

ADIVA DRC Checks

Notice

Representations in this User Guide are meant as an overview and quick reference. Full details can be found in the On-Line manuals located at the *ADIVA Corporation* website - www.adiva.com

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ADIVA DRC Checks

Getting Started...

Running a DRC check in Adiva is a simple process of filling out the DRC check dialogs and executing the DRC check process.

When checks are complete, a **Violation Checklist** will automatically appear reporting all checks that were run and their results. From this **Violation Checklist**, a user can sort and/or choose which check results to investigate and then perform a **Violation Seek** to review the violation. The entire selected group of violations can be reviewed or a subset of violations can be reviewed as user selected.

While viewing the violation, details of the check results are displayed. During this review, the user can decide to “Accept” the violation, “fix” the violation, link the violation back to a CAD system, create a report in internet format of the violation image with all of the details of the violation or “Delete” the violation.

All violation reports can be saved for later review. Checks do not need to be re-run to view results at a later time. Comments can also be saved with each violation type for later reference.

ADIVA DRC Checks

Getting Started...

A typical checking process may involve....

- Choosing a rule file that automatically loads all of the DRC check dialogs with check parameters
 - loading a standard rule file is not required
 - rules can be entered directly into each DRC dialog on-the-fly
- Entering or modifying rules within a DRC check dialog
- Executing a check or a group of checks
- Viewing DRC check results either when all of the checks complete or while some of them have completed and others are still running
- Saving DRC check results for later review
- Assigning an attribute to a check result as one to be “Fixed” or “Accepted”
- Leaving a comment on a violation type for later reference
- Archiving a check result into a web page format for review
- Linking a DRC check result back to a CAD system (where available)

Load DRC Check Rules

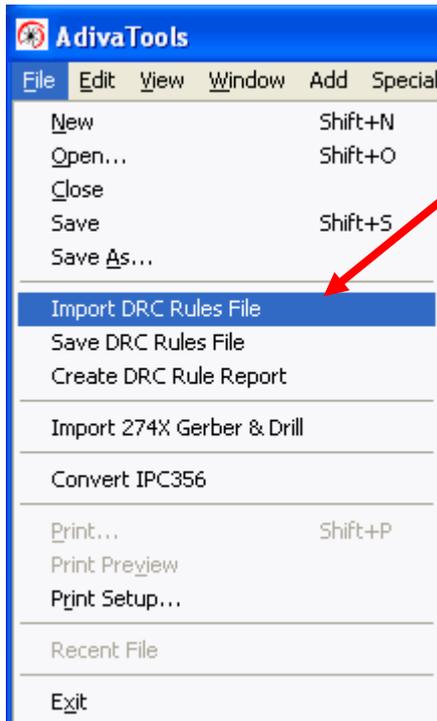
Standard DRC Rules files from a library of rule files can be loaded into each of the DRC dialogs. There are two ways this can be accomplished.....

- Choose a rule file when operating one of the CAD Interfaces. Then when AdivaTools opens, each of the DRC dialogs will be filled out with the rules defined in the file. (See the **CAD Interface Quick Start** guides for details)
- Choose a rule file by selecting an appropriate file from a standard location – typically the Adiva “data” directory located by default at “c:\adiva\data”.

Adiva installs with multiple basic rule files named like **95_example.rul** and **95_example_metric.rul** for metric designs.

These rule files are a collection of IPC and industry standards.

Loading DRC Check Rules



Select **File > Import DRC Rules** to bring in a master set of rules that you may have created or select from the standard files installed with Adiva.

Navigate to the **c:\adiva\data** directory and choose either **95_example.rul** or **95_example_metric.rul** if using a metric design as a good basic ruleset.

Rule files can be reloaded if it is found the values selected are incorrect.

Values for individual checks can also be modified on-the-fly inside each of the DRC dialogs.

Saving DRC Check Rules

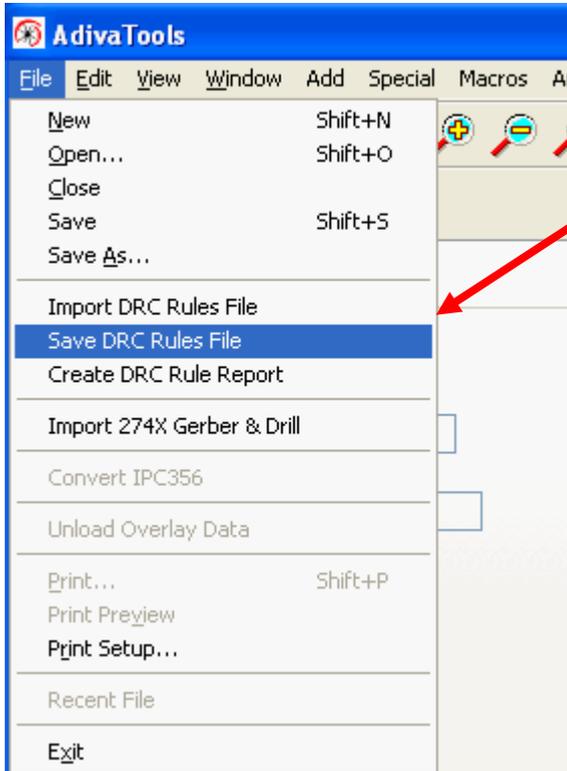
In each of the DRC dialogs is a collection of available DRC checks. Each check can have a parameter assigned and it can also be activated ON or OFF with a check box selection. These parameters and activity states can be saved in a file for recall on other designs.

There must be a separate rule file for US units and Metric units.

It is best to save rule files into the **c:\adiva\data** directory for easy access and recall.

It is best to save rule files with a “.rul” extension for easy identification by Adiva DRC.

