2 (instanceRef &R2))  
(portRef &1 (instanceRef &H2)))))))))
```

```
(design &NETCHK1  
(cellRef &NETCHK1  
(libraryRef MAIN_LIB))))
```

[Files](#) [File Format](#)

ORCAD/PCB II (Sample File: COUNTER.net)

```
( { Export from EDWinXP to ORCAD/PCB II  
}  
( 7404 U1 7404  
  ( 1 CLOCK )  
  ( 2 UN1 )  
  ( 3 UN5 )  
  ( 4 UN8 )  
  ( 5 ?1 )  
  ( 6 ?2 )  
  ( 7 SPL0 )  
  ( 8 ?3 )  
  ( 9 ?4 )  
  ( 10 ?5 )  
  ( 11 ?6 )  
  ( 12 ?7 )  
  ( 13 ?8 )  
  ( 14 5V )  
)  
( 7486 U2 7486  
  ( 1 UN11 )  
  ( 2 5V )  
  ( 3 UN9 )  
  ( 4 ?9 )  
  ( 5 ?10 )  
  ( 6 ?11 )  
  ( 7 SPL0 )  
  ( 8 ?12 )  
  ( 9 ?13 )  
  ( 10 ?14 )  
  ( 11 ?15 )  
  ( 12 ?16 )  
  ( 13 ?17 )  
  ( 14 5V )  
)  
( 7420 U3 7420  
  ( 1 UN9 )  
  ( 2 UN10 )  
  ( 3 ?18 )
```

```

( 4 UN8 )
( 5 UN3 )
( 6 RESET )
( 7 SPL0 )
( 8 ?19 )
( 9 ?20 )
( 10 ?21 )
( 11 ?22 )
( 12 ?23 )
( 13 ?24 )
( 14 5V )
)
( 7474 U4 7474
( 1 RESET )
( 2 UN12 )
( 3 UN1 )
( 4 5V )
( 5 UN11 )
( 6 UN12 )
( 7 SPL0 )
( 8 UN6 )
( 9 UN10 )
( 10 5V )
( 11 UN12 )
( 12 UN6 )
( 13 RESET )
( 14 5V )
)
( 7474 U5 7474
( 1 RESET )
( 2 UN7 )
( 3 UN6 )
( 4 5V )
( 5 UN5 )
( 6 UN7 )
( 7 SPL0 )
( 8 UN2 )
( 9 UN3 )
( 10 5V )
( 11 UN7 )
( 12 UN2 )
( 13 RESET )
( 14 5V )
)
)

```

[Files](#) [File Format](#)

ORCAD Wirelist

Wire List

My Project
 2010
 2010-1000
 My Company
 My Address 1
 My Address 2
 My Phone Number

Revised: May 19,
 Revision:

<<< Component List >>>

?	R1	RN50
?	J1	8SIP100
?	C1	CK06
?	P1	9SIP100
?	U1	3SIP100
?	Q1	3SIP100
?	R2	RN50
?	C2	CK06
.		
.		
.		

<<< Wire List >>>

NODE	REFERENCE	PIN #	PIN NAME	PIN TYPE	PART VALUE
[00001]	N00001				
	C14	2	2	Passive	?
	U16	5	VS	Passive	?
	J2	1	1	Passive	?
	Q5	3	3	Input	?
	D14	1	1	Passive	?
	Q6	2	2	Input	?
	D17	2	2	Passive	?
[00002]	N00002				
	J2	3	3	Passive	?
	D15	1	1	Passive	?
	Q8	3	3	Input	?
	D16	2	2	Passive	?
	C16	2	2	Passive	?
	Q7	2	2	Input	?
	U17	5	VS	Passive	?
[00003]	N00003				
	C19	2	2	Passive	?
	U18	5	VS	Passive	?
	J2	5	5	Passive	?
	Q9	3	3	Input	?
	D20	1	1	Passive	?
	Q10	2	2	Input	?
	D23	2	2	Passive	?

.
.

[Files](#) [File Format](#)

Pads PCB (Sample File: PadsPCB.net)

PADS-PCB

PART

C1 CK06
H1 2x1Hdr100mil
H2 2x1Hdr100mil
R1 QuarterWatComp
R2 QuarterWatComp

NET

SIGNAL GND
C1.1 H2.2 H1.2
SIGNAL NET1
H1.1 R1.1
SIGNAL NET2
R1.2 C1.2 R2.1
SIGNAL NET3
R2.2 H2.1
END

[Files](#) [File Format](#)

Wire Bond Explorer Bug and Enhancement Report

To make a bug report, please include:

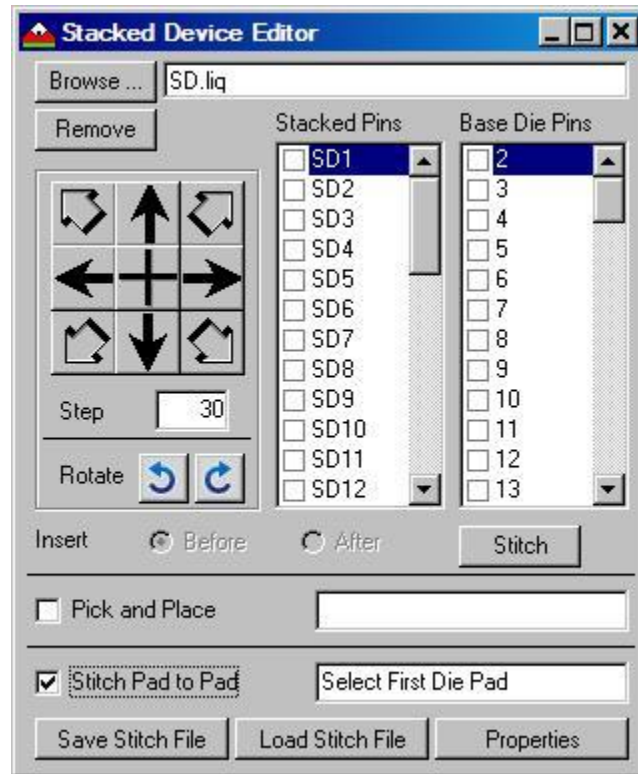
- The run log.
- Supporting Documents.
- Description of the bug.
- Send an email with attachments to me at doug@windytop.com

To Request an enhancement, Please include:

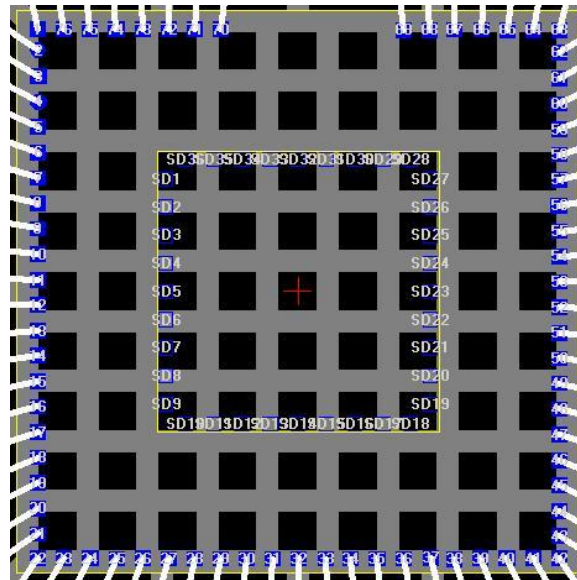
- A description of the enhancement.
- When the enhancement would be used.
- Interface description.
- Input Data
- Output Data

In any case please feel free to make any comments

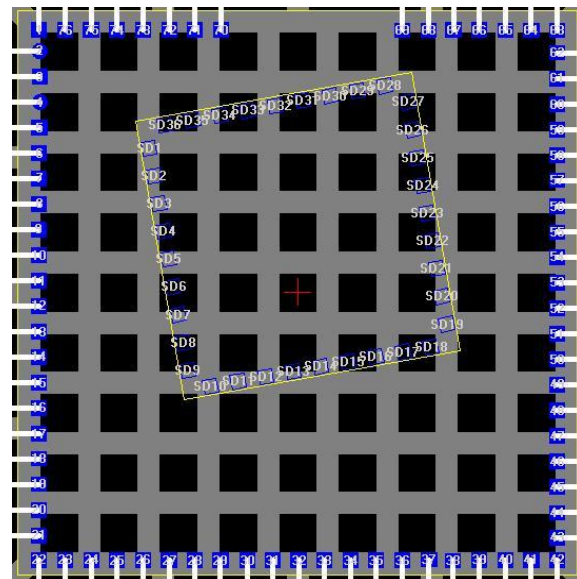
Stacked Device Editor



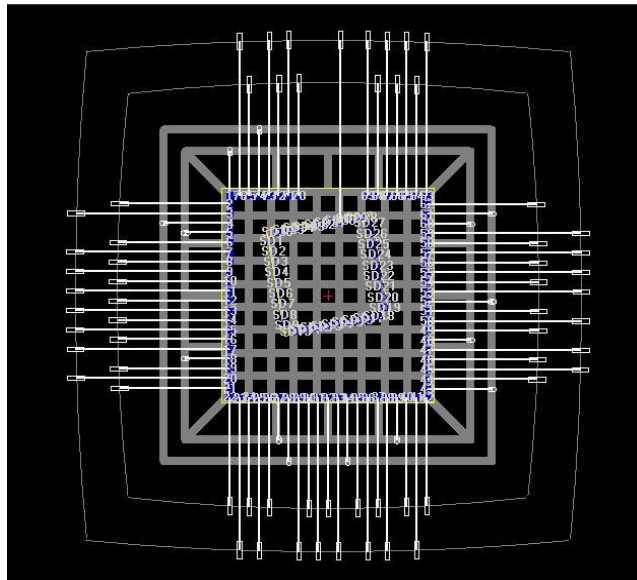
The Stacked Device Editor allows you to add a stacked device to the design and position it using the arrow keys and rotation buttons. The Step value is used to determine the amount of the move in microns or rotation in degrees. To add a stacked device, click on the browse button and locate the LIQ file for the die that you wish to add to the project. This LIQ file should contain only die data and all other structures will be ignored.



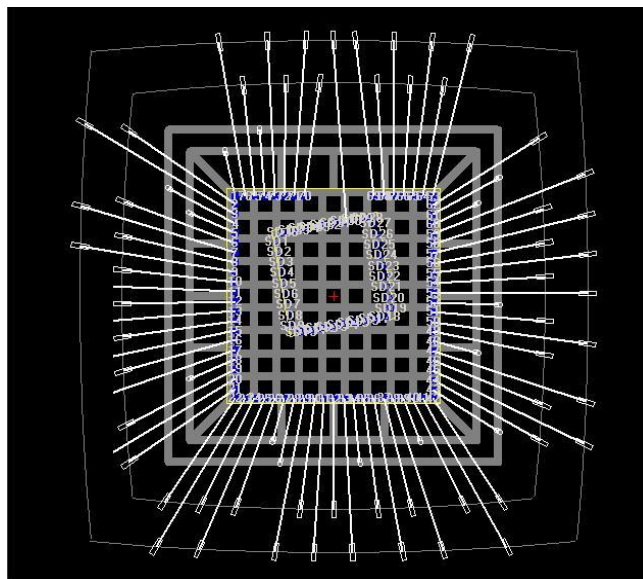
The die can be rotated and moved to any position you wish using the arrow keys and rotation buttons.



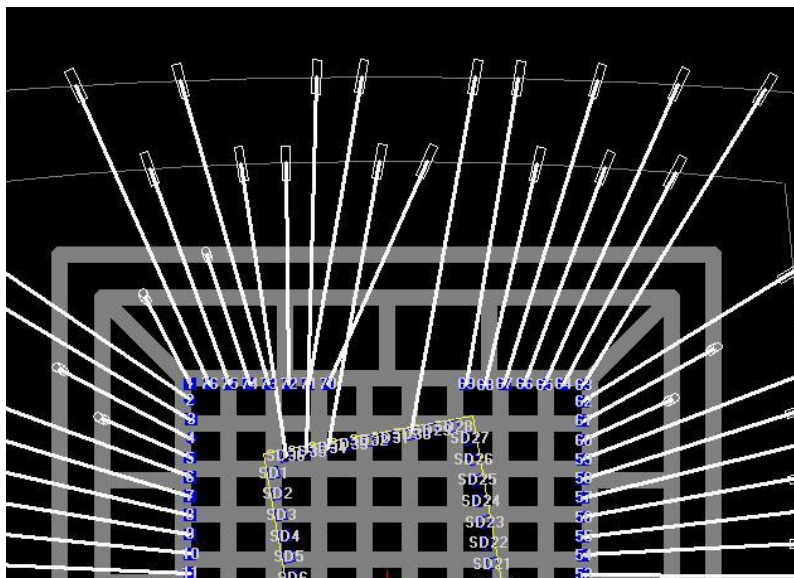
Once the die is in the desired position the pads can be bonded out using the Assign tool. For this exercise only 1 pad will be bonded out. Select pad SD30 in the Assign tool and assign it to tier 4



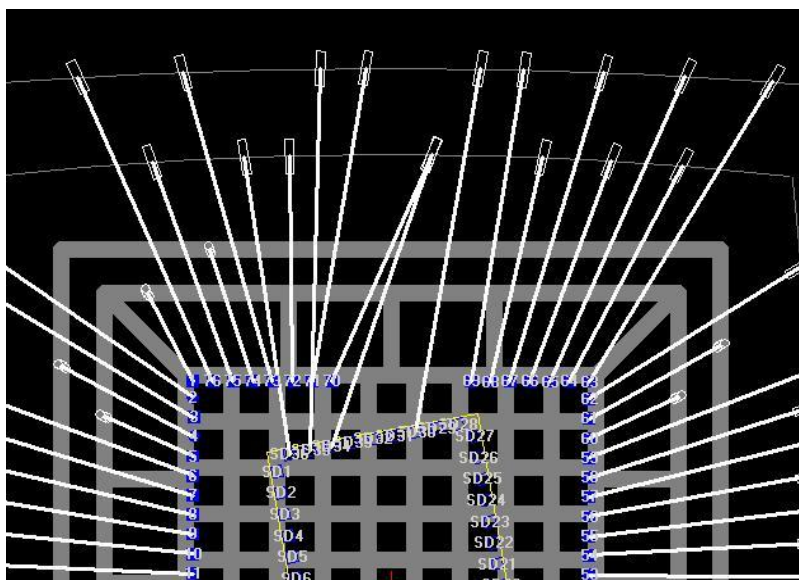
Next open the Fan Out tool and run the fan out process.



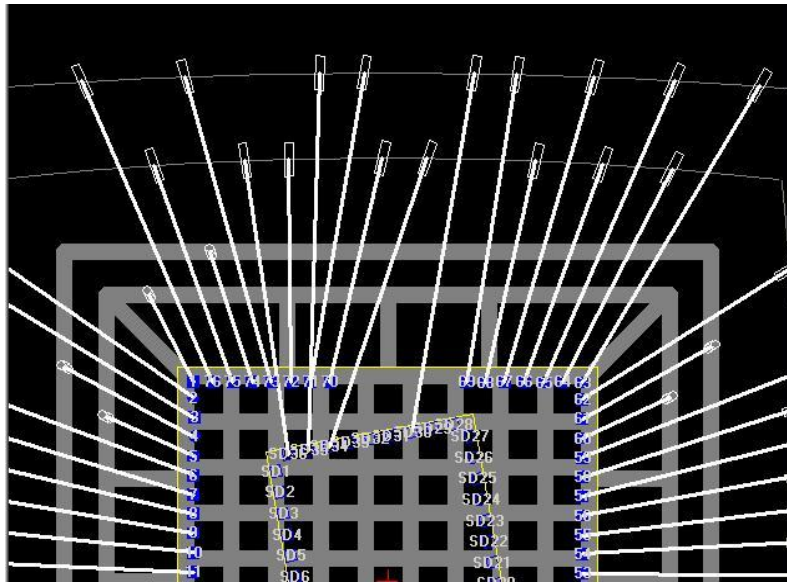
Open the Assign tool again and select SD34, SD35 and SD36 placing them on alternating tiers 3 and 4 using the >> button. Run the fan out again.



Now you see that there are crossed Bond Wires. To fix this problem open the Stacked Device tool and click on the Pick and Place check box. This will allow you to reorder the pads to fix the crossed wire problem. Select the SBP connected to pad 34 and then click on the SBP connected to pad 70. This will reposition the SBP pin SD34 before SBP pin 70. In the Fan Out tool check Keep Pin Order and Keep Edges options. This will preserve the position of the SBP pin order during the fan out process. Make sure that the Before option is also selected. Selecting the After option will place the pad after the selected destination pad. In this case we want to place it before the selected destination pad.

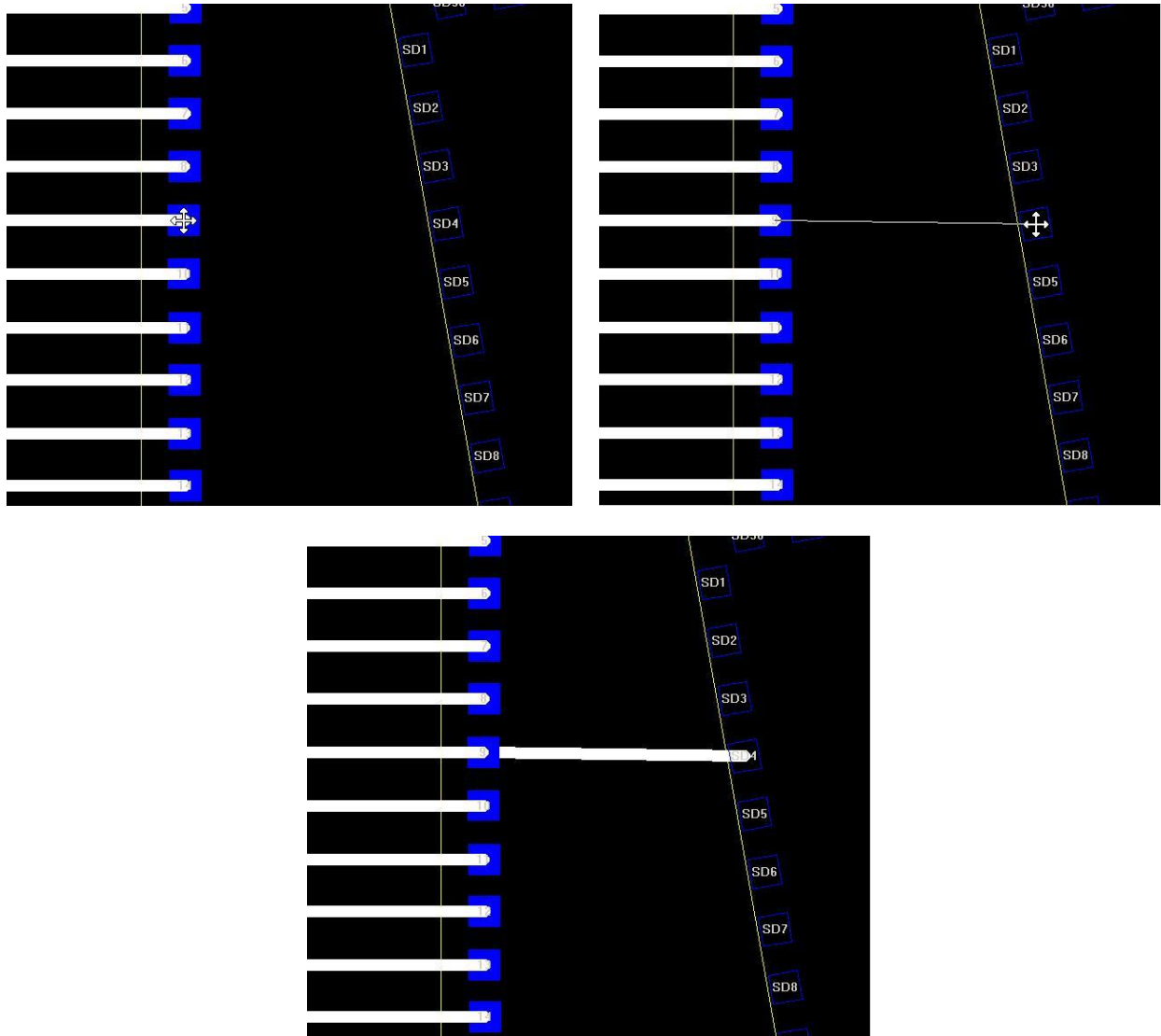


Run the fan out process again and look at the result. You will see that the wires no longer cross.

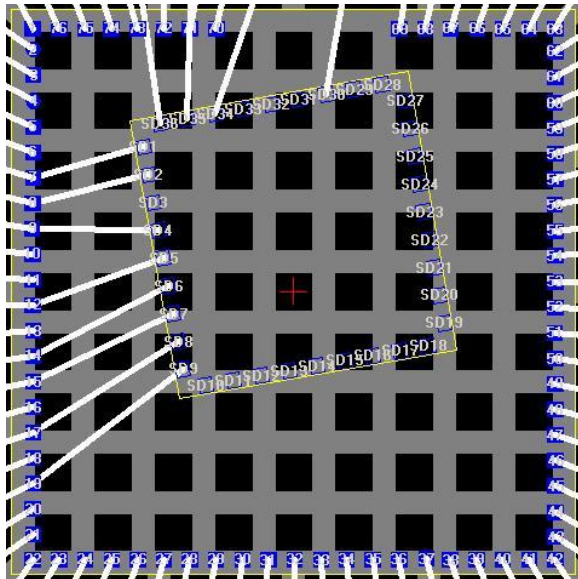


This same process can be done from the pick lists. The Stacked Pins is a list of all the Stacked Device pins that have been placed into the design using the Assign tool. The All Pins list is a list of all the pins in the design. Select a pin from the Stacked Pins list and then a pin from the All Pins list and click the Move button.

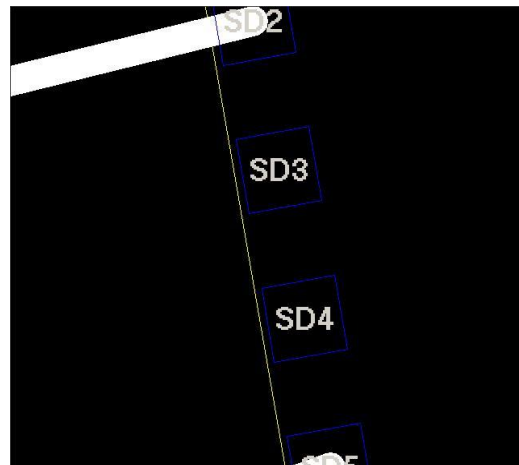
Now let's say you want to stitch some signals from the stacked device to the base die. To do this, select the Stitch Pad to Pad option in the Stacked Device Editor. To initiate a stitch select either a CBP or an SBP followed by the selection of the destination pad on the other die. Continue doing this until all the pads are stitched.



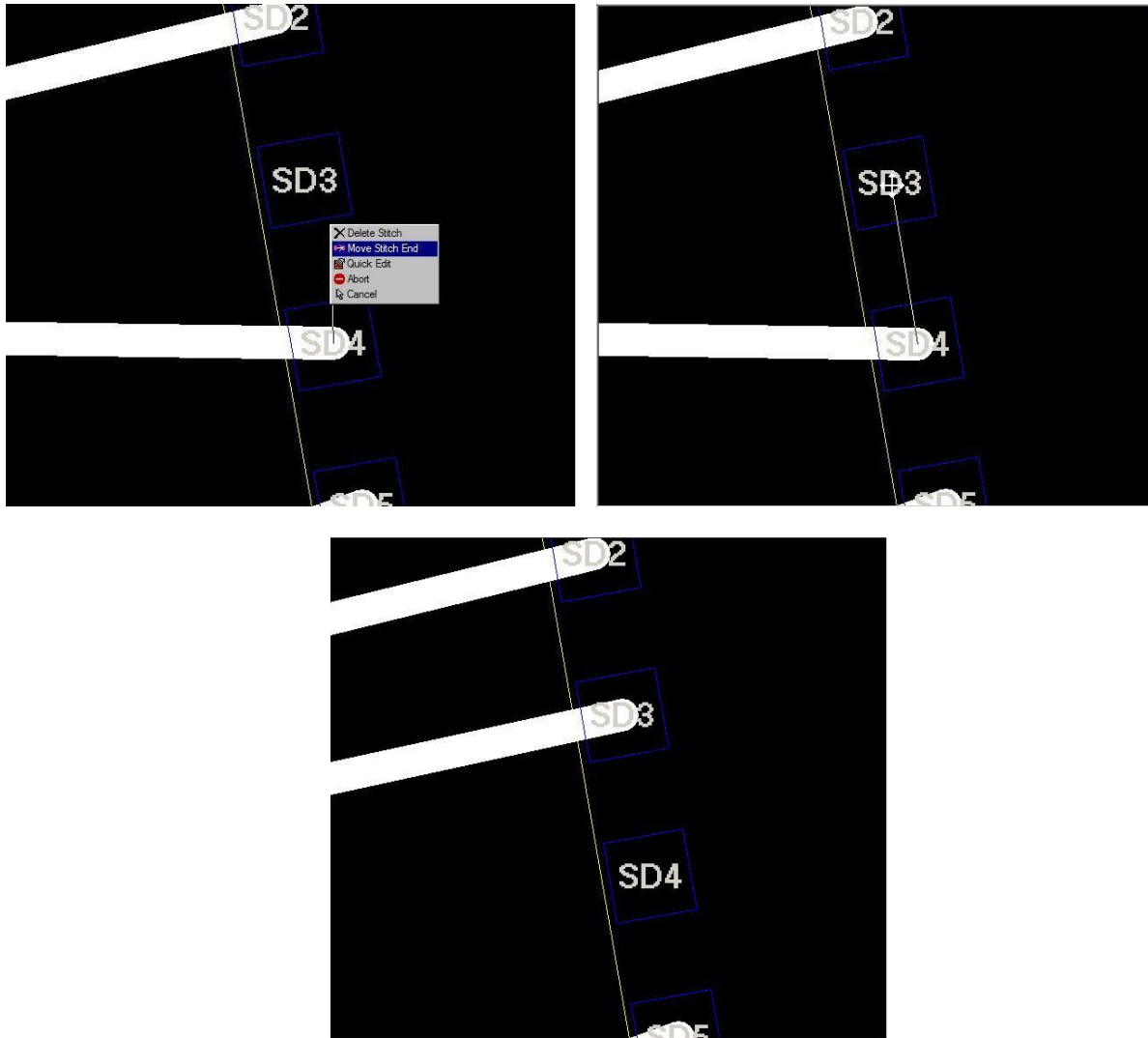
Once completed, the stitched information can be saved using the Save Stitch File option at the bottom of the tool. This will save the stitched data as a *.stch file with the SD pad listed followed by the base die pad. This file can be edited and then loaded back into the tool using the Load Stitch File option.



- While you are in the Stitch Pad to Pad mode you can modify the bond wires using the popup menu tools by right clicking on the screen. To delete a stitch move the cursor over one of the pads attached to the wire you wish to delete and select Delete Stitch or press the Del key. This will remove the wire form the database.

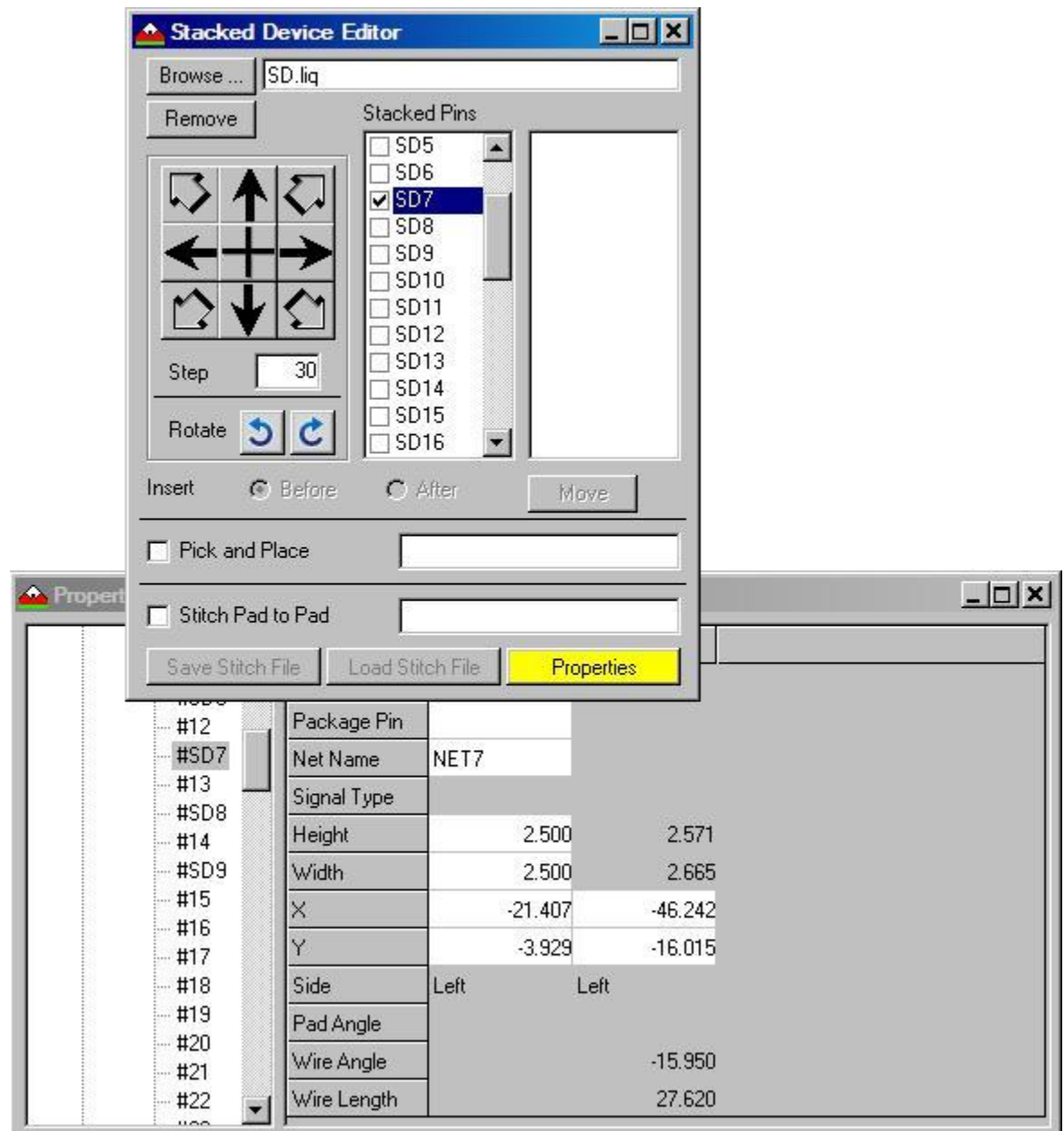


- To move the end of the Stitch, select the pad at the end of the stitch to be moved followed by the selection of the destination pad.

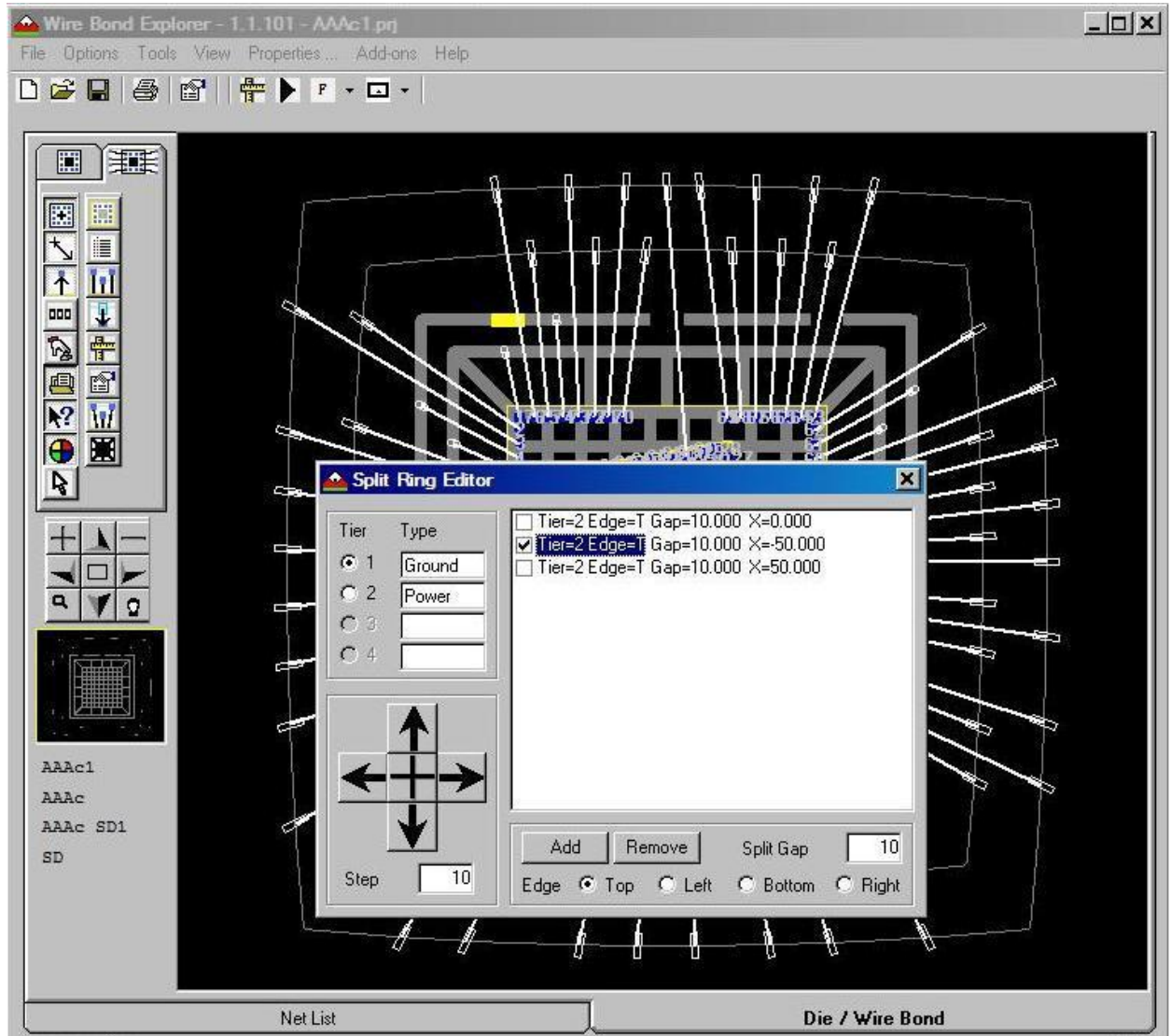


- Quick Edit will open the Quick Edit dialog box
- Abort will stop the current edit.
- Cancel will end the Stitch Pad to Pad process.

To view the properties of pads and stitches of the stacked device, click the Properties button. This will open the properties dialog box. As you move the cursor over the pads on the stacked device the properties for that pad and stitch if there is one are displayed. The wire angle is referenced to the stacked device edge taking rotation into consideration.



Split Ring Editor



This tool allows you to manage Split Rings for multiple power and grounds.

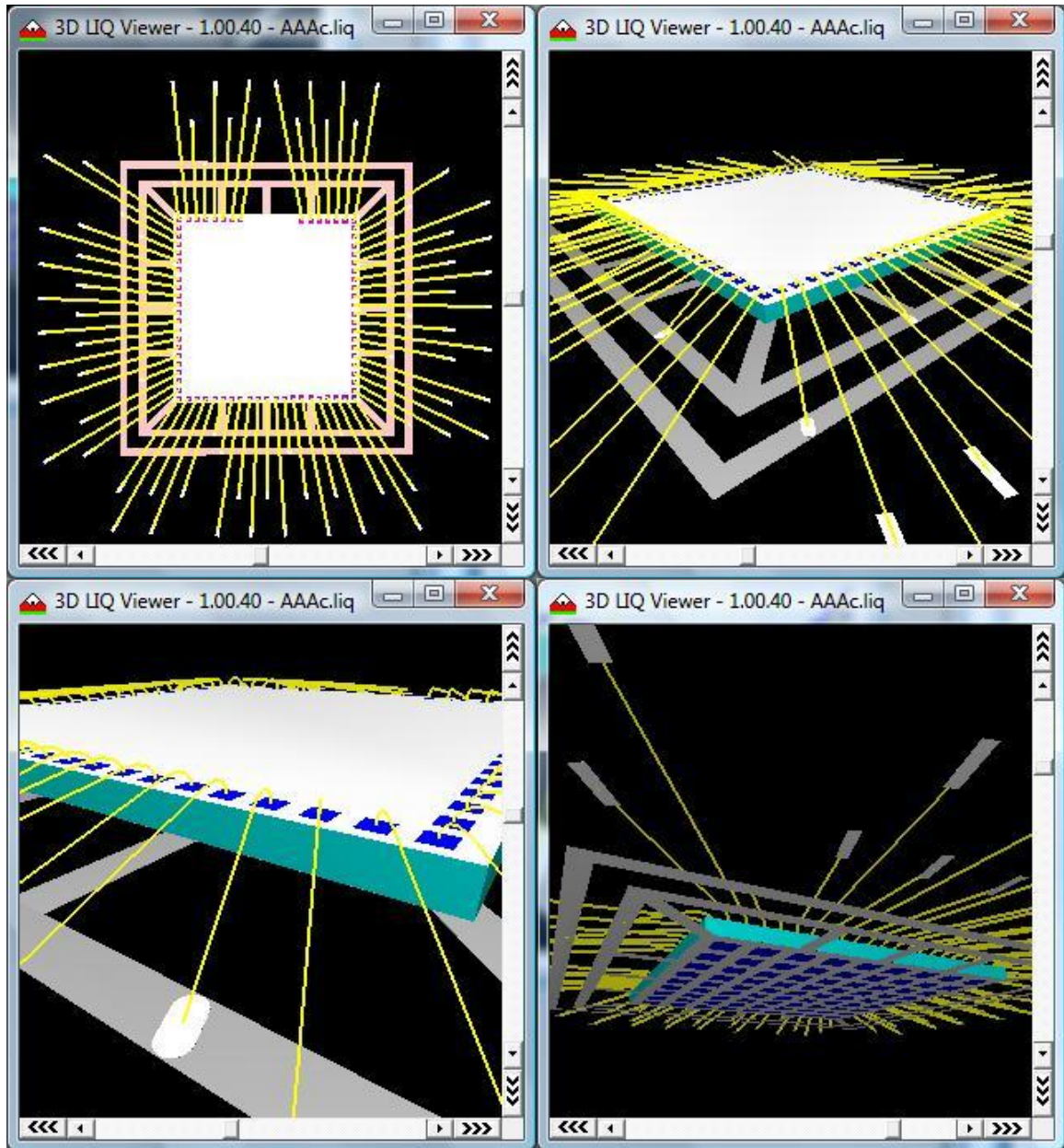
- **Tier:** Is used when adding a split to a ring.
- **Type:** is just a label assigned to the tier and cannot be changed here.
- **Step:** is the step rate in microns when the arrow buttons are used.
- **List:** Displays the Ring Splits, Split Gap and Location within a given tier.
- **Edge:** Is used to select the edge for new split additions.

- **Split Gap:** Defines the Split Gap when a new Gap is created. It is also used to change the Gap if selected Splits.
- **Add:** Is used to create a new split.
- **Delete:** Is used to delete selected Splits.

By selecting a split in the list by checking the select box, you can delete the split or move it with the arrow keys. As you select splits they are highlighted yellow. The + moves the split to the center of the edge. All moves made by either by using the arrow buttons or the mouse is limited to the edge ends of the tier they are on.

You can also select splits to edit by moving the cursor over a split while the Split Ring tool is open. To select multiple splits, hold down the shift key while moving the cursor over another split. Once selected you can use the arrow keys to move the split(s) or click anywhere on the screen other than on a split and you can move the splits by moving the cursor. To change the size of a Split Gap, select the splits you want to change and enter a new Split Gap value and press enter and the selected gaps will be resized.

3D LIQ Viewer



This LIQ Viewer allows you to view an LIQ file in 3D. Using the arrow, + and - keys and scroll bars you can rotate the die and change the viewing angle so you can visualize the relationship between the die, bond pads and wires from any viewing angle. In addition, the Shift, Ctrl and Alt keys add even more functionality to the arrow keys as described below.

To access this program from the Library Builder use the Files\Export\to LIQ Viewer menu item in the Library Builder program. This will build an LIQ file for the current design in the applications directory and pass it to the 3D LIQ Viewer.

Standard Key Functions

- **Up** and **Down** arrows rotates the die in the x axis (Pitch).
- **Left** and **Right** arrows rotate the die in the Z axis (Yaw).
- + and – keys zoom in and out.
- **Shift**² + **UP** or **Down** arrows rotates the die in the X axis at a accelerated rate¹.
- **Shift**² + **Left** or **Right** arrows rotate the die in the Z axis at an accelerated rate¹.
- **Shift**² +(plus) or – (minus) keys zooms in and out at an accelerated rate¹.
- **Ctrl** + **Up** or **Down** arrows looks up and down.
- **Ctrl** + **Left** or **Right** arrows looks left and right.
- **Alt** + **Up** or **Down** arrows zooms in and out like the + and – keys.
- **Ctrl** + **Alt** + **Left** or **Right** arrows pan left and right.
- **Ctrl** + **Alt** + **Up** or **Down** arrows pan up and down.
- **Home** key returns the design to the default state.

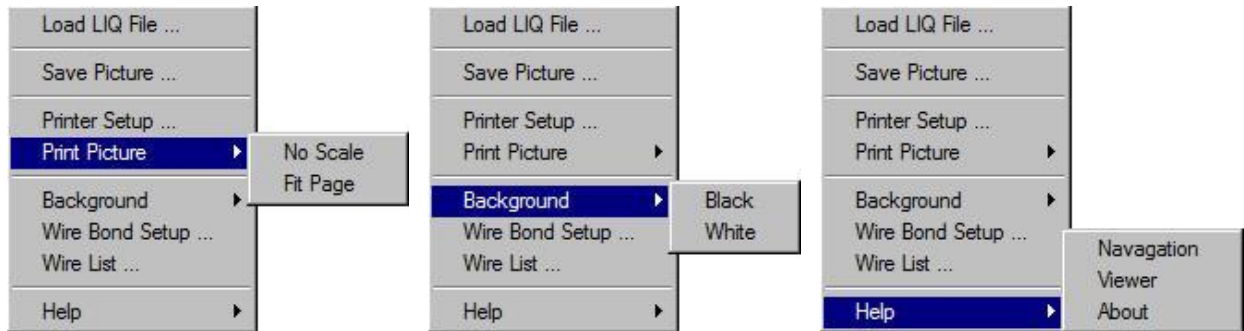
Note:

1. When using the keypad for movement, the **accelerated rate** is twice the speed of the normal rate. When using the mouse the **accelerated rate** is based on how fast you move the mouse. The faster you move the mouse the greater the change in movement.
2. When the shift key is pressed and the accelerated rate has not been enabled with a double click the cursor changes to the accelerated rate arrow as if the mode was activated with a double click. When the shift key is released the accelerated rate is ended and the arrow returns to the normal state.

All these functions can also be executed using the mouse only

- **Left mouse down and move** rotates the image the same way as the left, right, up and down arrows.
- **Left mouse down + Ctrl and move** looks around the same way as the Ctrl arrows

- **Left mouse down + Alt** and move up and down zooms in and out the same as Alt arrows.
- **Left mouse down + Ctrl + Alt** and move pans around the same way as the Ctrl + Alt arrows.
- **Double clicking** the mouse will change the arrow indicating that the **accelerated rate** is active like using the shift key with the arrows. Double click again to exit the **accelerated rate**.
- **Middle mouse down** and move pans left, right, up and down.
- **Mouse Wheel** zooms in and out is a combination of a pan to the position where the mouse is and a zoom. The mouse is then moved to the center of the screen..
- **Right mouse** displays a pop up menu.



- **Load LIQ File** opens the open file dialog box allowing you to load an LIQ file for viewing.
- **Save Picture** opens the save file dialog box allowing you to save a screen image to a named file.
- **Printer Setup** opens the printer set up dialog box.
- **Print Picture** has two options.
 - **No Scale** will print a screen image to the printer with no scaling.
 - **Fit Page** will print a screen image to the printer scaled to fit the page.
- **Background** has two options.
 - **Black** displays the image on a black background.
 - **White** displays the image on a white background with some color changes for viewing purposes.
- **Wire Bond Setup** displays the dialog box for setting up the wire bond parameters. These are used to help visualize the wire bonds as well as passing needed information to the [LR Estimator](#).
- **Wire List** allows you to pick wires for display from a pick list
- **Help** has 3 options
 - **Navigation** lists all the navigation key and mouse functions.
 - **Viewer** describes the basic features of the 3D LIQ Viewer.
 - **About** displays information about the program.

Wire Bond Setup

Material: ☒ Au ☐ Al ☐ Cu

Wire Diameter Mils: ☐ 0.5 ☐ 0.7 ☐ 0.8 ☒ 1.0 ☐ 1.25 ☐ 1.5 ☐ Custom

Frequency: ☐ hz ☐ Khz ☒ Mhz ☐ Ghz

Base Loop Height: ☒ Default to Die Height ☐ Custom

Base Loop Extension: ☒ Default to Die Height ☐ Custom

Stack Loop Height: ☒ Default to Die Height ☐ Custom


Stacked Loop Extension: ☒ Default to Die Height ☐ Edge of Base Die ☐ Custom

Stitch Loop Extension: ☒ Default to Die Height ☐ Custom

Apply OK Cancel

Load Save Reset

LCR Estimator



```

LIQFile=AAAclSplitArc.liq
Material=Au
WireDiameter=1
Frequency=1000000
BaseLoopHeight=4
BaseExtension=4
StackLoopHeight=4
StackExtension=4
StichExtension=4

```

Scroll Bars and Buttons

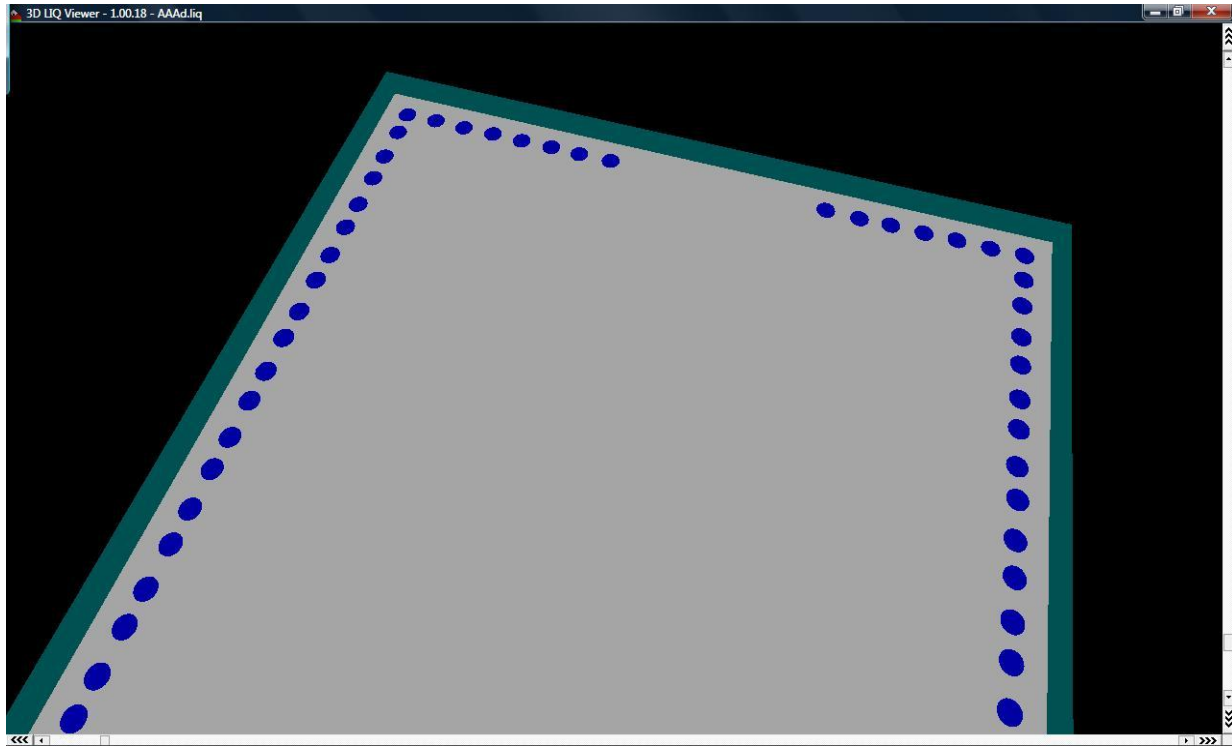
- The scroll bar at the bottom of the screen (Yaw) rotates the image around the Z axis -180° to 180° default 0°.