Saving DRC Check Rules

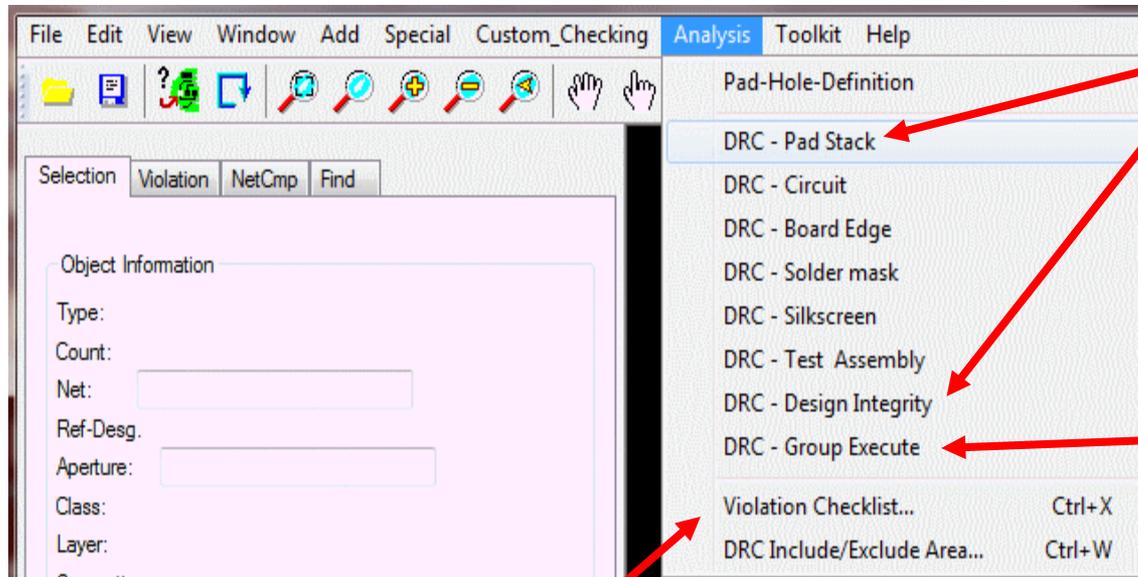


Select **File > Save DRC Rules File** to save a master set of rules that you may have created or adjusted within the DRC dialogs.

It is best to save rule files to the **c:\adiva\data** directory but they can also be saved to a location of choice.

Adiva uses the filename extension **“.rul”** to identify DRC rule files

Accessing DRC Checks and Results



DRC Checks all reside under the **Analysis** menu

– select one of the check types to open a dialog displaying the checks that are available and either **Update** their settings or **Execute** the selected checks.

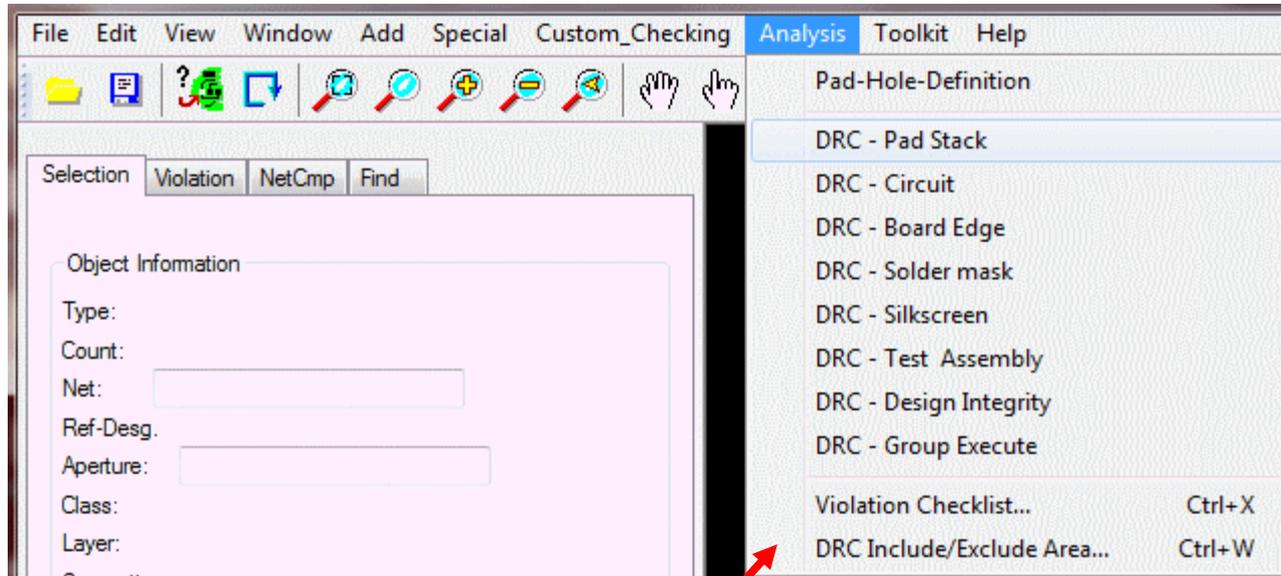
DRC checks can also be run as a group by setting all of the parameters desired in the above DRC dialogs and then **Group Executing** the desired checklists.

DRC check results can be viewed by selecting the **Violation Checklist** menu item or the Toolbar Icon or **<ctrl>x** on the keyboard.



TIP: **Violation Checklist** can be opened while checks are still in process allowing a user to view what has been completed so far.

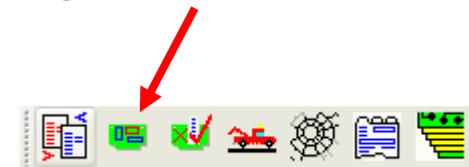
DRC Checks by Area



DRC checks can be applied to user defined **Include** or **Exclude** areas

The **Include / Exclude** dialog allowing area definition can be accessed through the **Analysis** menu selection...

...or through a Toolbar Icon.



DRC Checks (Creating Include / Exclude Areas)

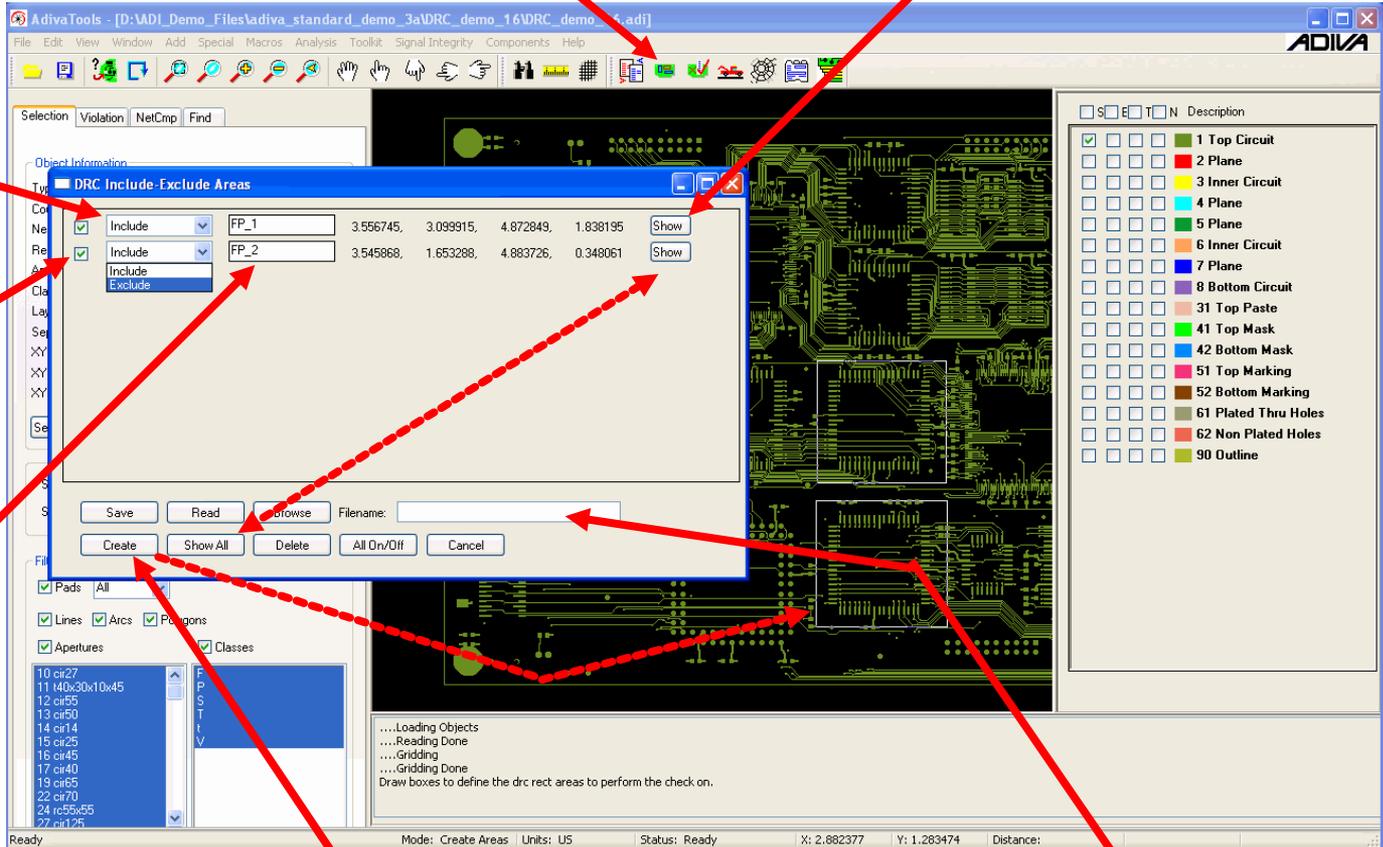
Open **Include/Exclude Area** Function

1

Select the **Show** buttons to refresh the drawing of the Include/Exclude areas

Define type of area
Include or **Exclude**

3



Check box **ON** to make it active

Name the area for reference if desired

– **DO NOT** use spaces in the name

2

Select **Create** and draw areas on screen

Enter and save a file for later use or read a file from a previous DRC run

DRC Dialogs

All DRC dialogs work in a similar manner. If an existing rule file was loaded, the dialogs will be filled in and check boxes in their defined state as shown, ready for execution. Details about the dialogs are....

Check ON layers to be processed

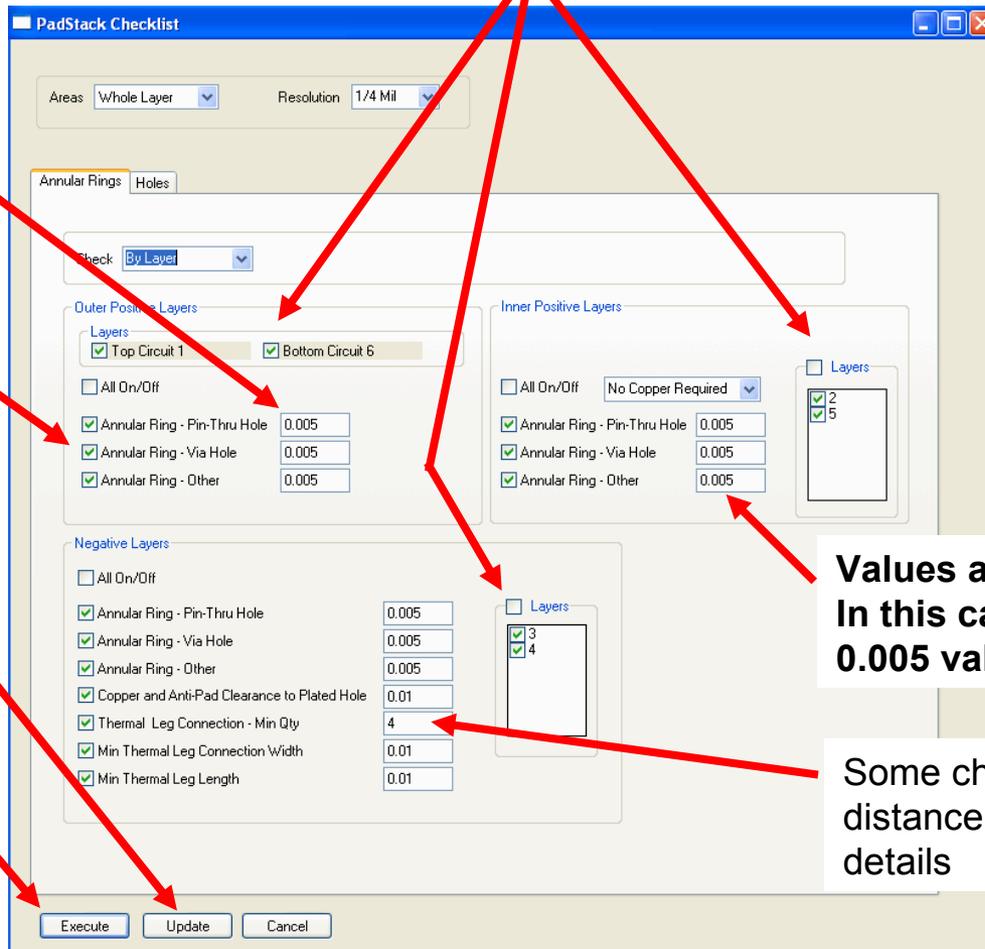
Values can be manually adjusted as desired

Checked boxes will be processed

Update to save changes in current dialog – useful when using **Group Execute**

Execute to start checking process

TIP: Execute also performs the **Update** process



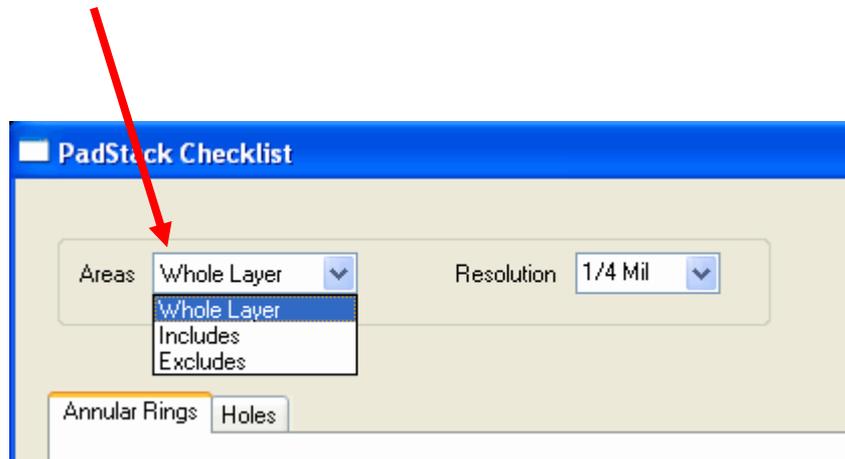
Values are in inches or mm
In this case:
0.005 value = 5-mil space

Some checks do not use a distance value – see manual for details

DRC Dialogs

By default, Adiva checks are run across the entire layer selected in the DRC dialog.