- The scroll bar at the right of the screen (Pitch) rotates the image around the x axis -90° to 270° default 90°.
- The arrow buttons at the ends of the bottom scroll bar pan the image left and right.
- The arrow buttons at the ends of the right scroll bar pan the image up and down.
- Both of the above functions differ from the look up, down, left and right functions which tilt the view. The pan functions move the image left, right, up and down.
- At the lower right where the two scroll bars meet there is another small button that does the same thing as the Home key.

Loading the liq file for view

If the **properties/shortcut/target** for the LIQ file is set to point to this program it will be loaded when the LIQ file is double clicked in the Windows Explorer. You can also use the **Send To** function if the LIQ Viewer has been added to the send to list. This program was written to interface with the Library Builder as an add on feature. For demonstration purposes the AAAC.LIQ file is being sent along with this program and the program has been set up to use this LIQ file as a default demo.

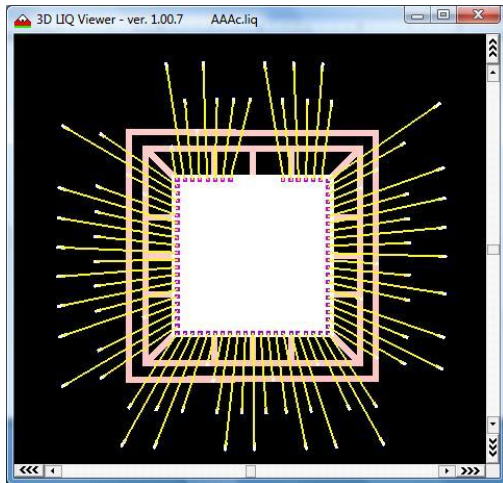
Flip Chip Technology

When a Flip Chip is loaded the bottom of the die is not drawn and you see the pads on the backside of the die top as you rotate or flip the die. This will allow you to visualize the placement when the chip has been flipped.

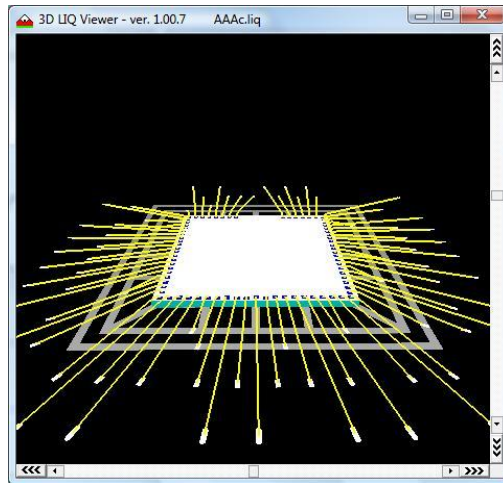


Key navigation using combinations of Shift, Ctrl, Alt with the arrow keys.

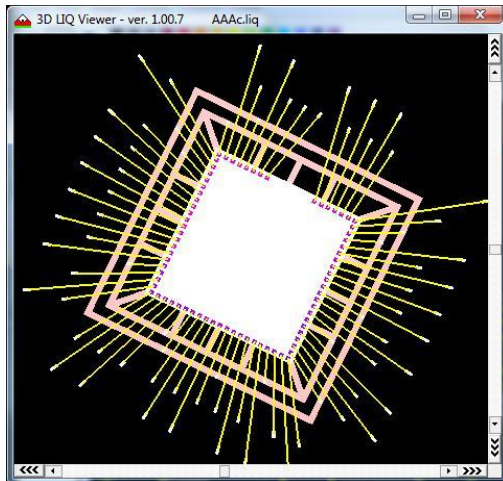
Home:



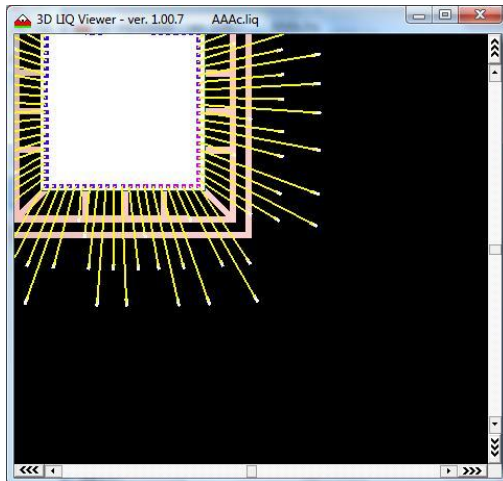
Pitch (Up, Down keys)



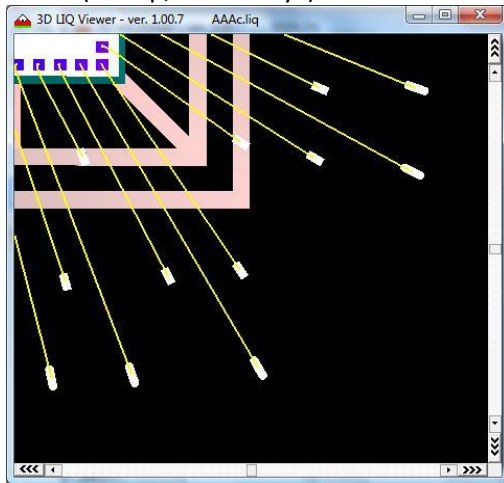
Yaw (Left and Right) keys



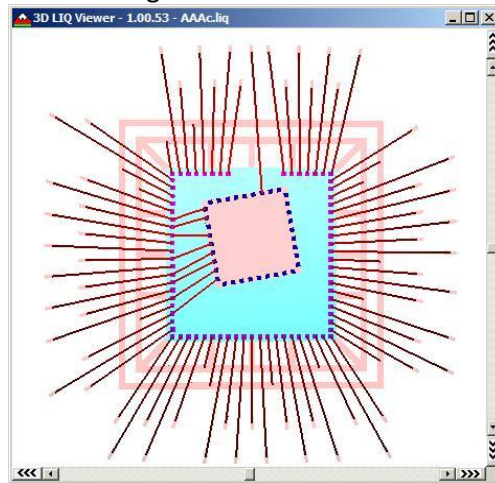
Pan (Ctrl + Alt and Arrow Keys)



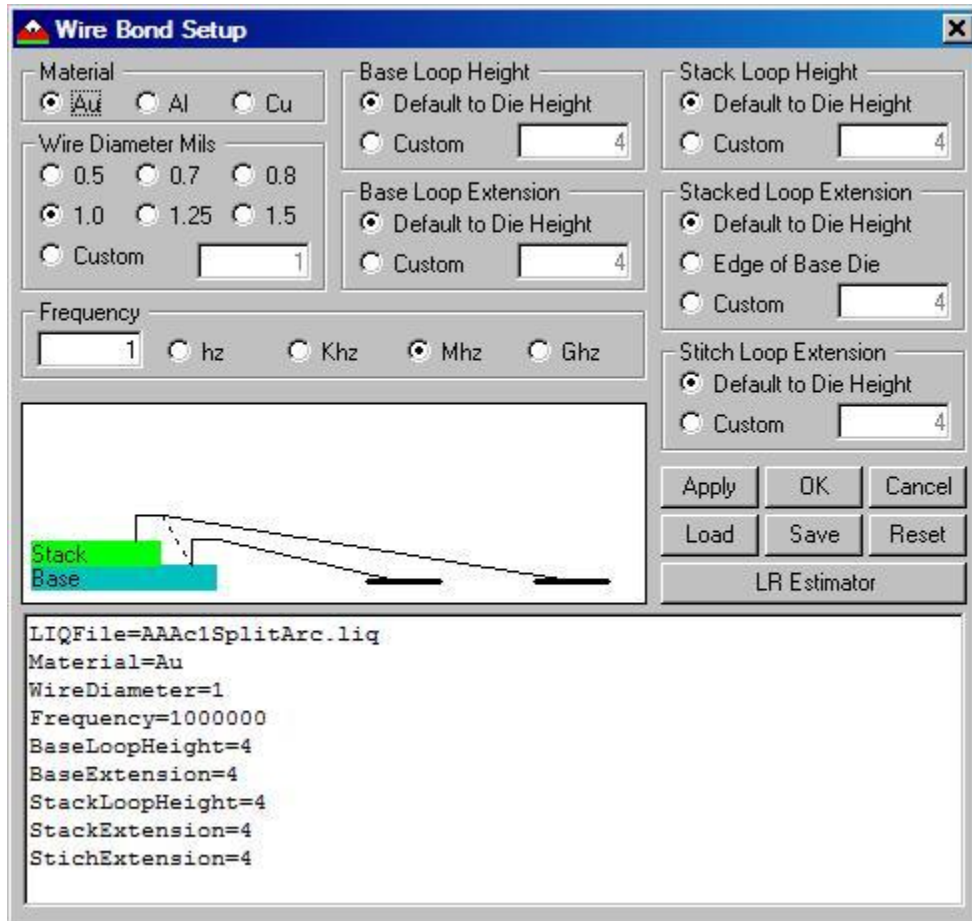
Zoom (Alt Up, Down keys)



White Background



Wire Bond Setup



The Wire Bond Setup dialog box contains the following sections:

- Material:** Radio buttons for Au (selected), Al, and Cu.
- Wire Diameter Mils:** Radio buttons for 0.5, 0.7, 0.8, 1.0 (selected), 1.25, and 1.5. A Custom option with a text box containing 1.
- Frequency:** A text box containing 1, and radio buttons for hz, Khz, Mhz (selected), and Ghz.
- Base Loop Height:** Radio buttons for Default to Die Height (selected) and Custom (with a text box containing 4).
- Stack Loop Height:** Radio buttons for Default to Die Height (selected) and Custom (with a text box containing 4).
- Base Loop Extension:** Radio buttons for Default to Die Height (selected) and Custom (with a text box containing 4).
- Stacked Loop Extension:** Radio buttons for Default to Die Height (selected), Edge of Base Die, and Custom (with a text box containing 4).
- Stitch Loop Extension:** Radio buttons for Default to Die Height (selected) and Custom (with a text box containing 4).

Buttons: Apply, OK, Cancel, Load, Save, Reset, and LR Estimator.

Diagram: A schematic showing a wire bond loop between a 'Stack' (green) and a 'Base' (blue) die. The wire starts at the base, goes up to form a loop, and then goes down to the stack.

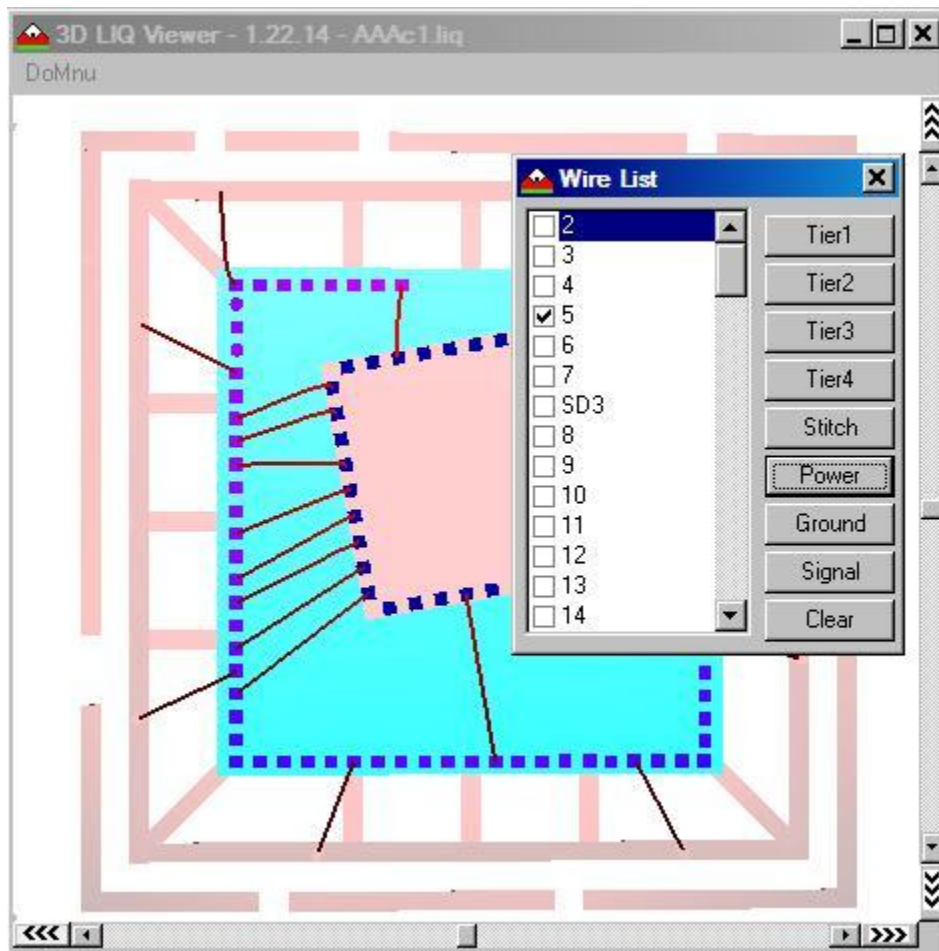
Text area:

```
LIQFile=AAAc1SplitArc.liq
Material=Au
WireDiameter=1
Frequency=1000000
BaseLoopHeight=4
BaseExtension=4
StackLoopHeight=4
StackExtension=4
StichExtension=4
```

- **Material** defines the metal used for the wire. This is used when calculating the resistance of the wire in the [LR Estimator](#).
- **Wire Diameter** is measured in Mils with common sizes selected using the radio buttons. For a custom diameter select the custom option and enter the value in the text box. Used when calculating the inductance and resistance of the wire.
- **Frequency** is selected using the hz, Khz, Mhz or Ghz option with the base value in the text box. Used when calculating the resistance of the wire.
- **Base Loop Height** is the height of the wire bond loop as it leaves the base die. As changes are made the diagram is updated to reflect the change in height. Default is the height if the die. A custom height can be entered when the custom option is selected. Measured in Microns.
- **Base Loop Extension** is the horizontal extension portion of the wire and has a default of the base die height. A custom extension can be entered when the custom option is selected. Measured in Microns.

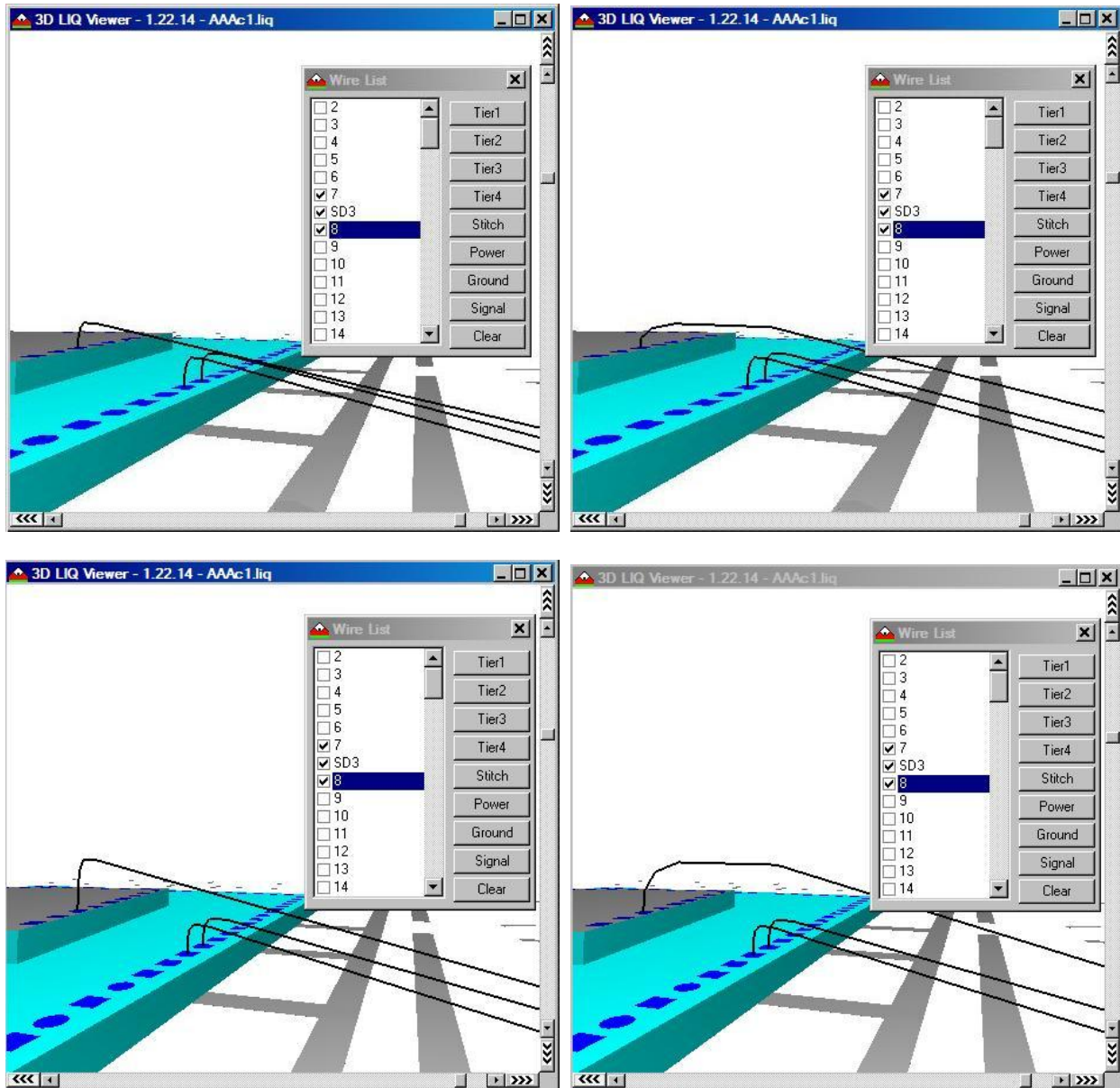
- **Stack Loop Height** is the height of the wire bond loop as it leaves the stacked die if one is used. If no stacked die is present these options are not enabled. As changes are made the diagram is updated to reflect the change in height. Default is the height of the die. A custom height can be entered when the custom option is selected. Measured in Microns.
- **Stack Loop Extension** is the horizontal extension portion of the wire and has a default of the base die height. A custom extension can be entered when the custom option is selected. An additional option for the stacked die is to extend the wire to the edge of the base die. Measured in Microns.
- **Stitch Loop Extension** is used when a stacked die is stitched to the base die. A custom extension can be entered when the custom option is selected. Measured in Microns.
- The text box at the bottom of the tool displays the setup parameters that are in the .lcr file.
- **Command Buttons:**
 - **Apply** will make the changes to the 3D View.
 - **OK** will apply the changes to the 3D Viewer and close the Wire Bind Setup tool.
 - **Cancel** will close the Wire Bond Setup tool without making any changes to the 3D Viewer.
 - **Load** will allow you to load a previously saved [.lcr file](#) that contains the setup parameters for the Wire Bond Setup tool.
 - **Save** will save the setup parameters to an .lcr file.
 - **Reset** returns the values to their original default settings. Heights and extensions are defaulted to the die height.
 - **LCR Estimator** will save the wire bond parameters to an [.lcr file](#) and invoke the LCR Estimator tool.

Wire List

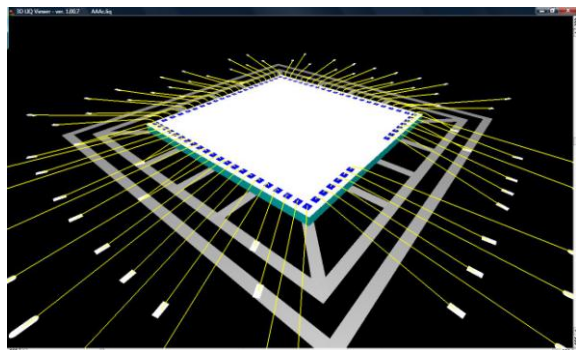
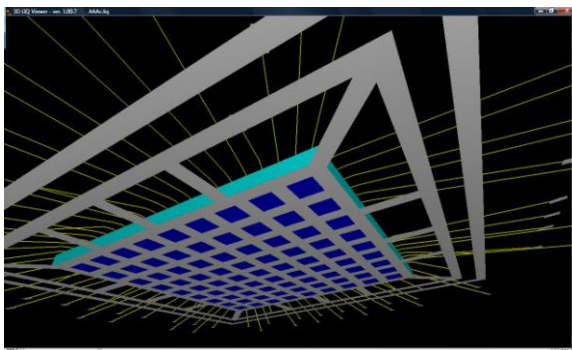
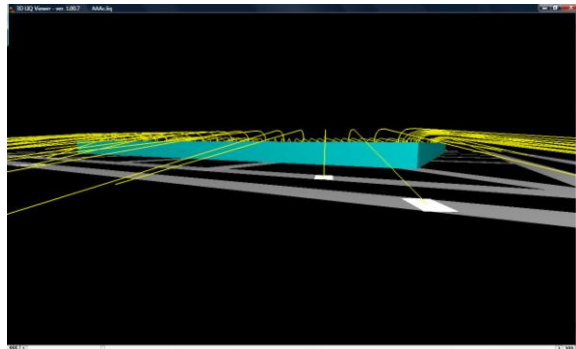
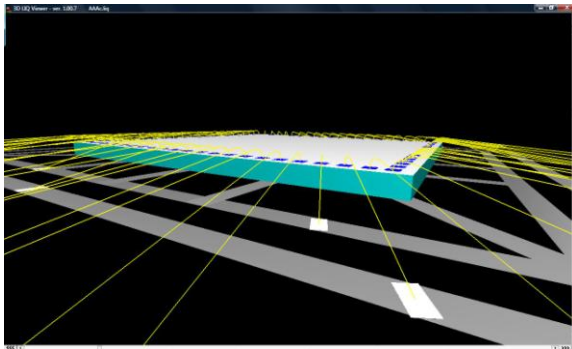
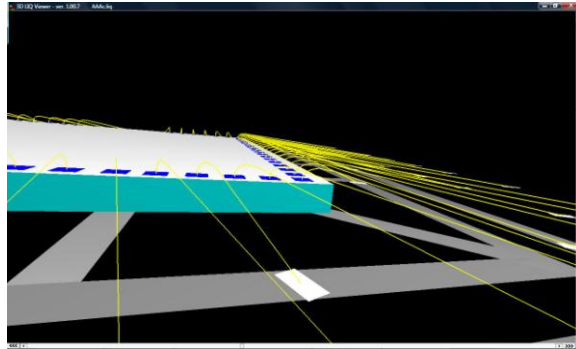
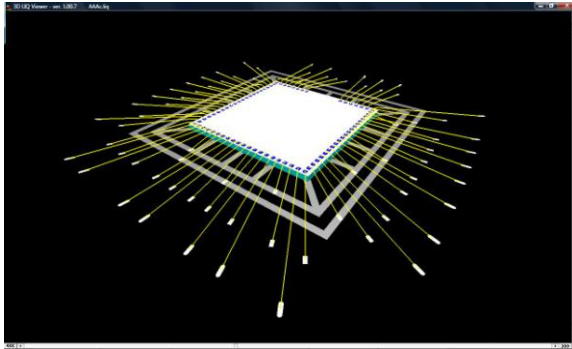


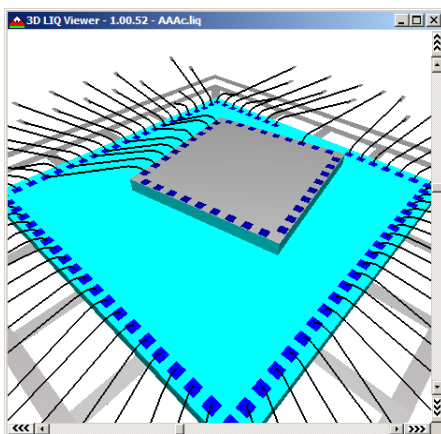
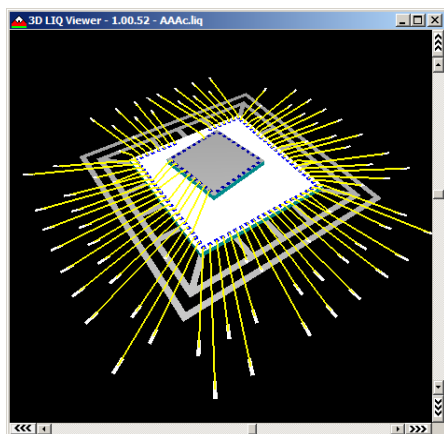
This tool allows you to select specific wires for viewing. In the example above the Powers and stitched wires were selected using the quick pick buttons at the right side of the tool. Clicking on a button will highlight the wires associated with the button. Individual wires can also be selected from the pick list at the left. This tool is accessed from the right click popup menu and initially no wires are displayed. Each time you make a selection using the quick pick buttons only those wires will be displayed. To add wires from other groups hold down the shift key while making a selection and likewise to select/deselect a group by holding down the CTRL button when selecting a group button. The clear button will clear all selected wires from the viewing area. When the tool is closed, all wires will be displayed again. This tool is useful if you want to view a selected group of wires without the congestion of all the other wires. When 3D Viewer is invoked from the Wire Bond Explorer and additional file (.vu) is generated that has the signal type definition that is not carried in the LIQ file. If it is not present than the signal type selections are disabled.

Below are four views of three wires showing the spacing difference before and after the wire loop is extended to the edge of the die with and without loop height increased on the stack die.



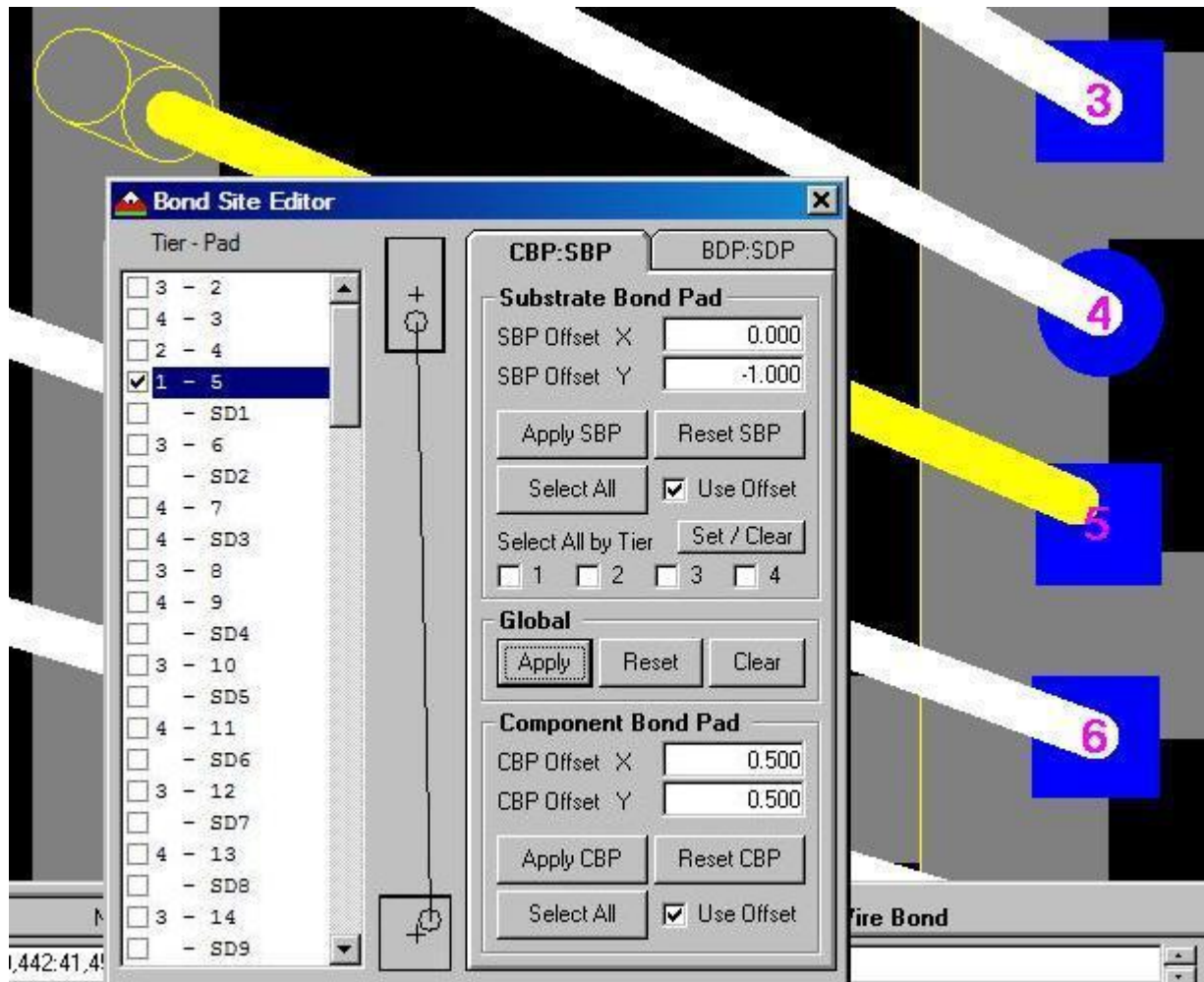
Other screen shots





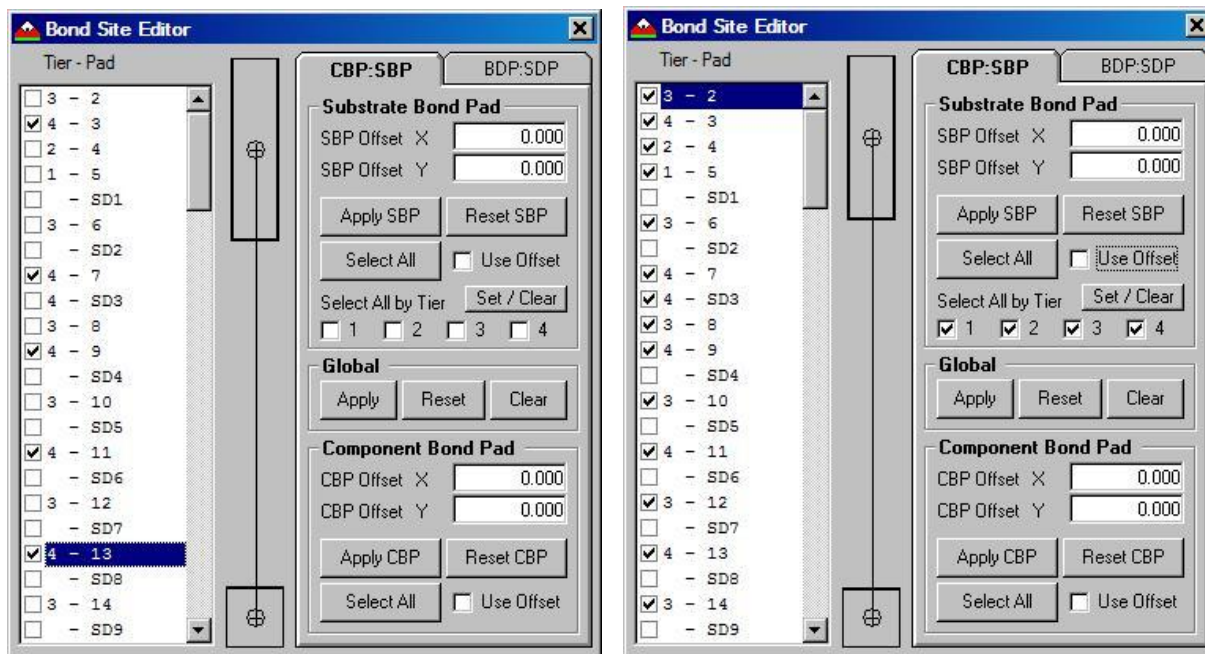
Bond Site Editor

The Bond Site Editor is a tool that allows you to selectively modify the locations of the bonding sites on either the die bond pad or the substrate bond pad. There are 2 tabs on the editor. The CBP-SBP is used to modify bonding sights on wires that run from the die to the substrate. The BDP-SDP is used to modify bonding sites on wires that run form a stacked device to the base device. As pins are selected from the Pick List the corresponding wire is highlighted on the main editing window and a diagram of the selected objects is displayed in the Bond Site Editor. If multiple pins are selected and they are the same the data fields will contain valid data. If not they will be left blank. All movements are relative to the side meaning a + offset in the Y direction is away from the die and a + X offset moves the point to the right. The diagram is useful to help you visualize this movement. In the example below the SBP for pad 5 the bond site has been moved -1 microns and the CBP bond site has been moved .5 in both the X and Y directions.



CBP-SBP:

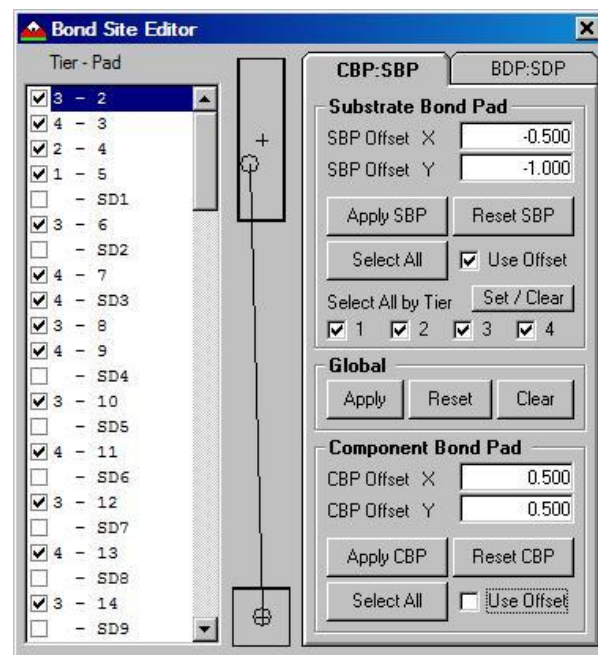
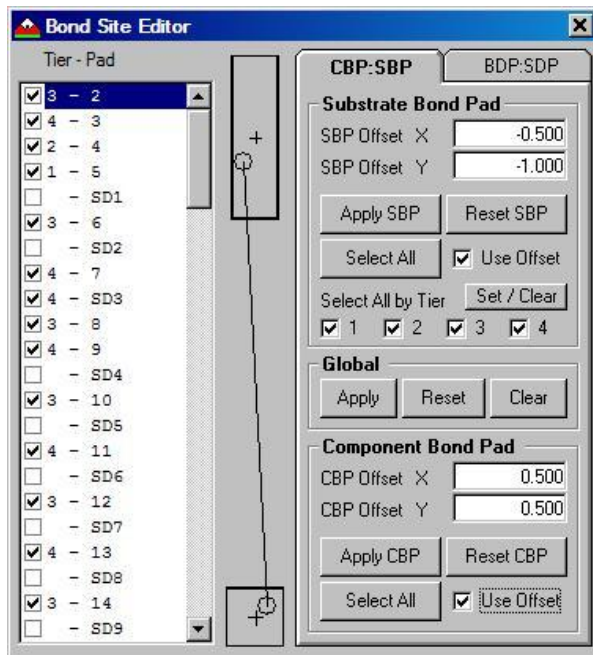
Selecting pins from the list can be done either by individual selecting in the list or by using the Select All buttons at the right. In the SBP (top) section you can select SBPs by Tier when using the Select All button. The Set / Clear button will alternately select and deselect tiers. Notice that in this case that the SD pins are not selected.



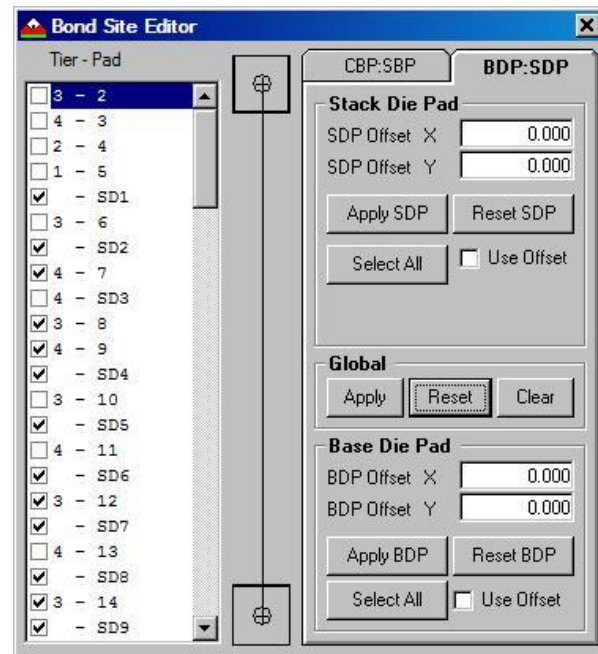
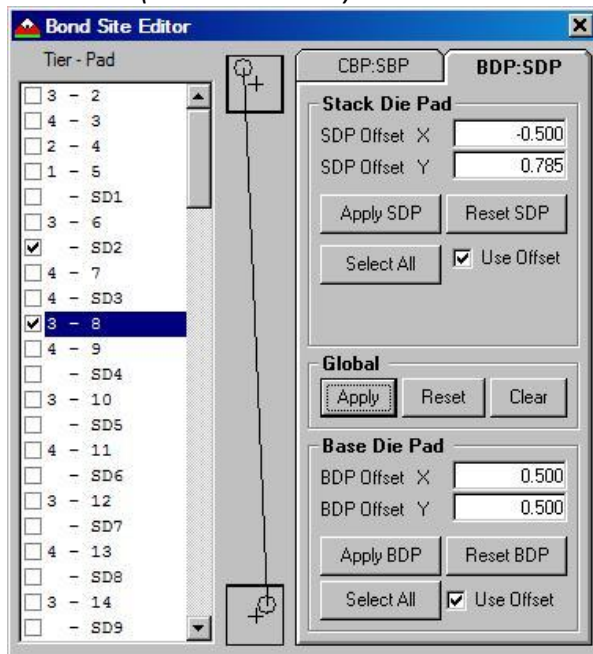
Once selected, you can modify the bond site location of the selected pins by entering the offsets for the SBP, CBP and clicking the Apply SBP, Apply CBP buttons. Clicking the Apply buttons will also check the Use check box. The Use check box will also in turn apply the settings to the bond wires. This will update the database but to see the results you need to check the Use check box. The use parameter lets you to alternately use the offset information or default to the center of the die. In the case below, both offsets are use in the left diagram and the CBP is deselected in the right diagram.

Clicking the Reset buttons will reset the offsets for the selected pad(s) to the origin and clear the Use Offset check boxes.

The Global buttons act on both the SBPs and CBPs at the same time. The clear option will unselect all pads in the list. This can also be accomplished by clearing all the tier check boxes and clicking on the Select button in the SBP section.



BDP-SDP: (Stacked Device)

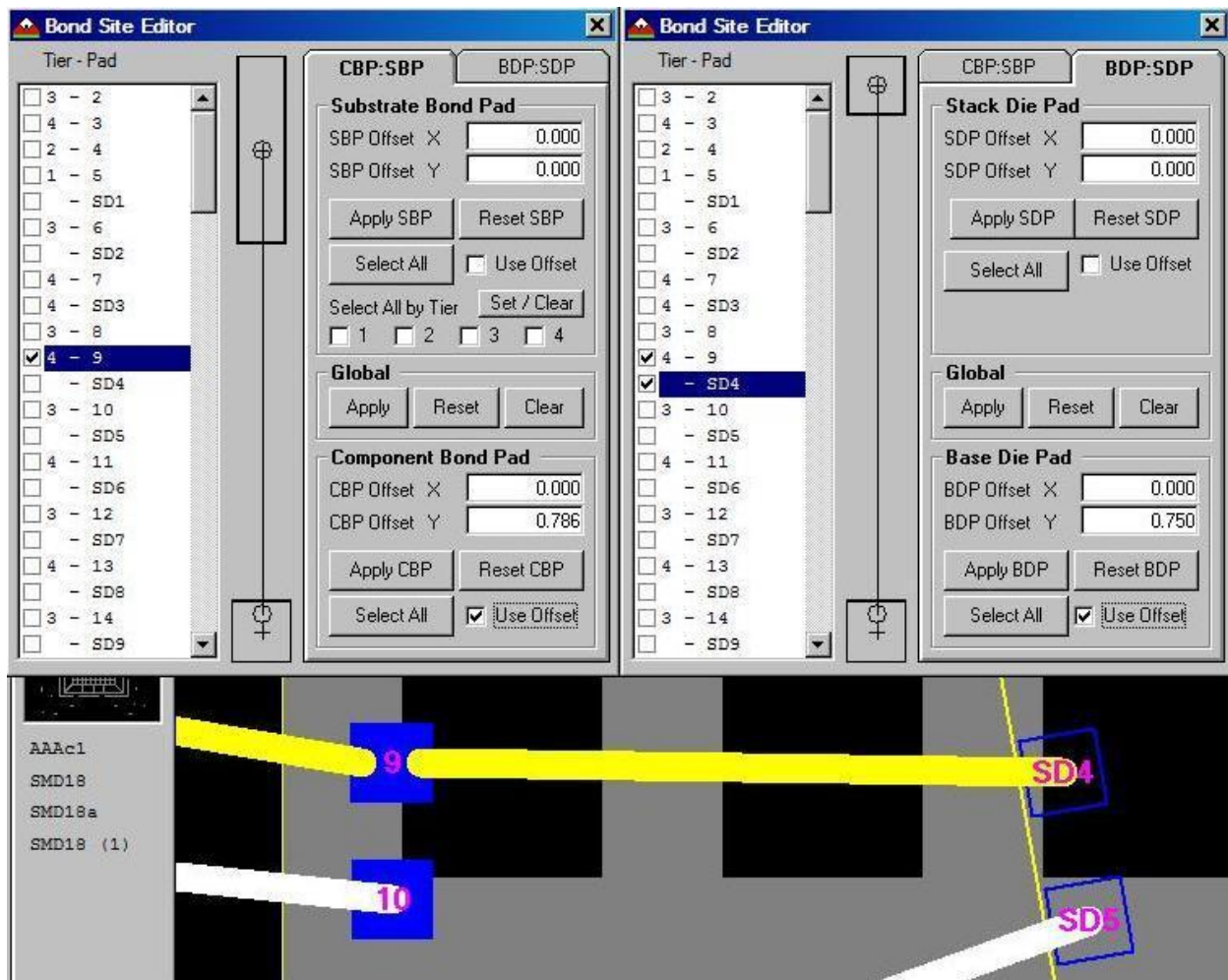


The same functions also apply to the BDP-SDP tab with the exception that you don't have to tier options since these wires go from Die to Die. When selecting all BDP, all the pads on the Base Die are selected. When selecting all the SDP, only the pads with stitching are

selected. As pads are selected if any are in the stitch list the corresponding stitch wire bond is displayed in yellow along with the substrate wire bonds if one exists.

Note: If you attempt to place a wire end outside the pad dimensions, the tool will auto correct for this and place it inside the pad dimensions to the taking into consideration the diameter of the wire.

By editing both the **CBP-SBP** and **BDP-SDP** you can effectively have a die pad with 2 bond sites as seen below for pin 9 should you wish to stitch from a stacked device and then also bond the same pad out to the substrate.



Note: The view presented in the preview box represents a view looking from the CBP to the SBP (top edge equivalent view) or BDP to the SDP (bottom edge equivalent view).

LR Estimator

Single Die

Stacked Die (The stitch wire is a dot line)

This tool is used to give you a quick estimation of the LR values of a wire bond. If only one die is present than the left view shows the enabled options. If a stacked device is present the right view shows the enabled options. The .lr file contains the setup parameters used in the LR calculations. The wire information comes from an LIQ file named in the .lr file.

- **Material** defines the metal used for the wire. This is used when calculating the resistance of the wire in the LR Estimator.
- **Wire Diameter** is measured in Mils with common sizes selected using the radio buttons. For a custom diameter select the custom option and enter the value in the text box. Used when calculating the inductance and resistance of the wire.
- **Frequency** is selected using the hz, Khz, Mhz or Ghz option with the base value in the text box. Used when calculating the resistance of the wire.
- **Base Loop Height** is the height of the wire bond loop as it leaves the base die. As changes are made the diagram is updated to reflect the change in height. Default is the height if the die. A custom height can be entered when the custom option is selected. Measured in Microns.
- **Base Loop Extension** is the horizontal extension portion of the wire and has a default of the base die height. A custom extension can be entered when the custom option is selected. Measured in Microns.
- **Stack Loop Height** is the height of the wire bond loop as it leaves the stacked die if one is used. If no stacked die is present these options are not enabled. As changes are made the diagram is

updated to reflect the change in height. Default is the height of the die. A custom height can be entered when the custom option is selected. Measured in Microns.

- **Stack Loop Extension** is the horizontal extension portion of the wire and has a default of the base die height. A custom extension can be entered when the custom option is selected. An additional option for the stacked die is to extend the wire to the edge of the base die. Measured in Microns.
- **Stitch Loop Extension** is used when a stacked die is stitched to the base die. A custom extension can be entered when the custom option is selected. Measured in Microns.
- **Wire to Wire Distance** is the average distance between wires when calculating the mutual inductance of a wire. This is defaulted to the average distance between pads on the base die multiplied by 1.5. This is an arbitrary number and can be changed to any value measured in microns.
- The text box at the bottom of the tool first displays the setup parameters in the [.lr file](#). Once the data has been processed this text box displays the [.lr.doc](#) file that is generated by the tool.
- **Command Buttons:**
 - **Process Data** initiates the estimation process and writes out an [.lr.doc](#) file which contains all the information generated by the tool.
 - **Cancel** will close the LCR Estimator without processing any data.
 - **Load** will allow you to load a previously saved .lr file that contains the setup parameters for the LR Estimator and the LIQ file contained in the .lr file will also be loaded.
 - **Save** will save the setup parameters to an .lr file.
 - **Reset** returns the values to their original default settings. Heights and extensions are defaulted to the die height.

Sample .lr file Base Die only

```
LIQFile=SMD18.liq
Material=Au
WireDiameter=1
Frequency=1000000
BaseLoopHeight=200
BaseExtension=200
```

Sample .lr file Base and Stack Die

```
LIQFile=AAAc1SplitArc.liq
Material=Au
WireDiameter=1
Frequency=1000000
BaseLoopHeight=200
BaseExtension=200
StackLoopHeight=200
StackExtension=200
StichExtension=200
```

Sample .lr.doc

```

*Input File: SMD18.lr
*Output File: SMD18.lr.doc
*
*Material: Au
*Frequency: 1.000 Ghz
*Wire Diameter (Mils): 1.000
*Wire Distance (Microns): 297.781
*
*Base Loop Height (Microns): 200.000
*Base Extension (Microns): 200.000
*
*Stack Loop Height (Microns): 200.000
*Stack Extension (Microns): 200.000
*Stitch Extension (Microns): 200.000
*
Pad: 1
Length:                5130.270 Microns
Resistance:             661.432 mOhms
Inductance DC:          6.099 nH
Inductance AC:          5.843 nH
Inductance Self:        2.597 nH
Inductance Mutual:      2.665 nH
.
.
.
.