However, if **Include** or **Exclude** areas have been created, the DRC checks can be directed to run **ONLY** on those areas. Choose where to apply the checks and then **Execute** the dialog.



NOTE: only the **Include** or **Exclude** areas checked ON in the **DRC Include / Exclude** dialog box will be used.

DRC Dialogs

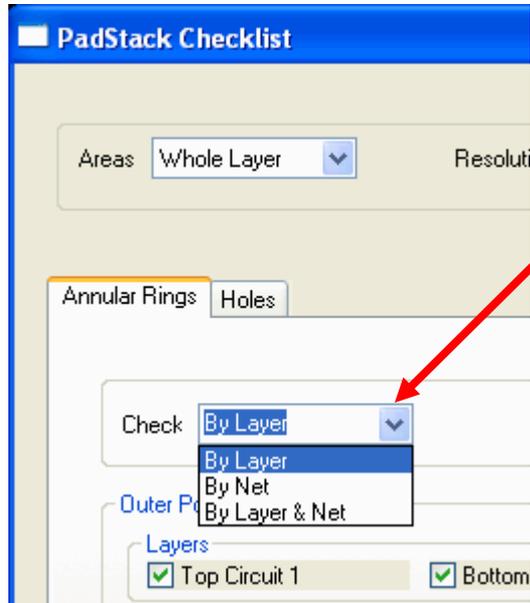
DRC checks can be applied to specific nets or to specific nets on a specific layer.

If **By Net** is chosen, then regardless of the layer settings in the DRC dialog, the specific nets will be checked against themselves and each other.

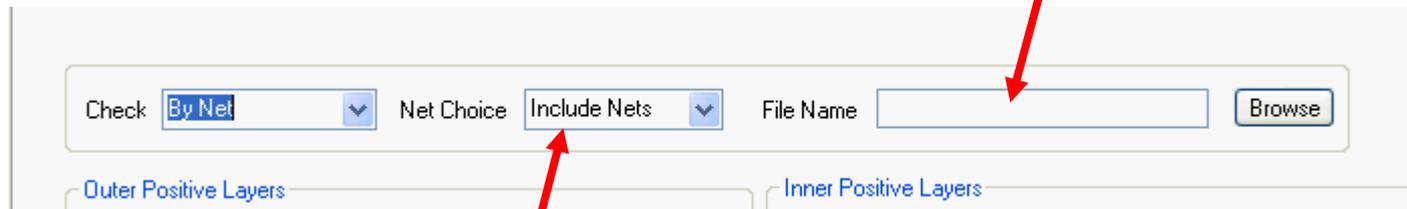
If **By Layer & Net** is chosen, then specific nets will only be checked against themselves and each other and only on the layers selected.

Nets are defined by a simple ASCII text file listing the specific nets to be checked. There should be one net name per line in the file.

Note: Wildcards "*" can also be used in the file.



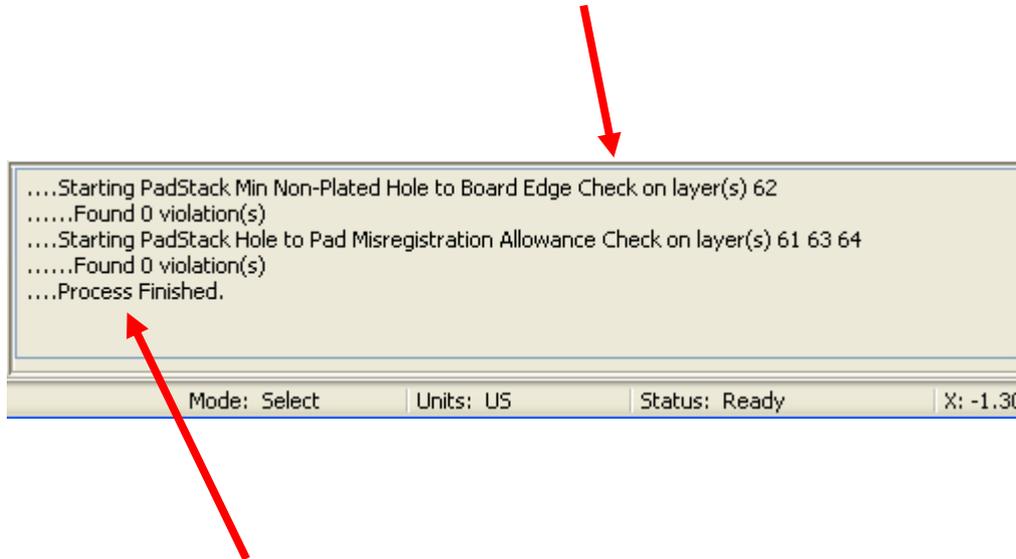
Enter net file name here.



Tip: The nets contained in the file can also be **Excluded** from checks by changing **Net Choice**.

DRC Checks

As DRC checks process, a status will scroll in the Adiva message window.



While DRC checks are running, the **Violation Checklist** can be opened to review what has already completed or...

...when **...Process Finished** appears the **Violation Checklist** will automatically open for review.

Violation Review

As DRC checks are running, the **Violation Checklist** can be opened to review current results or at the end of a set of checks, the **Violation Checklist** will open automatically displaying check results.

When the DRC checks complete, a file called “adiva.vio” will be created in the project directory containing the results of the DRC check routine. The user also has the ability to save the DRC results into its own user defined file directly from the **Violation Checklist**.

Further DRC check processes will create more violation files but they will be sequence numbered for better identification. For example, if one DRC check is run, the auto-saved violation file will be named “adiva.vio”. A second DRC check run will create a file called “adiva_1.vio” and so on.

The **Violation Checklist** is **cumulative** meaning that every time a DRC check is executed, its results will be added to the **Violation Checklist**.

Each DRC check is provided a sequence number based on its run order.