```

- **Input File** is the .lr file generated by the tool and used to define the wire bonds.
- **Output file** is the .lr.doc file that is generated by the tool and shown in this example.
- **Material** is the wire material used when calculating the resistance of the wire.
- **Frequency** is used when calculating the resistance of the wire.
- **Base Loop Height** is the height of the base loop.
- **Base Extension** is the length of the horizontal extension from the attach point.

If there is a stacked device than the following parameters are also included:

- **Stack Loop Height** is the height of the base loop.
- **Stack Extension** is the length of the horizontal extension from the attach point on the stacked device. A value of -1 indicated the extension will be to the edge of the base die.
- **Stitch Extension** is the length of the horizontal extension from the attach point on the stacked device.

Output data:

- **Pad n** is the pad number.
- **Length** is the total length of the wire bond in Microns.
- **Resistance** is the frequency dependent resistance of the wire in nH.
- **Inductance DC** is the calculated DC inductance of the wire in nH.
- **Inductance AC** is the calculated AC inductance of the wire in nH.
- **Inductance Self** is the calculated inductance taking into consideration the distance from the substrate. This is calculated by dividing the wire into segments and calculating the inductance of each segment than adding the sub inductances together to get the total self inductance of the wire.
- **Inductance Mutual** is calculated using the Wire Distance value as the wire distance. This is assuming that the adjacent wire is parallel to the wire being calculated. This may or may not be the case for all wires. The wire to wire distance is initially calculated by averaging the distance from center pad to center pad distance of the base die and multiplying that by 1.5 to take into account some fan out substrate bond pad center to center spacing of 2x the die pad center to center spacing.

Note: All the inductance and resistance calculations are done using the EIA/JEDEC Bond Wire Modeling Standard EIA/JESD59 and are not true 3D extractions. These values are just estimations and should be used for simulation purposes with caution. Some liberties were taken when calculating the self inductance by splitting the wire into segments. The end value does not take into consideration the mutual inductance of each segment to segment. This will be addressed in future versions.

○ Pad Ring Explorer

1. [Introduction](#)
 - a. [Explorer](#)
 - b. [Outputs](#)
 - c. [Ring View](#)
2. [Running the Program](#)
3. [Main Menus](#)
 - a. [Files](#)
 - i. [New Blank Ring](#)
 - ii. [Load CSV / TSV File](#)
 - iii. [Import LastSettings File](#)
 - iv. [Import Package DXF File](#)
 - v. [Remove Package DXF file](#)
 - vi. [Convert to Excel](#)
 - vii. [Export to Excel](#)
 - viii. [Export to Wire Bond Explorer](#)
 - ix. [Save CSV File As](#)
 - x. [Save LastSettings File As](#)
 - xi. [Save DXF File](#)
 - xii. [Exit](#)
 - b. [Tools](#)
 - i. [View Ring](#)
 - ii. [View Log](#)
 - iii. [View CSV](#)
 - iv. [Edit Cell List](#)
 - v. [Dummy Ring Generator](#)
 - vi. [Display Tool Tips](#)
 - vii. [Reset Display](#)
 - c. [Properties](#)
 - i. [Bond Wire Rules](#)
 - ii. [Excel Path](#)
 - d. [Process](#)
 - i. [Process Current CSV File](#)
 - ii. [Backup CSV Then Process Data](#)
 - iii. [Use Backup as Process Input File](#)
 - iv. [Process DXF Package Pins](#)
 - v. [Run Script](#)
 - e. [Help](#)
 - i. [About](#)
4. [Explorer Tab](#)
 - a. [Input Database File](#)
 - b. [Die Process Options](#)
 - c. [Pad Sides With Fillers](#)

- d. [User Dimensions](#)
 - e. [Ends / Center](#)
 - f. [Using](#)
 - g. [Auto Renumber](#)
 - h. [Bond Pad Parameter](#)
 - i. [ICED Pin Text Parameters](#)
 - j. [Pin 1 Assignment](#)
 - k. [Last Executed Command Button](#)
 - l. [Die Origin, Thickness and Back Bias](#)
 - m. [Statistics](#)
 - i. [Width / Height](#)
 - ii. [Stats Tally](#)
 - iii. [Area](#)
5. [Output Tab](#)
- [Astro Parameters and Output Files](#)
 - i. [Select All / Unselect All](#)
 - ii. [TDF by Order](#)
 - iii. [TDF by Location](#)
 - iv. [Astro Fixed Pads](#)
 - v. [Wire Bond LLC](#)
 - vi. [Wire Bond CNTR](#)
 - vii. [JTAG LLC](#)
 - viii. [Create Pins](#)
 - ix. [Astro Add Pin Text](#)
 - x. [Astro LVS Power's](#)
 - xi. [Pad Ring Placement](#)
 - xii. [Astro Corner Cell Parameters](#)
 - xiii. [Astro Add Pin Text Parameters](#)
 - [AtopTech Parameters and Output Files](#)
 - i. [AtopTech Floor Plan](#)
 - ii. [Select All / Unselect All](#)
 - iii. [Corner Cell List](#)
 - iv. [Cell Boundary](#)
 - v. [Hierarchical Prefix](#)
 - vi. [Net list](#)
6. [Ring View](#)
- a. [Files](#)
 - i. [Save Bit Map](#)
 - ii. [Printer Setup](#)
 - iii. [Print](#)

- iv. [Exit](#)
 - b. [Tools](#)
 - i. [Measure](#)
 - ii. [Swap Cells](#)
 - iii. [Flip Cell](#)
 - iv. [Insert Cell](#)
 - v. [Move Cell](#)
 - vi. [Change Cell](#)
 - vii. [Find](#)
 - viii. [Delete](#)
 - ix. [Relocate Pin 1](#)
 - x. [Rotate Die CW](#)
 - xi. [Rotate Die CCW](#)
 - xii. [Renumber Pads / Spacers](#)
 - xiii. [Cancel](#)
 - c. [Options](#)
 - i. [Display Colors](#)
 - ii. [Color Fill](#)
 - iii. [DXF Associations](#)
 - iv. [Remove Filler Cells Before Processing](#)
 - v. [\(0,0\) Origin at Center of Die](#)
 - d. [View](#)
 - i. [All](#)
 - ii. [Zoom In](#)
 - iii. [Zoom Out](#)
 - iv. [Redraw](#)
 - v. [Pad Data](#)
 - vi. [Cell Data](#)
- 7. Sample Files
 - a. [CSV File Format](#)
 - b. [PRELastSettings.ini File Format](#)
 - c. [Cellist.dat File Format](#)

Introduction:

This program generates all the files needed to create a Pad Ring in both ICED and Astro using a CSV (TSV) file as the input database, the PRELastSettings.ini file for setup parameters, and the cellist.dat file for all the cells and their parameters. The program consists of 2 parts. The first part has two tabs.

The **Explorer** is the Project setup screen where the Work path, Input Database, Die Process Options, Bond Pad Parameters, ICED Pin Text Parameters, Pin1 Assignment, Die Information and the Stats are entered and displayed. The output file list can be selected using the target tool list and checking which formats to output.

Pad Ring Explorer - 1.0.37 - AAAXtest.csv

File Tools Properties Process Help

Work Directory [C:\Program Files\Microsoft Visual Studio\VB98\SourceCode\Tools2010\PadRingExplorer\]

Explorer Outputs

Input Database [AAAXtest.csv]

Die Process Options

☒ Pad Sides With Fillers ☐ User Dimensions

Width [2800] Height [2800]

Using [FSPCPD*] ☐ Ends ☒ Center

☒ Auto Renumber Spacers
☒ Auto Renumber Bond Pads
☒ Renumber Based On Corner 1 Location
☒ Remove Filler Cells Before Processing
☐ Remove Spacer Cells Before Processing

Dimensions

Bond Pad Width / Height [20.000]
Corner Cell Width / Height [300]

ICED Pin Text Parameters

ICED Pin Text Size [5]
ICED PinText Layer [CPTX]

Lower Case

☐ Cell Names
☐ Instance Names

Create Cell List

SPCPD*
PFEED*
PVSS*
AVSS*
PVDD*
AV3DD*
FSPCPD*
IOCAP*

Pin 1 Assignment

LL Corner Cell ☐
LR Corner Cell ☐
UR Corner Cell ☐
UL Corner Cell ☒

Freeze

Process Current CSV File

Astro
AtopTech

Die Origin, Thickness and Back Bias

☒ Center of Die ☐ Lower Left Corner of Die

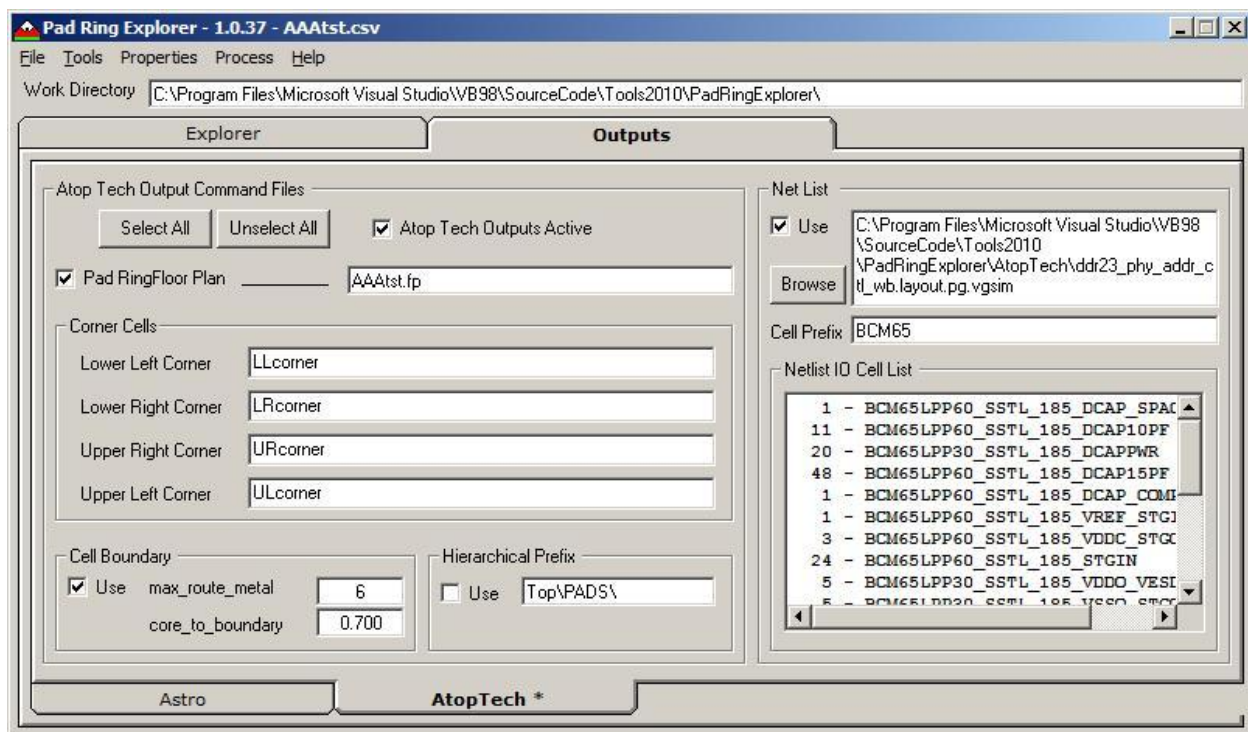
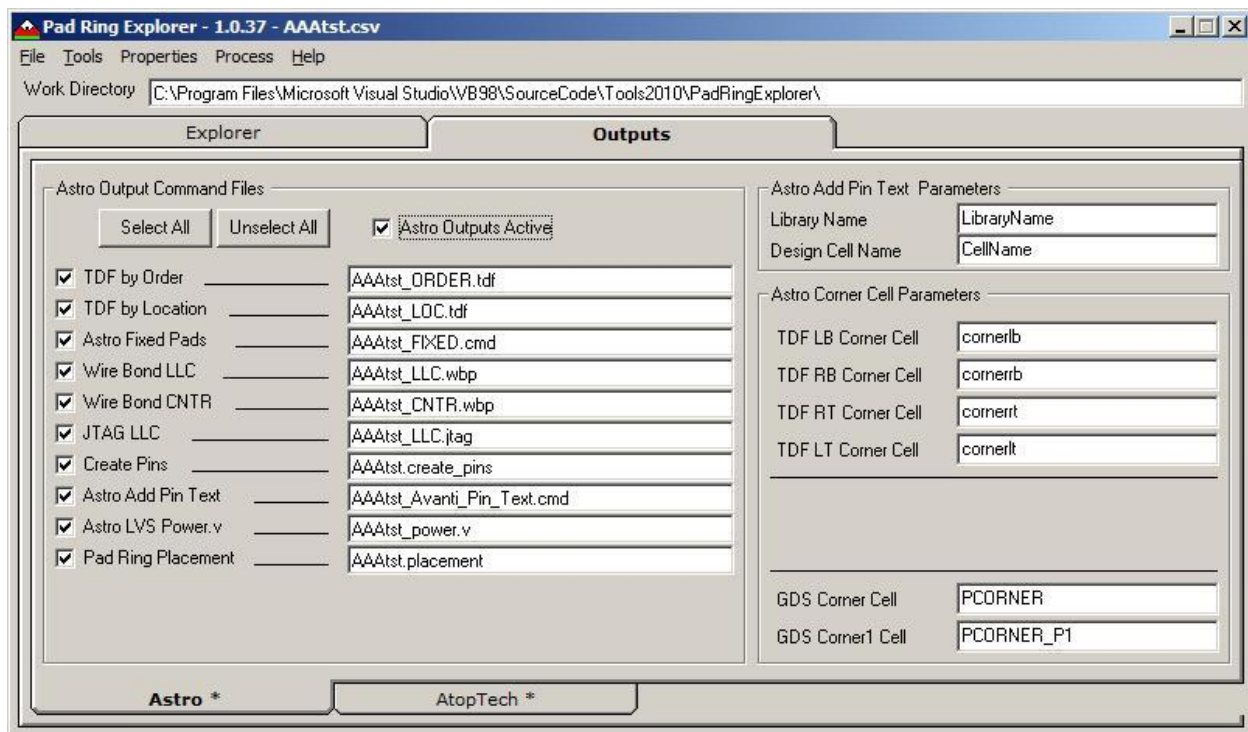
Thickness [4] Bias [VSS]

Stats

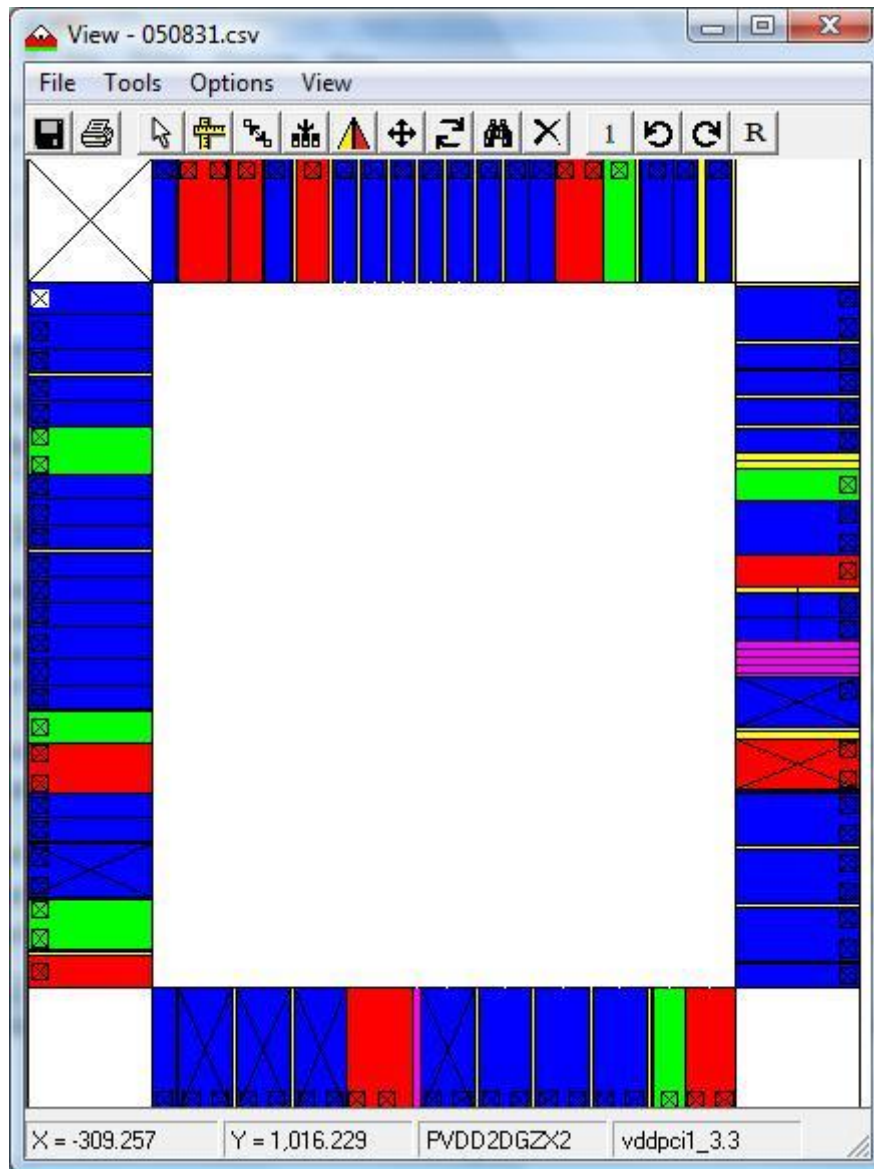
Bottom Width	5800.000	130	130	130	0	130	0
Right Height	5800.000	140	120	120	0	120	20
Top Width	5800.000	140	120	120	0	120	20
Left Height	5800.000	130	130	130	0	130	0
Core Width	5200.000						
Core Height	5200.000						
Area um^2	33,640,000.000	540	500	500	0	500	40

Total Cell Count
Total Bond Pad Count
Used Bond Pad Count
Double Bond Pad Count
Total Pin Count
Spacer Cell Count

The second tab **Outputs** currently has multiple output formats available. Currently supported tool formats are the Astro and AtopTech. This lists the output files that can be selected for output along with any parameters needed to generate these files. * In the tab name indicates active output.



The second part of the program is the **Ring Viewer** where the Pad Ring is displayed and edited.



Running the program:

Several things have to be set up before the program can be run. Once the directory and files are set up the processing can begin:

1. There must be a working directory.
2. That directory must have the following files in it. These (sample) files can be found in the Application's path:

[WireBondExplorer](#) [StackedDeviceEditor](#) [SplitRingEditor](#) [BondSiteEditor](#) [3DLIQViewer](#)
[WireBondSetup](#) [LREstimator](#) [WireList](#) [PadRingExplorer](#) [Top](#)

- [The .CSV Pading file.](#)
- [The cellist.dat file.](#)
- [PRELastSettings.dat file.](#)

3. When this directory has created and the 3 files are placed in it you can start the program.

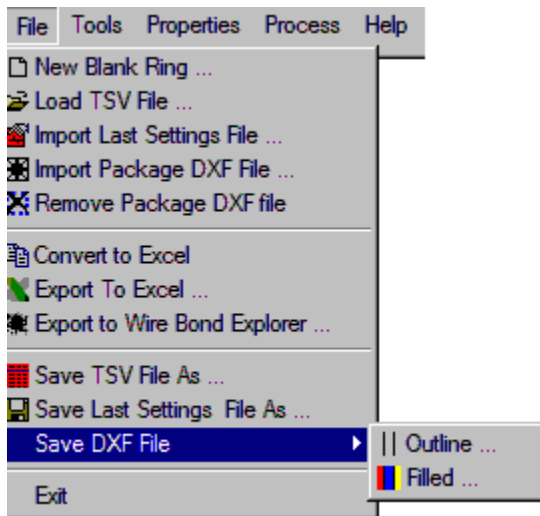
4. Click on the Input Database File in the upper left corner of the Files Frame or use the Files:Open CSV File option to load the CSV file.

5. Select a CSV file for processing when the dialog box pops up. This will update the working directory and set up the output file names.

6. Go to Process and select either Process Current CSV File or Backup CSV Then Process Data. If you use the latter, a backup copy of the file is created and used when you want to execute the command Use Backup as Process Input File. The last used command button can also be used to execute the last command and by default is set to "Process Current CSV File" when the program starts.

7. The Ring Viewer will be displayed if no errors were found and the process has completed. Once the Ring Viewer has been displayed, the die can be edited using the tools in the Ring Viewer.

Main Menus:



New Blank Ring ...: Clears the database and sets up a blank project.

Load CSV / TSV File ... : The CSV File is a comma delimited file and is the backbone of the Pading. Each field in the line of the CSV File describes a specific cell in the ring. For detailed description of each field see the [CSV File Definition](#). A TSV file will be used instead of a CSV file if the country data format is different than the US data format.

Import LastSettings File ... : All the setup parameters required to run the program are stored in a "PRELastSettings.ini" file which resides in both the application's directory and the project directory. The "Import LastSettings File ..." menu option will allow you to load this file from any path. This is useful if one project uses different settings from another. Since the program saves these settings to both the work directory and the application's directory when it terminates, you may wish to open a specific set of settings when you start a project from either location or possibly from a library of collected LastSettings files. "PRELastSettings.ini" is the default name but you can have many different .ini files using different names. The program, however, uses the "PRELastSettings.ini" name when it terminates.

Import Package DXF File ... : If you have a package in DXF format you can import the file to be displayed with the Pading. This file must conform to a specific format. New formats can be requested for packages which do not conform to the current default package style. For more details see the [DXF Package Format Definition](#). Once imported and associated with the Die pins, the wire bonds are displayed in the Pad Ring Viewer along with the Die. This also allows the generation of a from-to list for the wire bonds.

Remove Package DXF file: This will remove the package information from the project and the Pad Ring Viewer. No From-To file data will be written once this has been done.

Convert to Excel: Depending on how the CSV / TSV file was created, you may have multiple pins, pads, and names separated by commas or spaces within the (1, 2, 3) parenthesis notation. To read a CSV file into Excel and keep columns aligned there should not be any commas in these fields when a cell has multiple pins. This utility is used to convert either format to an Excel format which can be read into Excel as a comma delimited entity.

Export to Excel: Converts the database into an Excel format than invokes Excel and importing the converted database.

Export to Wire Bond Explorer: Converts the database into a pinlist file format then invokes the Wire Bond Explorer loading the converted database.

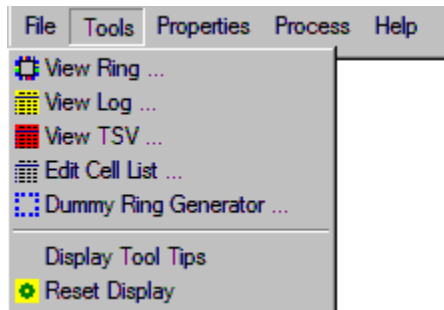
Save CSV File As ...: This is used if you want to save the current CSV file as another name or to another directory.

Save LastSettings File As ...: This allows you to save the PRELastSettings.ini file as another name or to another directory.

Save DXF File: The Save DXF File has two options. The first options allow you to save the generated Pading as seen in the Ring Viewer as outline only. The second option saves the Pading as filled polygons. In either case if a DXF package has been loaded this is also written to the DXF file. In order to do this you must first have a TemplateFile.DXF installed in the working directory. This carries the basic

DXF format information used by AutoCAD. During the save process this file is referenced and the current Pading data and optional package information is inserted in the appropriate place.

Exit : This terminates the program and saves the PRELastSettings.ini to both the working directory and the application's directory.