Check results can be sorted through any of the data columns – hi-lo – lo-hi. Original run order can be displayed simply by sorting the sequence column.

DRC results can be deleted by checking on all or some of the check boxes for a particular check result and selecting the **Delete Selected Violations** button in the **Violation Checklist**

Individual DRC violations can be deleted by selecting the individual violation (or group) and choosing **Viol Delete** in the ViolSeek dialog displayed on the left side of the screen.

Violation Review

Violation results can be communicated in various ways.....

- By viewing the Adiva Violations directly within the main Adiva Graphical interface
- By linking an Adiva Violation back to the host CAD system.
(See the **Violation Link-Back User Guide** for further details)
- By creating an internet based collection of violation information and images

TIP:

An application for Web Page creation is to archive images of violations that a designer needs to address. This way, there is a graphical document of the issue allowing a paper trail for confirmation that the problem was addressed.

Another application for Web Page creation is to record images of violations that may not strictly pass the design rules but have been approved for production. This way, the collection of images can be passed to the manufacturer as an approved list of violations – meaning if during the production process these archived violations are found, do not place the job on hold.

The Violation Checklist appears when checks are completed

The Checklist can also be opened while checks are running by selecting its Toolbar Icon



Violations are displayed by concern level as defined by the range setting

Save violations to a file to read back and review later

| | Accepted | Param | Layer | Seq | Violation Type | Comment |
|-------------------------------------|----------|---------|-------|-----|----------------------------------|---------|
| <input type="checkbox"/> | 0 | 4.00000 | 4 | 34 | Thermal Leg Connection - Min Qty | |
| <input type="checkbox"/> | 0 | 4.00000 | 7 | 36 | Thermal Leg Connection - Min Qty | |
| <input checked="" type="checkbox"/> | 0 | 0.00500 | 2 | 17 | Annular Ring - Via Hole | |
| <input checked="" type="checkbox"/> | 0 | 0.00500 | 4 | 18 | Annular Ring - Via Hole | |
| <input checked="" type="checkbox"/> | 0 | 0.00500 | 7 | 20 | Annular Ring - Via Hole | |
| <input checked="" type="checkbox"/> | 0 | 4.00000 | 5 | 35 | Thermal Leg Connection - Min Qty | |
| <input checked="" type="checkbox"/> | 0 | 0.00500 | 5 | 19 | Annular Ring - Via Hole | |
| <input type="checkbox"/> | 0 | 0.00500 | 2 | 21 | Annular Ring - Other | |
| <input type="checkbox"/> | 0 | 0.00500 | 4 | 22 | Annular Ring - Other | |

Choose a **Violation Type** and amount to review by using **ViolSeek** on the main user interface

Select **Close Violation Checklist** to close the dialog (violations are not lost)

Adjusting the **Violation Range** effects violation count distribution in the **Violation Checklist**. The values listed for each range analyze how close a violation comes to the parameter to determine the category a particular violation will be placed. Changes take effect on **Update**.

For example.... given the range values shown, if a check parameter is 0.005 and the violation amount is 0.00480 – this violation amount falls within ¼ Mil of the parameter categorizing the violation as “**Tolerance**”. If the violation amount is 0.0046 – this makes the violation amount fall between ¼ and ½ mil of the parameter making it a “**Concern**” violation. Anything else is deemed “**Critical**”.

The screenshot shows the 'Violation Checklist Report' window. A red arrow points to the 'Adjust Violation Range' button. A dashed red line connects this button to the 'Adjust Violation Range' dialog box. The dialog box contains a table for adjusting violation ranges for various types, with 'Concern' and 'Tolerance' columns. The 'Update' button is highlighted.

| Violation Type | Concern | Tolerance |
|----------------------------|---------|-----------|
| Padstack | 0.0005 | 0.00025 |
| Circuit Violation | 0.0005 | 0.00025 |
| Board Edge Violation | 0.0005 | 0.00025 |
| Soldermask Violation | 0.0005 | 0.00025 |
| Silkscreen Violation | 0.0005 | 0.00025 |
| Test Assembly Violation | 0.0005 | 0.00025 |
| Design Integrity Violation | 0.0005 | 0.00025 |
| Component Violation | 0.0005 | 0.00025 |

Violations can be **sorted** by selecting the column button above each data column. First selection sorts high to low, second sorts low to high, third sorts high to low again...

Check all boxes on for a violation type to **Delete** or **Save** from list

Adjust Violation Range

Violation File: ./my_violation_file.vio

Save Violation File Read Violation File Browse

Choose Violations to View...

Critical Concern Tol

| Param | Layer | Seq | Violation Type | Comment |
|---------|-------|-----|----------------------------------|---------|
| 4.00000 | 4 | 34 | Thermal Leg Connection - Min Qty | |
| 4.00000 | 7 | 36 | Thermal Leg Connection - Min Qty | |
| 0.00500 | 2 | 17 | Annular Ring - Via Hole | |
| 0.00500 | 4 | 18 | Annular Ring - Via Hole | |
| 0.00500 | 7 | 20 | Annular Ring - Via Hole | |
| 4.00000 | 5 | 35 | Thermal Leg Connection - Min Qty | |
| 0.00500 | 5 | 19 | Annular Ring - Via Hole | |
| 0.00500 | 2 | 21 | Annular Ring - Other | |
| 0.00500 | 4 | 22 | Annular Ring - Other | |