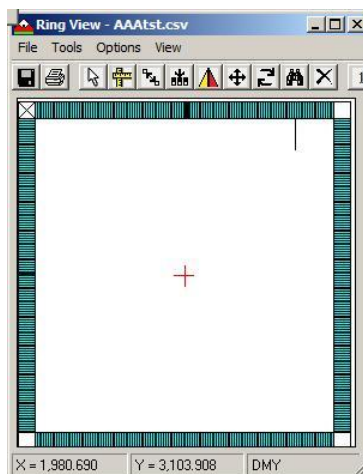
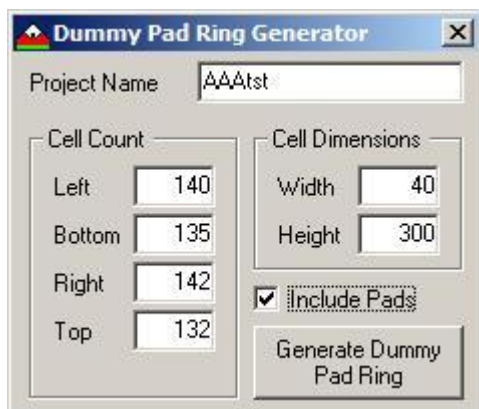
View Ring ... : Once the Pading has been generated the Pading is displayed automatically in the Pading Viewer. If you should close the Pading Viewer and want to open it later you can do so by selecting View Ring.

View Log ...: This will allow you to view the log file generated when the processing of the CSV / TSV file is done.

View CSV ... This allows you to View the CSV or TSV input file.

Edit Cell List ...: The Cell List defines all the cells which are in the Pading cell library. This is a tool for viewing and editing this list.

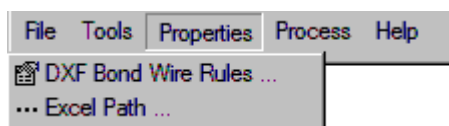
Dummy Ring Generator ...: Invokes the Dummy Ring dialog box used to create a dummy ring based on Cell width, Cell Height and number of pads on each side. This uses some of the settings on the Explorer tab. If Include Pads is checked then a single pad will be placed at the bottom of the cell $\frac{1}{2}$ the width of the cell and centered.



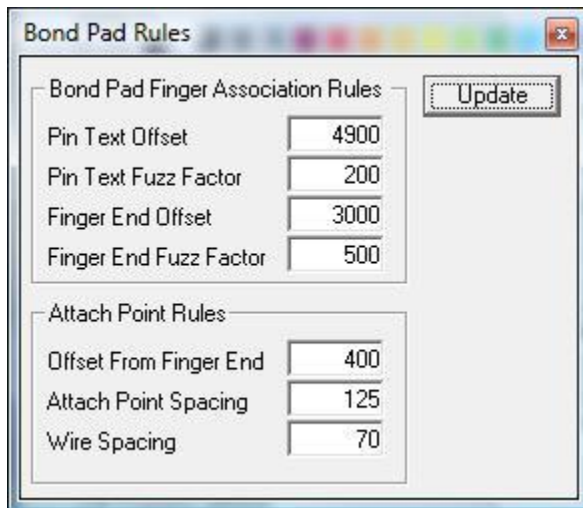
```
Side,PackagePin,BondPadNumber,PadName,InstanceName,CellName(,Comments)
L,,,DMYinstance1,DMY,***** DMY Cell
L,,,DMYinstance2,DMY,***** DMY Cell
L,,,DMYinstance3,DMY,***** DMY Cell
L,,,DMYinstance4,DMY,***** DMY Cell
```

Display Tool Tips: If checked the tool tips for the controls are displayed.

Reset Display: Sets all the forms to a default size and moves them to a (0,0) origin.



Bond Wire Rules ...: This opens the Bond Wire Rules dialog box which sets all the parameters used when a Package DXF file has been loaded and the package pins have been processed. These rules set the attach point rules for the Package side of the wire bonds.



Bond Pad Finger Association Rules: These parameters are used when a DXF file has been imported. During the processing of the DXF file the fingers are associated to Pin Text.

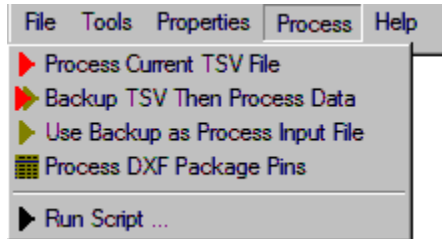
- The **Pin Text Offset** is the distance from the center of the die to the DXF text you are trying to associate.
- The **Pin Text Fuzz Factor** tells the program how far to look (+ or -) away from the Offset point.
- The **Finger End Offset** like the Pin Text Offset is the distance from the center of the die to the bond finger end.
- The **Finger End Fuzz Factor** is again the distance (+ or -) from the Offset point.

Attach Point Rules : These parameters are use to place the bond attach points on the bond fingers.

- The **Offset From Finger End** is the distance from the end of the bond finger to a spot where you want the attach point.
- The **Attach Point Spacing** is the clearance you want between two adjacent bond attach points.
- The **Wire Spacing** is the Minimum wire to wire spacing.

Update Button : When all data has been entered press the update button to update the system parameters.

Excel Path: Select this option to point to the Excel Spreadsheet path. When set the CSV / TSV file can be sent to Excel for editing and updating.



Process Current CSV File: Once the Last Settings and the Input database (.CSV / .TSV) files have been loaded and all the options and data fields are set, the processing of the data is initiated by using this option. Once the processing has been completed, the Ring View screen appears displaying the die. If there are any errors during processing messages will be displayed telling you what needs to be fixed. All input files and databases are checked for correct format. If any file or list has an error in it the process is halted until the problem has been fixed and the process started again. Each time the file is processed a backup of the file is generated which is the Input Database file with the date and time appended to the end of it. e.g. 050831.csv_061202_034926PM. The date is in the format of YYMMDD and the time HHMMSS(AM/PM).

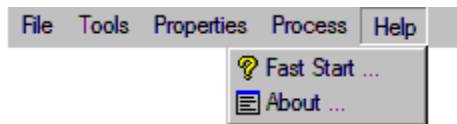
Backup CSV Then Process Data: This initiates a backup of the current CSV / TSV file and then starts processing the file. The backup file has the same name as the Input Database File with ".org" appended to the end of it. Unlike the Process Current CSV File no dated backup is generated since the original CSV file was used for the backup.

Use Backup as Process Input File: Once you have run Backup CSV / TSV file the Use Backup as Process Input File can use that backup file as a starting point for processing. This is handy if you have made changes to the Pading in the View Ring editor and want to get back to the beginning again without having to copy the file over again. This automatically copies the backup file to the current input file name before initiating the processing of the file.

Process DXF Package Pins: Once the Input Database File has been processed and a Package DXF File has been imported you need to process the package pins. This analyses the Package DXF file and extracts the finger location and pin numbers of the package and associates them with the Die Pad numbers. When the Ring View is displayed the package as well as the wire bonds will be displayed along with the Die. Two files are generated during this process. The first one is the Bond Wire Report which lists each

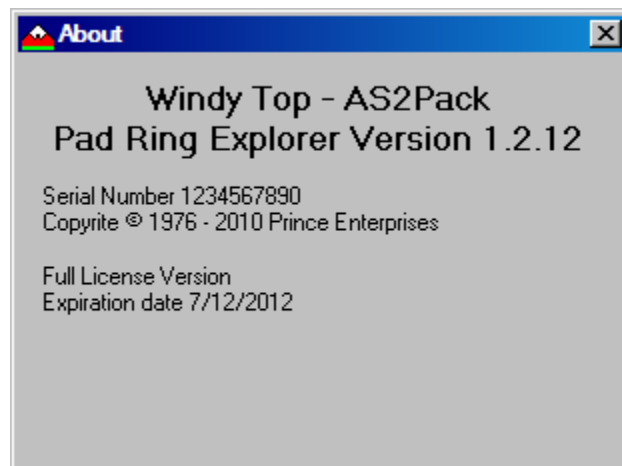
Bond Wire giving the coordinates of the from - to attach points along with the length and angle. The second file is the Bond Pad Spacing Report which

Run Script ...: This option allows you to automate the design process by allowing you to run a script which contains some basic functions.



Fast Start...: Displays the Fast Start document using Adobe Reader.

About ...: Displays the About screen showing the program name and version number.



Explorer Tab:

Pad Ring Explorer - 1.0.37 - AAAtst.csv

File Tools Properties Process Help

Work Directory [C:\Program Files\Microsoft Visual Studio\VB98\SourceCode\Tools2010\PadRingExplorer\]

Explorer Outputs

Input Database [AAAtst.csv]

Die Process Options

☒ Pad Sides With Fillers ☐ User Dimensions

Width [2800] Height [2800]

Using [FSPPCD*] ☐ Ends ☒ Center

☒ Auto Renumber Spacers

☒ Auto Renumber Bond Pads

☒ Renumber Based On Corner 1 Location

☐ Remove Filler Cells Before Processing Process

Dimensions

Bond Pad Width / Height [40]

Corner Cell Width / Height [300]

ICED Pin Text Parameters

ICED Pin Text Size [5]

ICED PinText Layer [CPTX]

Lower Case

☐ Cell Names

☐ Instance Names

Create Cell List

SPCPD*

PFEED*

PVSS*

AVSS*

PVDD*

AV3DD*

FSPPCD*

IOCAP*

Pin 1 Assignment

LL Corner Cell ☐

LR Corner Cell ☐

UR Corner Cell ☐

UL Corner Cell ☒

Freeze

Process Current CSV File

Astro

☒ AtopTech

Die Origin, Thickness and Back Bias

☒ Center of Die ☐ Lower Left Corner of Die

Thickness [4] Bias [VSS]

Stats

Bottom Width	6000.000	135	0	0	0	0	0
Right Height	6280.000	142	0	0	0	0	0
Top Width	6000.000	138	0	0	0	0	6
Left Height	6280.000	144	0	0	0	0	4
Core Width	5400.000	Total Cell Count	Total Bond Pad Count	Used Bond Pad Count	Double Bond Pad Count	Total Pin Count	Spacer Cell Count
Core Height	5680.000	559	0	0	0	0	10
Area	um^2 37,680,000.000						

Input Database File:

Input Database [050831.csv]

Input Database: This is the backbone of the process. It is a comma or tab delimited text file which list all the cells by side in the Padring. This file can be edited in a plain text editor but must not have any formatting data which programs like Word interject. It can also be edited in Excel. For more information on the file format see the description of the CSV / TSV.

Die Process Options:

Die Process Options

☒ Pad Sides With Fillers ☐ User Dimensions

Width [2800] Height [2800]

Using [FSPPCD*] ☐ Ends ☒ Center

☒ Auto Renumber Spacers

☒ Auto Renumber Bond Pads

☒ Renumber Based On Corner 1 Location

☒ Remove Filler Cells Before Processing

☐ Remove Spacer Cells Before Processing

Pad Sides With Fillers: When this option is checked the auto filler cell insertion process is turned on. If a side needs to be lengthened to match its complimentary side, filler cells will be inserted until their lengths are equal.

User Dimensions: If you want to force the pad ring to be a specific size then checking this box will allow you to enter Width and Height information in the Width and Height fields. When the ring is processed and sides need to be enlarged to meet the side size requirements then filler cells are automatically inserted until the side meets the entered length.

Ends / Center: This radio button set tells the program where to put the filler cells. If the Ends option is selected the filler cells are divided into to equal batches and placed at the ends of the rows. If the Center option is selected than all the filler cells will be placed somewhere near the center of the side.

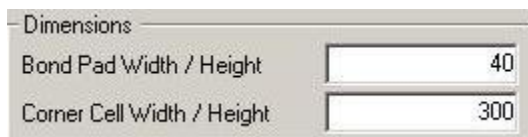
Using: The cell in the Using data field is the Wild Card name for the filler cells. If the filler cells are exact copies of the spacer cells with the exception that to file name begins with an "F" the color will be different from spacer cells for viewing and swapped out with equivalent spacer cells if desired later in the design process.

Auto Renumber ...: Auto Renumber Spacers check box enables the renumbering of spacer cells so their names are unique and in sequence around the die The Auto Renumber Bond Pads check box enables the renumbering of the die bond pads so they are unique and in sequence around the die. If the Renumber Based On **Corner 1 Location** check box is checked then Pin one will be moved if necessary to the corner 1 indicator on the Main Form.

Remove Filler Cells Before Processing: If checked the filler cells, if any, will be removed before processing starts.

Remove Spacer Cells Before Processing: If checked the spacer cells, if any, will be removed before processing starts.

Bond Pad Parameter:

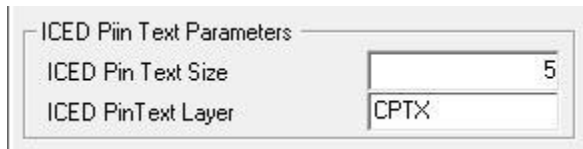


Dimensions	
Bond Pad Width / Height	40
Corner Cell Width / Height	300

The bond pad width sets up the size of the bonding area on cells with a pad. This is assumed to be a square and used for visualizing the layout in the Ring View tool.

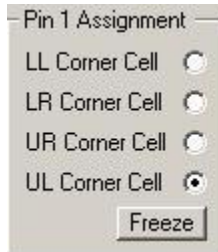
The Corner Cell Width / Height defines the size of the corner cells as well as the height of the pad ring cells.

ICED Pin Text Parameters:

A dialog box titled "ICED Pin Text Parameters" with two input fields. The first field is labeled "ICED Pin Text Size" and contains the value "5". The second field is labeled "ICED PinText Layer" and contains the value "CPTX".

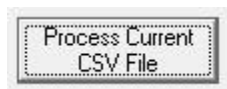
The fields in this frame are used when generating the Iced Add Pin Text file. The default font for ICED Pin Text Size is 5 and the ICED Pin Text Layer defaults to CPTX.

Pin 1 Assignment:

A dialog box titled "Pin 1 Assignment" with four radio buttons and a "Freeze" button. The radio buttons are labeled "LL Corner Cell", "LR Corner Cell", "UR Corner Cell", and "UL Corner Cell". The "UL Corner Cell" radio button is selected. The "Freeze" button is at the bottom.

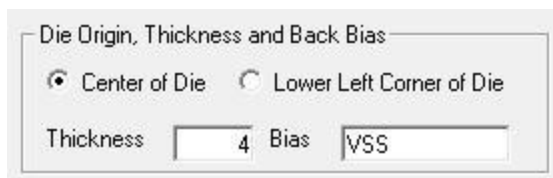
This set of radio buttons is used to select which corner is to be the corner 1 cell. This selection can be frozen by pressing the Freeze button. If frozen the corner 1 cell will not be changed when the die is rotated in the Ring View editor.

Last Executed Command Button:

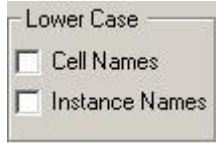
A button labeled "Process Current CSV File".

This button indicates the last executed command and is a short cut to executing the same command again. By default it is set to Process Current CSV File.

Die Origin, Thickness and Back Bias:

A dialog box titled "Die Origin, Thickness and Back Bias" with two radio buttons and two input fields. The radio buttons are labeled "Center of Die" (selected) and "Lower Left Corner of Die". The input fields are labeled "Thickness" and "Bias". The "Thickness" field contains the value "4" and the "Bias" field contains the value "VSS".

- **Center of Die:** Places the (0,0) coordinate origin at the center of the Die.
- **Lower Left Corner of Die:** Places the (0,0) coordinate origin at the lower left corner of the die.
- **Thickness:** Defines the thickness of the die.
- **Bias:** Defines the back bias that is applied to the die.



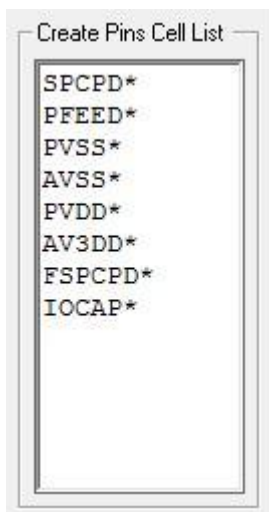
Lower Case

☐ Cell Names

☐ Instance Names

Lower Case (Cell/Instance) names: If the Lower Case Cell Names check box is checked then all the cell names are lower cased when the CSV / TSV is read during processing. Likewise, if the Lower Case Instance Names is checked the Instance names are lower cased during the CSV reading.

Create Pins Cell List:



Create Pins Cell List

SPCPD*

PFEED*

PVSS*

AVSS*

PVDD*

AV3DD*

FSPCPD*

IOCAP*

The Create Pins Cell List contains a keyed lookup of all the cells in the Pading which are not in the netlist. The keyed name will be anything for the prefix followed by * to designate a wild card. If this wild card string matches any cell name any cell name it will be added to the cellist.dat File Format. e.g all spacer cells could be added to this file with using the following "SPCPD*". This is used when the ".create_pins" file is written.

Statistics:

Stats	
Bottom Width	6000.000
Right Height	6280.000
Top Width	6000.000
Left Height	6280.000
Core Width	5400.000
Core Height	5680.000
Area <input checked="" type="radio"/> Die <input type="radio"/> Core	
um^2	37,680,000.000

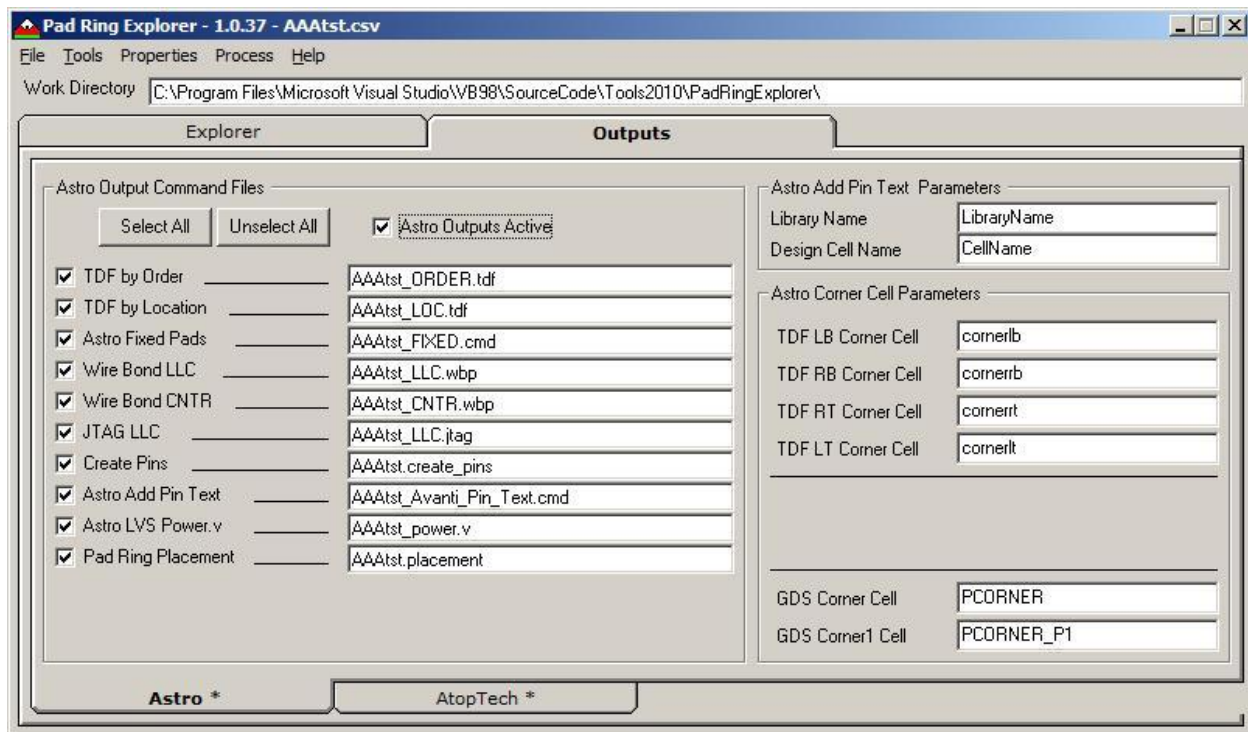
135	0	0	0	0	0
142	0	0	0	0	0
138	0	0	0	0	6
144	0	0	0	0	4
Total Cell Count	Total Bond Pad Count	Used Bond Pad Count	Double Bond Pad Count	Total Pin Count	Spacer Cell Count
559	0	0	0	0	10

Width / Height: These fields display the lengths of each side in the pad ring. If padding is not enabled the sides will be absolute without any padding. If the opposing sides are of different lengths, a warning is issued and the appropriate boxes are marked red. If padding is enabled then the side lengths should agree with your requested size provided that the size you specify is greater than or equal to the actual size specified in the .CSV / .TSV file. The Core Width and Height is theoretical and may not reflect the true area if any of the pad cells are taller than the corner cell height.

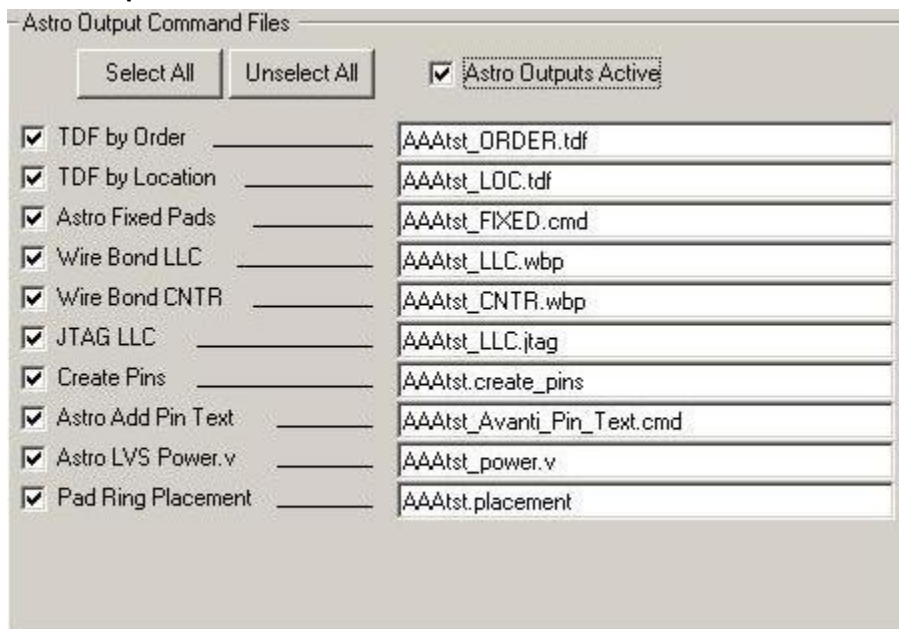
Stats Tally: Each column is processed by side and then tallied at the bottom. There is also arpt file which is written and contains these as well as other statistics including pad to pad spacing and cell count by name.

Area: Alternately selects the area calculation displayed in square Microns.

Outputs Tab:

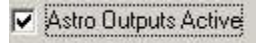


Astro Output files:



This section explains what files are generated when the CSV / TSV file is processed. There is one other file which is generated but only after the package DXF file has been loaded and the Package Pins have

been processed. This file is named ...BondWire.rpt and lists the from to points of the bond wires.



The Astro output files will be created if this is checked. Unchecking this disables the Astro output tab.

Select All / Unselect All: These buttons allows you to select or unselect all output files. Each file has a check box next to it which can also be manually checked or unchecked. If selected then files will be generated and saved in the working directory. If unselected they will not be processed. This will save some time if you are editing the die in the Ring View window. You may also select only those which you want to use. For example if you want to view the Pading in ICED than you may only want to select Iced Output File as the only file to be generated.

Iced Output File: This file is read into the ICED editor and carries the names and locations of all the cells in the Pading. This is a handy tool for verifying the design by allowing you see the actual GDS based Pading. The GDS cells comes from a cell library which is not part of this program and may reside on any other directory where ICED is run from. The cells in this library should contain all the cells in the cellist.dat file.

TDF by Order: This file is used by Astro and places the Pading cells around the die by side and order. No placement coordinates are applied.

TDF by Location: Like the TDF by Order file, this file is used by Astro and places the Pading cells around the die by side but uses location instead of order. The location is an absolute coordinate for each side. The left and right side use "Y" coordinates while the bottom and top use "X" coordinates for the location relative to the starting point of each side.