Delete Selected Violations Clear Accepted Violation File

Close Violation Checklist Save Violation Summary Report

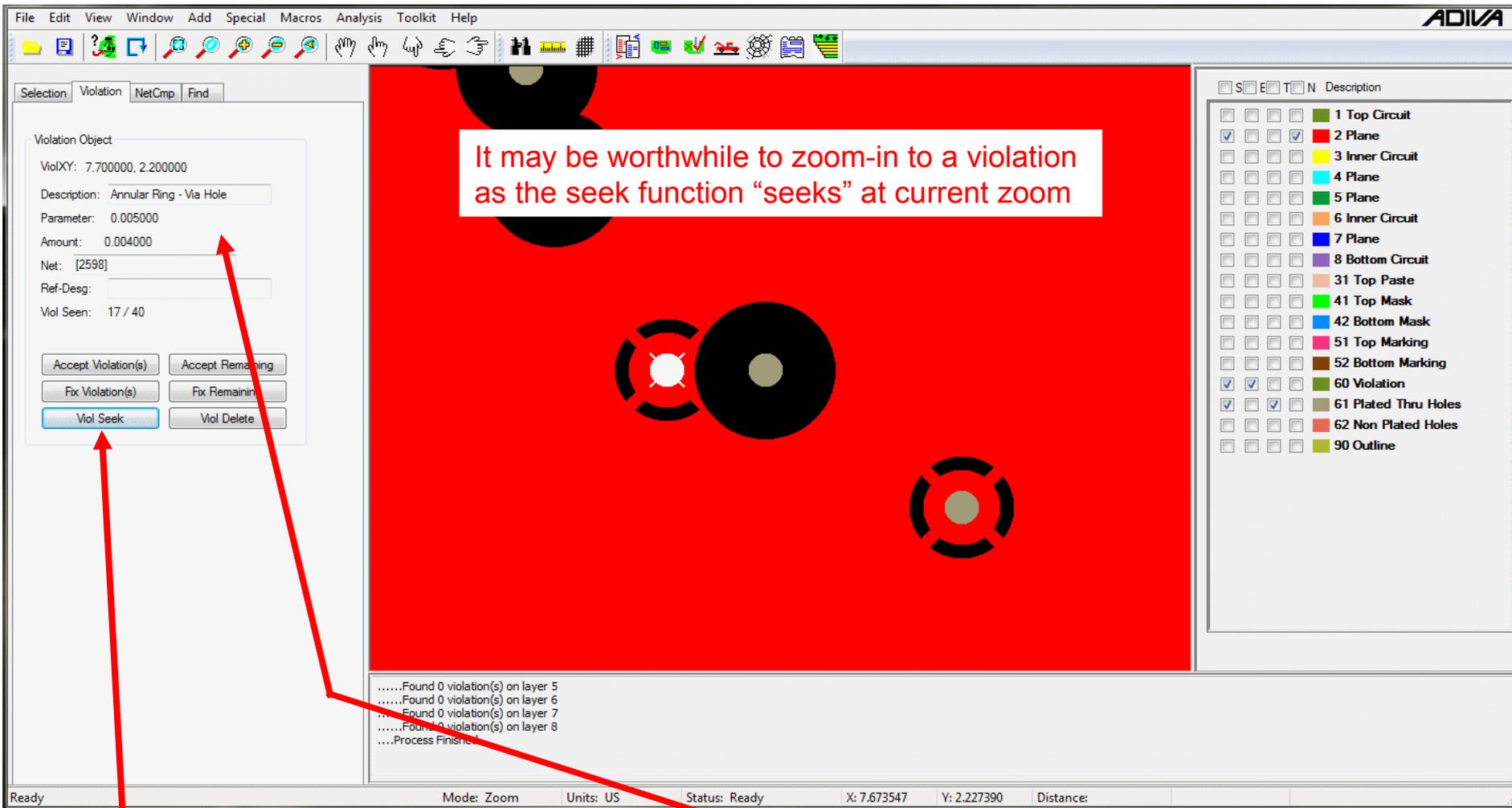
Creates a text summary report of all DRC violations. These violations are itemized by violation amounts and sorted by type. Creation of the file can be either in ASCII ".txt" file format or in a comma-delimited spreadsheet-ready format.

Empties all data contained in the "approved.vio" file. All **Accepted** violations are returned to the **Violation Checklist** for review or deletion.

This column shows the checking sequence which is the order the checks were performed

| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Accepted | Param | Layer | Seq | Violation Type | Comment |
|-------------------------------------|-------------------------------------|-------------------------------------|----------|---------|-------|-----|----------------------------------|----------------------|
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 0 | 4.00000 | 2 | 33 | Thermal Leg Connection - Min Qty | |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 0 | 4.00000 | 4 | 34 | Thermal Leg Connection - Min Qty | |
| <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | 0 | 4.00000 | 7 | 36 | Thermal Leg Connection - Min Qty | Need to Review Again |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 1 | 4.00000 | 5 | 35 | Thermal Leg Connection - Min Qty | Rvwd - 1 accepted |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 1 | 0.00500 | 2 | 17 | Annular Ring - Via Hole | Rvwd - 1 accepted |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 1 | 0.00500 | 4 | 18 | Annular Ring - Via Hole | Rvwd - 1 accepted |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 1 | 0.00500 | 7 | 20 | Annular Ring - Via Hole | Rvwd - 1 accepted |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 0 | 0.00500 | 5 | 19 | Annular Ring - Via Hole | |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 0 | 0.00500 | 2 | 21 | Annular Ring - Other | |

Comments can be added to the checklist and saved to a Violation file. Enter any text and save the violation file – when the violation file is reloaded, these comments will display as they were entered



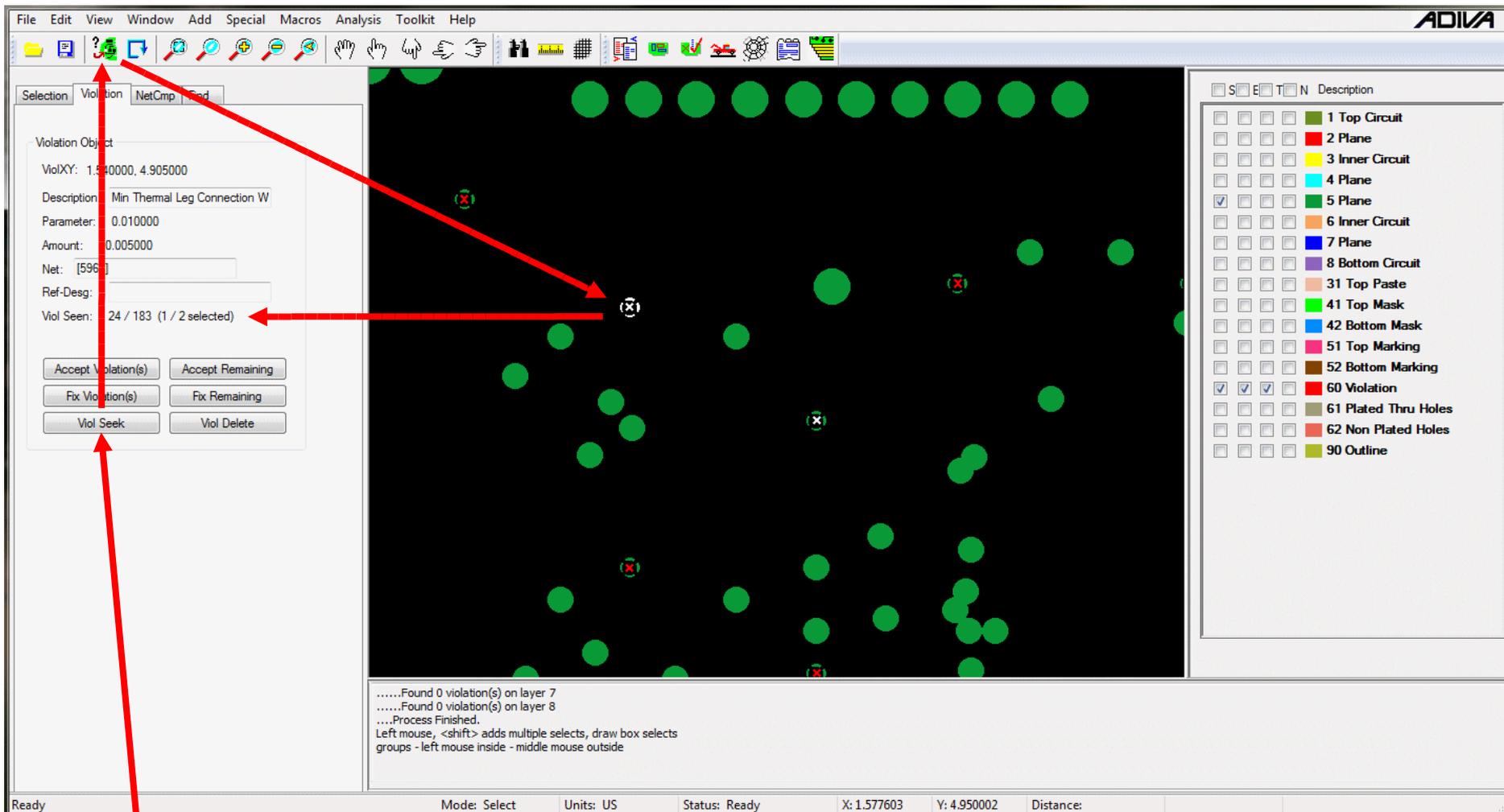
It may be worthwhile to zoom-in to a violation as the seek function “seeks” at current zoom