Astro Fixed Pads: This Astro file again places the Pading around the die but uses absolute coordinates both "X" and "Y" and also includes rotation information which neither the TDF by Order or TDF by Location has. This file also defines the boundary of the die.

Wire Bond LLC: This Astro file defines the bond wire attach points for each pad relative to the lower left corner of the die. The pins numbers listed are for the package and double bonds will have multiple listings.

Wire Bond CNTR: This Astro file defines the bond wire attach point for each pad relative to the center of the die. The pins numbers listed are for the package and double bonds will have multiple listings.

JTAG LLC: This Astro file is similar to the Wire Bond LLC file except that the pin numbers are for the die and in the case of multiple bonds there is only 1 listing. This file is handy when generating JTAG cell groupings for placement purposes.

Create Pins: This Astro file is generated using the cells listed in the Create Pins Cell List. These cells are not in the netlist and need to be added to the design using this file. The program scans the **CSV / TSV** for any of these cells and if found it adds it to the .create_pins file. This file is necessary for the successful creation of the Pading in Astro.

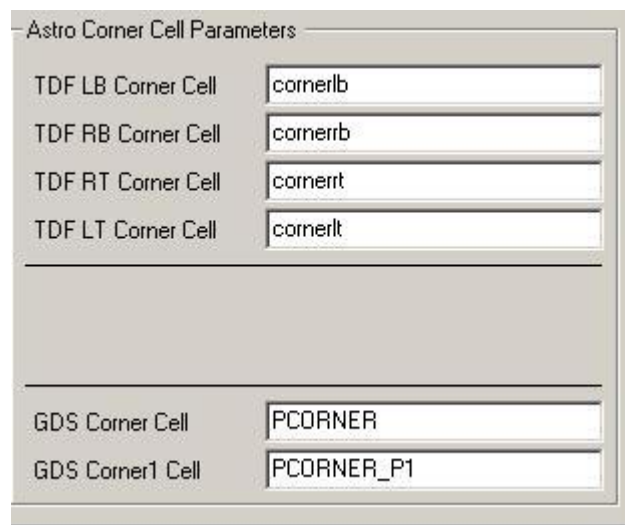
ICED Add Pin Text: This is an ICED file which adds the pin text to the ICED generated Pading. This is needed to generate a GDS file with pin text added to the bond pads for LVS checking.

Astro Add Pin Text: This Astro file is like the ICED Add Pin Text file except that it adds the pin text to the bond pads using Astro.

Astro LVS Powers: This Astro file creates the Verilog netlist which needs to be added to the top Verilog netlist of the chip. This is needed for LVS purpose since the top level Verilog netlist does not contain this information.

Pad Ring Placement: This Astro file is basically the same as the Astro Fixed Pads except it does not contain the die outline or the corner cells and is not formatted.

Astro Corner Cell Parameters:



TDF LB Corner Cell	cornerlb
TDF RB Corner Cell	cornerrb
TDF RT Corner Cell	cornerrt
TDF LT Corner Cell	cornerlt
GDS Corner Cell	PCORNER
GDS Corner1 Cell	PCORNER_P1

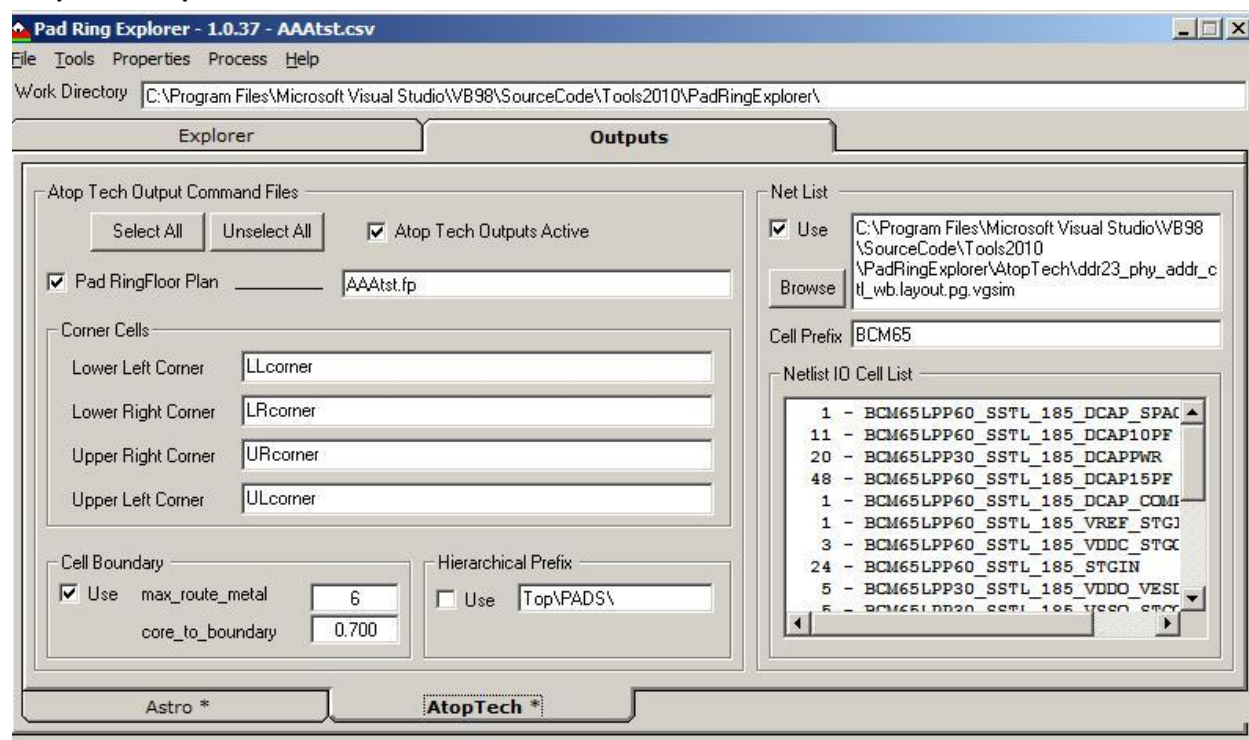
- **TDF (LB/RB/RT/LT) Corner Cell:** This is the name of the corner cell designator used by Astro and is found in the TDF by Order and Astro Fixed Pads file.
- **GDS Corner Cell:** Is the GDS name of the Corner Cell.
- **GDS Corner 1 Cell:** Is the GDS name of the Corner 1 Cell

Astro Add Pin Text Parameters:

Astro Add Pin Text Parameters	
Library Name	LibraryName
Design Cell Name	CellName

These two fields are used when the Astro Add Pin Text file is written. The Library Name, if none is supplied, will default to "LibraryName" and the Design Cell Name to CellName.

AtopTech Output files:



AtopTech Floor Plan: This is the one and only output file for AtopTech at this time. It consists of cells that need to be created as a result of not being found in the netlist and placement information of all the cells in the input database CSV / TSV file.

Select All / Unselect All: These buttons allow you to select or unselect all output files. Each file has a check box next to it which can also be manually checked or unchecked. If selected then files will be generated and saved in the working directory. If unselected they will not be processed. This will save some time if you are editing the die in the Ring View window. You may also select only those which you want to use. In this case there is only one output file at this time.

Corner Cell List: These are the 4 corner cell names.

Corner Cells

Lower Left Corner	LLcorner
Lower Right Corner	LRcorner
Upper Right Corner	URcorner
Upper Left Corner	ULcorner

Cell Boundary: If Use is checked than these parameters will be added to the Floor plan.

Cell Boundary

☒ Use max_route_metal 6

core_to_boundary 0.700

Hierarchical Prefix: If Use is checked than the Hiercharcial Prefix will be appended to all structures in the Floor Plan output file. The text box is the prefix.

Hierarchical Prefix

☐ Use Top\PADS\

Net List:

Net List

☒ Use C:\Program Files\Microsoft Visual Studio\VB98
\SourceCode\Tools2010
\PadRingExplorer\AtopTech\ddr23_phy_addr_c
tl_wb.layout.pg.vgsim

Browse

Cell Prefix BCM65

Netlist IO Cell List

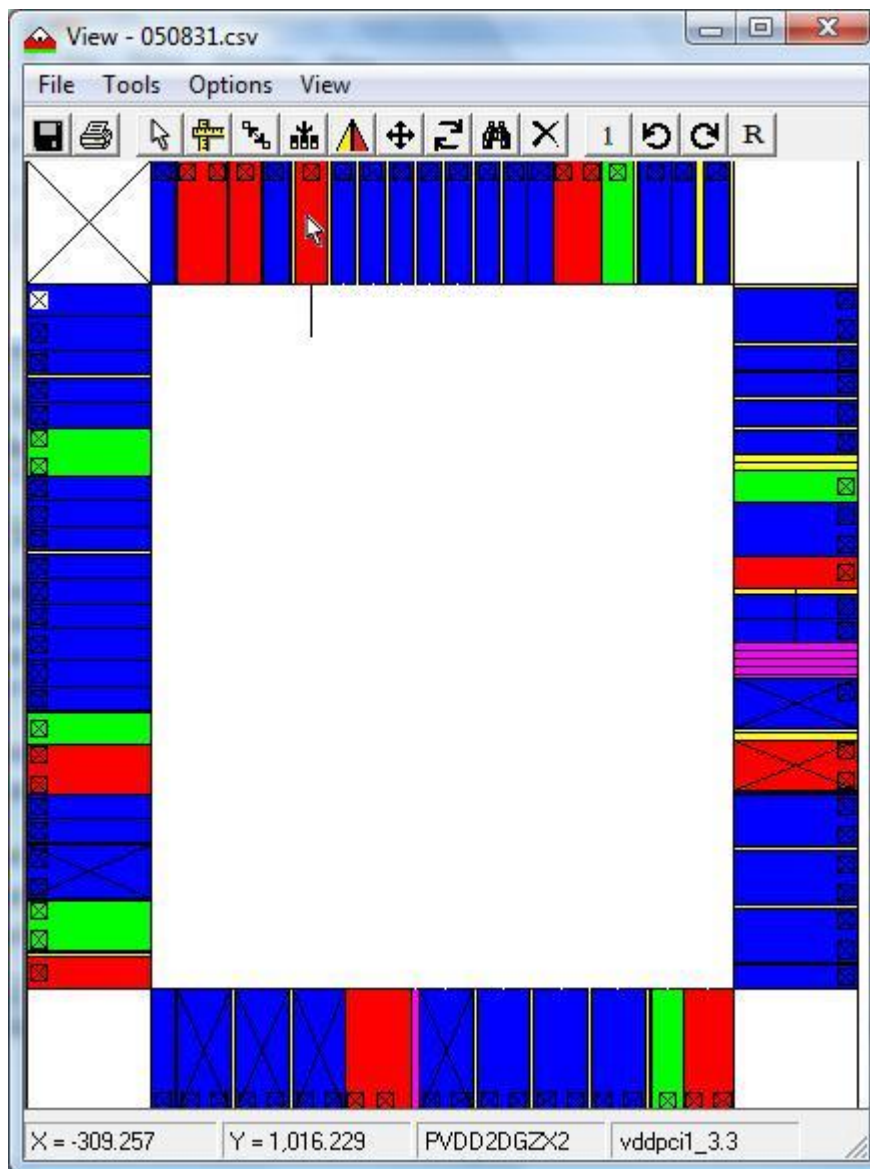
```

1 - BCM65LPP60_SSTL_185_DCAP_SPAC
11 - BCM65LPP60_SSTL_185_DCAP10PF
20 - BCM65LPP30_SSTL_185_DCAPPWR
48 - BCM65LPP60_SSTL_185_DCAP15PF
1 - BCM65LPP60_SSTL_185_DCAP_COMI
1 - BCM65LPP60_SSTL_185_VREF_STGJ
3 - BCM65LPP60_SSTL_185_VDDC_STGX
24 - BCM65LPP60_SSTL_185_STGIN
5 - BCM65LPP30_SSTL_185_VDDO_VESI
5 - BCM65LPP30_SSTL_185_VSSO_STGX

```

- Use: If selected, this will read the input netlist and search for all the cells with the prefix listed in the Cell Prefix text box
- Browse: This button allows you to select the input Verilog netlist. The path to this file is displayed to the text box to the right of the button.
- Netlist IO Cell List: Displays all the cells found in the netlist. This also displays the number of cells used of each type.

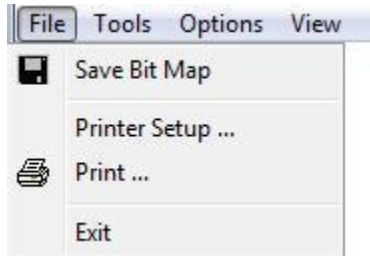
- **Ring View:**




The Ring View functions as both a Pading Viewer and editor. The menu selections can also be found in the tool bar for easier access. There are options to view the Bond Pad Data and Cell Data as the cursor is moved over Cells or Bond Pads. As an editor, you can manipulate the Pading by inserting, swapping and moving cells around. You can rotate the Die and Renummer pads and spacers. Modifying the ring in any way will be reflected in the CSV file. As the cursor passes over a cell a marker is displayed showing the active edit cell. The status bar at the bottom of the screen displays the (X,Y) coordinates. It also displays both the GDS and Cell names if the cursor is over a cell or the Pin Number and Pad Name if the cursor is over a pad.




Tool Bar:

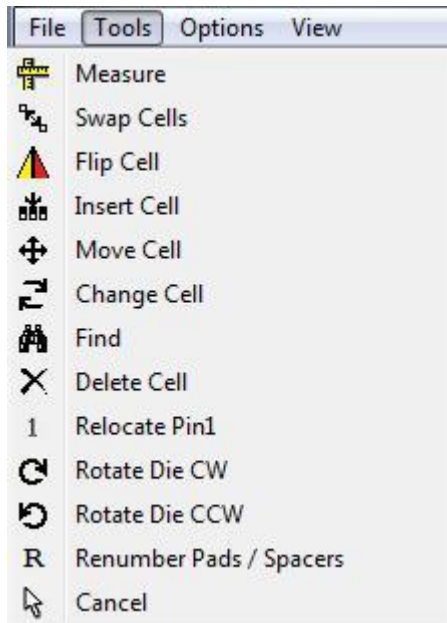



Save Bit Map : This will save a bitmap screen shot of the Ring View picture window.


Printer Setup ...: This opens the standard printer setup dialog box.

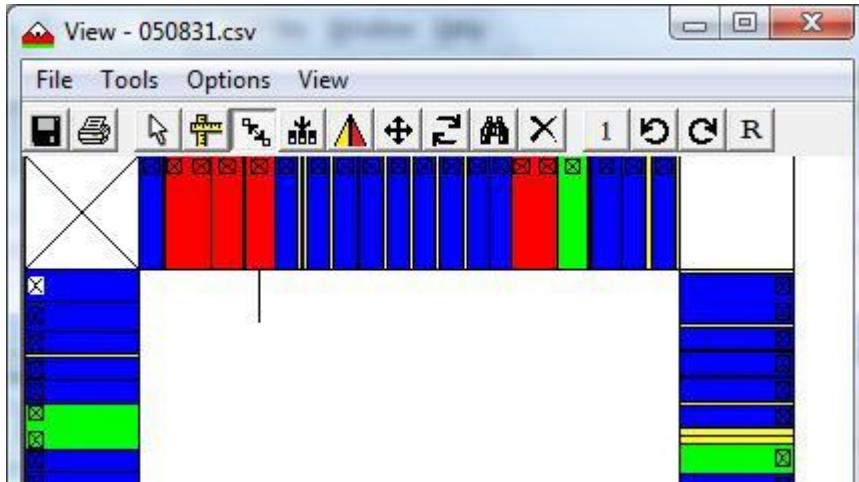
Print ... : This opens the standard printer dialog box.


Exit: This terminates the Ring View editor. Nothing is updated or written to the database.




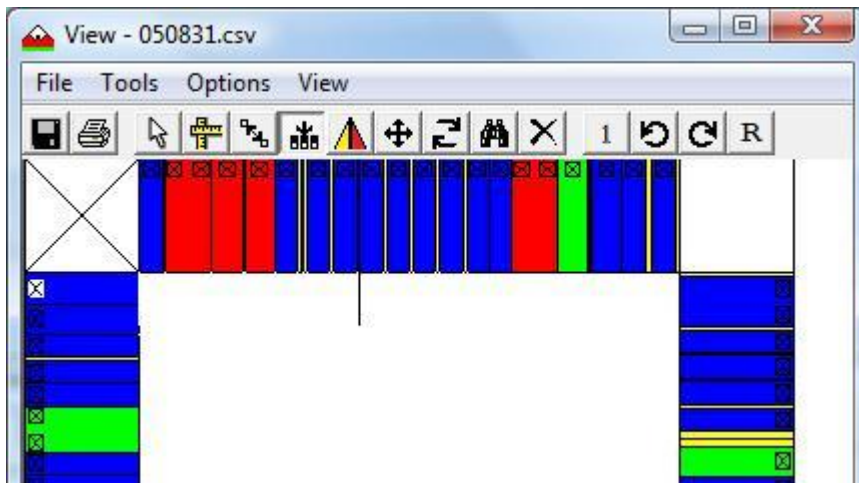
Measure : While this is selected, the first left click of the mouse marks the starting point of the measurement. The measurement text box appears and is attached to the cursor displaying the distance as the cursor moves across the die. The second click resets the measurement to 0 and starts waiting for the next click.

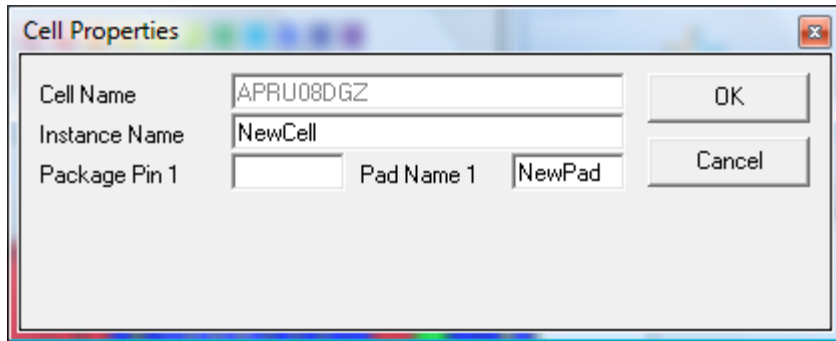
Swap Cells : While this is selected, the first left click marks the first cell for the swap. The second left click implements the swap and the cell marker disappears.





Flip Cell : While this is selected, the left mouse click will flip a cell indicated by lines crossing the cell from corner to corner. Pads are renumbered but the names are mirrored to their new position if multiple pads are involved.


Insert Cell : When this is selected a cell pick list will appear in the Toolbar. You may have to expand the View to the right to see it. Pick the cell for insertion. Move the mouse over the cells to see a marker indicating the insertion point. Once the correct point is picked and the mouse clicked, a dialog box opens asking for an Instance Name, Package Pin and Pad Name. The instance name must be unique. As cells are added, the sides are automatically padded with filler cells to maintain a rectangle shape of the shortest sides.








Move Cell : While this is selected, the first left click of the mouse marks the cell to move. The second left click on another cell moves the marked cell to the position after the second cell in counter clockwise rotation and the cell marker disappears.


Change Cell : While this is selected a text box opens up on the right side of the tool bar. This is a pick list box with all the available cells. When an existing cell is selected with a left click the new cell replaces it. A dialog box will be displayed verifying the change cell names. If OK, the new cell replaces the selected cell. As cells are added, the sides are automatically padded with filler cells to maintain a rectangle shape of the shortest sides.


Find : While this is selected a text box opens up on the right side of the tool bar. This is a pick list box with all the available cells. As the cells are selected in this box they are marked in the Pading showing their position.

Delete : While this is selected any cell which is selected is deleted from the Pading. As cells are deleted, the sides are automatically padded with filler cells to maintain a rectangle shape of the shortest sides.

Relocate Pin 1 : This is a onetime button and is used to relocate pin 1 in the Pading. All pads are renumbered and optionally spacer cells. This option unchecks the Renumber Based On Corner 1 Location box on the main form.


Rotate Die CW : This is a onetime button and is used to rotate the die Clock Wise by 90 degrees.

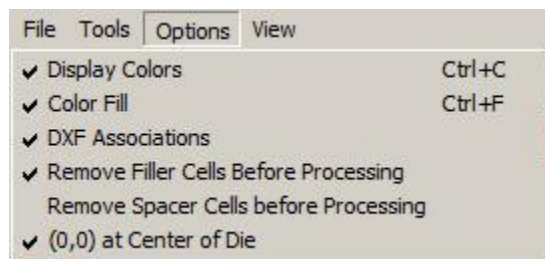
Rotate Die CCW : This is a onetime button and is used to rotate the die Counter Clock Wise by 90 degrees.

Renumber Pads / Spacers : This opens the Renumber dialog box. This is used to renumber bond pads as well as spacer cells.



- **Auto Renumber Spacers:** If checked will renumber the spacer cells.
- **Auto Renumber Bond Pads:** If checked will renumber the Bond Pad numbers.
- **Renumber Based On Corner 1 Location:** If checked the renumbering will begin in the corner designated as Corner 1.
- **Remove Filler Cells Before Processing:** If checked all filler cells will be removed before processing starts.
- **Remove Spacer Cells Before Processing:** If checked all spacer cells will be removed before processing starts.

Cancel : This cancels any of the above selected edit mode and ends their operation and returns to the pointer mode.



Display Colors: If this is checked then the cells in the Pading will be colored. Red for Power, Green for Ground, Yellow for Spacers, Blue for signals and Magenta for Fillers.

Color Fill: If Display Colors is checked then if Color Fill is checked then the cells will be filled with a solid color else only the outline will be colored.

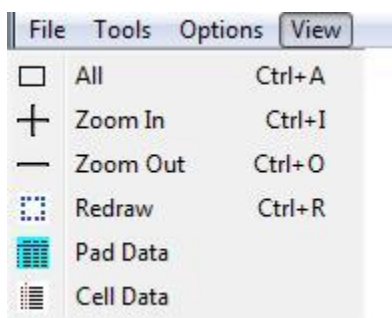
DXF Associations: If a DXF file has been imported and the Package Pins have been processed than if this box is checked then the wire bond associations is displayed. That is there will be a line running from the

Die Bond Pad to the Finger Bond Pad then to the finger number. If unchecked the true bond wires are shown without any association.

Remove Filler Cells Before Processing: If this is checked than when an edit occurs to a Die it will automatically remove all previously inserted Filler cells before re-padding with Fillers where needed.

Remove Spacer Cells Before Processing: If this is checked than when an edit occurs to a Die it will automatically remove all previously inserted Spacer cells before re-padding with Fillers where needed.

(0,0) Origin at Center of Die: Selects the coordinate set that is displayed in the status bar. If checked the (0,0) Coordinate is at the center of the die. If unchecked the (0,0) coordinate is at the Lower Left Corner of the die. These coordinates reflect the lower left corner of the cell.