Violation details are shown here

Once a Violation Type is chosen for review, select **Viol Seek** to review graphically the violations selected **<shift>Viol Seek** progresses backward

NOTE: Worst violations are always shown first



Individual or groups of violations can also be reviewed. **ViolSeek** to the first violation type selected in the **Violation Checklist**, choose the **Select** button then click on an individual violation or window-select a group of violations to review. Notice the **ViolSeen** list shows the qty selected

Read information on the one violation selected – or - **ViolSeek** again to review the group items selected. Choose **Select** again to un-select violations.

A violation (or group of violations) can be **Accepted** which removes the violation(s) from the “violation seek” list.

The violation(s) is(are) not removed – just marked so that the violation(s) is(are) not seen. Notice the violation count shown in the Violation Checklist adjusts to a lower number while the count for the **Accepted** violation(s) increases.

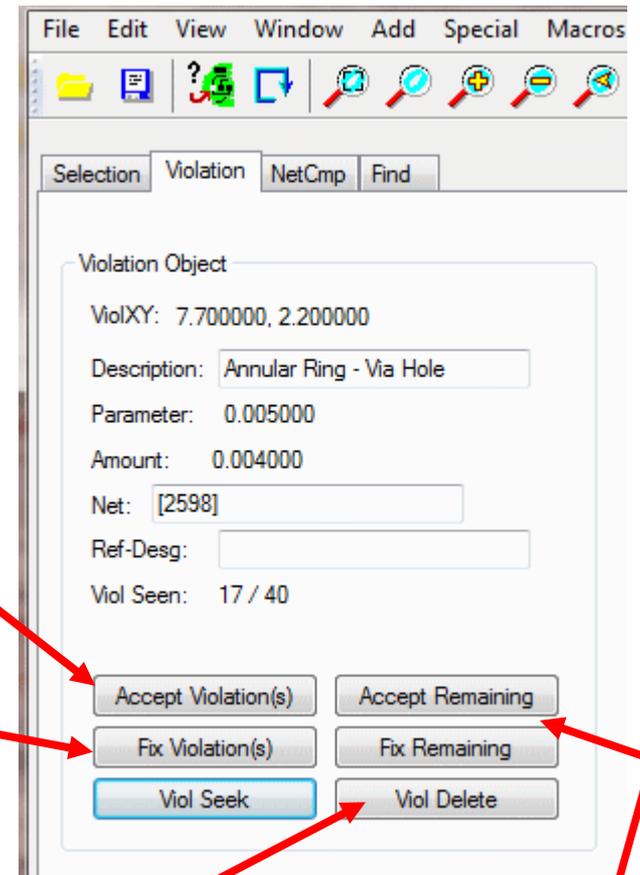
An “approved.vio” file is created in the DRC project directory containing accepted violations. This file can be used in future DRC analysis to filter already approved violations from a new design.

A violation (or group of violations) can be **Fixed** which creates a file in the DRC project directory called “fix.vio”.

This file is typically a collection of violations that a reviewer is interested in having someone else review or fix the violation in a CAD system.

The “fix.vio” file can be read into specific CAD systems or read back into Adiva’s **Violation Checklist** to review only the violations to be “fixed”.

A violation (or group of violations) can be **Deleted** removing it from the Violation Checklist results list.



Fixing or Accepting the Remaining violations adds the currently viewed violation and all those left to be seen into their appropriate .vio files

Violations can also be saved in a format suitable for web-browser display

Select the **DRC Archive** Icon for Web Creation



A **DRC Archive** dialog will appear...

Design Analysis Archive

Archive Directory: e_demo\.\pads_interface_demo-HTML

Archive Index File: index.htm

Part Number: 123_23ASB

Revision: AA

Designer Name: Designer

Checker Name: Checker

Date:

Data Type: Error Data

Description: These Non-Plated Holes are too close...

Create Cancel

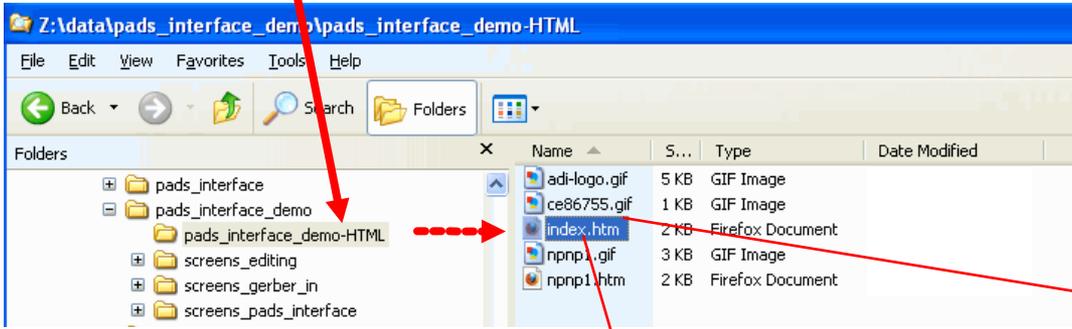
Fill in items such as part number, revision, designer's and checker's name if desired then...

Add any custom notes to help communicate the issue...

Select **Create** to finish the DRC Archive

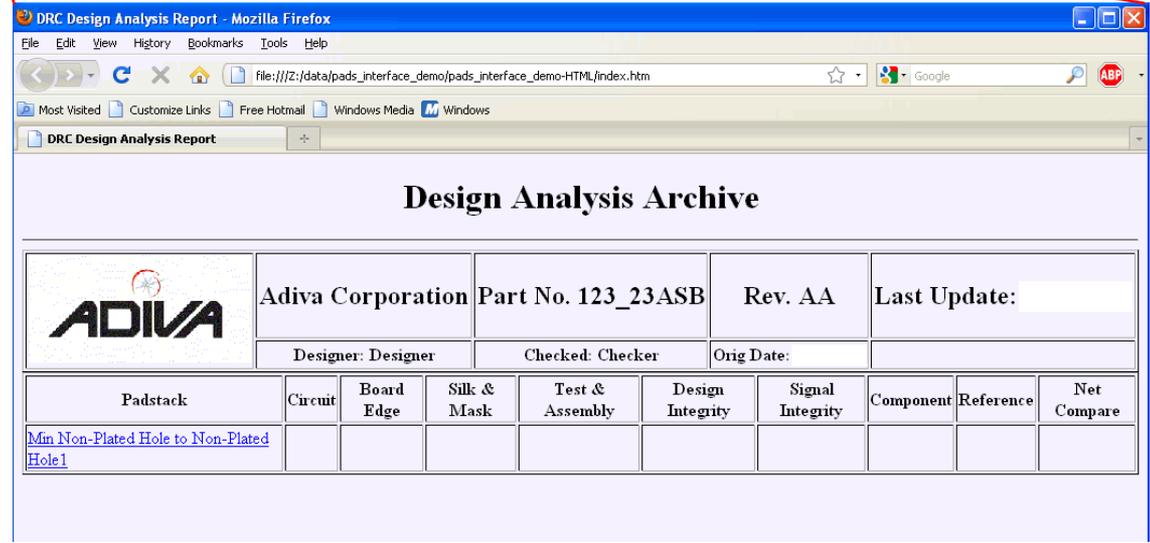
Leave this dialog open and select **Create** for other violations to be archived

To view violations that have been archived to HTML, navigate through Windows Explorer finding the Adiva HTML directory (should be under the main job directory) and double-click on “index.htm”....



A web browser should open displaying a matrix of violations that have been archived.

Violations should be clearly described – click on one to see a graphic of the violation



Web browser should now show a graphic of the selected violation including specific details about the violation...

Violation Description,
Check parameter,
Violation amount,
XY location,
Layer involved

Custom note
added from main dialog

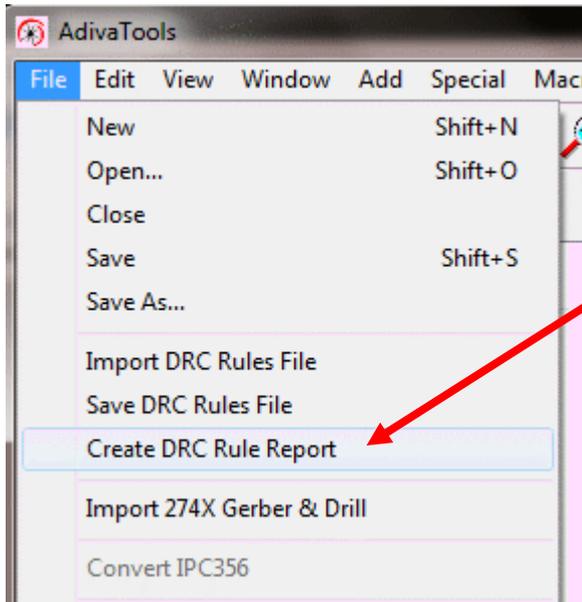
Same graphic displayed
in AdivaTools DRC Violation
review

The screenshot shows a Mozilla Firefox browser window displaying a "Design Analysis Archive" report. The report header includes the Adiva logo, company name, part number (123_23ASB), revision (AA), and origin date. Below the header is a table with the following data:

| Violation Type | Amount - Inches | Parameter - Inches | X - Y Location | Layer |
|--|-----------------|--------------------|---------------------|-------------------------|
| Min Non-Plated Hole to Non-Plated Hole-1 | 0.01850 | 0.05000 | X:0.50100 Y:2.49340 | 252 (Non Plated Holes), |

Below the table, a custom note reads: "These Non-Plated Holes are too close...". At the bottom of the report, a graphic displays a grid of holes on a PCB layout. The holes are represented by red circles, with some marked with a red 'X' to indicate violations. The layout is centered on a black background.

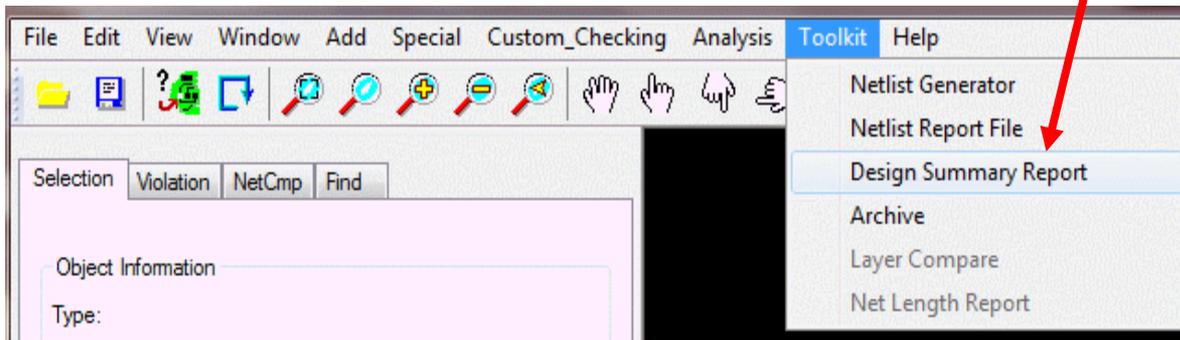
Extra DRC Outputs



Select **File > Create DRC Rule Report** to create an ASCII text file documenting all of the DRC Check dialogs. In this document will be a listing of all DRC Check settings, their values and whether they are on/off.

This is useful in documenting the settings of all DRC checks for later reference.

Select **Toolkit > Design Summary Report** to receive an ASCII text file in comma-delimited (spreadsheet ready) format summarizing details about the design.



Included in this report is enough information suitable for characterizing the design including items such as board dimensions, hole counts, min spacing values, etc...

END

ADIVA DRC Checks