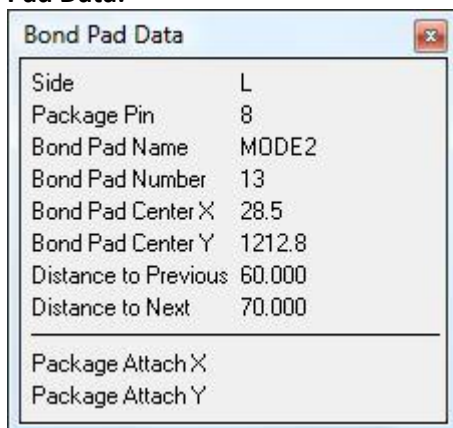
All: This views the entire die in the picture box. (**Ctrl + A** or **Home**)

Zoom In: Zoom in 1 level centering the design on the cursor. (**Ctrl + I** or **+**)

Zoom Out: Zoom out 1 level centering the design on the cursor. (**Ctrl + O** or **-**)

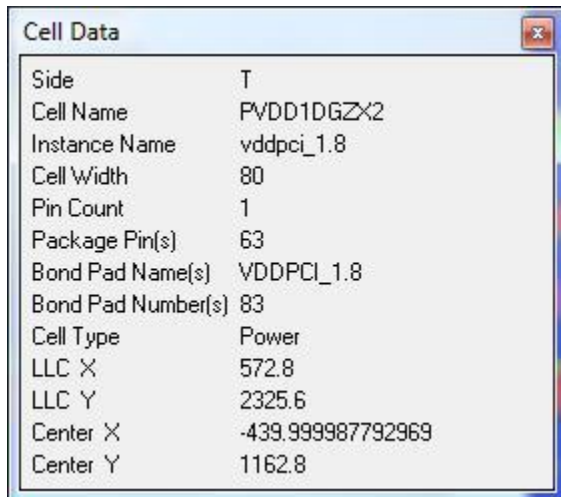
Redraw: Redraws the current view. (**Ctrl + R**)

Pad Data:



This dialog box lists all the statistics about a bond pad when the cursor has moved over it. The data remains unchanged after you leave a pad and is updated only when you have moved over another pad.

Cell Data:

A screenshot of a Windows-style dialog box titled "Cell Data". It contains a list of properties and their values for a specific cell. The properties include Side, Cell Name, Instance Name, Cell Width, Pin Count, Package Pin(s), Bond Pad Name(s), Bond Pad Number(s), Cell Type, LLC X, LLC Y, Center X, and Center Y.

Side	T
Cell Name	PVDD1DGZx2
Instance Name	vddpci_1.8
Cell Width	80
Pin Count	1
Package Pin(s)	63
Bond Pad Name(s)	VDDPCI_1.8
Bond Pad Number(s)	83
Cell Type	Power
LLC X	572.8
LLC Y	2325.6
Center X	-439.999987792969
Center Y	1162.8

This dialog box lists all the statistics about a cell when the cursor has moved over it. The data remains unchanged after you leave the cell and is updated only when you have moved over another cell.

Notes:

1. Left mouse click on the screen will pan to that point centering the image at the point of the click.
2. Use the arrow keys to navigate around the image.

Sample Files

CSV File Format:

The CSV file contains all the information to construct and explore a Pading design. When read into Excel, it forms a spread sheet which can be edited and saved back out as a comma separated value file. Commas may not be embedded in any field including comments.

The first column is the Side field and is one of the following (L, B, R, T). If the cell is flipped than an "F" is appended to the end. This is reflected in the Ring View by crossing the cell corner to corner. *e.g. "RF"*
RF,(39,39),(28,29),(VDDCPU2_1.8,VDDCPU2_1.8),vddcpu2_1.8,PVDD12DGZX2WBP,'VDDCPU -New Pad Type -120u Wide pad -Bring VDD to Core'

The second column is the Package Pin. If a cell contains more than one pad then this column must be formatted using () to enclose the multiple entries. The entries can be separated with either a "," or a space. If a space is used than there must be valid data in each slot where data is called for. *e.g. (39,39) or (39 39)*
RF,(39,39),(28,29),(VDDCPU2_1.8,VDDCPU2_1.8),vddcpu2_1.8,PVDD12DGZX2WBP,'VDDCPU -New Pad Type -120u Wide pad -Bring VDD to Core'

The Third column is the Bond Pad Number and needs to be unique. Tools are available to renumber these pads. They are an integer type starting at 1 and incrementing counter clockwise around the chip. If a cell contains more than one pad then this column must be formatted using () to enclose the multiple entries. The entries can be separated with either a "," or a space. If a space is used, there must be valid data in each slot where data is called for. *e.g. (28,29) or (28 29)*
RF,(39,39),(28,29),(VDDCPU2_1.8,VDDCPU2_1.8),vddcpu2_1.8,PVDD12DGZX2WBP,'VDDCPU -New Pad Type -120u Wide pad -Bring VDD to Core'

The forth column is the Pad name and is a string. It is often referenced to a net name. If a cell contains more than one pad then this column must be formatted using () to enclose the multiple entries. The entries can be separated with either a "," or a space. If a space is used, there must be valid data in each slot where data is called for. *e.g. (VDDCPU2_1.8,VDDCPU2_1.8) or (VDDCPU2_1.8 VDDCPU2_1.8)*
RF,(39,39),(28,29),(VDDCPU2_1.8,VDDCPU2_1.8),vddcpu2_1.8,PVDD12DGZX2WBP,'VDDCPU -New Pad Type -120u Wide pad -Bring VDD to Core'

The fifth column is the Instance name and is a string. This name has to be unique. There is a tool available for re-sequencing spacer cells to make them unique and is handy if the CSV file was edited in Excel or a text editor and you didn't want to do this manually. *e.g. vddcpu2_1.8*
RF,(39,39),(28,29),(VDDCPU2_1.8,VDDCPU2_1.8),vddcpu2_1.8,PVDD12DGZX2WBP,'VDDCPU -New Pad Type -120u Wide pad -Bring VDD to Core'

The sixth column is the cell name in the library you are using for the Pading and is a string. *e.g. PVDD12DGZX2WBP*
RF,(39,39),(28,29),(VDDCPU2_1.8,VDDCPU2_1.8),vddcpu2_1.8,PVDD12DGZX2WBP,'VDDCPU -New Pad Type -120u Wide pad -Bring VDD to Core'

The seventh column and on are comments and must start with one of the following " ' * ! and must not have any embedded commas. The same character can end a comment but is not processed. You can have as many comments as you would like. e.g. 'VDDCPU -New Pad ...

RF,(39,39),(28,29),(VDDCPU2_1.8,VDDCPU2_1.8),vddcpu_1.8,PVDD12DGZX2WBP,'VDDCPU -New Pad Type -120u Wide pad -Bring VDD to Core'

Side,PackagePin,BondPadNumber,PadName,InstanceName,CellName(,Comments)

T,,,,p24,IOCAP10

T,49,41,VDDREF_3.3,vddref_3.3,PVDD2DGZ,'VDDREF33'

T,,,,p25,IOCAP20

T,50,42,REF0,ref0pad,PCI66DGZ

T,51,43,REF1_FSC,ref1_fscpad,COMBOIO

T,,,,pi26,PFEED5_ISOVDVSS_IO_COR

T,,,,pi27,PFEED5_ISOVDVSS_IO_COR,'Changed'

T,52,44,VSS11,vss10,PVSS3DGZX2,'VSS'

T,(53,53),(45,46),(VDDCORE2_1.8,VDDCORE2_1.8),vddcore2_1.8,PVDD12DGZX2WBP,'VDD -New Pad Type -120u Wide pad -Bring VDD to Core'

T,PADDLE11,47,VSS12,vss11,PVSS3DGZ,'VSSPCI'

T,54,48,RESETN,resetnpad,PDB24DGZ

T,,,,p28,IOCAP10

T,55,49,PCI0,pci0pad,PCI66DGZ

T,,,,p29,IOCAP10

T,56,50,PCI1,pci1pad,PCI66DGZ

T,,,,p30,IOCAP10

T,57,51,PCI2,pci2pad,PCI66DGZ

T,,,,p31,IOCAP10

T,58,52,TESTMODE,testmodepad,PDIDGZ

T,,,,p32,IOCAP10

T,59,53,PCI3,pci3pad,PCI66DGZ

T,,,,p33,IOCAP10

T,60,54,PCI4,pci4pad,PCI66DGZ

T,,,,p34,IOCAP10

T,61,55,PCI5,pci5pad,PCI66DGZ

T,,,,p35,IOCAP10

T,,,,p36,PFEED5

T,(62,62),(56,57),(VSS13,VSS13),vss12,PVSS3DGZX3,'VSSPCI'

T,,,,p37,PFEED5

T,63,58,VDDPCI_1.8,vddpci_1.8,PVDD1DGZX2,'VDDSHARED'

T,,,,p38,PFEED5
 T,(64,64),(59,60),(VDDPCI2_3.3,VDDPCI2_3.3),vddpci2_3.3,PVDD2DGZX3,'VDD33SHARED'
 T,,,,p39,PFEED5
 L,1,61,PCIF2,pcif2pad,COMBOIO
 L,2,62,PCIF1_FSB,pcif1_fsbpad,COMBOIO
 L,3,63,PCIF0,pcif0pad,PCI66DGZ
 L,,,,p40,IOCAP10
 L,4,64,AUTOOF,autofpad,PDIDGZ
 L,5,65,VDDPCI1_3.3,vddpci1_3.3,PVDD2DGZX2,'VDD33SHARED'
 L,PADDLE1,66,VSS1,vss1,PVSS3DGZ,'VSSPCI'
 L,6,67,VTTWPRGD_PWRDWNB,vttwprgd_pwrdownbpad,PDIDGZ
 L,7,68,PORBYPASS,porbypasspad,PDDDGZ,'PORBYPASS'
 L,,,,pi41,PFEED10_ISOVDVSS_IO_COR
 L,8,69,MODE1,mode1pad,PDDDGZ
 L,8,70,VDDUSB_3.3,vddusb_3.3,PVDD2DGZ,'VDD33DOT_USB'
 L,8,71,MODE2,mode2pad,PDDDGZ
 L,9,72,USB48_FSA,usb48_fsapad,COMBOIO
 L,PADDLE2,73,VSS2,vss2,PVSS3DGZ,'VSSDOT_USB'
 L,10,74,VDDUSB_1.8,vddusb_1.8,PVDD1DGZ,'VDDDOT_USB'
 L,,,,pi42,PFEED5_ISOVDVSS_IO_COR,'Note: VDD33 rail can be cut; ESD fed by VDD pad'
 L,11,75,VSS3,vss3,PVSS3DGZX2,'VSS'
 L,(12,12),(76,77),(VDDCORE1_1.8,VDDCORE1_1.8),vddcore1_1.8,PVDD112DGZX3,'VDD'L,,,,p43,PFEED5
 LF,(13,14),(78,79),(DOT,DOTN),dotpad,DIFFCLKDRVPAD
 L,,,,p44,PFEED5
 L,(PADDLE3,),(80,81),(VSS4,VSS4),vss4,PVSS3DGZX3_DIFF_PULLBACK,'VSS -Swapped VSS and VDDSRC
 pads - used to be package pin 16'
 L,,,,pi45,PFEED5_ISOVDVSS_IO_COR
 L,,,,pi46,PFEED10_ISOVDVSS_IO_COR
 L,,82,VDDSRC1_1.8,vddsrc1_1.8,PVDD12DGZX2,'VDDSRC -Swapped VSS and VDDSRC pads'
 B,PADDLE5,1,VSS5,vss5,PVSS3DGZ,'VSSSRC -Changed from M2 strip'
 B,,,,p1,PFEED5
 BF,(17,18),(2,3),(SRC0,SRC0N),src0pad,DIFFCLKDRVPAD
 B,,,,p2,IOCAP10
 BF,(19,20),(4,5),(SRC1,SRC1N),src1pad,DIFFCLKDRVPAD
 B,,,,p3,IOCAP10
 BF,(21,22),(6,7),(SRC2,SRC2N),src2pad,DIFFCLKDRVPAD
 B,(23,23),(8,9),(VDDSRC2_1.8,VDDSRC2_1.8),vddsrc2_1.8,PVDD1112DGZX4
 BF,(24,25),(10,11),(SRC3,SRC3N),src3pad,DIFFCLKDRVPAD
 B,,,,p4,IOCAP10

B,(26,27),(12,13),(SRC4N,SRC4),src4_satapad,DIFFCLKDRVPAD
 B,,,,p5,IOCAP10
 B,(28,29),(14,15),(SRC5N,SRC5),src5pad,DIFFCLKDRVPAD
 B,,,,p6,IOCAP10
 B,(30,31),(16,17),(SRC6N,SRC6),src6pad,DIFFCLKDRVPAD
 B,,,,p7,IOCAP10
 B,,,,p8,PFEED5
 B,PADDLE6,18,VSS6,vss6,PVSS3DGZX2,'VSSSRC -Changed'
 B,(,),(19,20),(VDDSRC3_1.8,VDDSRC3_1.8),vddsrc3_1.8,PVDD112DGZX3,'New Pad Type -Bring VDD to core'
 R,PADDLE7,21,VSS7,vss7,PVSS3DGZ,'VSSCPU'
 R,,,,p9,PFEED5
 R,(33,34),(22,23),(CPU2N,CPU2),cpu2pad,DIFFCLKDRVPAD
 R,,,,p10,IOCAP10
 R,(35,36),(24,25),(CPU1N,CPU1),cpu1pad,DIFFCLKDRVPAD
 R,,,,p11,IOCAP10
 R,(37,38),(26,27),(CPU0N,CPU0),cpu0pad,DIFFCLKDRVPAD
 R,,,,p12,PFEED5
 R,,,,p13,PFEED5
 RF,(39,39),(28,29),(VDDCPU2_1.8,VDDCPU2_1.8),vddcpu2_1.8,PVDD12DGZX2WBP,'VDDCPU -New Pad Type -120u Wide pad -Bring VDD to Core'
 R,,,,pi14,PFEED20_ISOVDVSS_IO_COR
 R,,,,p15,IOCAP10
 RF,40,30,IREF,irefpad,IREF
 R,41,31,MODE0,mode0pad,PDDDGGZ
 R,41,32,VDDA_3.3,vdda_3.3,PVDD2DGZ
 R,,,,p16,IOCAP10
 R,42,33,VDDA_1.8,vdda_1.8,PVDD1DGZX2,'Changed'
 R,PADDLE9,34,VSS9,vss8,PVSS3DGZX2,'VSSA - Moved VSSA to pair with VDDA'
 R,,,,p17,IOCAP20
 R,,,,pi18,PFEED20_ISOVDVSS_IO_COR
 R,44,35,SCL,sclpad,PDB04DGZ
 R,,,,p19,IOCAP10
 R,45,36,SDA,sdapad,PDB24DGZ
 R,,,,p20,IOCAP10
 R,46,37,VDDREF_1.8,vddref_1.8,PVDD1DGZ,'VDDREF'
 R,,,,p21,PFEED5
 R,PADDLE10,38,VSS10,vss9,PVSS3DGZ,'VSSREF -Changed'
 R,,,,p22,IOCAP10

R,(47,),(39,40),(XTALIN,XTALOUT),xtalpad,PDX002DG
R,,,,p23,IOCAP10

PRELastsettings.ini:

This file contains all the presets and process parameters for the Project and reflects the Last Settings used for the design.

```
ProcessOption0= 1
ProcessOption1= 0
ProcessOption2= 1
ProcessOption3= 1
ProcessOption4= 1
ProcessOption5= 0
UserDim0=2800
UserDim1=2800
Pin1_3=true
POpt1
FilePath0=050831.csv
FilePath1=050831_ICED.cmd
FilePath2=050831_ORDER.tdf
FilePath3=050831_FIXED.cmd
FilePath4=050831_LOC.tdf
FilePath5=050831_LLC.wbp
FilePath6=050831_CNTR.wbp
FilePath7=050831_LLC.jtag
FilePath8=050831.create_pins
FilePath9=050831_ICED_Pin_Text.cmd
FilePath10=050831_Avanti_Pin_Text.cmd
FilePath11=050831_power.v
FilePath12=050831.placement
Param0=PCORNER
Param1=PCORNER_P1
Param2=cornerlb
Param3=cornerrb
Param4=cornerrt
Param5=cornerlt
Param6=302.8
Param7=40
Param8=5
Param9=CPTX
Param10=LibraryName
Param11=CellName
PadDef=SPCPD*
PadDef=PFEED*
PadDef=PVSS*
```

PadDef=AVSS*
PadDef=PVDD*
PadDef=AV3DD*
PadDef=FSPCPD*
PadDef=IOCAP*
Stat0=2085.600
Stat1=23
Stat2=20
Stat3=18
Stat4=20
Stat5=12
Stat6=2
Stat7=2345.600
Stat8=37
Stat9=22
Stat10=19
Stat11=20
Stat12=21
Stat13=1
Stat14=2085.600
Stat15=37
Stat16=20
Stat17=20
Stat18=20
Stat19=20
Stat20=0
Stat21=2345.600
Stat22=30
Stat23=26
Stat24=21
Stat25=26
Stat26=7
Stat27=5
Stat28=1480.000
Stat29=1740.000
Stat30=
Stat31=127
Stat32=88
Stat33=78
Stat34=86
Stat35=60
Stat36=8
LC0=0
LC1=0
WorkPath=C:\Program Files\Microsoft Visual Studio\VB98\SourceCode\Tools2010\PadRingExplorer\

ExcelPath=C:\Program Files\Microsoft Office\Office12\EXCEL.EXE
PackagePinOffset=4900
PackagePinFuzz=200
FingerEndOffset=3000
FingerEndFuzz=500
AttachOffset=400
AttachSpacing=125
WireSpacing=70
SpacerList=FSPCPD*
SaveFile0=1
SaveFile1=1
SaveFile2=1
SaveFile3=1
SaveFile4=1
SaveFile5=1
SaveFile6=1
SaveFile7=1
SaveFile8=1
SaveFile9=1
SaveFile10=1
SaveFile11=1
ToolTips=Off
MainTop=2625
MainLeft=870
BondWireRulesTop=0
BondWireRulesLeft=0
BPPPropTop=5400
BPPPropLeft=3360
CellPropTop=1065
CellPropLeft=6495
EditCellListTop=0
EditCellListLeft=0
EditCellListHeight=5355
EditCellListWidth=1860
PropTop=0
PropLeft=0
RenumTop=0
RenumLeft=0
RingViewTop=1725
RingviewLeft=7545
RingViewHeight=6630
RingViewWidth=7245
TxtTop=3885
TxtLeft=4290
TxtHeight=5745

TxtWidth=5490

Cellist.dat file: (Tab Delimited format)

This file lists all the cells that are available to the designer for this project.

- CellName i= GDS cell name.
- Width = cell placement boundary width.
- PadCount = Number of pads in the cell.
- YoffsetXoffset = Coordinate pair for each pad indicating the center of the pad offsets from the lower left corner of the cell.
- Type = Defines the type of cell for color coding and sorting.
 - Blank are GP signal cell, color Blue
 - S are spacer cells, color Yellow.
 - F are filler cells, color Magenta.
 - P are power cells, color Red.
 - G are ground cells, color Green.
 - D are dummy cells with no function, color Cyan.

CellName	Width	PadCount	YOffset	XOffset	Type
PADIZ60_MO	60	1	28.5	30	
DPAD 60	1	28.5	30		
REG80 80	0	0	0		
REG80_PAD	80	1	28.5	50	
Switch 60	0	0	0		
FSPCPD01	0.1	0	0	0	F
FSPCPD1	1	0	0	0	F
FSPCPD2	2	0	0	0	F
FSPCPD5	5	0	0	0	F
FSPCPD10	10	0	0	0	F
FSPCPD20	20	0	0	0	F
SPCPD01	0.1	0	0	0	S
SPCPD11	0	0	0	S	
SPCPD22	0	0	0	S	
SPCPD55	0	0	0	S	
SPCPD10	10	0	0	0	S
SPCPD20	20	0	0	0	S
SPCPD01S	0.1	0	0	0	S
SPCPD1S	1	0	0	0	S
SPCPD2S	2	0	0	0	S
SPCPD5S	5	0	0	0	S
SPCPD10S	10	0	0	0	S
SPCPD20S	20	0	0	0	S

SPCPD60	60	0	0	0	S		
SPCPD10SV	10	0	0	0	S		
SPCPD10SVT	10	0	0	0	S		
PFEED01	0.1	0	0	0	S		
PFEED1 1	0	0	0	S			
PFEED2 2	0	0	0	S			
PFEED5 5	0	0	0	S			
PFEED5_ISOVDIO_COR		5	0	0	0	S	
PFEED5_ISOVDIO_COR	5	0	0	0	S		
PFEED10	10	0	0	0	S		
PFEED20	20	0	0	0	S		
PFEED01S	0.1	0	0	0	S		
PFEED1S	1	0	0	0	S		
PFEED2S	2	0	0	0	S		
PFEED5S	5	0	0	0	S		
PFEED10S	10	0	0	0	S		
PFEED20S	20	0	0	0	S		
PFEED60	60	0	0	0	S		
PFEED10SV	10	0	0	0	S		
PFEED10SVT	10	0	0	0	S		
IOCAP10	10	0	0	0	S		
IOCAP20	20	0	0	0	S		
Pck01cdg	60	0	0	0			
Pck02cdg	60	0	0	0			
Pck03cdg	60	0	0	0			
Pck04cdg	60	0	0	0			
PCORNERDG_L	302.8	0	0	0			
PCORNER_TLC	302.8	0	0	0			
PCORNER_TLC_P1	302.8	0	0	0	0		
CORNER1	302.8	0	0	0			
PDT08DGZ	60	1	28.5	30			
PDO08CDG	60	1	28.5	30			
PDIDGZ 60	1	28.5	30				
PDB08DGZ	60	1	28.5	30			
PDDDZ	60	1	28.5	30			
PDT04DGZ	60	1	28.5	30			
PVDD1DGZ	60	1	28.5	30			
PVDD2DGZ	60	1	28.5	30			
PVSS1DGZ	60	1	28.5	30			
PVSS2DGZ	60	1	28.5	30			
PVSS3DGZ	60	1	28.5	30			
Pdb04dgz	60	1	28.5	30			
Pdu08dgz	60	1	28.5	30			
PDB12DGZ	60	1	28.5	30			
AV3DDPAD018	60	1	28.5	30			

AVSSPAD018	60	1	28.5	30					
PRB08DGZ	60	1	28.5	30					
PRB12DGZ	60	1	28.5	30					
PRT08DGZ	60	1	28.5	30					
PRT12DGZ	60	1	28.5	30					
PRU08DGZ	60	1	28.5	30					
PRO08CDG	60	1	28.5	30					
PDAPROT	60	1	28.5	30					
PDUDGZ	60	1	28.5	30					
PDUSDGZ	60	1	28.5	30					
PVSS6DG	60	1	28.5	30					
PVDD6DG	60	1	28.5	30					
PVAA1DGZ	60	1	28.5	30					
ZPOR018	60	0	0	0					
PUSBC11DG	60	1	28.5	30					
APRU08DGZ	60	1	28.5	30					
IOUSBC11FSM	382	4	28.5	65	150.185		230.185		316.425
USBC11FSM	382	4	28.5	65	150.185		230.185		316.425
IORTCOSC	300	4	28.5	30	90	210	270		
XOSC32K	300	4	28.5	30	90	210	270		
PDXO02DG	130	2	28.5	30	100				
DIFF	130	2	28.5	30	100				
DIFFCLKDRV PAD		130	2	28.5	30	100			
PVDD112DGZX3		120	2	28.5	25	95	P		
PVDD1112DGZX4		160	2	28.5	25	95	P		
PVDD1DGZX3	120	2	28.5	25	95	P			
PVSS1DGZX2	80	2	28.5	20	40	G			
PVDD2DGZX3	120	2	28.5	25	95	P			
PVDD2DGZX2	80	1	28.5	40	P				
PVSS3DGZX3	120	2	28.5	25	95	G			
PVSS3DGZX3_DWP_L	120	2	28.5	25	95	G			
PVSS3DGZX3_DWP_R	120	2	28.5	25	95	G			
PVDD1DGZX2	80	1	28.5	40	P				
PVDD12DGZX2	80	1	28.5	40	P				
PVDD12DGZX2WBP	120	2	28.5	25	95	P			
PVSS3DGZX2	80	1	28.5	40	G				
PVSS3DGZ	60	1	28.5	30	G				
PVSS3DGZX3_DIFF_PULLBACK	120	2	28.5	25	95	G			
PVDD112DGZX3_DIFF_PULLBACK		120	2	28.5	25	95	P		
COMBOIO	80	1	28.5	40					
PCI66DGZ	60	1	28.5	30					
IREF	120	1	28.5	30					
PDB24DGZ	60	1	28.5	30					
DMY	40	1	20.000	20.000	D				

DXF Package Format Definition:

