cadence®

Virtuoso Layout Viewer User Guide

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1

Layout Viewer

Virtuoso Layout Viewer is a view-only application that enables you to quickly open layout cellviews in view-only mode.

When using Layout Viewer, consider the following:

- You can view a layout cellview but you cannot make any edits or save the cellview.
- You cannot open a layout cellview using Layout Viewer if the cellview is open in edit mode in the memory.
- If you open a cellview in Layout Viewer and then open it in edit mode in Layout XL or a higher tier, a warning message is displayed in CIW.
- Layout Viewer is not an integration platform, and does not allow any customizations.
- Layout Viewer supports predefined bindkeys and SKILL functions.

Related Topics

Launching Layout Viewer

Bindkeys

Virtuoso Layout Suite SKILL Reference

Virtuoso Layout Viewer What's New

Virtuoso Layout Viewer Known Problems and Solutions

Virtuoso Layout Suite XL: Basic Editing User Guide

Launching Layout Viewer

You can launch Layout Viewer using CIW or Library Manager. Ensure that you have the correct Virtuoso version and license available.

To launch Layout Viewer from CIW:

1. In CIW, choose *File – Open*.

   The Open File form appears.
2. Select the library that contains your design by choosing from the *Library* list.
3. Select your design from the *Cells* list or enter the name in the *Cell* field.
4. Select *layout* from the *View* list to open the layout view of the design.
5. Select *Layout Viewer* from the *Open with* list.
6. Click *OK*.

   The design is displayed in Layout Viewer.

To launch Layout Viewer from Library Manager:

1. In CIW, choose *Tools – Library Manager*.
2. Select the library that contains your design by choosing from the *Library* list.
3. In the *Cell* list, double-click the design that you want to open.

   The Open File form appears.
4. Select *layout* from the *View* list.
5. Select *Layout Viewer* from the *Open with* list.
6. Click *OK*.

   The design is displayed in Layout Viewer.

Related Topics

Design Display Controls

Working with Palette Assistant

Layout Viewer Assistants

2

Design Display Controls

You can use various display controls to quickly navigate around the main canvas window and view your designs. For example, you can zoom, pan, or magnify a design and traverse the design hierarchy.

The following table describes the commands available on the *View* menu of a layout window that you can use to view and manage your designs.

Command	Description
Zoom	Controls magnification of a cellview through the following zoom commands: ■ *Zoom In*: Magnifies the image in the cellview window by a factor of 2. To zoom in, you can also scroll up the mouse scroll wheel. ■ *Zoom Out*: Reduces the image in the cellview window by a factor of 2. To zoom out, you can scroll down the mouse scroll wheel. ■ *Zoom To Area*: Prompts you to create a box on the canvas and then magnifies the image defined by the box to fit in the cellview window. ■ *Zoom To Grid*: Reduces the image to the smallest magnification at which the grid is visible. ■ *Zoom To Selected*: Increases the image to the largest magnification at which the selected objects can be viewed in the cellview window. ■ *Zoom To Fit All*: Redraws the window so that all objects in the cellview appear in the window. This saves time after you zoom or pan and want to see the entire cellview again. ■ *Zoom To Fit Edit*: Places the cell that you are editing in the center during edit-in-place. If you are not editing in place, *Zoom To Fit Edit* has the same result as *Zoom To Fit All*. This command is available in Layout XL and higher tiers, and not in Layout Viewer.
Magnifier	Lets you magnify or zoom a specific part of the design display area, rather than the entire design display area.
Dynamic Zoom	Pans or zooms the view automatically on the canvas based on the objects selected in the Navigator assistant.
Pan	Lets you pan a point in the center of the cellview window.
Hierarchy	Lets you descend into any level of an instance hierarchy, view the contents, and return to the desired level.

Command	Description
Select	Lets you select objects in full and partial selection modes. You can also set selection protection for objects.
Redraw	Refreshes the cellview display. This is helpful after you have made edits to a cellview and the design area sometimes shows portions of lines or objects that you moved or deleted.
Show Angles	Lets you display the angle enclosed at the intersection of two edges.
Show Selected Set	Displays information about a selected set of objects.
Save/Restore	Saves a zoomed or panned image to a file that lasts for the current session. You can later restore a saved view or cycle through the last three views.
Background	Lets you place an existing cellview in the background so you can place your new elements in alignment or by an offset based on the previously created cellview.

You can create rulers to measure objects and the distances between objects in a cellview. For information, see Rulers.

Related Topics

Zooming a Design

Magnifying the Design Area

Viewing Angles

Panning a Cellview

Hierarchical Designs

Object Selection

Zooming a Design

By using the mouse, you can create a box on the canvas to zoom in to a specific area or zoom out to a specific size of your design.

To zoom a specific area of your design, explore the following zoom features:

1. To zoom in using the mouse, right-click and drag the pointer to create a box around the design area you want to enlarge on the canvas.
2. Choose *View – Zoom to Fit All* or press the `F` key to redraw the window so that all cellview objects fit in the window.
3. To zoom out using the mouse, while pressing `Shift`, right-click and drag the pointer to create a box into which you want the reduced image to fit.
4. Again, choose *View – Zoom to Fit All* or press the `F` key to redraw the window so that all objects fit the window as per the defined zoom scale.

Related Topics

Magnifying the Design Area

Using Dynamic Zoom

Panning a Cellview

Design Display Controls

Magnifying the Design Area

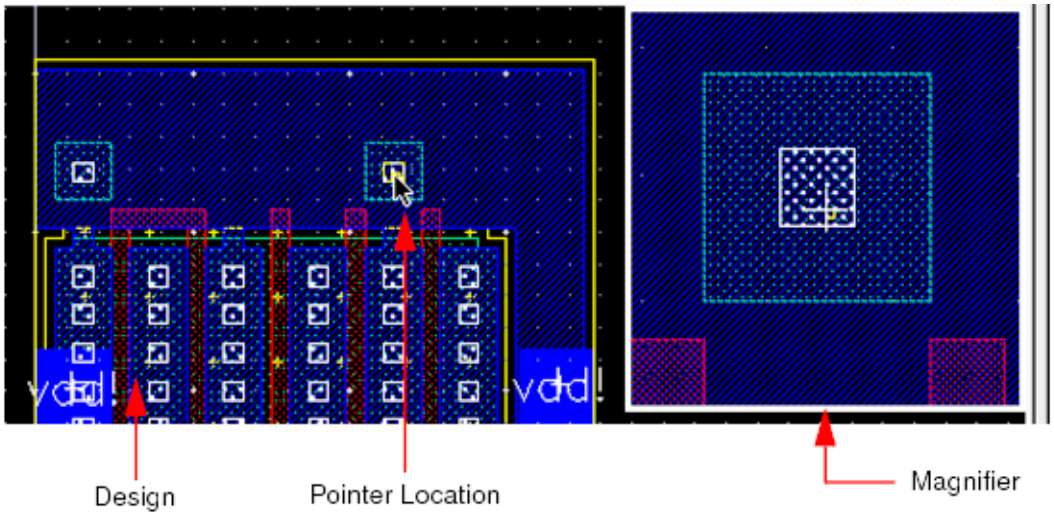
The magnifier lets you magnify or zoom in a specific part of the design display area instead of zooming in the entire design display area.

To magnify a specific part of the design area:

1. In the layout window, choose *View – Magnifier* or press the dot (`.`) bindkey to toggle the magnifier feature.

   A square magnifier appears.
2. Place the pointer over the area in the design that you want to magnify.

The magnifier appears as a square box on the design display area and shows a magnified view of the design area under and around the pointer, as shown in the figure.



3. Optionally, move the pointer around to magnify different regions of the design. The magnifier moves along with the pointer, based on the anchor defined for the magnifier.
4. Choose *View – Magnifier* or press the dot (`.`) bindkey again to turn off the magnifier.

While using the magnifier, you can use the following bindkeys:

- Press `#` to fix the magnifier position at one place in the design display area.
- Press `Shift` + `Ctrl` + Up arrow key to scale up the magnification by a factor of 1.25 in the magnifier. Alternatively, you can press `Shift` + `Ctrl` and scroll up the mouse scroll wheel.
- Press `Shift` + `Ctrl` + Down arrow key to scale down the magnification by a factor of 0.80 in the magnifier. Alternatively, you can press `Shift` + `Ctrl` and scroll down the mouse scroll wheel.

Customizing Magnifier Settings

You can customize magnifier settings according to your requirements.

To customize magnifier settings:

1. In the layout window, choose *Options – Magnifier* or press the single quote (`'`) key.

   The Magnifier Options form appears.

2. Specify the position of the magnifier with respect to the pointer.

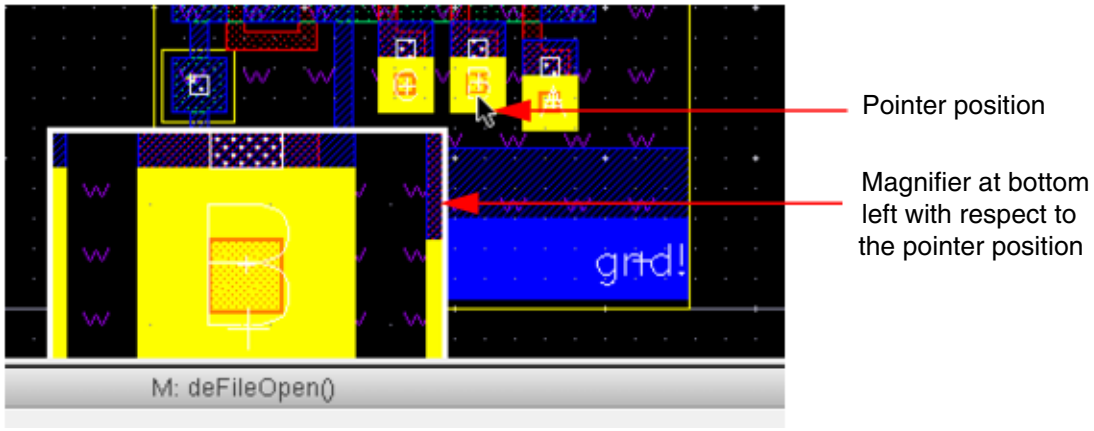
   Anchored at lets you position the magnifier in relation to the pointer tip. The default is top-left corner. *Not Anchored* enables you to specify the position of the magnifier either to the center of the area being magnified or as an offset value from the pointer position in *Position Magnifier*.

3. Set the pixel size of the square magnifier window by using *Magnifier Size*. You can set any value from `50` through `250`. The default value is `200`.

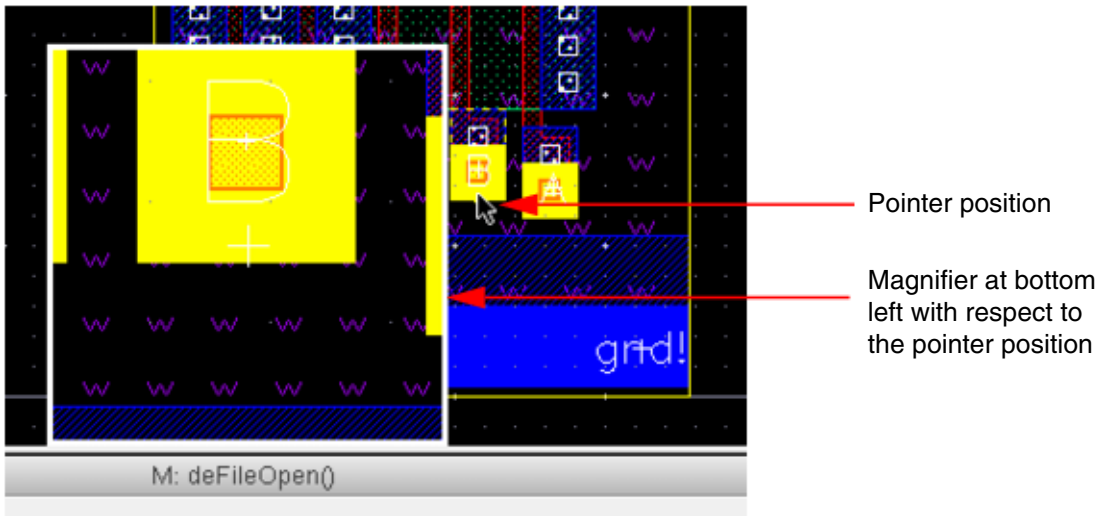
4. Leave the *Keep Within Window* check box selected, which lets the magnifier to always display in full within the confines of the design area.

   In the following example, *Position Magnifier* is set to *bottom left corner*, offset by `15`.

   - If the *Keep Within Window* check box is not selected, the magnifier is partially visible.



- If the *Keep Within Window* check box is selected, the magnifier is completely visible.



5. Click *OK*.

Related Topics

Magnifier Functions

Magnifier Options Form

Design Display Controls

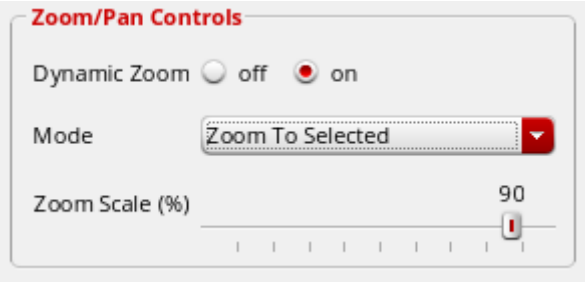
Using Dynamic Zoom

You can use the dynamic zoom feature to automatically pan or zoom on the canvas based on the objects selected in the Navigator assistant. This lets you locate objects easily in a busy design.

To set your preferred dynamic zoom mode:

1. In the layout window, select *Options – Display*.

The Display Options form appears.



2. Set *Dynamic Zoom* to *on* in the *Zoom/Pan Controls* section.
3. From *Mode*, select the dynamic zoom mode used when an object or a set of objects is selected/cross-selected in the Navigator assistant.
   - *Pan To Selected*: Pans the view to the selected objects without changing the zoom factor. This is equivalent to *View - Pan*.
   - *Zoom To Selected*: Zooms the view to the selected objects using the zoom scale defined in the *Zoom Scale (%)* field. This is equivalent to *View - Zoom to Selected*.
   - *Zoom To Fit*: Fits the complete design in the view using the defined zoom scale. This is equivalent to *View - Zoom to Fit*.
4. Specify the zoom scale in percentage by using the slider in *Zoom Scale (%)*.
5. Click *OK*.
6. Enable dynamic zoom by choosing *Options – Dynamic Zoom*.
7. Select the item in the Navigator assistant that you want to zoom or pan to.

   Based on your selection, the display area automatically zooms or pans to the selected item if not currently visible on the canvas.

Related Topics

Display Options Form

Navigator Assistant

Design Display Controls

Panning a Cellview

Panning lets you reposition your design within a cellview window. You can pan a point to the center of the window or pan across the cellview in any direction.

To pan a cellview:

1. In the layout window, choose *View – Pan.*
2. Click the point that you want to appear in the center of the window (the reference point). The design moves and places the reference point in the center of the window.
3. Press the arrow keys corresponding to the direction in which you want to pan the cellview.

   The design moves in the specified direction.

Related Topics

Zooming a Design

Using Dynamic Zoom

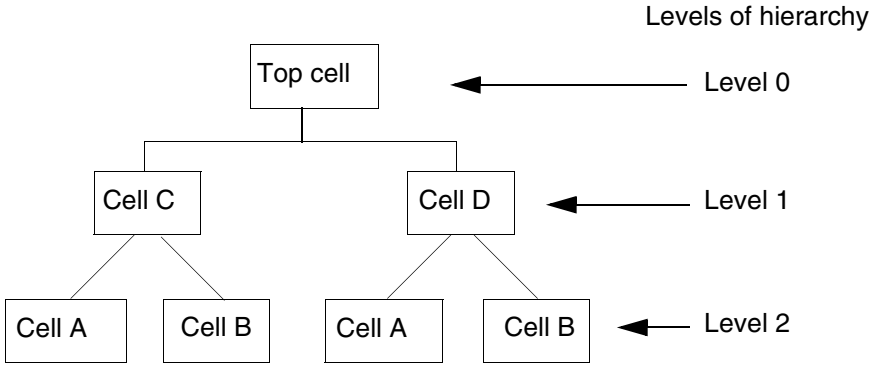
Design Display Controls

Hierarchical Designs

A design hierarchy comprises many levels of a design. Each time you descend into the design hierarchy, you view a smaller division of the larger design in greater detail. Hierarchical designs are created by placing instances of other cellviews inside a cellview. Levels of hierarchy are numbered from top to bottom, with the top cellview having the lowest number. The top cell is the cellview that you are currently viewing in a design window.

The following figure illustrates a design hierarchy. When you view Top cell, it is level 0. When you view Cell C or Cell D, it is considered level 1, and Cell A and Cell B are considered level 2.

You can descend into any level of an instance hierarchy and view the contents. You can also choose the view type or view name when descending into instances. By default, you are not prompted for a view type.



Related Topics

Descending into a Cellview

Viewing the Hierarchy Tree

Descending into a Cellview

To descend into a cellview:

1. In the Layout Viewer window, choose *View – Hierarchy – Descend View.*
2. Optionally, press `F3` to bring up the Descend Options form if you want to be prompted for the view type every time you descend into the hierarchy.
   a. Select the *Prompt For View Name* check box.

      If *Prompt For View Name* is not enabled and the master cell of the instance has more than one view type available, the command will determine which cellview to descend into. If *Prompt For View Name* is set and the master cell of the instance has more than one view type available, a form is displayed listing all the possible view names. You can then select the cellview to descend into. By selecting *Prompt for View Name*, each time you descend into a cellview, you will be prompted for the view type.

   b. Specify whether you want to open the cellview in the current tab, new tab, or new window.

   c. Click *OK*.

3. Click the instance whose cell you want to view. You can use the spacebar to toggle between the overlapping objects under the pointer.

   To descend into an instance, alternatively, you can select the instance, right-click it to display the instance context menu, and then choose *Descend View*.

4. Return up the hierarchy by choosing any of following, as applicable, from *View – Hierarchy*:

   - *Return To Level*: Return to a specific level of the instance hierarchy. You need to select the level you want to return to.
   - *Return*: Returns one level up in the instance hierarchy.
   - *Return To Top:* Return to the top level of the instance hierarchy.

Note: Once you have chosen to be prompted for the view type, you can pre-select or post-select an instance when using the *Descend* command.

You can set in advance the descend mode you prefer by using the `leHiDescend` SKILL function. It has an optional text string `t_mode` specifying the mode in which to open the selected instance. In Layout Viewer, you must set the `t_mode` argument to `read` to descend into the hierarchy.

Related Topics

Descend Options Form

Object Selection Cycle

Viewing the Hierarchy Tree

Viewing the Hierarchy Tree

You can view the hierarchy of cellview instances in the currently open cellview by using the *Tree* command in a layout window. You can also view the hierarchy of cellview instances in a cellview without opening the cellview by using the *Print Hierarchy Tree* command in CIW.

It could take a long time to open the hierarchy tree for a large design. As the *Print Hierarchy Tree* command lets you print the hierarchy tree without the need to open a design, it provides better performance compared to the *Tree* command.

Viewing the Hierarchy Tree from Within a Cellview

To view the hierarchy of instances in the current cellview:

1. In the layout window, choose *View – Hierarchy – Tree*. In Layout XL and higher tiers, the command is available on the *Edit* menu.

   The Tree form appears.

2. Select levels of the hierarchy that you want to view.

3. Click *OK*.

   The *Tree* window appears, listing the hierarchy. The cellview instances information lists the hierarchy of instances in this cellview or the instances above or below the cellview. The number in parentheses represents how many times that instance appears in the design. Indents show that instances of the indented cells are inside the instance listed above.

Viewing the Hierarchy Tree without Opening a Design

To view the hierarchy of instances in a cellview without opening the cellview:

1. From CIW, choose *Tools – Print Hierarchy Tree*.

   The Print Hierarchy Tree form appears.

2. Select the *Library*, *Cell*, and *View* for which you want to print the hierarchy tree.

3. Click *OK* or *Apply*.

   The *Hierarchy Tree* window appears, listing the hierarchy. The cellview instances information lists the hierarchy of instances in this cellview or the instances above or below the cellview. The number in parentheses represents how many times that instance appears in the design. Indents indicate that instances of the indented cells are inside the instance listed.

Opening the *Print Hierarchy Tree* command from Virtuoso could be time consuming. An alternative is to run the `fastTree` command at the command prompt which is significantly faster. The following is the command syntax:

```
fastTree [-h | -lib libName -cell cellname [-view viewName] [-cdslib cdsLibName]
[-file fileName] [-log logFileName]]
```

The following table below describes the arguments of the `fastTree` command.

Arguments	Description
`-lib` *`libName`*	Name of the library.
`-cell` *`cellName`*	Name of the cellview.
`-view` *`viewName`*	Name of the view. The default is `layout`.
`-cdslib` *`cdsLibName`*	Path of the `cds.lib` file. The default is the current working directory.
`-file` *`fileName`*	Name of the file. The default is `cellName.viewName.tree`.
`-log` *`logFileName`*	Name of the log file. The default is `fastTree.log`.
`-h` / `-help`	Command help.

Related Topics

Tree Form

Print Hierarchy Tree Form

Hierarchical Designs

Object Selection

You can select objects in two modes, full and partial selection. In full selection mode, an entire object is selected. In partial selection mode, you can select entire objects or edges or corners of objects. You can use the `F4` key to toggle between selection modes. The selection mode is indicated on the status banner and the status toolbar.

The following table describes the ways of selecting objects in full and partial section modes.

Selection Item	Selection Action
One object	Click the object.
One edge or corner	Press the `F4` key to turn on partial selection and then click the edge or corner of the object.
Fully select a partially selected object	Press the `J` key. If the selected set contains all fully selected objects, pressing `J` extends the selection based on current granularity.

Selection Item	Selection Action
Group of objects	Click and drag to create a selection box around the group.
An additional object	Press `Shift` and click inside the object.
An additional edge or corner	Press `F4` to turn on partial selection. Then, press `Shift` and click the edge or corner of the object.
An additional group	Press `Shift` and click and drag to create a selection box around the objects. Alternatively, press `Shift+A`, then create a selection box around the objects.
Group of edges or corners	Press `F4` to turn on partial selection. Then, create a selection box around the edges or corners.
All objects	Press `Ctrl+A` or choose *View – Select – Select All.*
An object located under other objects or cycle through overlapping objects	Select the top object, press `Control+Y`. Continue to press `Control+Y`, or click until you select the object you want.

Pre-Selection and Post-Selection of Objects

You can select objects either before you start a command (pre-selection mode) or after you start a command (post-selection mode).

- If you select an object before starting a command, the resultant objects remain selected after the command completes.
  In Virtuoso Layout Suite XL and higher tiers, editing commands do not automatically repeat, even if repeat mode is set on. Some editing commands prompt you for a starting point, called the reference point, for the edit.
- If you start a command and then select an object, the resultant objects are deselected after the command completes.
  In Virtuoso Layout Suite XL and higher tiers, editing commands automatically repeat if repeat mode is on, which is the default. Editing commands do not necessarily prompt you for a reference point. If you click to select the first object, the editor uses that point as the reference point.

Deselection of Objects

You deselect objects almost the same way as you select them, except that you press the `Ctrl` key as you click an object, corner, or edge.

The following table describes the ways in which you can deselect objects.

Item to be Deselected	Action
All objects	Use any of the following methods: ■ Click an empty portion of the design ■ Press `Ctrl+D` ■ Choose *View – Select – Deselect All* ■ Right-click and choose *Deselect All* from the context menu
One or more objects	Press `Ctrl` and click the object. Alternatively, right-click and choose *(De)Select Under Cursor* from the context menu and select the objects you want to deselect from the submenu.
Group	Press `Ctrl` and click and drag to create a deselection box around the objects.

Note: In Virtuoso Layout Suite XL and higher tiers, the *Select* command is available on the *Edit* menu.

Related Topics

Selecting Objects

Object Selectability Controls

Selecting a Group of Objects

Selecting a Group of Objects

Selecting Vias in a Via Stack

Selection of a Multipart Rectangle

Selecting Path Components

Selecting Objects

You can select objects by drawing a selection shape: rectangle, polygon, or line.

Selecting Objects By Defining an Area

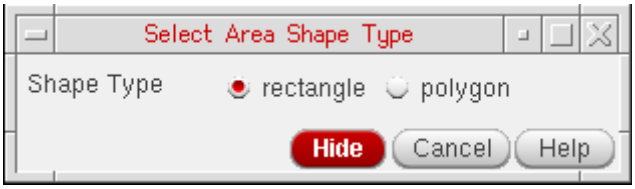
To select objects within an enclosed area by drawing a rectangle or polygon:

1. Choose *View – Select – Select By Area*.

   In Virtuoso Layout Suite XL and higher tiers, you can access the command by choosing *Edit – Select – Select By Area.*

2. Press `F3`.

   The Select Area Shape Type form appears.



3. Specify the selection shape type as *rectangle* or *polygon*.
4. Draw the selected shape around the required objects on the canvas.

   Any objects enclosed within the drawn shape are selected.

   Note: The selection of fully or partially enclosed objects within the drawn shape is based on the settings in the *Area Selection Controls* section in the Selection Options Form.

5. Optionally, continue to select more shapes by drawing a rectangle or polygon around them.
6. To add objects to the previous selection, press `Shift` and draw the shape around the additional objects to be selected.
7. To remove objects from the previous selection, press `Ctrl` and draw the shape around the objects to be removed from the selected set.
8. Press `Esc` to complete the command.

Selecting Objects by Drawing a Line

To select objects by drawing a line:

1. Select *View – Select – Select By Line*.

   In Virtuoso Layout Suite XL and higher tiers, you can access the command by choosing *Edit – Select – Select By Line.*

2. Click at the first point of the line on the canvas.
3. Click at the next point of the line.
4. Optionally, continue to click to define more points of the line.
5. Double-click to end the line.

   Any objects overlapping the line are selected.
6. Optionally, continue to select more shapes by drawing a line to overlap them.
7. To add objects to the previous selection, press `Shift` and draw a line to overlap the additional objects to be selected. Keep `Shift` pressed until you double-click on the canvas to end the line.
8. To remove objects from the previous selection, press `Ctrl` and draw a line to overlap the objects to be removed from the selected set. Keep `Ctrl` pressed until you double-click on the canvas to end the line.
9. Press `Esc` to complete the command.

Fully Selecting the Partially Selected Objects

To fully select objects that are partially selected:

1. Select *View – Select – Extend selection to object*.

   In Virtuoso Layout Suite XL and higher tiers, you can access the command by choosing *Edit – Select – Extend selection to object.*
2. Select the partially selected object that you want to fully select.
3. Press `Esc` to complete the command.

Saving Selected Objects as a Selection Set

Use the Save/Restore Selection Set form to save objects selected on the canvas as a selection set so that you can restore them later.

To save selected objects as a selection set:

1. Select *View – Select – Save/Restore*.

   In Virtuoso Layout Suite XL and higher tiers, you can access the command by choosing *Edit – Select – Save/Restore.*
2. Enter the name of the selection set in the *Name* field.

3. Click *Store*.
4. Click *Close*.

To restore a selection set, choose the selection set in the Save/Restore Selection Set form. Click *Select* and then *Close*.

Related Topics

Select Area Shape Type Form

Selection Options Form

Object Selection

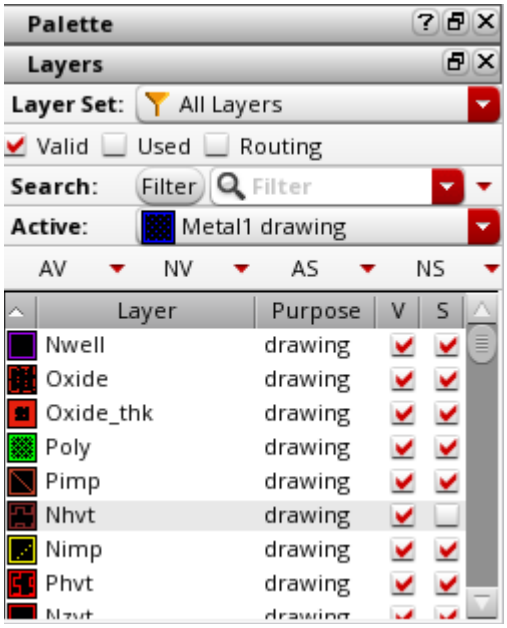
Save/Restore Selection Set Form

Object Selectability Controls

You can control selectability of objects by using the *Layers* panel in the Palette assistant and by using the selection protection commands.

The *Layers* panel lets you control the selectability of all objects on specific layer-purpose pairs. For example, the figure shows that selectability setting of the `Nhvt` layer-purpose pair is turned off, which implies that its objects are not selectable on the canvas. You can use the

S (Selectability) check box and the *AS* and *NS* control buttons to define the selectability setting for layer-purpose pairs.



To set individual objects as selectable or unselectable, use the selection protection commands. In Layout Viewer, you can access the commands from the *View – Select* menu. In Virtuoso Layout Suite XL and higher tiers, you can access the commands from the *Edit – Select* menu.

The following table describes the commands. These commands work in both pre- and post-selection modes.

Command	Description
Set Selection Protection	Protects objects from being selected.
Clear Selection Protection	Starts an enter function that removes protection from selected objects. Start this function, then either click or use area selection to specify the objects you want to make selectable again. The *Clear Selection Protection* command works in pre-selection mode only when *Override Selection Protection* is on.

Command	Description
Clear All Selection Protection	Makes all currently protected objects selectable again. Only the objects that were marked protected by using the *Set Selection Protection* command are made selectable. The selectability of objects set by using the *Layers* panel is not affected.
Selection Protection Options	Configures the settings for highlighting the objects that are marked protected. This command opens the Selection Protection Highlight Options form.
Override Selection Protection	(Available in Virtuoso Layout Suite XL and higher tiers) When turned on, enables selection of objects marked protected. In this mode, you can perform basic edit operations on the protected objects. When turned off, prevents selection of protected objects. If you turn off this toggle command after selecting a protected object, the protected object is deselected.
Highlight Protected Objects	(Available in Virtuoso Layout Suite XL and higher tiers) When turned on, displays a halo around objects that are marked protected. This is the default mode. When turned off, removes the halo around objects that are marked protected.

Related Topics

Selection Protection Highlight Options Form

Object Selection

Layers Panel

Selecting a Group of Objects

You can select a group of objects by using full or partial selection mode. You can define area selection controls for selection of objects in each mode.

To select a group of objects by using area selection controls in full and partial selection mode:

1. Choose *Options – Selection*.

   The Selection Options form displays.

2. Select the area selection control from the *Full Mode* list in the *Area Selection Controls* section. In full selection mode, you can choose to fully select enclosed figures, crossed figures, or enclosed and crossed figures.

3. Select the area selection control from the *Partial Mode* list. In partial selection mode, you can choose to select vertex, enclosed edges, crossed edges, or enclosed and crossed edges.

4. Choose your selection mode from *Mode* in the *Selection Controls* section.

   You can quickly toggle between full and partial selection modes by clicking the *Full Select* icon  or the *Partial Select* icon  on the *Options* toolbar or by pressing `F4`.

5. Click *OK* or *Apply*.

6. Draw the area selection box on the canvas to choose the objects.

   The objects are selected according to the area selection control set in the Selection Options form.

   Parameterized cells can only be selected fully. They are fully selected when you completely enclose them with the area selection box, irrespective of the selection mode setting.

The following figures illustrate object selection in full and partial selection modes based on area selection controls set in the Selection Options form.

Full Selection Options

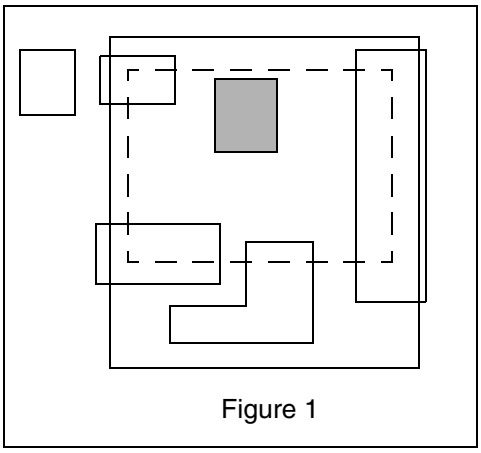


Figure 1

Full selection, enclosed figures

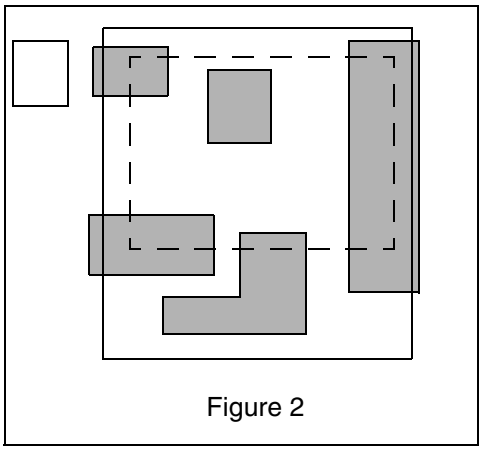


Figure 2

Full selection, enclosed and crossed figures

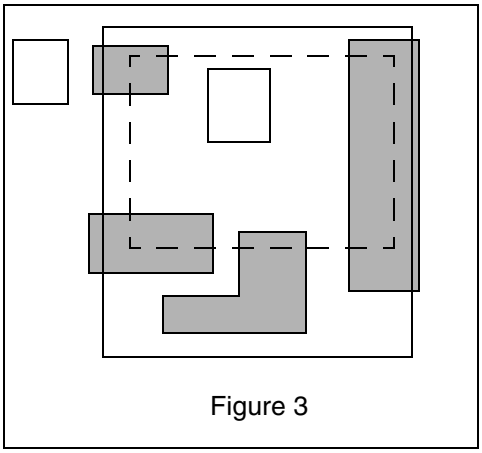


Figure 3

Full selection, crossed figures

Partial Selection Options

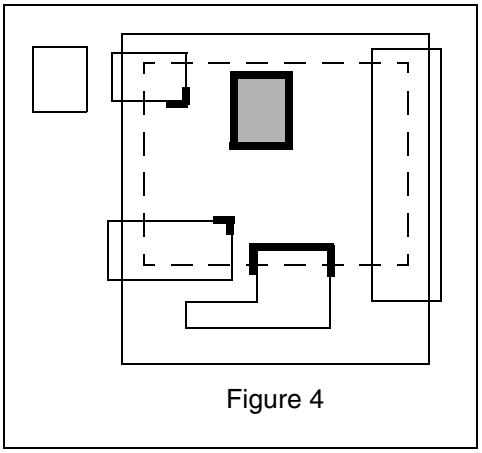


Figure 4

Partial selection, vertices

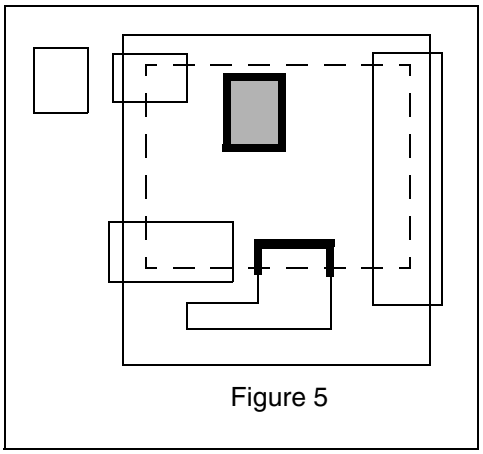


Figure 5

Partial selection, enclosed edges

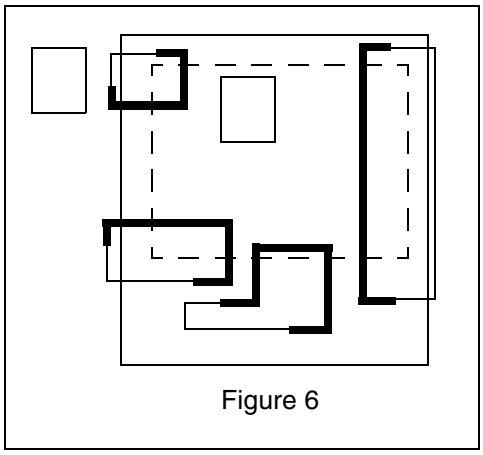


Figure 6

Partial selection, crossed edges

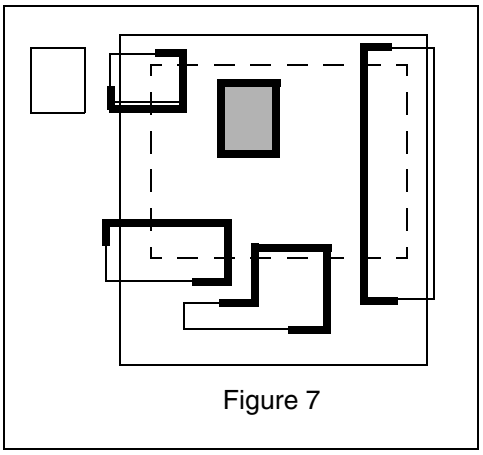
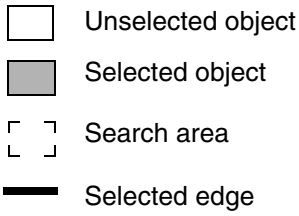


Figure 7

Partial l selection, enclosed and crossed edges



Related Topics

Selection Options Form

Object Selection

Selecting Vias in a Via Stack

To select all the vias in a via stack, use any of the following methods:

- Select a via in the via stack on the canvas and press `Ctrl+O` to select the remaining vias.
- Click and drag to create a selection box around the via stack on the canvas.
- Switch on via stack selection mode and then click a via on the canvas.
  You can turn on via stack selection mode by selecting the *Via Stack* check box in the Selection Options form or by using the Via Stack icon on the *Options* toolbar. You can also choose the *Via with matching sizes between common layers* check box to select only those vias that have the same size on common layers.

Full and partial selection modes do not have an impact on via stack selection. You can select a complete via stack even when partial selection mode is on.

Related Topics

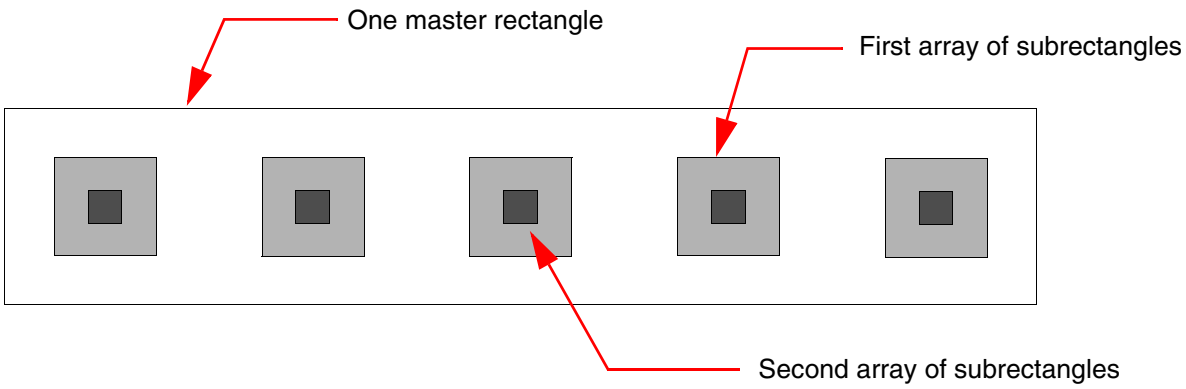
Object Selection

Selection Options Form

Selection of a Multipart Rectangle

A multipart rectangle is a single object composed of multiple parts on the same or different layers. The parts consist of one or more named master rectangles and one or more arrays of unnamed subrectangles. Each named master rectangle is a separate object with ROD attributes, created at level zero in the hierarchy. Each unnamed sub-rectangle is an ordinary, unnamed database shape with no ROD attributes, created at level zero in the hierarchy.

The figure illustrates a multipart rectangle that has one master rectangle and two arrays of subrectangles. Both arrays of subrectangles are offset from the master rectangle.



Selecting the master rectangle of a multipart rectangle is similar to selecting a regular rectangle, you click it or create a selection box.

- In full selection mode, when you select any part of a master rectangle or its associated subrectangles, the whole master rectangle and all its subrectangles are selected. The master rectangle is highlighted on the current selection layer, while the associated arrays of subrectangles are highlighted on different layers. This lets you view which part is the master and which parts are subrectangles.
- In partial selection mode, you can select an edge or vertex of a master rectangle.

Related Topics

Multipart Rectangles

rodCreateRect

Object Selection

Selecting Path Components

You can select an entire path, path ends, or a path vertex.

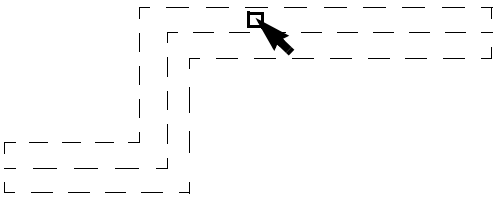
Selecting a Whole Path

You can select a whole path in full and partial selection modes.

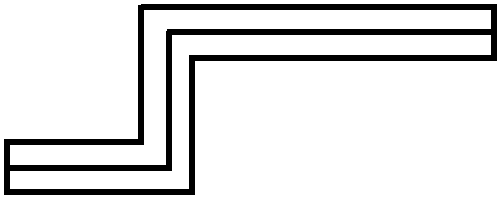
To select a path in full selection mode, do one of the following:

- Point anywhere on the path and then click to select the path.

  As you point, the whole path is highlighted with dotted lines.

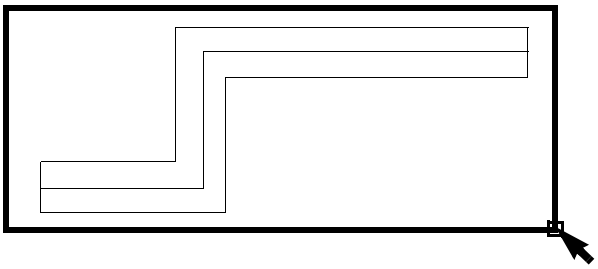


Click anywhere on the path

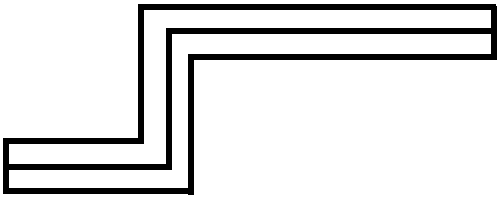


Highlighting shows the whole path is selected

- Create a selection box around the whole path.



Create a selection box around the whole path

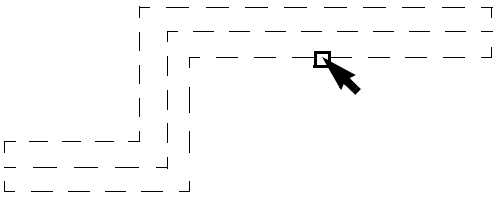


Highlighting shows the whole path is selected

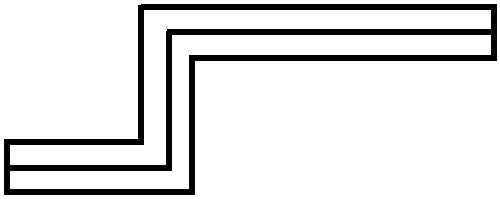
To select a path in partial selection mode, do one of the following:

- Point to the outer edge of any segment of a path and then click to select the path.

  As you point, the whole path is highlighted with dotted lines.



Point to the outer edge of a path segment and click



Highlighting shows the whole path is selected

- Create a selection box around the whole path.

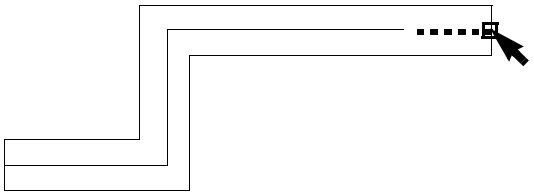
Selecting Path Ends

When you are in partial selection mode, you can select the end points of a path.

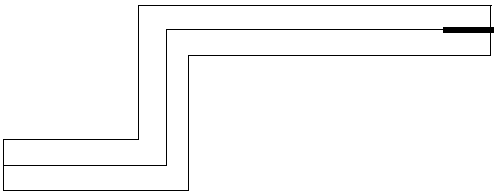
To select a path end in partial selection mode, do one of the following:

- Point to an end of the path centerline and then click it.

  As you point, the end of the centerline is highlighted with a dotted line.

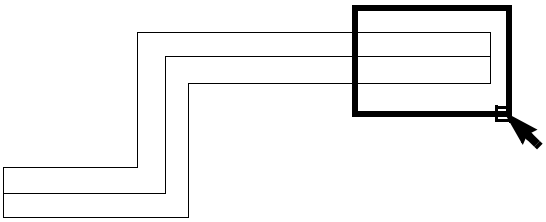


Point to an end of the path centerline and click it

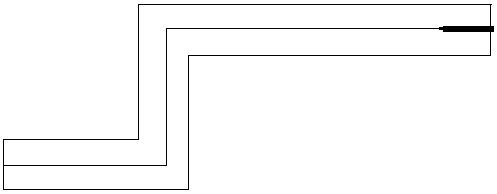


Highlighting shows the path end is selected

- Create a selection box around the endpoint of the path.



Create a selection box around an endpoint of the path



Highlighting shows the path end is selected

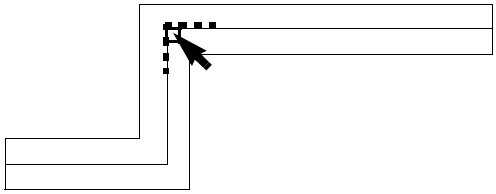
Selecting a Path Vertex

A vertex is a point on the path centerline where two segments join.

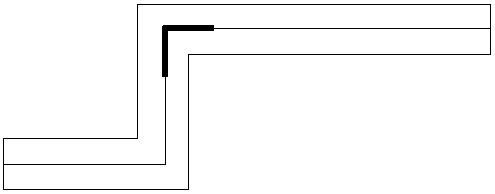
To select a path vertex in partial selection mode, do one of the following:

- Point to the vertex and click it.

As you point, the vertex is highlighted with a dotted line.

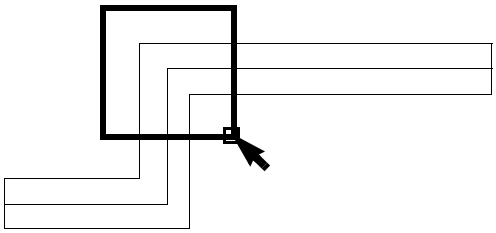


Point to the vertex and click it

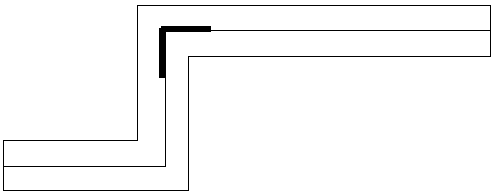


Highlighting shows the vertex is selected

- Create a selection box around the vertex.



Create a selection box around the vertex



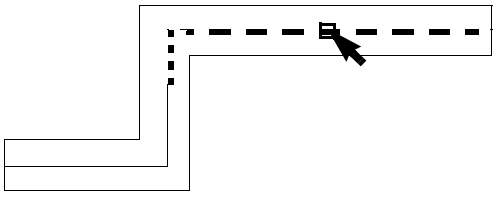
Highlighting shows the vertex is selected

Selecting a Single Path Segment

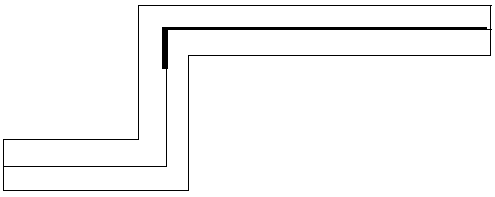
To select a single segment of a path in partial selection mode, do one of the following:

- Point to the centerline in the middle of a segment and click it.

  As you point, the centerline of the segment is highlighted with a dotted line.

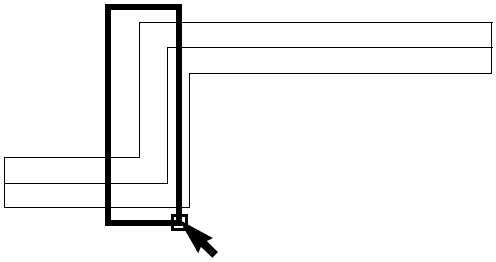


Point to the path centerline in a segment and click it

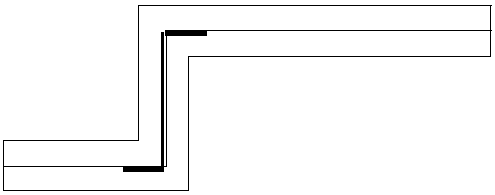


Highlighting shows the path segment is selected

- Create a selection box around a segment. Make sure both end points of the segment centerline are inside the selection box.



Create a selection box around the centerline of a segment



Highlighting shows the path segment is selected

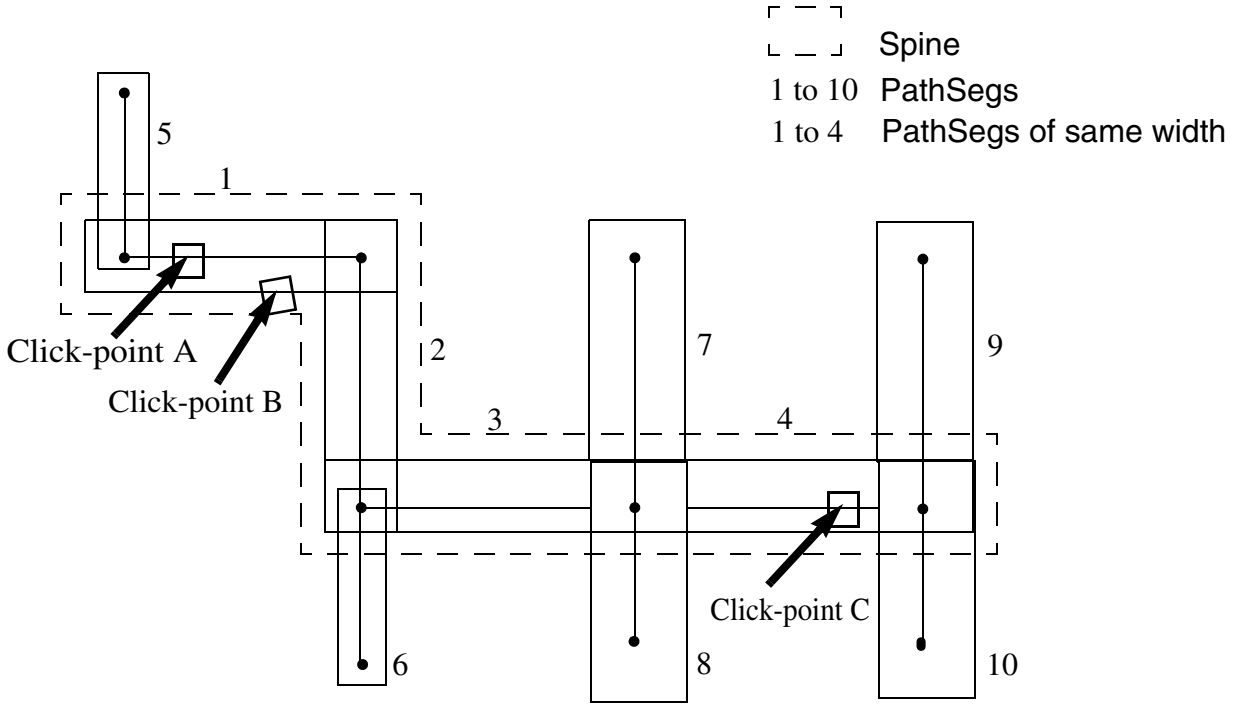
Selection of Multiple Path Segments

To select more than one pathSeg, ensure that the *Spine* option in the Selection Options form is selected. All pathSegs connected to and of the same width as the first pathSeg clicked get selected. The selection behavior differs for full and partial selection modes. The following example illustrates this.

- In full selection mode, clicking anywhere on pathSegs 1, 2, 3, or 4 in the figure selects all pathSegs forming the spine. The width of the pathSegs 5 and 6 is different from pathSegs 1 and 4, where the click points A, B, and C lie. Therefore, pathSegs 5 and 6 are not selected.
- In partial selection mode, clicking at point A selects only pathSeg 1. Clicking at point B, which is at the outer edge of the pathSeg, selects all pathSegs forming the spine. Clicking at point C selects both pathSegs 3 and 4 because they are of the same width and have the same direction.

The following table summarizes the selection of pathSegs when click-points displayed in the figure are clicked in the full and partial selection modes.

Point of Click	PathSegs Selected in Full Selection Mode	PathSegs Selected in Partial Selection Mode
A	1, 2, 3, 4	1
B	1, 2, 3, 4	1, 2, 3, 4
C	1, 2, 3, 4	3, 4



If you area select a spine such that the area selection box does not enclose all the pathSegs of the spine, then neither the spine nor the pathSegs within the area selection box are selected. PathSegs within the area selection box are selected only if the partial selection mode is on. To prevent issues when the spine comprises a large number of pathSegs, you can configure the `maxPathSegInSpineAreaSelection` environment variable.

Related Topics

Selection Options Form

Object Selection

Dynamic Selection of Objects

Use the *Dynamic Selection* assistant to identify and select specific objects of interest from a densely-populated design window with many overlapping or hierarchical objects.

The assistant lists all the objects currently under the mouse pointer in the design display area, ordered by the layer-purpose pair on which a particular object is drawn. The display is updated whenever the mouse pointer is moved in the design display area.

You can freeze (and unfreeze) the display by pressing `Ctrl+H` when the pointer is positioned in the design display area. When the display is frozen, if you select an object in the *Dynamic Selection* assistant, the object is automatically cross-selected in the layout window. If you move the pointer over an object in the assistant, that object is dynamically highlighted in the layout window.

For hierarchical instances, groups, and ROD objects, the assistant displays the hierarchical path of the objects under the mouse pointer. It does not necessarily list all the objects contained in a particular hierarchical object, only those that were under the pointer when the display was frozen. The depth of the hierarchy shown is governed by the number of display levels set for the layout window in the Display Options form.

Hierarchy Depth, Color, and State Object Information

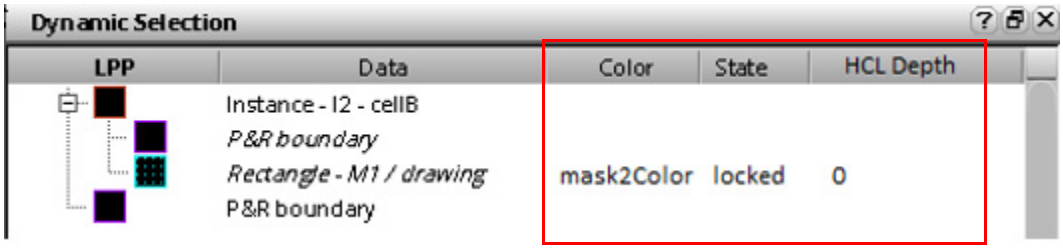
In the Dynamic Selection assistant, the *LPP* and *Data* columns specify the layer-purpose pair on which an object is drawn and provide a short description of the object, respectively.

For hierarchical objects, *LPP*, *Data*, and *HCL Depth* columns are displayed in the assistant. The assistant does not necessarily list all the objects contained in a particular hierarchical object, only those under the mouse pointer. You can use the [+] icon to reveal the hierarchical objects under a particular node and the [-] icon to hide them again. This happens automatically if the *Automatically expand hierarchy* option is enabled in the

Dynamic Selection Assistant Options form.

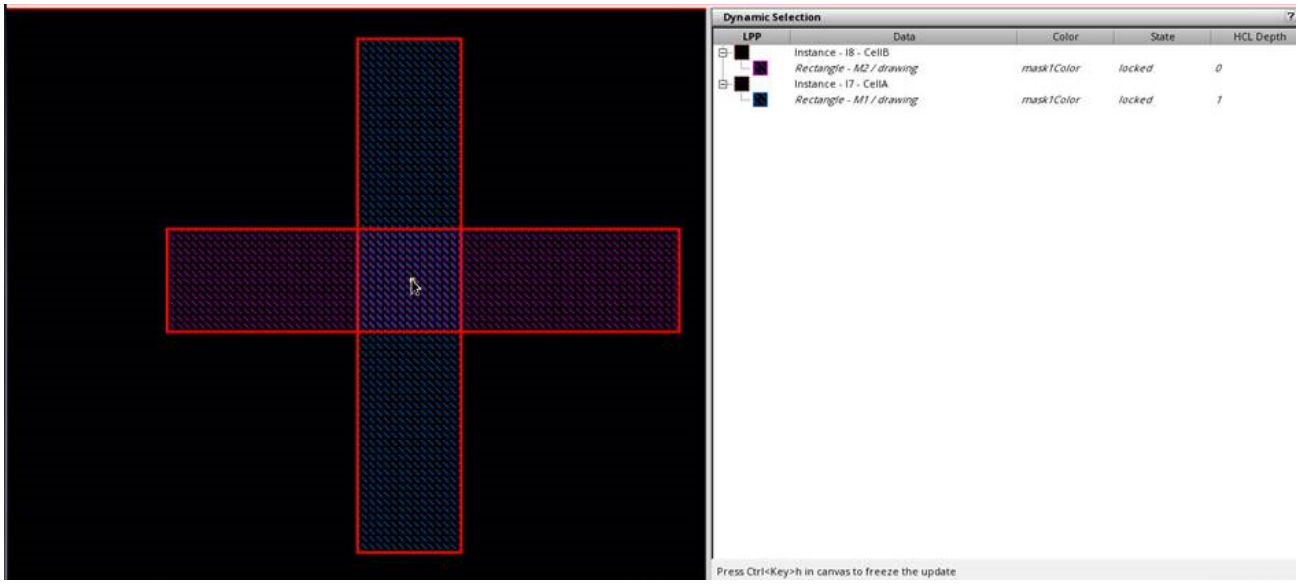
For designs with color data, the *Color* and *State* columns are also displayed in the assistant. In the *Color* column, the color information of the shape is displayed. In the *State* column, the lock state of the shape is displayed. In case of vias in a design with color data, the *Color* and *State* columns are displayed for each shape within the via.

You can view the hierarchy depth of the color lock. The *HCL Depth* column represents the depth from the current cellview to the color.

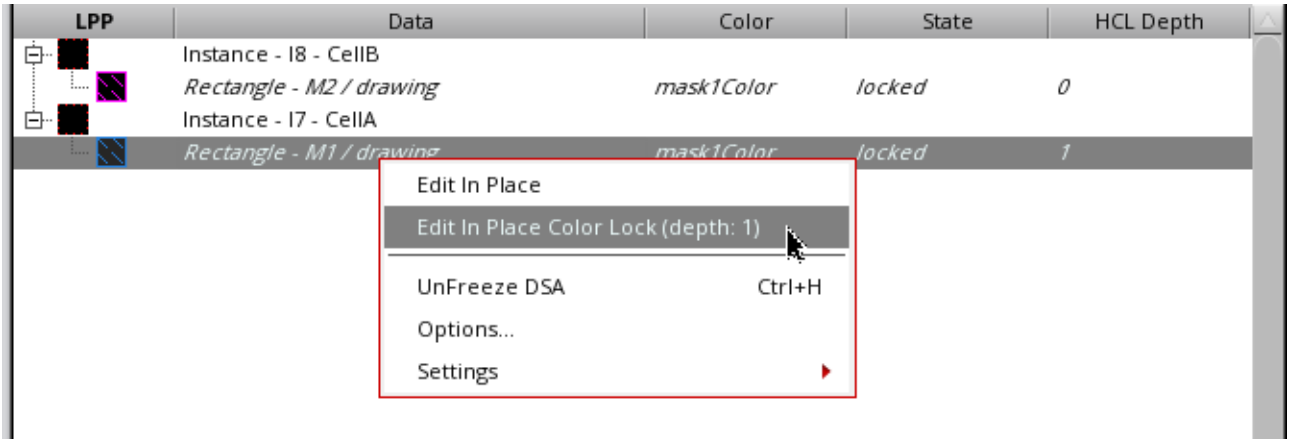


The value 0 indicates that the color and lock of the shape can be edited at this level. The value 1 in the *HCL Depth* column indicates that you have to descend one level below to edit the color and lock for the selected shape.

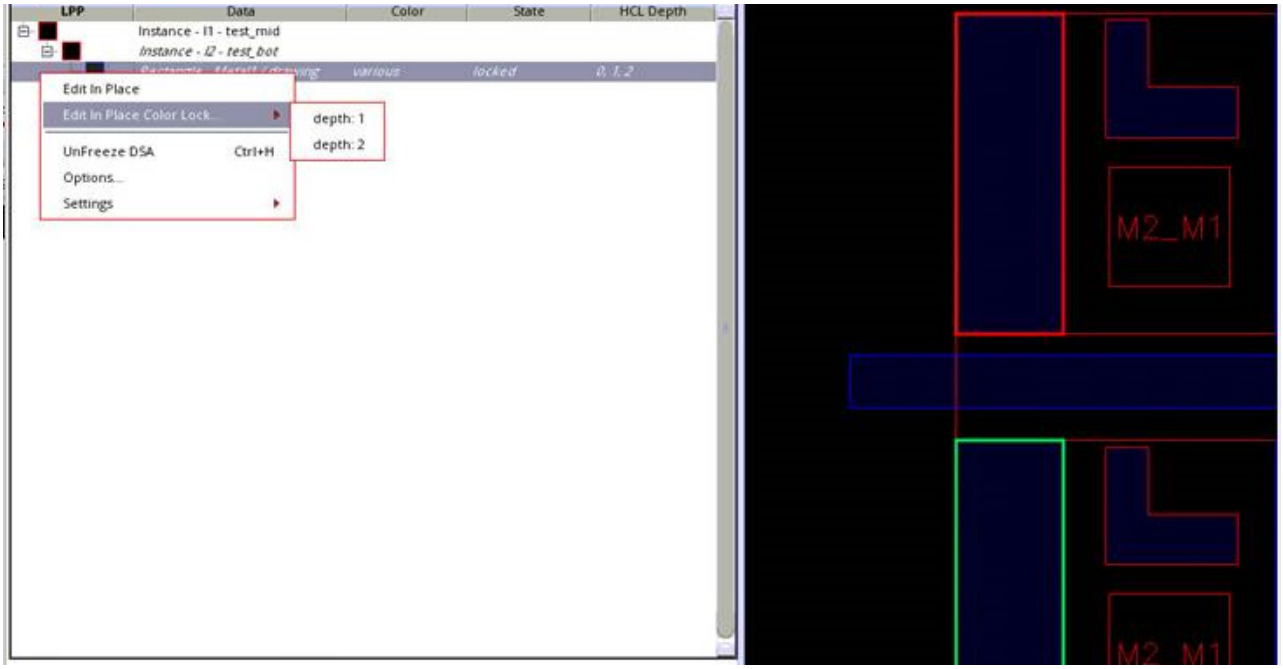
In the following example, the cellview has two instances, `I8 - CellB` and `I7 - CellA`. `CellB` has M2 shape with `mask1/locked` color and state. MPT coloring for this instance is set at the current cellview as the value of the *HCL Depth* column is `0`. `CellA` has M1 shape with `mask1/locked` color and state. MPT coloring for `CellA` is set one level below the current cellview as the value of the *HCL Depth* column is `1`.



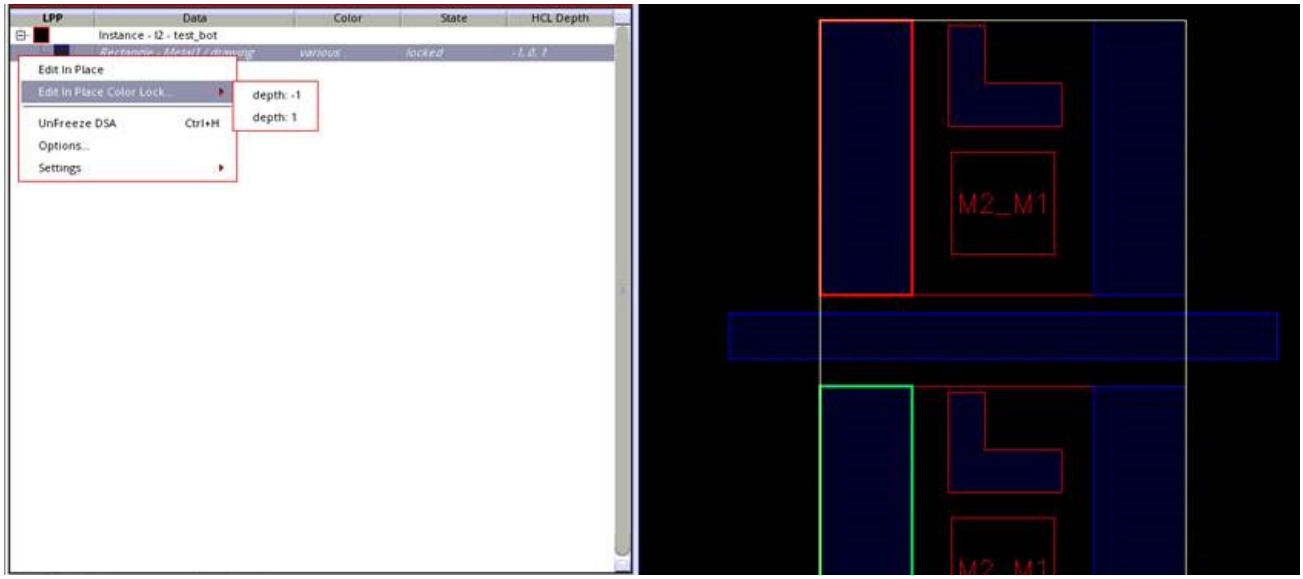
In Layout Suite XL and higher tiers, you can use the *Edit In Place Color Lock* option in the context-sensitive menu on the *Dynamic Selection* assistant to edit in place color and lock for the selected shape.



In the following example, there are three colors and three cellviews. The rectangle on the left is inside `test_bot` instance, instantiated in `test_mid`, which is instantiated in `test_top`. The lock color is set on this shape in `test_top`, then in `test_mid`, and then in `test_bot`, with different colors. The *HCL Depth* column displays values `0`, `1`, and `2`. The value of the *Color* column is `various`. The context-sensitive menu option, *Edit in Place Color Lock* displays a submenu so that you can edit in place in level `1` (`test_mid`) or `2` (`test_bot`).



If you edit in place in level `1`, the HCL depths are `-1`, `0`, and `1` to reflect the lock states from the current edit level.



Video

For a video demonstration of the *Dynamic Selection* assistant, see Virtuoso Dynamic Selection Assistant.

Related Topics

Selecting Objects Using the Dynamic Selection Assistant

Dynamic Selection Assistant

Dynamic Selection Assistant Options Form

Display Options Form

Selecting Objects Using the Dynamic Selection Assistant

To use the Dynamic Selection assistant:

1. From the layout window menu bar, choose *Windows – Assistants – Dynamic Selection*.

2. On the canvas, hover the mouse pointer over the design objects that you want to examine.

   The Dynamic Selection assistant lists all the objects under the pointer, provides a short description of each object and indicates the layer-purpose pair on which it is drawn.

3. With pointer in the design display area, right-click to display the *Layout* context-sensitive menu and choose *Freeze DSA* or press `Ctrl+H` to freeze the display.

4. In the *Dynamic Selection* assistant, choose the objects you are interested in.

   The objects are cross-selected in the layout window, allowing you to perform the required operations only on those specific objects.

   You can also expand and collapse the hierarchy and use the commands in the context menu when the display is frozen.

5. From the *Layout* context-sensitive menu, choose *UnFreeze DSA* or press `Ctrl+H` to unfreeze the display.

   The display now updates dynamically when you move your pointer in the layout window.

6. Optionally, choose *Settings – Save* from the Dynamic Selection assistant context menu. This ensures that the order of fields that you choose for the assistant and the show or hide state are retained even after you close the current Virtuoso session. The preferences are saved in the `*.ini` file.

   You can save your settings in the `DSA.ini` file which gets loaded automatically when you launch the Dynamic Selection assistant. The `DSA.ini` file is saved by default in the `./.cadence/dfII/DSA` directory, unless referenced at some other location as defined in the `setup.loc` file.

Related Topics

Dynamic Selection Assistant

Dynamic Selection Assistant Options Form

Display Options Form

Viewing Angles

You can use the *Show Angles* command to view the angle enclosed at the intersection of two edges. The command displays both the interior and exterior angles. You can view the

angles of a shape by selecting it fully or partially. The *Show Angles* command supports both pre-selection and post-selection modes.

The *Show Angles* command does not support paths or pathSegs with two end points and paths or pathSegs with only one of the end points selected.

- To view the angle measurement between the edges of a shape:

  a. Choose *View – Show Angles.*

  b. Select a shape, for example, a rectangle.

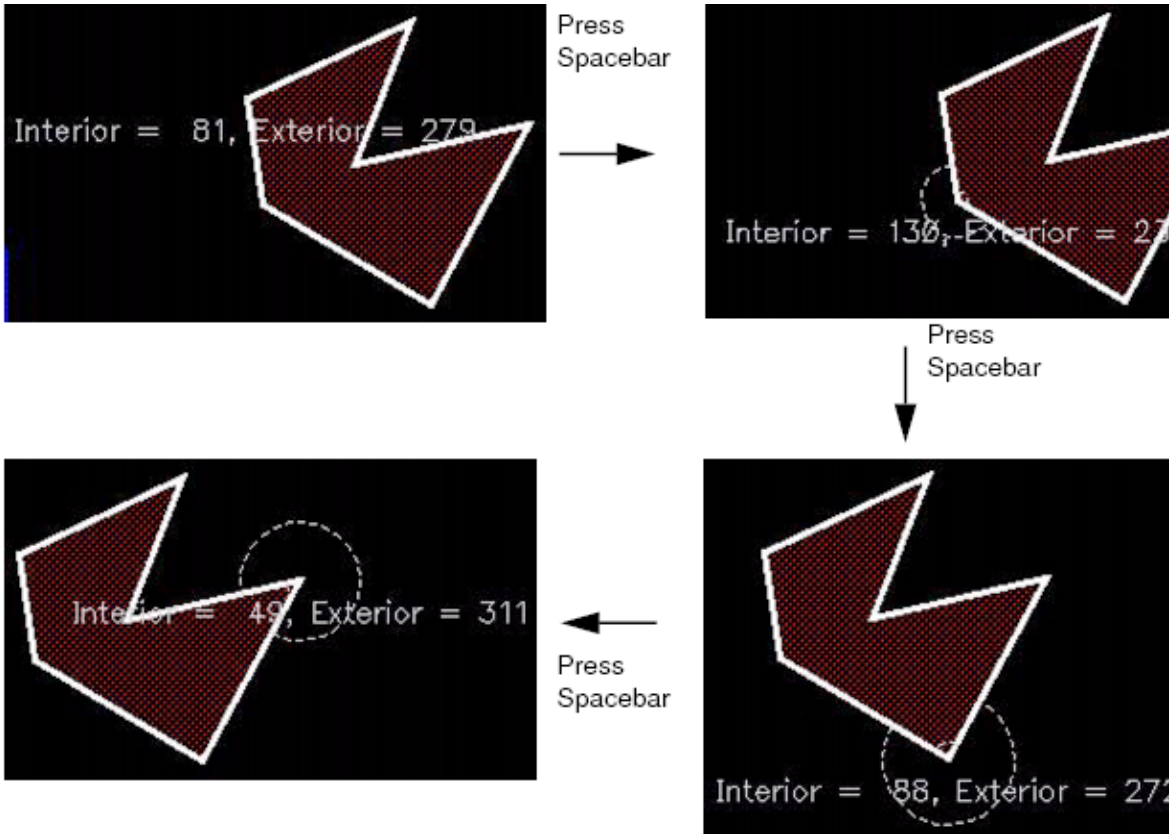
  The interior and exterior angle measurements appear, as shown in the figure. The angles are marked with arcs.

- To view the angle measurements at all the vertices of a selected shape:

  a. Select a shape, say a polygon.

  b. Press the spacebar to view the angle at the next vertex.

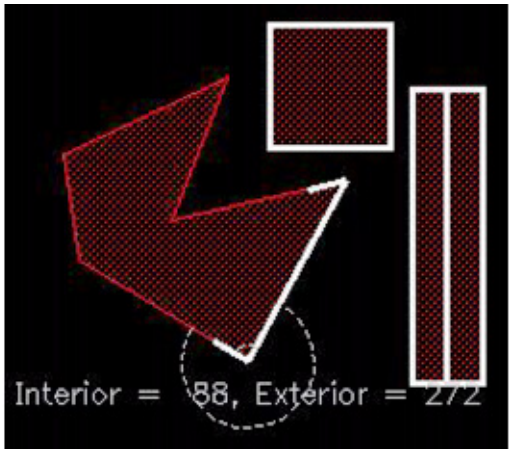
Continue to press the spacebar to view the angles at all the vertices of the shape in succession. If you select a shape partially, angles only at the selected vertices can be viewed.



- To view the angle measurements at the vertices of multiple selected shapes:

  a. Select multiple shapes, say a rectangle, a path, and the edge of a polygon.

The angle measurements are displayed at one of the vertices of the selected edge of the polygon, as shown in the figure.

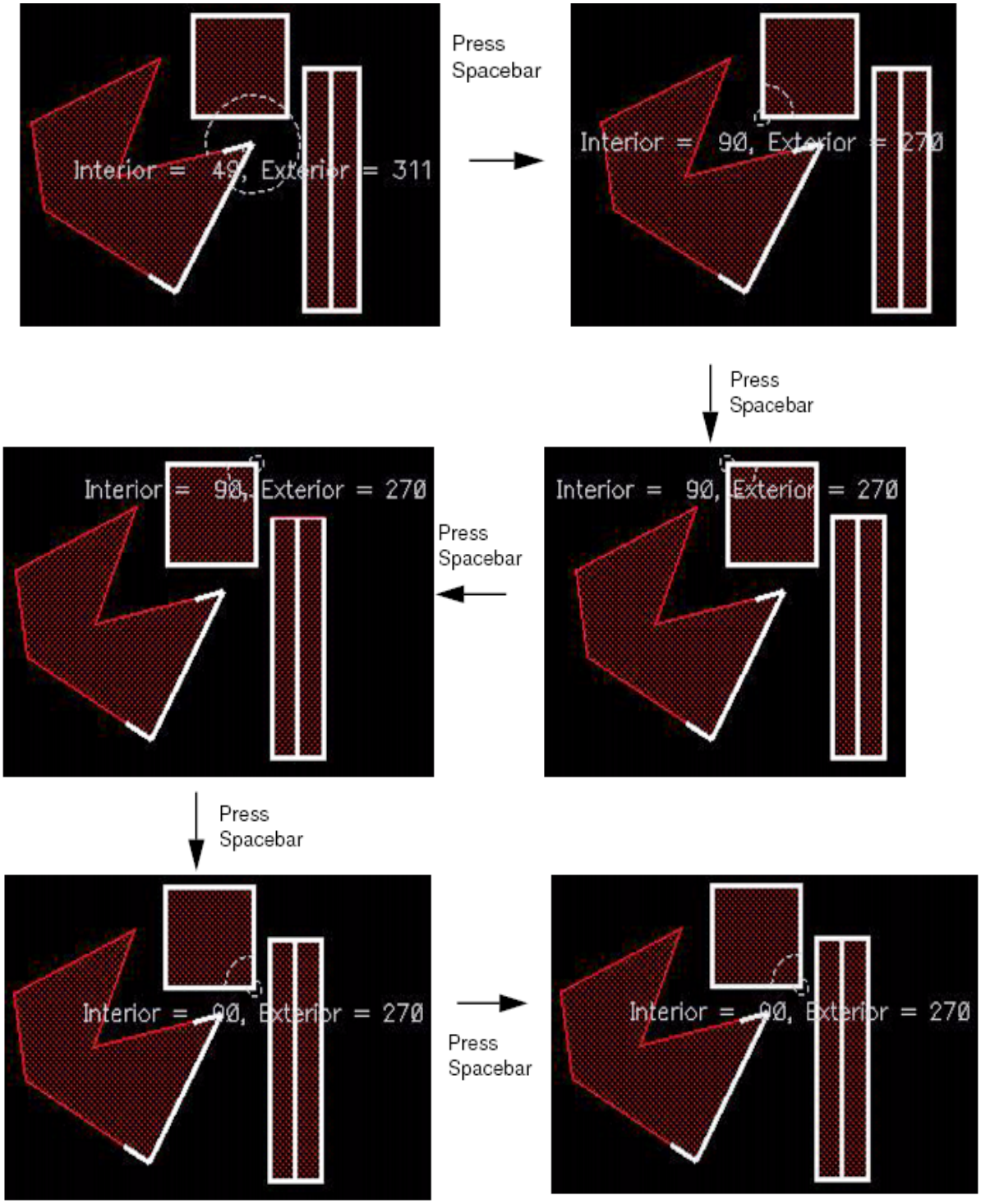


b. Continue to press the spacebar to view the angle measurements for the remaining vertices, that is, all the vertices of the rectangle.

Angle measurements are not displayed for the path because the *Show Angles* command does not support paths.

If you first run the *Show Angles* command and then select the required shapes, you can repeatedly cycle through the angles by pressing the spacebar. On the other

hand, if you first select the required shapes and then run the *Show Angles* command, the command exits after cycling through all the angles once.



c. Press `Esc` to finish the command.

Related Topics

Design Display Controls

showAnglesSigDigits

Saving and Restoring a View

You can save a zoomed or panned image shown in a layout window to a file that lasts for the current session. You can restore the view when you need it during the session. You can cycle through the last three views in a session. Views are saved only for the current session and are deleted when you exit Virtuoso.

Saving a View

To temporarily save a zoomed or panned image:

1. Choose *View – Save/Restore – Save View*.

   The Save View form appears.
2. Type the name in the *Name* field that you want to assign to your current view.
3. Click *OK*.

   The current view is saved.

Restoring a View

To restore a saved view:

1. Choose *View – Save/Restore – Restore View*.

   The Restore View form appears.
2. Select the name of the view you want to restore.
3. Click *OK*.

   The image in the window is replaced by the view you saved.

Returning to a View

To return to the previous image view:

➡ Choose *View – Save/Restore – Previous View*.

To go move to the next image view:

➡ Choose *View – Save/Restore – Next View*.

Related Topics

Save View Form

Design Display Controls

Background Cellview

You can display two superimposed cellviews in the same window. The Background command lets you place an existing cellview in the background so that you can place your new elements in alignment or by an offset based on the previously created cellview. You can use any cellview from any library as a background cellview. You can display layout, abstract, and schematic cellviews in the same window or you can use a layout cellview as a template to guide your design.

You can open only one background cellview per displayed cellview. The background cellview is not visible when you are descending, but becomes visible when you return to the original hierarchical level.

All display options set in the Display Options form are followed by both foreground and background cellviews. A background cellview can be hierarchical.

The cellview you superimpose as a background cellview is purely graphical. It has no influence on any application commands or functions.

- You cannot select, query, or move any objects in the background cellview.
- The background cellview has no effect on functions such as pointer gravity movement.
- The *View – Zoom to Fit All* command does not take into account the background cellview.

The background cellview retains all the settings of the Palette assistant, such as visibility and layer packet information, that is attached to the technology file of the background cellview. For

example, if the background cellview contains objects on metal2, the objects on metal2 are not displayed if the visibility of metal2 is turned off in the Palette assistant of the background cellview. If the background cellview has a different technology file than the foreground cellview, the displayed Palette assistant does not control any of the display characteristics of the background cellview.

Adding a Background Cellview

To display a background cellview:

1. In the layout window, choose *View – Background*.

   The Background Cellview form appears.

2. Specify the library, cell, and view name of the cell you want to use as the background cellview.

   Your current cellview cannot be used as a background in your currently open window.

3. Specify the X and Y coordinates where you want the cellview to be placed in the window.
4. Select the rotational angle you want to apply to the background cellview.
5. Specify in *Display* whether the background cellview should be hidden, displayed, or displayed with a reduced luminosity.
6. Click *OK* or *Apply*.

   The background cellview appears behind your currently open cellview.

Related Topics

Background Cellview Form

Display Options Form

Design Display Controls

Status Information

The status banner and the status toolbar in a design window provide dynamic information such as pointer movement, object coordinates, and the command currently active.

Status Banner

The status banner is displayed by default in a design window. You can choose the information that appears on the status banner and change the order in which the items appear by using the `bannerFields` environment variable.

Status Toolbar

You can display or hide the status toolbar by using either of the following ways:

- Choosing *Window – Toolbars – Status Toolbar.*
- Right-clicking anywhere on the main toolbar area and selecting *Status Toolbar.*

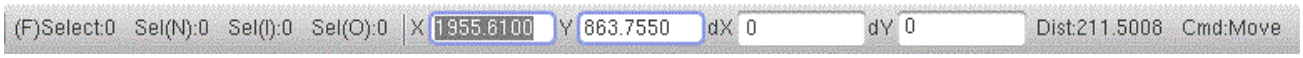
The status toolbar displays information related to the objects selected on the canvas.

The first section of the status toolbar displays the following information:

- Selection mode: Full select (`F`), full select with spine (`FS`), partial select (`P`), or partial select with spine (`PS`) and the number of figures selected. For example, *(F)Select:2* signifies two figures are selected on the canvas in the full selection mode.
- Number of nets selected: (*Sel(N):n*)
- Number of instances selected: (*Sel(I):n*)
- Number of objects selected: (*Sel(O):n*)

The second section of the status toolbar displays the editable toolbar. When you start a command and press the `Tab` key, the *X* and *Y* fields are highlighted and the *dX* and *dY* fields

are set to 0. You can use the `setDxDyToZero` environment variable to set the *dX* and *dY* fields to 0 on the status toolbar.



You can edit the *X* and *Y* fields on the status toolbar. When you press `Enter`, the *X* and *Y* coordinates are used by the currently active command. When you click the *X* and *Y* fields with no active command and press `Enter`, the pointer pans to the coordinates specified in the *X* and *Y* fields.

The *dX* and *dY* fields get highlighted if you press the `Tab` key again. Similar to the *X* and *Y* fields, you can edit the *dX* and *dY* fields. When you press `Enter`, the *dX* and *dY* coordinates are used by the currently active command.

You can control the width of the *X*, *Y*, *dX*, and *dY* fields by using the `statusBarXYdXdYLength` environment variable. The *X* and *Y* fields are coupled. If you set one, the other is automatically set. The same is true for *dX* and *dY* fields.

The *Dist* field displays the distance the pointer has moved and the *Cmd* field displays the currently active command.

For `Move`, `Copy`, and `Stretch` commands, when you do not specify the values in the *X* and *Y* fields and press `Enter`:

- If the selection set has a single object with origin, the origin is considered as the reference point.
- If the selection set has a single object without origin, the lower-left corner of the bounding box of the object is considered as the reference point.
- If the selection set has multiple objects, the lower-left corner of the bounding box of the selection sets is considered as the reference point.

As the data displayed by the status toolbar is dynamic, Cadence recommends that you dock the toolbar only horizontally, either to the top or the bottom of the design window.

Using the *Window – Workspaces – Save As* command, you can save a configuration to display the status toolbar every time the cellview window is opened.

In Virtuoso Layout Suite XL and higher tiers, you can customize the information that is displayed on the status toolbar by using the `statusToolbarFields` environment variable. You can display fields such as cell size, number of selected objects, environment variable values, shell environment variable values, and window variable values. You can also customize the display format of the information displayed on the status toolbar. You can specify information in bold font and change the color of some information on the toolbar. You

can also use an expression format that allows conditional formatting based on values. For example, the information can be displayed in bold font if a command is active or if the number of selections is more than zero, you can customize the status toolbar to display this information in red and bold font.

Related Topics

Design Display Controls

Creating a Reference Window

You can display a small copy of your whole cellview and this is called a reference window. When you have two windows displaying the same cellview, you can start a *Zoom* or *Pan* command in your original window and then enter the points to zoom or pan in the reference window. This way you can pinpoint the area you want to display by using the reference window.

To create a reference window and use it to zoom or pan:

1. In the layout window, choose *Window – Copy Window* to create a reference window.

   The reference window appears, displaying the same cellview.
2. To shrink the new window, click a corner of the new window and drag it towards the opposite corner.
3. In the new window, choose *View – Zoom To Fit All*.
4. With the pointer in the original window, choose *View – Zoom In*.
5. Move the pointer to the reference window.
6. Click to create the zoom box in the reference window.

   The original window zooms in to the area you designated in the reference window, but the reference window remains unchanged.

In Virtuoso Layout Suite XL and higher tiers, you can use the reference window to create and edit objects. When you have two windows displaying the same cellview, you can start an editing command in one and finish it in the other window. For example, in the original window, you can choose *Create – Path* and click to begin creating the path. You can then move the pointer to the reference window and double-click on the canvas to finish creating the path.

Related Topics

Design Display Controls

Zooming a Design

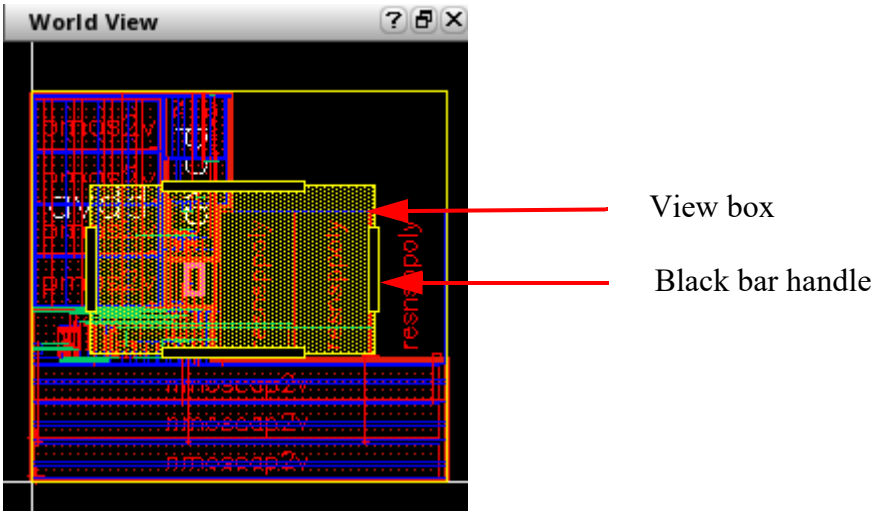
Navigating a Design Using the World View Assistant

The World View assistant shows the complete picture of your design and its relationship to the main window. The part of the design currently displayed on the canvas is marked with a view box in the assistant. The World View assistant acts as a navigation tool, and is especially useful in large designs and when working at high zoom levels.

To navigate a design by using the World View assistant:

1. In the layout window, choose *Window – Assistants – World View* to open the World View assistant. Alternatively, right-click anywhere on the layout window menu bar and choose *Assistants – World View*.

   The World View assistant appears, marking the current design area displayed on the canvas with a view box, represented by a yellow rectangle.



2. Resize the view box by using the black bar handles to zoom in or zoom out the design on the canvas.

   When you hold down the left mouse button on a handle of the view box and drag inward or outward, the view box increases or decreases in size and the design on the canvas zooms in or zooms out corresponding to the size of the view box.

3. Click the desired design area in the assistant or drag the view box to a new location.

The design area on the canvas is displayed accordingly.

4. Explore the options on the context menu to navigate your design by right-clicking the design in the World View assistant and choosing an option to perform the desired task. You can refresh the window, zoom in or zoom out the design, fit the entire design into the World View assistant window, and set the color luminosity of the view box.

Related Topics

World View Assistant

Setting Display Options

You can control how objects are displayed on the canvas by setting display options in the Display Options form.

Setting Up Design Objects to be Displayed

To control which objects or attributes appear in a design:

1. Choose *Options – Display*.

   The Display Options form appears.

2. Set the desired display controls. For example, select *Instance Pins* to shows pins in instances.

   For a description of the options available in the form, see Display Options Form.

3. Click *Apply* to see the result of your changes.

4. Click *OK* when you are done applying the settings.

Displaying Instance or Master Cell Names

When you suppress cell instance details, by using the `Ctrl + F` bindkey, one of the following is displayed for each instance:

- Master cell name
- Instance name, usually an incremented number
- Both master cell and instance names

To specify the name to be displayed:

1. Choose *Options – Display*.

   The Display Options form appears.

2. In the *Display Controls* section, set *Show Name Of* to any of the following: *instance*, *master*, or *both*.

3. Click *OK* or *Apply*.

Setting Display Levels

You can set display levels to control whether details inside of cell instances placed in a cellview are displayed.

1. Choose *Options – Display*.

   The Display Options form appears.

2. Set *Display Levels* in the *Display Controls* section.

   - *Start*: Shows the lowest level of hierarchy that appears. By default, the display begins at the current level, 0.
   - *Stop*: Shows the highest level of hierarchy that appears. Cell instances inside this cellview are level 1, instances inside level 1 are level 2, and so on.

3. Click *OK* or *Apply*.

To set the display level to 0, press `Control+F` in the design window. To set the display level to 32, press `Shift+F` in the design window.

Related Topics

Display Options Form

Displaying Details or Outlines of Arrays

Setting Up Grid Controls

Setting Up the Snap Mode

Setting Up Dimming Options

Displaying Details or Outlines of Arrays

You can adjust the display details of cell arrays.

To set the array display details:

1. Choose *Options – Display*.

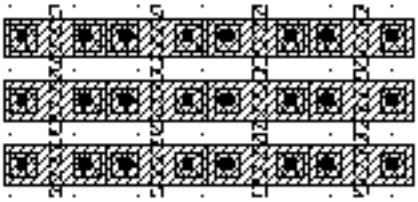
   The Display Options form appears.

2. In the *Display Controls* section, set the *Array Icons*, *Array Display*, and *Display Levels* options as desired.

   - *Array Icons*: Shows outlines of array cells when *Display Levels* suppresses cell details. When *Array Icons* is enabled and *Display Levels* is set to *Start 0 Stop 0*, outlines of array elements appear with no detail.
   - *Array Display*: Controls the number of elements that appear in the array. You can set it to display all instances in the array, only the instances around the outside edge of the array, or only the instance at the origin of the array.
   - *Display Levels*: Controls the level of instance hierarchy details displayed. You can set the first (*Start*) and last (*Stop*) levels in the design hierarchy that can be seen in detail. The hierarchy levels are numbered 0 to 32.

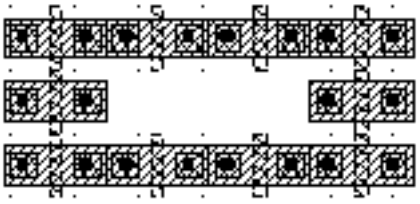
3. Click *OK* or *Apply*.

The following figures show sample settings for displaying arrays.



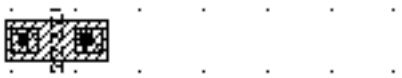
Array Icons: Off
Array Display: Full
Display Levels: 0-32

Array Icons: On
Array Display: Full
Display Levels: 0-0



Array Icons: Off
Array Display: Border
Display Levels: 0-32

Array Icons: On
Array Display: Border
Display Levels: 0-0



Array Icons: Off
Array Display: Source
Display Levels: 0-32

Related Topics

Display Options Form

Setting Up Grid Controls

Setting Up the Snap Mode

Setting Up Dimming Options

Setting Display Options

Setting Up Grid Controls

By default, the cellview window shows a grid of dots. There are two different grids: the minor (small) grid and the major (large) grid. Minor grid points are white and appear at every micron. Major grid points are green by default and appear at every 5 microns.

The grid defines the points at which the pointer (the small square) snaps to the cellview or to objects. With the snap grid set to 0.5 microns, the pointer can snap to each visible grid point or halfway between each grid point. For example, if your user units are microns and you want to draw objects at 0.5 micron intervals, you set the spacing for the snap grid to 0.5 microns.

To set the grid, you set the *X Snap Spacing* (distance the pointer can move along the X axis) and the *Y Snap Spacing* (distance the pointer can move along the Y axis) fields. Setting *X Snap Spacing* and *Y Snap Spacing* to 0 produces the same result as turning the environment variable `snapToGrid` off.

Gravity has precedence over snap grid. While using snap grid, turn *Gravity* off.

Note: The snap grid is not the same as the visible grid in the cellview.

To set the grid type and snap grid spacing:

1. Choose *Options – Display*.

   The Display Options form appears.

2. Set the visible grid *Type* to *none*, *dots*, or *lines*.

3. Type the smallest distance you want between the points you enter along the X axis (*X Snap Spacing*) and Y axis (*Y Snap Spacing*).

   The value you type is in user units, usually microns.

4. Click *OK*.

Related Topics

Display Options Form

Gravity Controls

Setting Up the Snap Mode

Setting Up Dimming Options

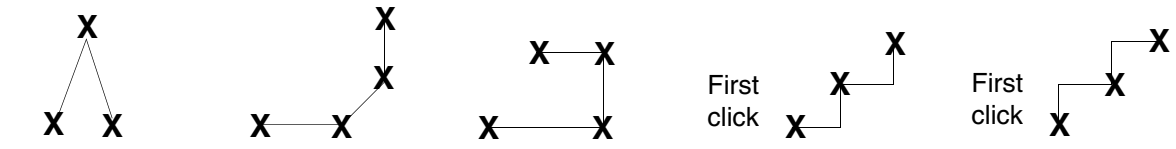
Setting Display Options

Displaying Details or Outlines of Arrays

Setting Up the Snap Mode

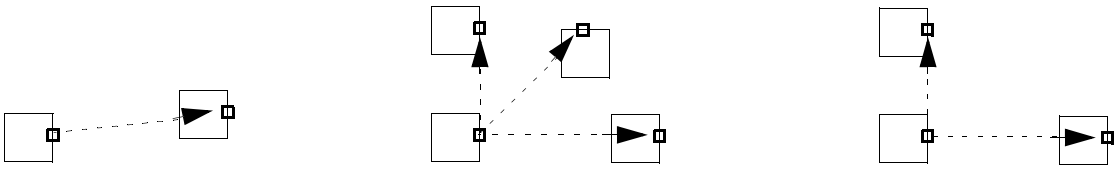
The snap mode controls how the pointer locks to the grid as you create or edit objects.

- The create commands use the snap mode to control the shape of segments as you create or reshape objects. The following figure illustrates the snap mode settings.



anyAngle diagonal orthogonal L90XFirst L90YFirst

- The edit commands use the snap mode to control where you can move all or part of an object. The following figure illustrates the snap mode settings.



anyAngle diagonal orthogonal

To set the default snap mode:

1. Choose *Options – Display*.

   The Display Options form appears.

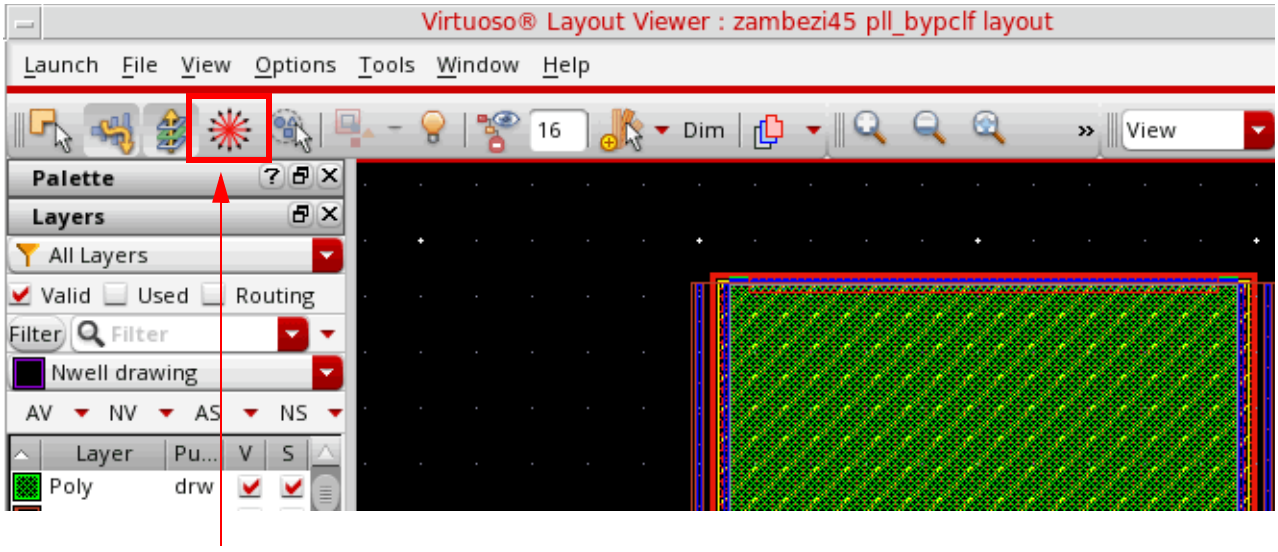
2. Set the snap modes for create and edit in the *Snap Modes* section:

   - *Create* controls how segments snap as you create objects. You can also access this by using the Create Snap Mode icon  on the *Options* toolbar.
   - *Edit* controls how segments snap as you move or stretch objects. You can also access this by using Edit Snap Mode icon  on the *Options* toolbar.

3. Click *OK*.

The synchronized Create/Edit Snap Mode icon on the *Options* toolbar displays the snap mode of the both the create and edit commands. It provides a single way to change both the create and edit snap modes, simultaneously.

When both the create and edit snap modes are synchronized, the appropriate icon (anyAngle, diagonal, or orthogonal) displays as the synchronized Create/Edit Snap Mode icon, as shown in the figure below.



Important

You can cycle through the snap modes (anyAngle -> diagonal -> orthogonal) by pressing the `N` bindkey or clicking the synchronized Create/Edit Snap Mode icon on the *Options* toolbar. The *Create* and *Edit* snap modes become unsynchronized if you change either the *Create* snap mode or the *Edit* snap mode in the Display Options form or on the *Options* toolbar. When the *Create* and *Edit* snap modes are unsynchronized, then the synchronized Create/Edit Snap Mode icon on the *Options* toolbar is displayed as a dotted diagonal double-headed arrow  .

Related Topics

Display Options Form

Setting Up Dimming Options

Setting Display Options

Displaying Details or Outlines of Arrays

Setting Up Grid Controls

Saving, Loading, and Deleting Display Settings

Setting Up Dimming Options

Dimming lets you change the color luminosity of objects in the cellview. The dimming feature lets you differentiate objects in editable context from objects in other contexts. For example, you can dim everything in the design but the objects in the edit cellview, to better view what is currently editable. Dimming settings are associated with the window environment.

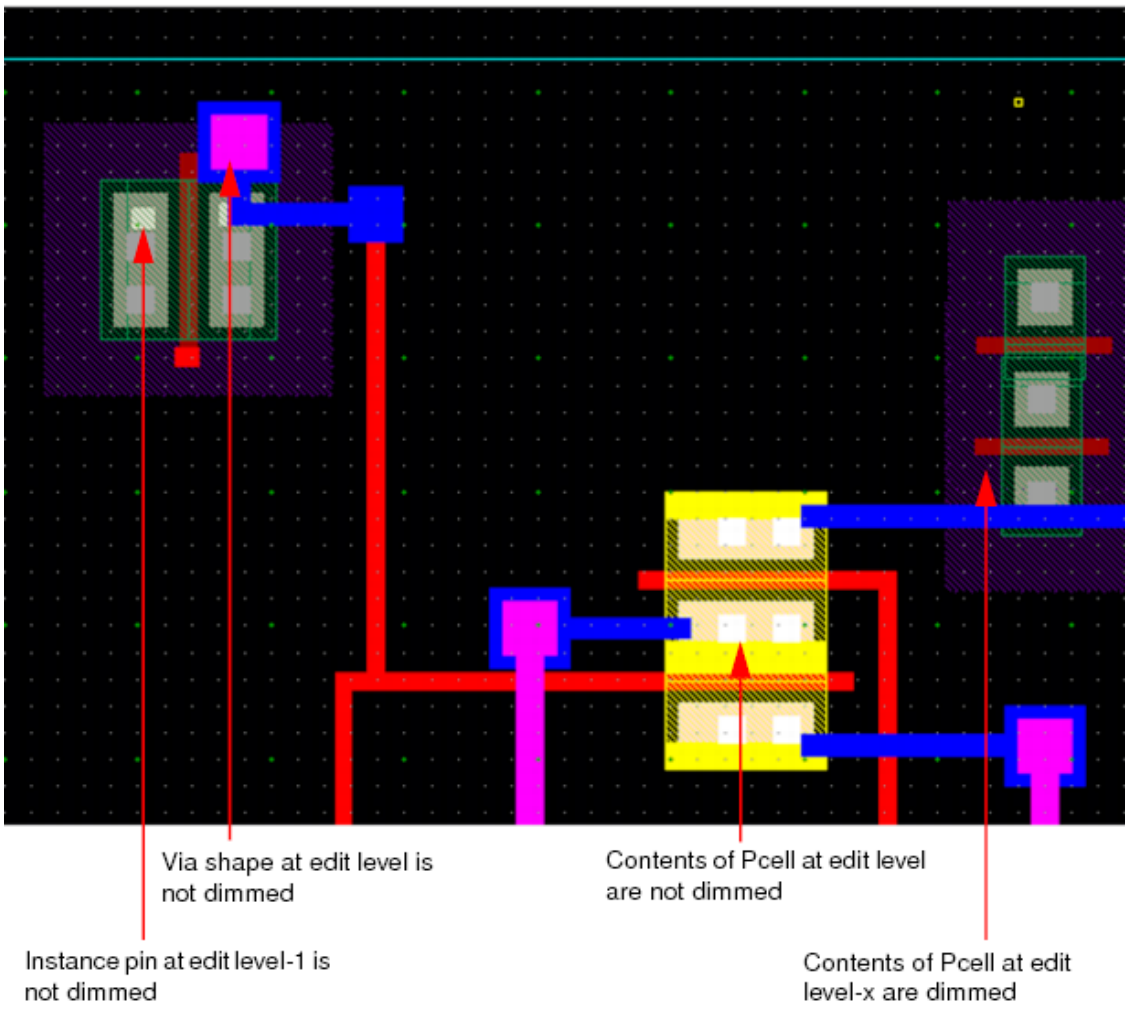
- Only one dimming intensity can be set per window.
- When you descend the hierarchy or edit-in-place, the dimming settings from the parent environment are used for the new environment.
- When returning from a descend or an edit-in-place, the dimming settings of the parent environment are restored.

To set the dimming options:

1. Choose *Options – Display*.
2. Select *Enable Dimming* in the *Dimming* section.
3. Set the *Scope* cyclic field of the *Display Options* to one of the following:
   - *none*: Does not apply dimming.
   - *all*: Dims the design completely.

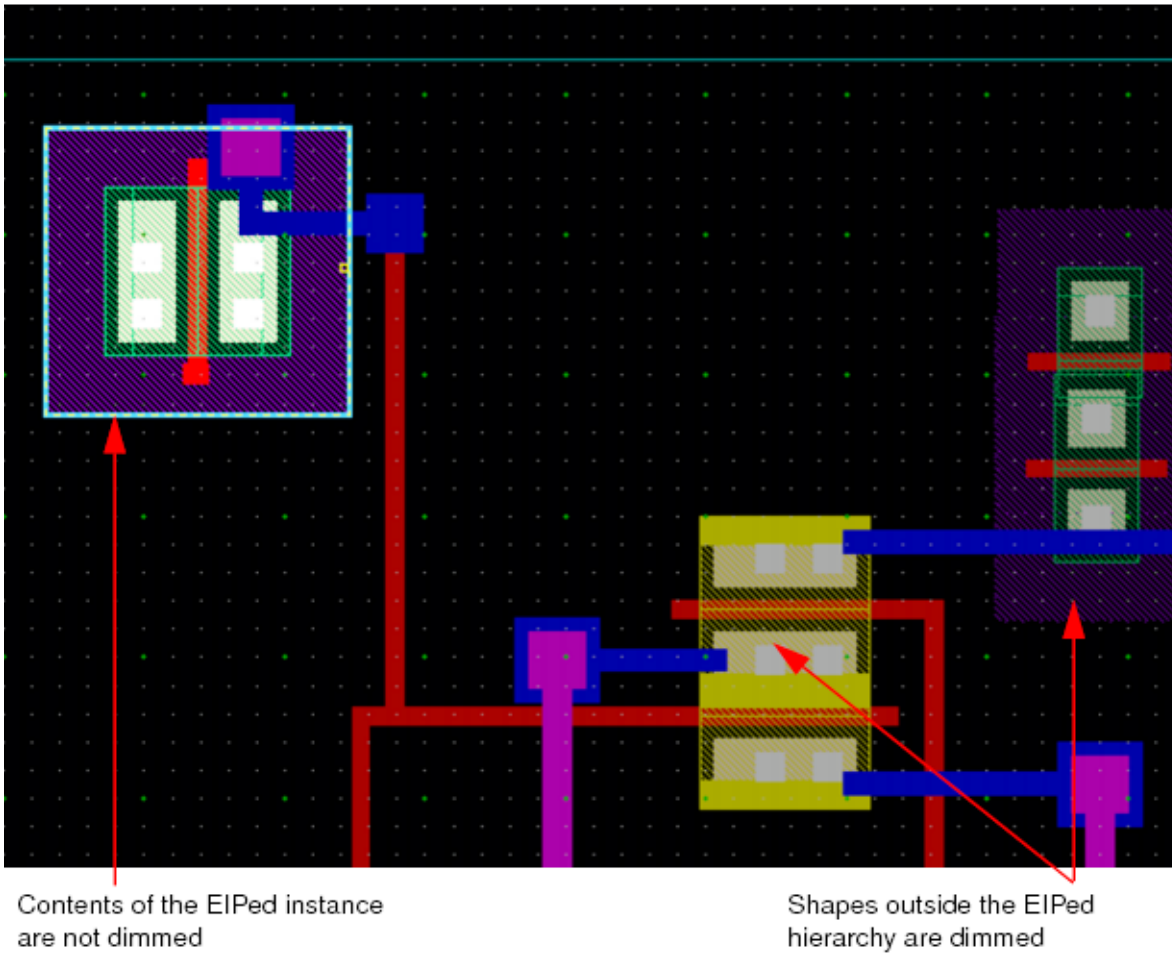
- *outside*: Dims upper and lower-level hierarchy and surrounding hierarchy objects outside of the current context. It help you distinguish editable objects from the objects that are in other contexts.

Display Stop Level = 32, Dimming Scope = outside

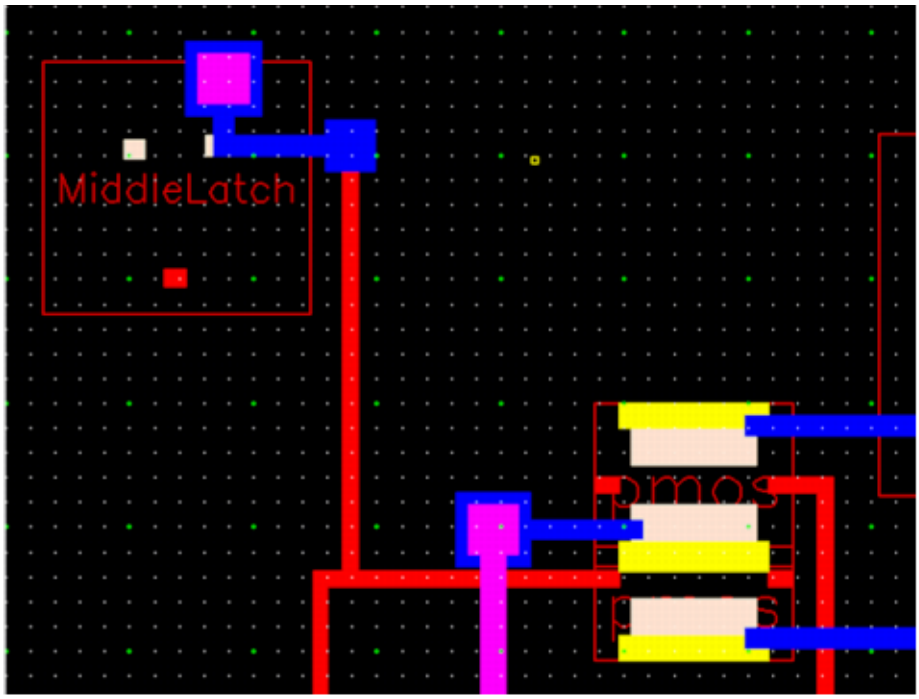


- *eipSurround*: Dims only the objects surrounding the EIP hierarchy.

Display Stop Level = 32, Dimming Scope = eipSurround

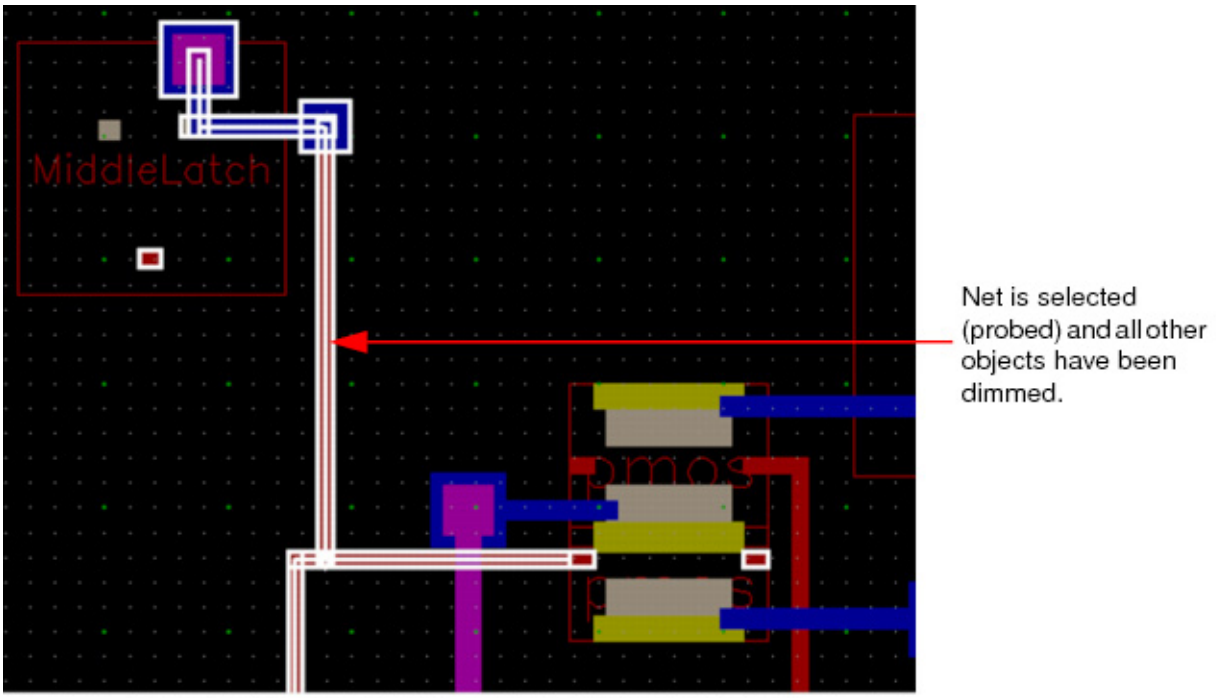


4. Select *Automatic Dimming* to activate dimming irrespective of the dimming *Scope*.



Dimming Scope = none, Automatic Dimming = on

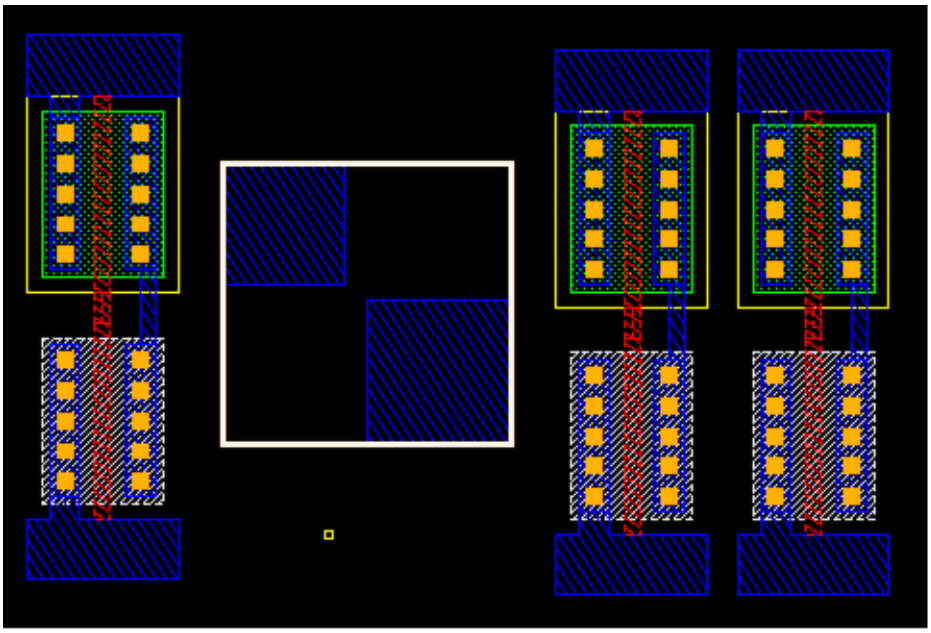
Nothing is selected, highlighted, or probed. So nothing is dimmed.



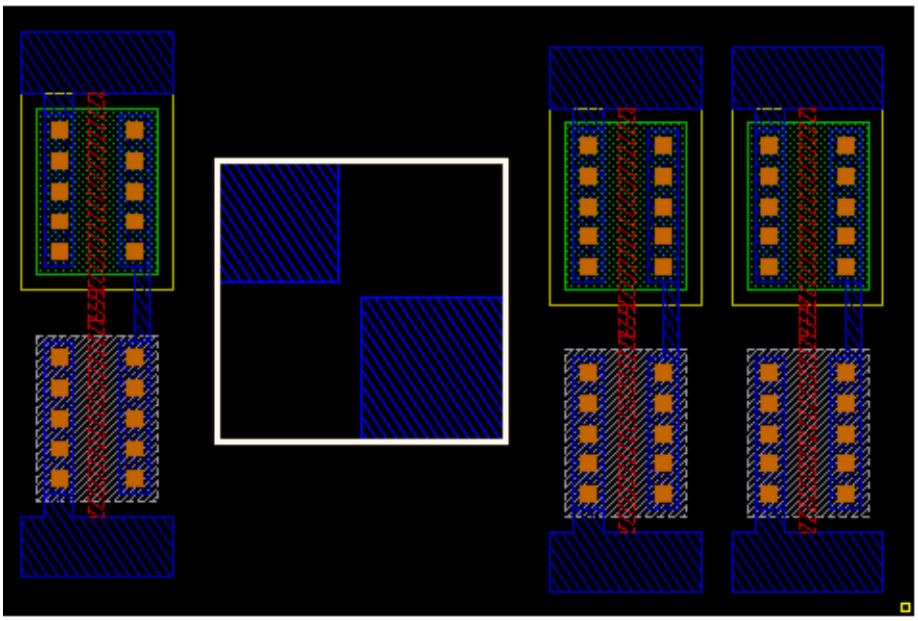
Dimming Scope = none, Automatic Dimming = on

5. Select *True Color Selection only* to display the selected objects in their original colors and not display their selection highlight.

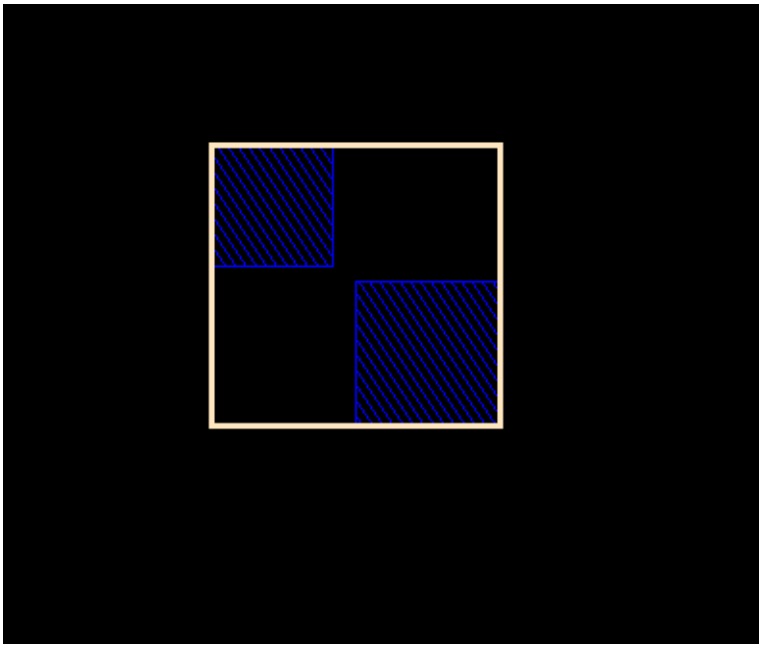
6. Move the *Dim Intensity* slider to set the color luminosity of the dimmed objects.



Edit in Place with surrounding objects dimmed to 0.



Edit in Place with surrounding objects dimmed to 50.



Edit in Place with surrounding objects dimmed to 100.

6. Click *Apply*.

You can also enable dimming by using the Dim icon Dim on the *Options* toolbar.

Related Topics

Display Options Form

Saving, Loading, and Deleting Display Settings

Setting Display Options

Displaying Details or Outlines of Arrays

Setting Up Grid Controls

Setting Up the Snap Mode

Saving, Loading, and Deleting Display Settings

You can save, load, and delete the settings in the Display Options form to several locations. Saving the display settings lets people who work on the same design use the same display settings.

The display settings can be saved to the current cellview, library of the cellview, technology library of the cellview, or a specified file.

To save the display settings:

➤ In the Display Options form, choose *Save To* and any of the following options: *Cellview*, *Library*, *Tech Library*, or *File.* Save the setting.

To load the display settings, do one of the following:

- Start the software.

  The display settings are loaded in this precedence, from highest to lowest:

  - Cellview
  - Library of the cellview
  - Technology library of the cellview
  - File (`~/.cdsenv`)

- In the Display Options form, choose *Load From* and any of the following options: *Cellview*, *Library*, *Tech Library*, or *File.* Save the setting.

To delete the display settings:

➤ Choose *Delete From* and either *Cellview*, *Library*, or *Tech Library*. Save the setting.

Related Topics

Display Options Form

Setting Display Options

Displaying Details or Outlines of Arrays

Setting Up Grid Controls

Setting Up the Snap Mode

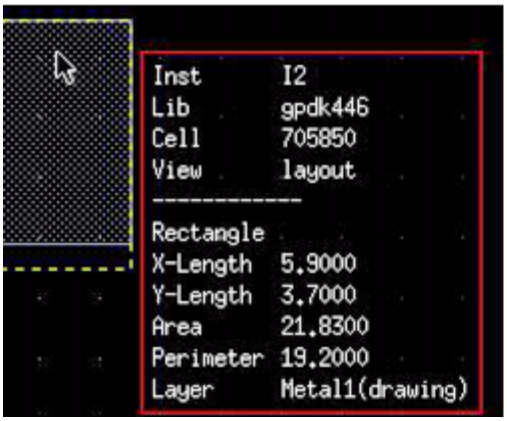
Setting Up Dimming Options

Object Information Display

To display textual information about objects, you can use two types of controls, information balloons and dynamic measurement.

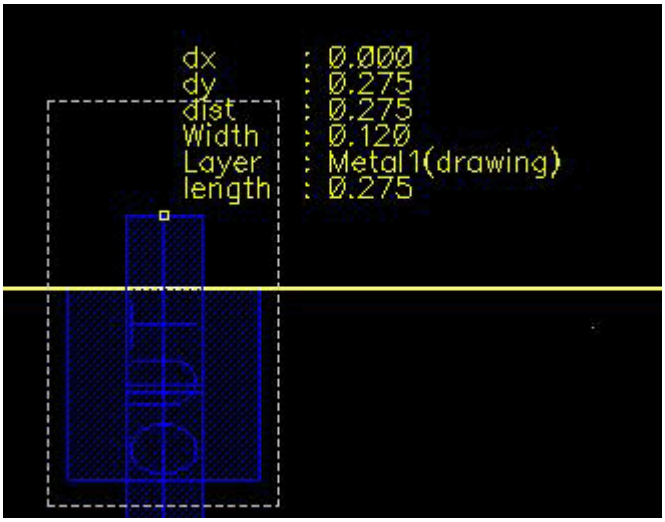
- **Information Balloons**

  Information balloons display textual information when you move the pointer over an existing object or shape. They display information about the bound and unbound instances. The information displayed for unbound instances when the stop display level ranges from `0` to `32` is the same as the information for bound instances when the stop display level is set to `0` in the Set Area View Level form. Information balloons display information about members of figure groups when you are editing a figure group or the *Transparent Group* option is selected in the Display Options form.



- **Dynamic Measurement**

Dynamic measurement displays distance measurements when creating or editing objects. The measurement text is displayed next to the pointer.



(Virtuoso RF Option) You can view information balloons for curvilinear geometries such as curved paths and curved polygons. Dynamic measurement is supported for curved shapes.

Related Topics

Set Area View Level Form

Display Options Form

Enabling Information Balloons and Dynamic Measurements

Enabling Information Balloons and Dynamic Measurements

To display object information balloons and dynamic measurement:

1. In the layout window, choose *Options – Dynamic Display*.

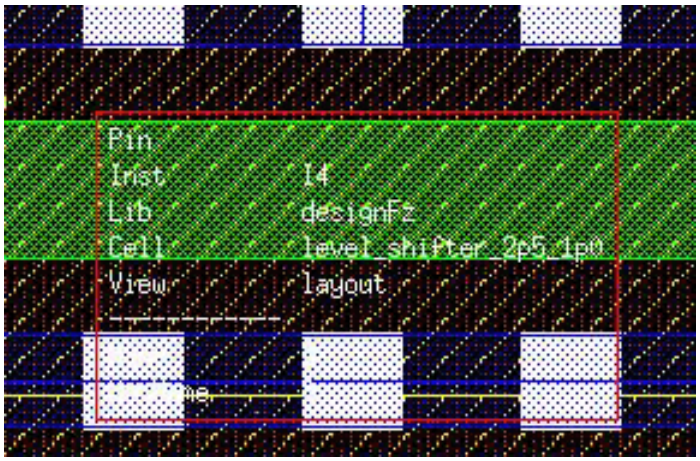
   The Dynamic Display form appears.

2. Select the *Show Info Balloon* check box to enable information balloons.
3. On the *Info Balloon* tab, set the following:

   - *Pause Time:* Specify the amount of time before the information balloon will appear when the pointer is over an object. The range is from 0 to 10.

- *Fade Time*: Specify the amount of time in seconds for the information balloon to fade away after it appears. Valid values are between .001 and 100.
- *Transparency*: Specify the transparency of the balloon information box. When set to 0, the box is completely transparent. When set to 100, objects behind the box are not visible. The default is 50.

Transparency level set to 0.



Transparency level set to 100.

4. Select the *Measurement Display On* check box to enable dynamic measurement.
5. On the *Dynamic Measurement* tab:
   a. Set *Text Height* to the desired size in pixels. The valid values are from 4 to 50, and the default size is 10.
   b. Choose the text color from the *Color* list.
6. Click *OK*.

In Layout XL and higher tiers, dynamic measurement supports the *Create*, *Copy*, *Move* and *Stretch* commands. When using the *Move* and *Copy* commands, dynamic measurement is displayed only in the current cellview. If an object or group of objects are moved or copied to another cellview, dynamic measurement is not displayed beyond the original cellview.

(Virtuoso Photonics Option) In Layout EXL and higher tiers, the *Photonics* option is also available in the Dynamic Display form. When the *Photonics* and *Show Info Balloon* options are selected in the form, information related to photonics object is displayed.

Related Topics

Dynamic Display Form

Object Information Display

Customizing Object Information Display

Dynamic display controls can be enabled to display information about objects or to display the information dynamically when objects are being created, moved, or copied. The type of information displayed is object dependent and can be customized. You can use the Setup tab of the Dynamic Display form to specify the type of object information to be displayed.

To customize the type of object information displayed in information balloons:

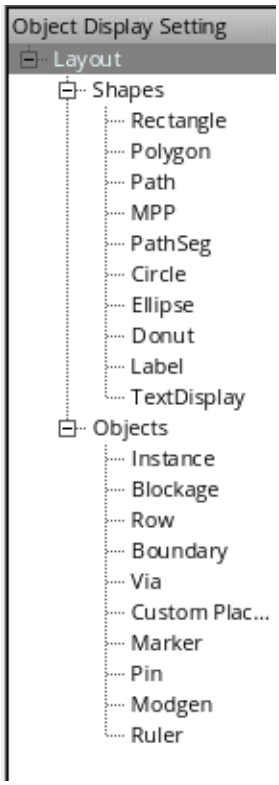
1. In the layout window, select *Options – Dynamic Display*.

   The Dynamic Display form appears.

2. In the *Setup* tab, expand the *Object Display Setting* tree.

   Expanding the tree displays the *Shapes* and *Objects* categories in which data types are organized.

3. Expand the *Shapes* and *Objects* trees.



4. Select a category, shape, or object.

   - Select a top-level category by clicking *Layout*, *Shapes*, or *Objects* to customize the display information for all types of data within the top-level category.
   - Select individual shapes and objects such as *Rectangle* or *Instance* to customize the display information at a specific shape or object level.

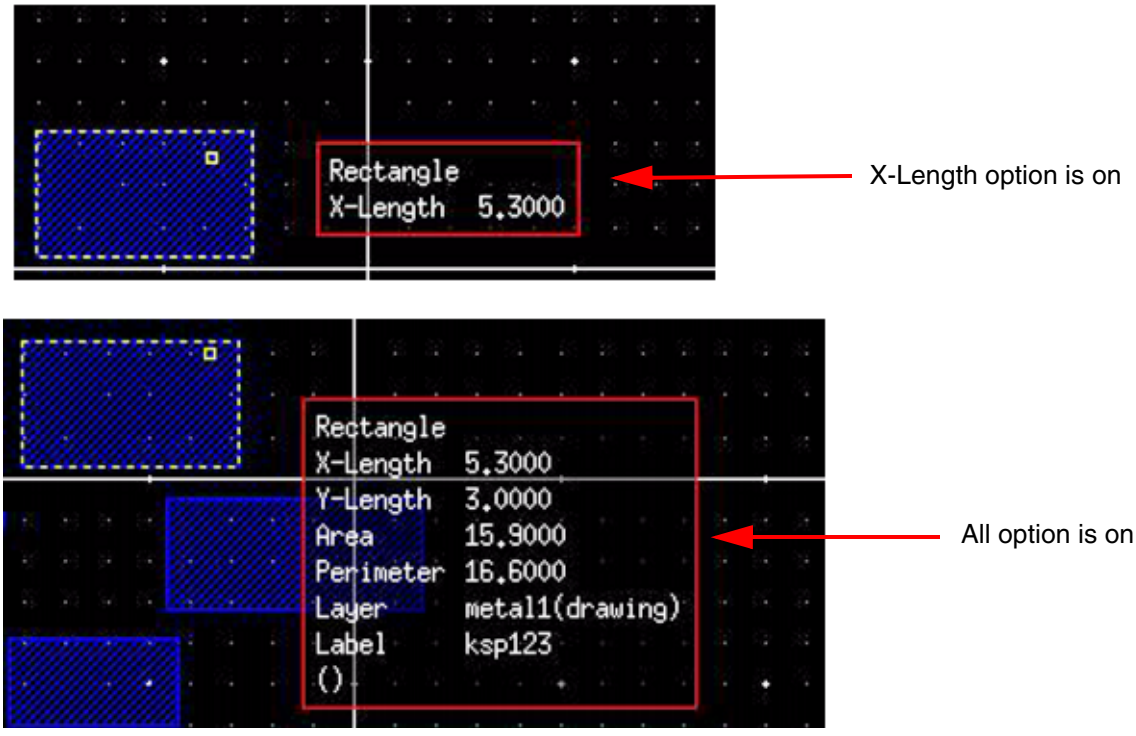
   When clicking a specific shape or object, the *Contents* section of the tab refreshes and displays the parameters that can be displayed. Only parameters that are relevant to the shape or object are selectable and other parameters are grayed out.

5. Click the parameters that you want to display in the information balloon.

You can customize the display by selecting parameters at the top-level category and then selecting additional parameters to display or remove from the display at the individual object or shape level.

You can use the *All* or *None* buttons to select or deselect all available parameters for each shape and object rather than selecting parameters individually.

The following example shows the results of changing the display for *Rectangle*.



6. Click *Apply* or *OK*.

The number of decimal digits that display during the dynamic display of measurements of shapes is controlled by the `displaySigDigits` environment variable. However, the number of decimal places displayed for the *Area* field is fixed to `6` and is not controlled by this environment variable.

Related Topics

Dynamic Display Form

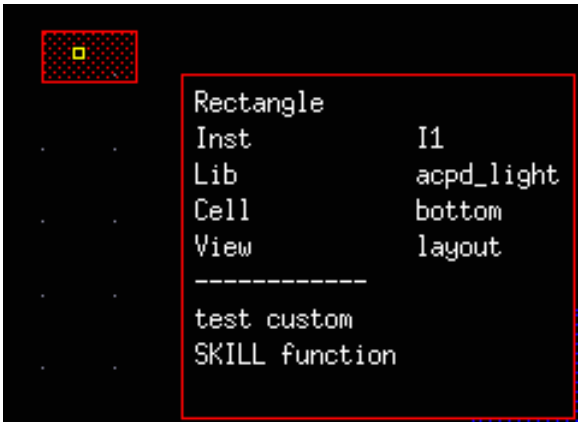
Parameter Types for Shapes and Objects

Object Information Display

Customizing Information Balloon Using Custom SKILL Functions

Note: This functionality is available in Layout XL and higher tiers, and not in Layout Viewer.

You can define a custom SKILL extension to specify your own information to be displayed in the information balloon. The information you specify appears below a dashed line in the information balloon.



The SKILL extension must be defined at the object level. Global levels, that is Layout, Objects, and Shapes, are not supported. Also, the application must be specified for each SKILL function. Currently, only `Layout-XL` is supported. For example,

```
odcRegShapeRect("Layout-XL" "test custom SKILL function")
```

To turn the display of the SKILL extension on, you need to select the *Custom SKILL Function* check box on the *Setup* tab of the *Dynamic Display* form for the object specified in the SKILL function.

Related Topics

Dynamic Display Form

Object Display Control Functions

Object Information Display

Managing Object Information Configuration

Once you have customized the information to be displayed for shapes and objects in information balloons and dynamic measurement, you can save the configuration, set it as the default configuration, and load and delete it as required.

Saving Display Information Configuration

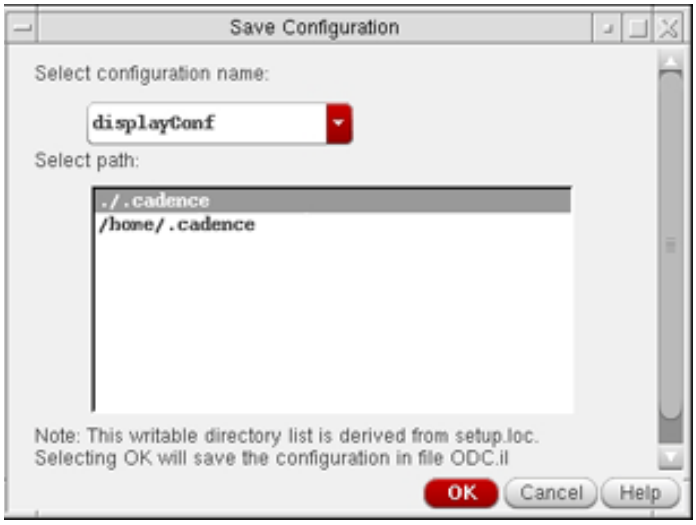
To save the object display information configuration:

1. In the layout window, select *Options – Dynamic Display*.

   The Dynamic Display form appears.

2. Click *Save* on the *Setup* tab.

   The Save Configuration form opens.



3. Type the name of the configuration in the *Select configuration name* field.

4. Choose the directory from the *Select path* field where you want to save the configuration.

   The configuration is saved to `odc.il` in the location of `<selectedPath>/dfII/ODC/odc.il`. The path where you choose to save the configuration determines the sequence in which a configuration is loaded and is derived from the `setup.loc` file.

5. Click *OK*.
6. Click *OK* or *Apply*.

Loading Display Information Configuration

To load a display information configuration:

1. Open the Dynamic Display form.
2. On the *Setup* tab, choose a configuration from the *Configuration* list.
3. Click *OK* or *Apply*.

The order in which configuration files are loaded is determined by the Cadence Setup Search File mechanism (CSF). To find this information, CSF uses the `setup.loc` file. The `setup.loc` file is an ASCII file that specifies the locations to be searched and the order in which they should be searched.

Saving a Configuration as Default

To save a configuration as the default for object display information:

1. Open the Dynamic Display form.
2. On the *Setup* tab, choose a configuration from the *Configuration* list.
3. Click the *Default* button.
4. Click *OK* or *Apply*.

The configuration you choose as the default is loaded the next time you launch the application.

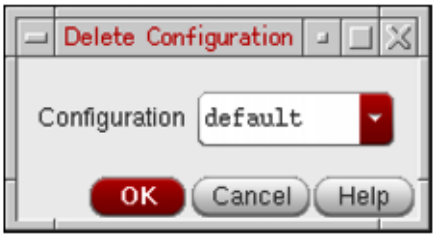
Deleting a Display Information Configuration

To delete an object display information configuration:

1. Open the Dynamic Display form.

2. Click *Delete* on the *Setup* tab.

   The Delete Configuration form displays.



3. Select the configuration you want to delete, from the *Configuration* list.
4. Click *OK*.
5. Click *OK* or *Apply*.

Related Topics

Cadence Setup Search File: setup.loc

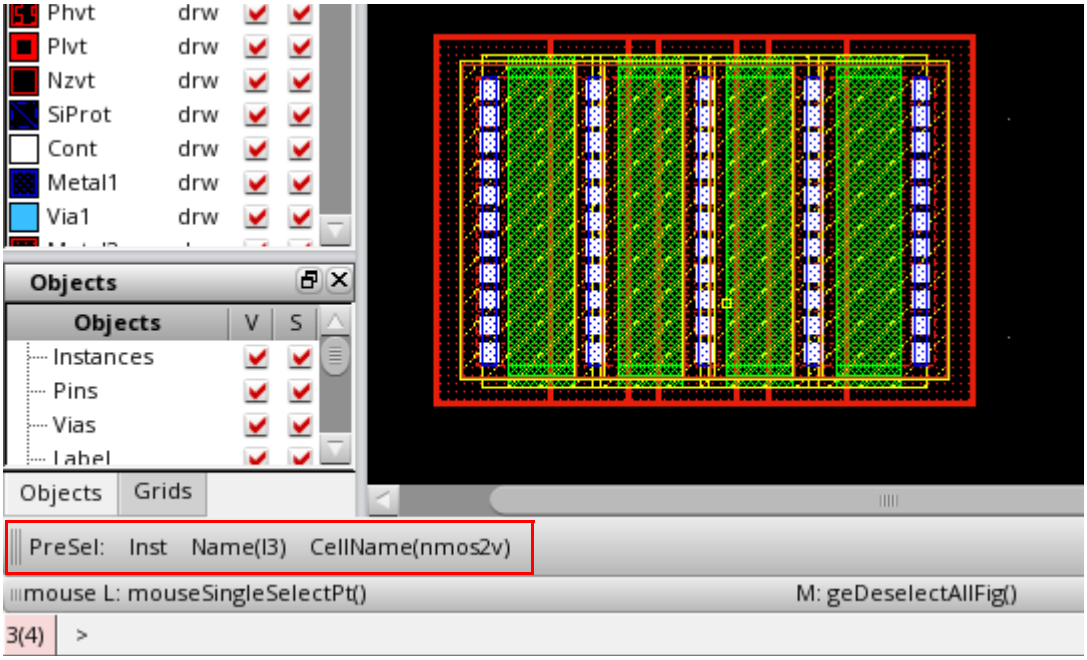
Object Information Display

Preselect and Selection Object Information Display

You can view object information in two modes, before selecting objects (preselection mode) or after selecting objects (selection mode). The preselect and selection object information is displayed by default on the *Show Selection Info* dockable toolbar in the design window.

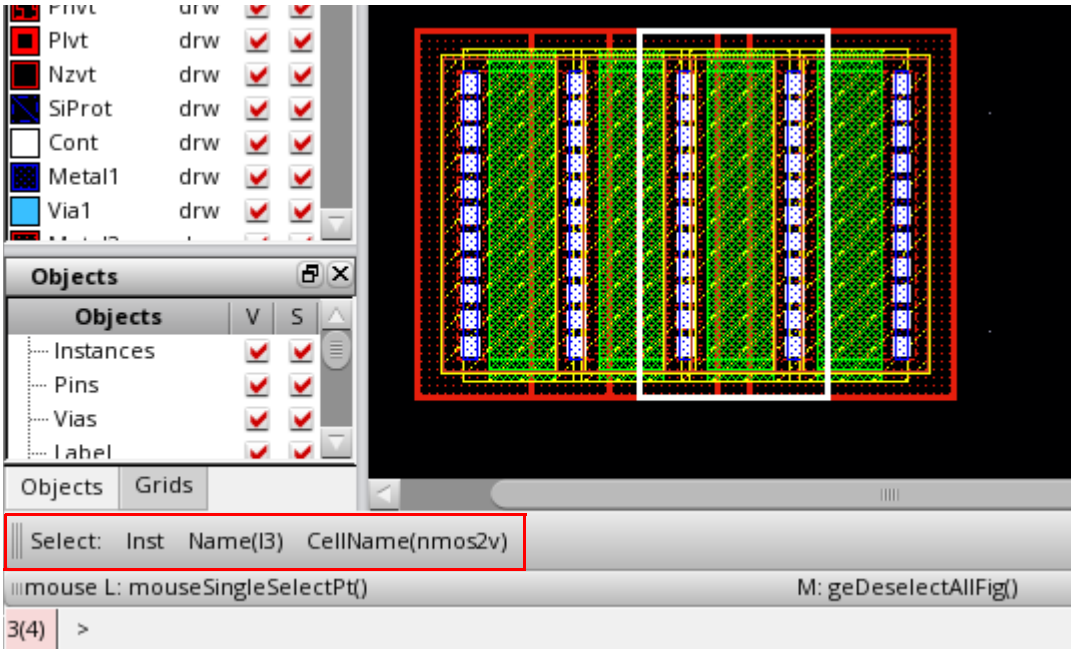
The preselect and selection object information is displayed for both fully and partially selected objects. This information is also displayed when a command is active. The following figure shows the preselect information for an instance on the *Show Selection Info* toolbar. The information is displayed in the following format:

`PreSel: Inst Name(`*`InstName`*`) CellName(`*`Cell`*`)`



The following figure shows the selection information for the selected instance. The information is displayed in the following format:

`Select: Inst Name(`*`InstName`*`) CellName(`*`Cell`*`)`



(Virtuoso RF Option) You can view preselect and selection information for curvilinear geometries such as curved paths and curved polygons.

To access the *Show Selection Info* toolbar, you can use either of the following ways:

- Choose *Window – Toolbars – Show Selection Info* in the layout window.
- Right-click anywhere on the main toolbar area of the layout window and then select *Show Selection Info*.

Preselect and Selection Object Information Format

The following table lists the preselect and selection information displayed on the *Show Selection Info* toolbar for various types of objects.

Object	Preselect and Selection Object Information
Area Boundary	`PreSel: Area Boundary`
	`Select: Area Boundary`
Blockages	`PreSel: Placement Blockage Layer(`*`layer`*`) `*`Color`*
	`Select: Placement Blockage Layer(`*`layer purpose`*`) `*`Color`*
	Blockages include Routing Blockage, Fill Blockage, Slot Blockage, Pin Blockage, FeedThruBlockage, and Screen Blockage.
Bus	`PreSel: PathSeg Layer(`*`layer purpose`*`) Net(`*`netname`*`)`
	`Select: PathSeg Layer(`*`layer purpose`*`) Net(`*`netname`*`)`
Cluster Boundary	`PreSel: Cluster Boundary`
	`Select: Cluster Boundary`
FigGroup	`PreSel: FigGroup Name(`*`FigGroupName`*`)`
	`Select: FigGroup Name(`*`FigGroupName`*`)`
Fluid Guard Ring	`PreSel: Inst Name(`*`InstName`*`) CellName(`*`Cell`*`)`
	`Select: Inst Name(`*`InstName`*`) CellName(`*`Cell`*`)`
Halo Blockage	`PreSel: Halo Blockage`
	`Select: Halo Blockage`

Object	Preselect and Selection Object Information
Instance	`PreSel: Inst Name(`*`InstName`*`) CellName(`*`Cell`*`)`
	`Select: Inst Name(`*`InstName`*`) CellName(`*`Cell`*`)`
Label	`PreSel: Label Text(`*`TextName`*`) Layer(`*`layer purpose`*`)`
	`Select: Label Text(`*`TextName`*`) Layer(`*`layer purpose`*`)`
Marker	`PreSel: Marker ShortMsg(`*`short message`*`) Severity (`*`severity`*`)`
	`Select: Marker ShortMsg(`*`short message`*`) Severity (`*`severity`*`)`
Modgen	`PreSel: Modgen`
	`Select: Modgen`
Mosaic	`PreSel: Mosaic Name(`*`MosaicName`*`) CellName(`*`Cell`*`)`
	`Select: Mosaic Name(`*`MosaicName`*`) CellName(`*`Cell`*`)`
MPP Guard Ring	`PreSel: MPP Layer(`*`layer purpose`*`) Net(`*`NetName`*`)`
	`Select: MPP Layer(`*`layer purpose`*`) Net(`*`NetName`*`)`
Multipart Path	`PreSel: MPP Layer(`*`layer purpose`*`) Net(`*`NetName`*`)`
	`Select: MPP Layer(`*`layer purpose`*`) Net(`*`NetName`*`)`
Pin	`PreSel: Pin Term(`*`TermName`*`) Layer(`*`layer purpose`*`) Color LockState`
	`Select: Pin Term(`*`TermName`*`) Layer(`*`layer purpose`*`) Color LockState`
Placement Blockage	`PreSel: Placement Blockage`
	`Select: Placement Blockage`
PR Boundary	`PreSel: PR Boundary`
	`Select: PR Boundary`
Row	`PreSel: Row Site(`*`sitedefname`*`)`
	`Select: Row Site(`*`sitedefname`*`)`

Object	Preselect and Selection Object Information
Ruler	`PreSel: Ruler Length(`*`Length`*`)` `Select: Ruler Length(`*`Length`*`)`
Shape	A shape refers to a path, pathseg, polygon, rectangle, circle, ellipse, and donut. For example, the following format is used to display information for a path. `PreSel: Path Layer(`*`layer purpose`*`) Net(`*`netname`*`)`*`Color LockState`* `Select: Path Layer(`*`layer purpose`*`) Net(`*`netname`*`)`*`Color LockState`* On the toolbar, instead of the full purpose name, the abbreviation for purpose is displayed. The `Net` field is displayed only if a net is present. Color and lock state are displayed on colored layers. For a path and pathseg, `Width` is also displayed. For a rectangle, `Width` and `Height` are displayed. In Virtuoso Layout Suite XL and and higher tiers, for `Edit In Place` and `Descend Edit` commands, the cellname of the shape one level above in the hierarchy is also displayed. For example: `PreSel: CellName(Cell) | Rect Layer(`*`layer purpose`*`) Width(`*`n1`*`) Height(`*`n2`*`)`
Snap Boundary	`PreSel: Snap Boundary` `Select: Snap Boundary`
SyncClone	`PreSel: SyncClone Name(`*`name`*`)` `Select: SyncClone Name(`*`name`*`)`
TextDisplay	`PreSel: TextDisplay Text(`*`Text`*`)` `Select: TextDisplay Text(`*`Text`*`)`

Object	Preselect and Selection Object Information

Via	Via on non-colored layers:
	`PreSel: Via ViaDef(`*`ViaDefName`*`) Net(`*`NetName`*`)`
	`Select: Via ViaDef(`*`ViaDefName`*`) Net(`*`NetName`*`)`
	Via on colored layers, where `LockState` is displayed only if the state is locked:
	`PreSel: Via ViaDef(`*`ViaDefName`*`) Net(`*`NetName`*`) Layer1(`*`Color LockState`*`) cutLayer(`*`Color LockState`*`) Layer2(`*`Color LockState`*`)`
	`Select: Via ViaDef(`*`ViaDefName`*`) Net(`*`NetName`*`) Layer1(`*`Color LockState`*`) cutLayer(`*`Color LockState`*`) Layer2(`*`Color LockState`*`)`

ViaStack	Via stack on non-colored layers:
	`PreSel: Via ViaDef(`*`ViaDefName`*`) Net(`*`NetName`*`)`
	`Select: Via ViaDef(`*`ViaDefName`*`) Net(`*`NetName`*`)`
	Via stack on colored layers, where `LockState` is displayed only if the state is locked:
	`PreSel: Via ViaDef(`*`ViaDefName`*`) Net(`*`NetName`*`) Layer1(`*`Color LockState`*`) cutLayer(`*`Color LockState`*`) Layer2(`*`Color LockState`*`)`
	`Select: Via ViaDef(`*`ViaDefName`*`) Net(`*`NetName`*`) Layer1(`*`Color LockState`*`) cutLayer(`*`Color LockState`*`) Layer2(`*`Color LockState`*`)`

Virtual Group	`PreSel: Virtual FigGroup Name (`*`figGroupName`*`) Type (`*`type`*`) PlacementStatus (`*`status`*`) StopLevel (`*`number`*`)`
	`Select: Virtual FigGroup Name (`*`figGroupName`*`) Type (`*`type`*`) StopLevel (`*`number`*`)`
	The `Type` parameter can be `Generated`, `Clone`, or `Created`. If `Placement Status` of a virtual hierarchy is not set to `Fixed` or `Locked`, the *Show Selection Info* toolbar does not display any information about the placement status.

Object	Preselect and Selection Object Information

Virtual Pin	`PreSel: Virtual Pin Layer(`*`name purpose`*`) Net(`*`netname`*`) Width(`*`width`*`) Height(`*`height`*`)`
	
	`Select: Virtual Pin Layer(`*`name purpose`*`) Net(`*`netname`*`) Width(`*`width`*`) Height(`*`height`*`)`

Wire	`PreSel: PathSeg Layer(`*`layer purpose`*`) Net(`*`netname`*`)`
	
	`Select: PathSeg Layer(`*`layer purpose`*`) Net(`*`netname`*`)`

Note: For a valid selection set, in the preselection mode only one command is performed.

Related Topics

Object Information Display Criteria

Design Display Controls

Object Information Display Criteria

The type of object information (preselect or selection) that is displayed on the *Show Selection Info* toolbar in the design window depends on the number of objects selected and the location of the mouse pointer on the canvas. For example, when no object is selected on the canvas and the mouse pointer is placed on an empty space, then no object information is displayed on the toolbar.

The following table describes various combinations of object selection and mouse pointer position and the corresponding type of information displayed on the *Show Selection Info* toolbar in the design window.

Object Selected on the Canvas	Position of the Mouse Pointer	Information Displayed on the Show Selection Info Toolbar
No object selected	Mouse pointer is placed on an empty space	No object information is displayed.
No object selected	Mouse pointer is placed on an unselected object	The preselect information of the object on which the mouse pointer is currently placed is displayed.

Object Selected on the Canvas	Position of the Mouse Pointer	Information Displayed on the Show Selection Info Toolbar
No object selected	Mouse pointer is placed on an unselected object and the left mouse button is clicked	The selection information of the object is displayed until the mouse pointer is moved.
One object selected	Mouse pointer is placed on the selected object	The preselect information of the object on which the mouse pointer is currently placed is displayed.
One object selected	Mouse pointer is placed on empty space	The selection information of the object is displayed.
One object selected	Mouse pointer is placed on an unselected object	The preselect information of the object is displayed in the status line of the design window.
One object selected	Mouse pointer is placed on an unselected object and the left mouse button is clicked	The selection information of the object is displayed until the mouse pointer is moved.
Multiple objects selected	Mouse pointer is placed on the selected object(s)	The preselect information of the object is displayed.
Multiple objects selected	Mouse pointer is placed on empty space	No object information is displayed.
Multiple objects selected	Mouse pointer is placed on an unselected object	The preselect information of the object is displayed.

Object Selected on the Canvas	Position of the Mouse Pointer	Information Displayed on the Show Selection Info Toolbar
Multiple objects selected	Mouse pointer is placed on an unselected object and the left mouse button is clicked	The selection information of the object is displayed until the mouse pointer is moved.

Note: In case of overlapping objects, the selection information of the object is displayed on the *Show Selection Info* toolbar. When the left mouse button is clicked again, the selection information of the next object is displayed.

Related Topics

Object Information Display

Object Selection Cycle

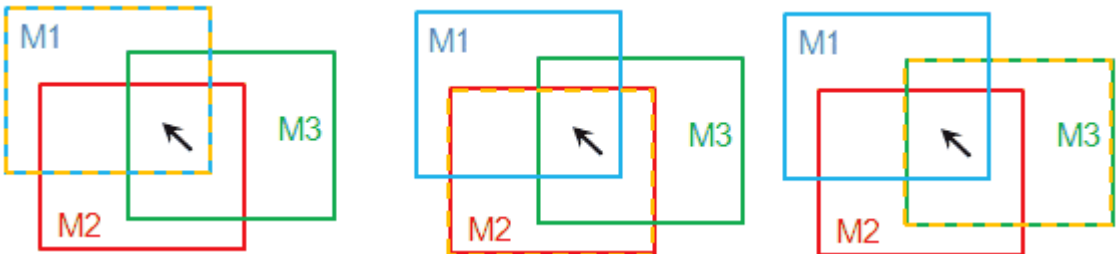
In the Selection Options form, when the overlap mode is set to cycle mode, you can select overlapped objects on the canvas one by one by using the left mouse button to select any object and continuing to select them by clicking on the original object until you reach the largest overlapped object.

- Cycle mode is for use when three or more objects overlap at the same point. Cycle mode is window based.
- Cycle mode always cycles from the smallest to the largest object. If you continue to click the original object after reaching the largest object the cycle returns to the smallest object that you first clicked. The cycle repeats by re-selecting the smallest object that you clicked and selecting outwards again to the largest object. If you start by selecting the largest object in the overlapping stack the selection does not cycle back to the smaller objects.
- You must select a smaller object so that each selected point selects larger and larger objects except the one you have clicked on. This does not delete the objects themselves.
- The objects are selected according to the selection filter set for the Layer Selection Window and the Object Selection Window.

- You can delete one of the selections by using the `Ctrl` key and clicking the left mouse button on the selected object. The objects are deselected in the opposite order in which they were selected.
- Once you have selected the objects you want in the set you can also click the selected edge of one of the objects. This deletes all of the selections
- Multiple objects are not retained in the selected set. The final selected object is the selection that is retained. You can unselect by clicking outside of all of the overlapping objects.
- You can add an unlimited number of objects to the selected set by holding down the `Shift` key and selecting additional objects.

Selection Cycle of Preselected Objects

When the pointer is on overlapping objects in the design window, press the spacebar to cycle through the preselected objects. In the following example, the pointer is in the area where the three objects M1, M2, and M3 overlap. You can cycle through the preselected objects (dynamic highlight) using the spacebar.



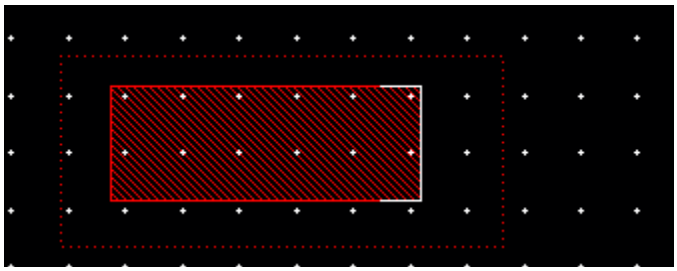
The preselect information is updated simultaneously in the dynamic highlight, *Show Selection Info* toolbar, and the information balloon. You can cycle through preselected objects even if the *Dynamic Highlight* option is not selected in the Display Options form. When you use dynamic highlight, the bounding box and label are selected or dynamically highlighted.

Note: If the spacebar is being used by another command, such as *Quick Align*, *Create Measurement*, or *Create Wire*, the spacebar will not cycle the preselection inside that command.

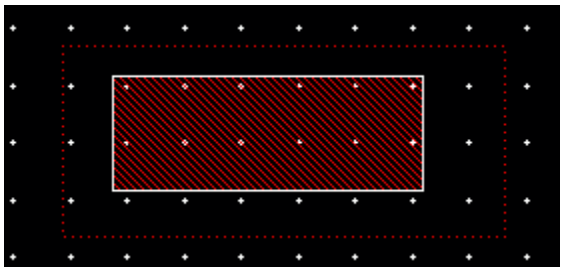
Selection Cycle in Partial Selection Mode

You can select and cycle through a shape in the partial selection mode. The following example illustrates this.

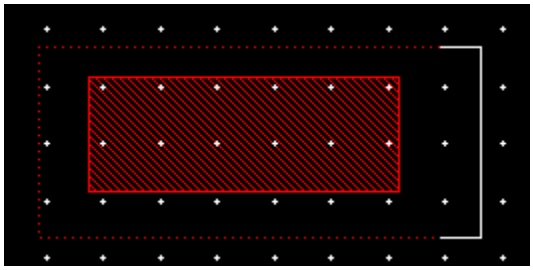
On the first click, the edge of the red shape is selected.



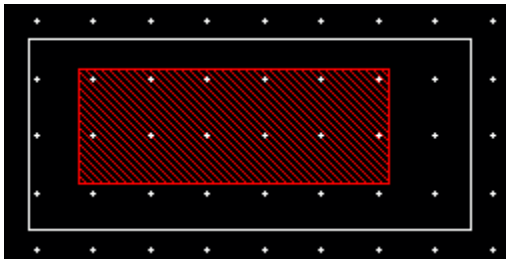
On the second click, the red shape is selected.



On the third click, the edge of the outer shape is selected.



On the fourth click, the outer shape is selected.



Related Topics

Display Options Form

Object Information Display

Object Information Display Criteria

3

Working with Palette Assistant

Using the Palette assistant, you can manage the window display context of the Palette and layer sets in your designs.

The following are some of the key features available in the Palette assistant:

- Lets you define the window display context by setting the visibility and selectability of layers, objects, and grid items in a layout window. The context is initialized with the information in the technology file.
- Lets you manage layer sets.
- Provides access to various layer properties, including routing directions, GDS numbers, and technology file properties such as validity, priority, function, description, and mask.
- Lets you edit the routing direction of layers.
- Provides options to filter layer, object, and grid items.
- Lets you manage layer properties individually or as groups.
- Supports both synchronized and independent display contexts for the palettes attached to different layout windows.
- Lets you configure the default behavior of the Palette through the Options form.
- Enables configuration of Palette settings that can be saved as part of a Virtuoso workspace. By default, Palette is activated in the Classic and Basic workspaces.

Related Topics

Palette Assistant Panels

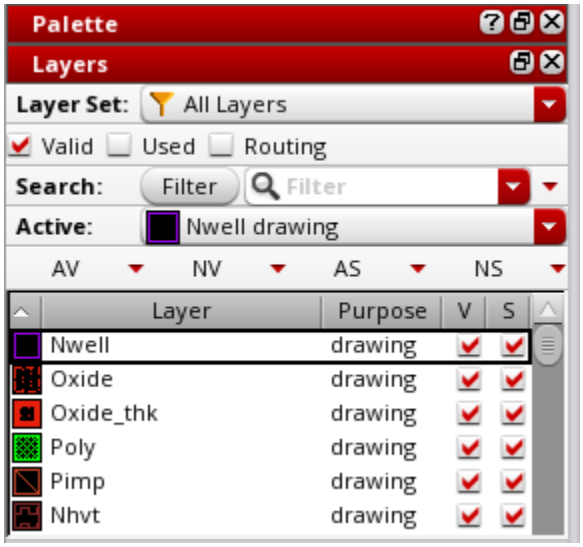
Types of Palette Containers

Palette Assistant Panels

When you open a cellview, Palette assistant is displayed by default, docked to the left of the layout window. It comprises three panels: Layers, Objects, and Grids.

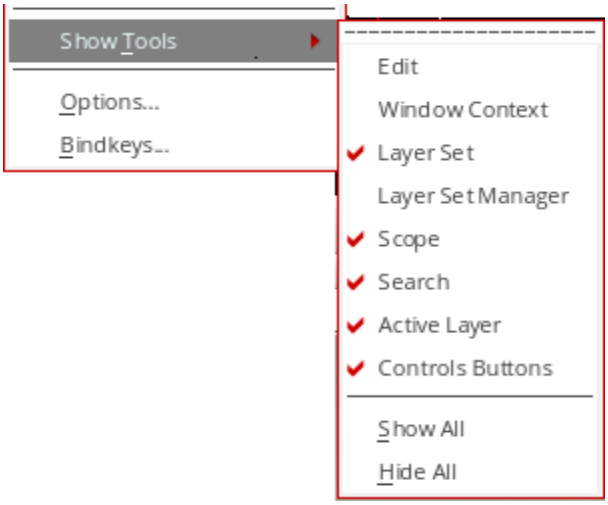
Layers Panel

By using the *Layers* panel, you can control the visibility and selectability of layer-purpose pairs. By default, it lists the layer-purpose pairs that are defined in the `leLswLayers` section of the technology file. Only valid layer-purpose pairs are displayed if the *Valid* check box is selected in the panel.



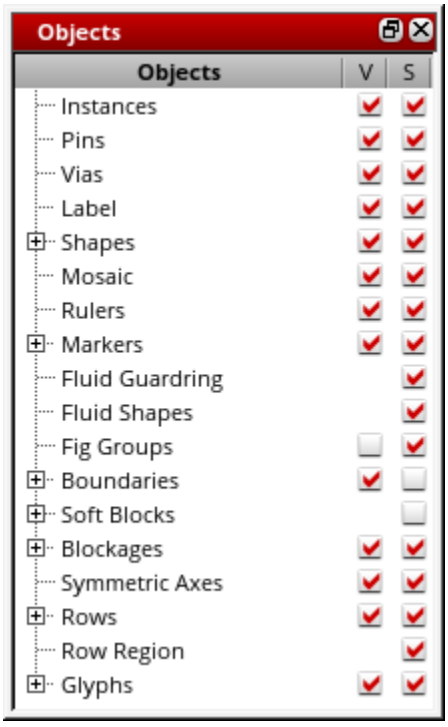
By default, the *Layers* panel displays the following toolbars: *Layer Set*, *Scope*, *Search*, *Active Layer*, and *Control Buttons*. It can also display the following additional toolbars if you enable them: *Edit*, *Windows Context*, and *Layer Set Manager*. To display a toolbar, you can right-click any toolbar in the *Layers* panel, point to *Show Tools* in the Palette context

menu, and choose the required toolbar. The red check mark next to a toolbar indicates that the toolbar is displayed in the *Layers* panel.



Objects Panel

Use the *Objects* panel to manage the visibility and selectability of objects such as instances, pins, and vias in a design. It is a dockable panel that is displayed below the *Layers* panel. By default, the objects in the *Objects* panel are listed in the order shown in the following figure.



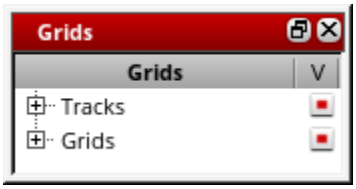
The object *Row Region* shown in the figure is an Advanced Node Layout EAD Only feature. In Layout EXL and higher tiers, the *Objects* panel displays the *Virtual Hierarchy* object as well.

Instance selection and visibility is controlled through the *Objects* panel. Pin visibility and selectability is determined by the visibility and selectability status of the layer-purpose pair of the corresponding pin figure. You can further control the selection of pins by using the pinSelectionMode environment variable. Blockage selection and visibility is controlled by the layer-purpose pair on which the blockage is created. You can further control the selection of blockages by using the blockageAttributeMode environment variable.

The *Objects* panel supports the *Search* and *Control Buttons* toolbars, which are hidden by default. To display a toolbar, you can right-click an object in the *Objects* panel, choose *Show Tools* from the Palette context menu, and then select the toolbar.

Grids Panel

You use the *Grids* panel to manage the visibility and selectability of tracks and grids. It is a dockable panel that appears below the *Layers* panel. If both *Objects* and *Grids* panels are displayed, they appear as separate tabs and you need to click the *Grids* tab to view its contents.



The *Grids* panel supports the *Search* and *Control Buttons* toolbars, which are hidden by default. To display a toolbar, right-click an item in the *Grids* panel, choose *Show Tools* from the Palette context menu, and then select the toolbar.

Related Topics

Palette Assistant

Layer-Purpose Pair Selection Controls

Showing and Hiding Palette Assistant Panels

Layer-Purpose Pair Selection Controls

Layout Support for Row Regions

Showing and Hiding Palette Assistant Panels

You can choose to display and hide the *Layers*, *Objects*, and *Grids* panels in the Palette assistant according to your requirements.

To display a panel in the Palette assistant, use either of the following ways:

- Right-click any panel title bar and choose the panel you want to display.
- Use the pteMapWindow SKILL function to specify the name of the Palette panel to be displayed.

To hide a panel in the Palette assistant, use either of the following ways:

- Right-click any panel title bar and choose the panel you want to hide.
- Use the pteUnmapWindow SKILL function to specify the name of the Palette panel to be hidden.

Related Topics

Palette Assistant Panels

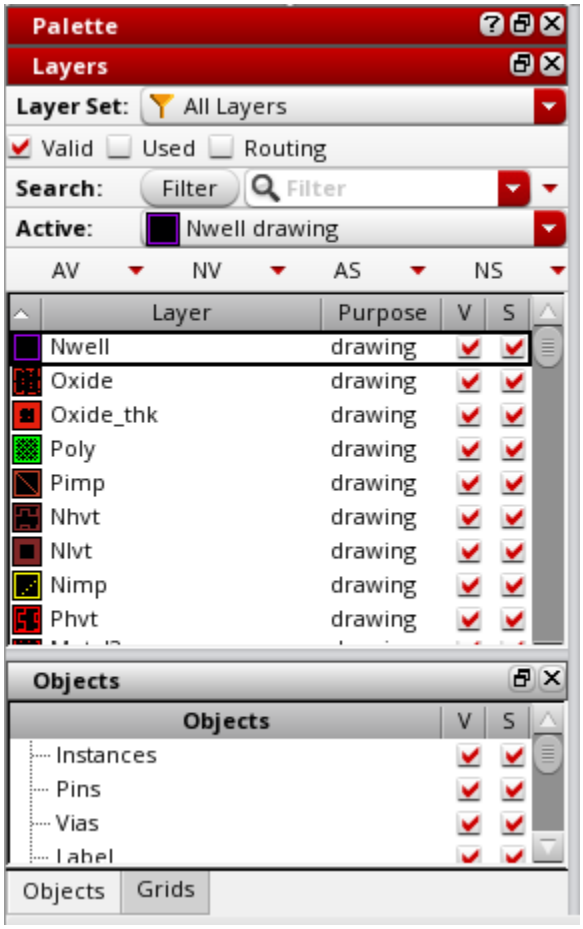
Types of Palette Containers

By using palette containers, you can control how the Palette assistant displays the *Layers*, *Objects*, and *Grids* panels. You can choose from the following types of palette containers: single assistant, multiple assistants, and single window. By default, the Palette assistant opens in the single assistant container.

Single Assistant Palette Container

The single assistant palette container encapsulates the *Layers*, *Objects*, and *Grids* panels into a single Palette assistant. Therefore, when you hide the Palette assistant, all three panels are hidden from view. If required, you can hide each panel individually. You can also dock or undock the entire Palette or each of the three panels individually.

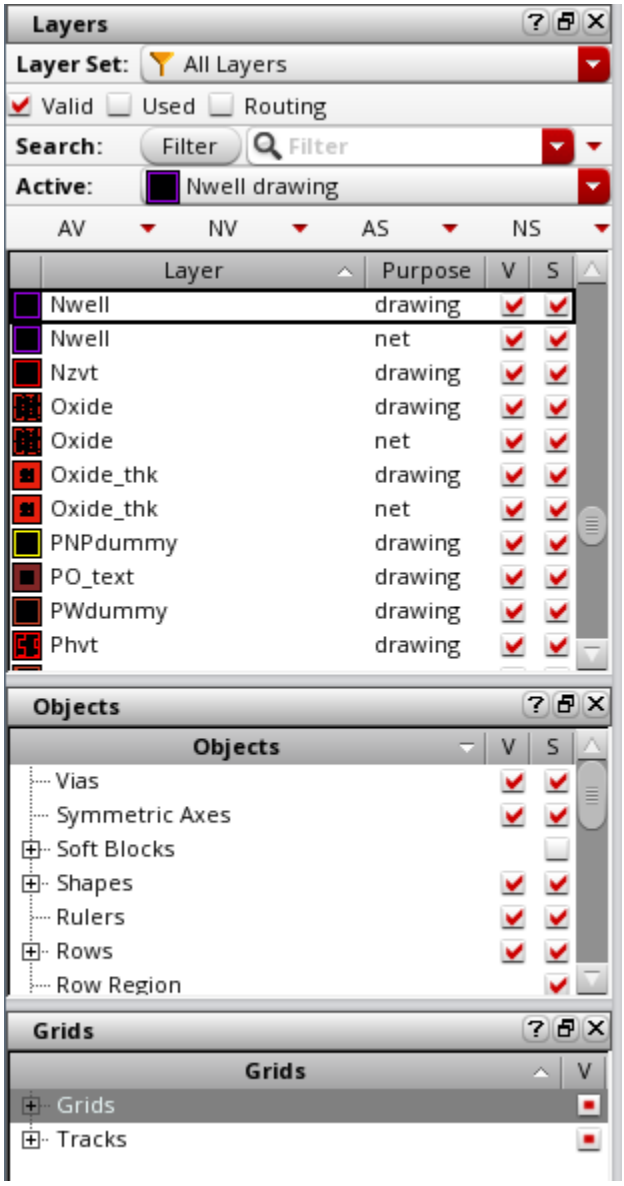
The single assistant palette container is linked to the layout window. So, the Palette assistant is automatically closed when you close the layout window.



Multiple Assistants Palette Container

The multiple assistants palette container displays the *Layers*, *Objects*, and *Grids* panels as three separate assistants. These are also listed as three separate assistants on the *Assistants* context menu, which is displayed when you right-click the menu bar area of the layout window. You can hide or unhide each panel individually. Each panel can also be docked or undocked individually. The multiple assistants palette container is linked to the layout

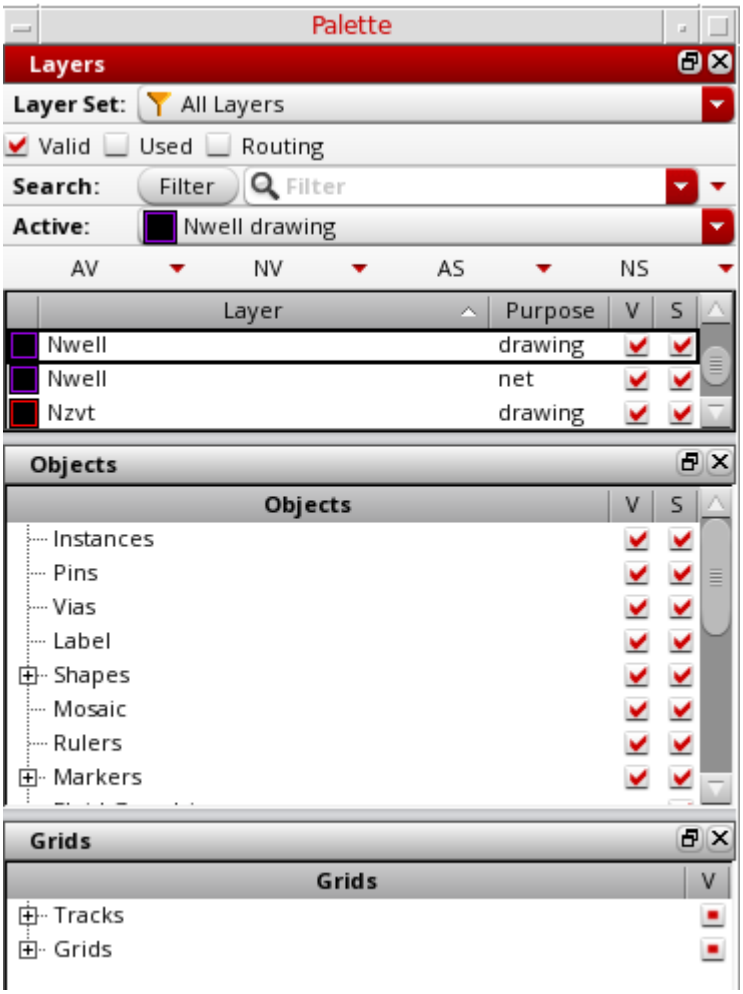
window. Therefore, the Palette assistant is automatically closed when you close the layout window.



Single Window Palette Container

The single window container encapsulates the *Layers*, *Objects*, and *Grids* panels in a single window that is independent of the layout window. In this mode, a single Palette window manages all the designs that are open. The three panels can be docked or undocked individually. You can also hide or unhide them individually.

The Palette window is closed automatically when you exit the Virtuoso session.



To resize the Palette window, use the pteResizeSingleWindowPalette environment variable. To set the location of the window, use pteMoveSingleWindowPalette.

Related Topics

Setting the Palette Container

Palette Assistant Panels

Setting the Palette Container

Single assistant is the default palette container type for the Palette assistant. You can change the container to the multiple assistants or single window type, as required, by using the `CDS_PALETTE_TYPE` Unix environment variable. You must set the environment variable before running Virtuoso. Its value cannot be changed during a Virtuoso session.

➡ Type one of the following commands in the shell environment to set the required palette container type:

- `setenv CDS_PALETTE_TYPE SingleAssistant`
- `setenv CDS_PALETTE_TYPE MultiAssistant`
- `setenv CDS_PALETTE_TYPE SingleWindow`

Related Topics

Types of Palette Containers

Showing and Hiding the Single Palette Assistant

Showing and Hiding the Single Palette Assistant

To display the Palette assistant, do either of the following:

- In the layout window, choose *Window – Assistants – Palette*.
- Right-click anywhere in the layout window menu bar and choose *Assistants – Palette*.

To hide the Palette assistant, when the palette container is set to single assistant, do one of the following:

- Click the *Hide* button *(X)* in the Palette title bar.
- Right-click anywhere in the layout window menu bar and choose *Assistants – Palette*.
- Use the `hiUnMapWindow(dwindow('ptePaletteAssistant`*X*`'))` SKILL function, where *X* is the Palette instance number.

Related Topics

hiUnMapWindow

Types of Palette Containers

Setting the Palette Container

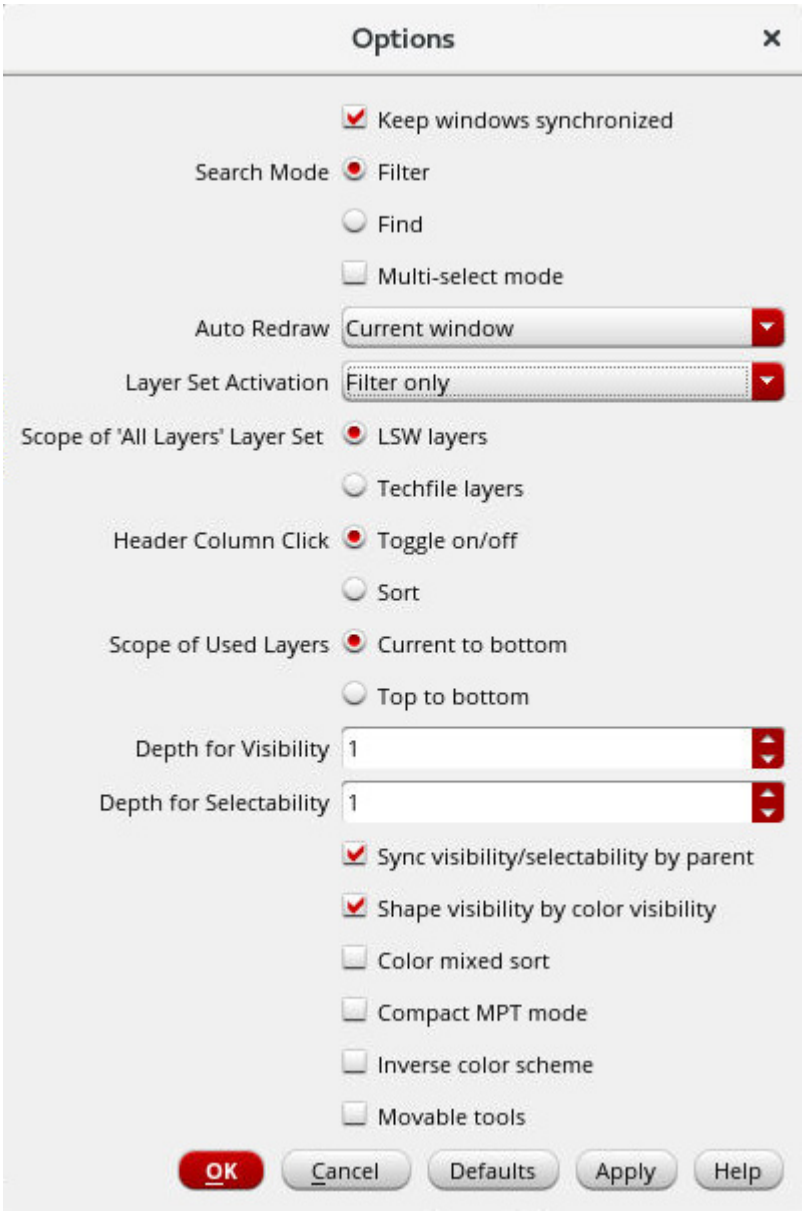
Customizing the Palette Environment

For Palette assistants, you can define local and global settings, such as the default search mode and the depth for visibility and selectability. The global settings are applicable to all Palette assistants across all layout windows.

To define Palette assistant settings:

1. Choose *Options* from the Palette context menu. You can display the context menu by right-clicking any toolbar in the *Layers* panel or anywhere in the *Objects* and *Grids* panels except the title bar and column headers.

The Options form appears.



2. Set the options that you want to define for the Palette assistant.

   For information about the options in the form, see Palette Options Form.

3. Click *OK* or *Apply*.

Related Topics

Setting Layer Visibility and Selectability Depth in Single Selection Mode

Setting Attributes for Multiple Layers in Multi-Selection Mode

MPT Support

Synchronized and Desynchronized Palettes

A window display context determines display properties such as the visibility and selectability of layers, objects, and grids in a layout window. You can save the current window display context to a technology file or an LSW information file and reload it later.

Each layout window is controlled by a separate Palette assistant. By default, all Palette assistants initialized by using the same technology file are synchronized. For example, the visibility property of a layer is identical in all layout windows if the palettes in these windows are synchronized.

When two Palette assistants are synchronized, changes made in one palette are reflected in the other. For example, if you change the visibility of a layer-purpose pair in one palette, the visibility of that layer-purpose pair is automatically updated in the other palette.

Palette assistants are desynchronized or independent of one another if they are linked to different technology files. For example, if Palette assistants in two separate layout windows point to different technology files, namely `techfile1` and `techfile2`, the palettes are independent. The changes made in an independent palette are not reflected in other palettes.

You can choose to synchronize or desynchronize the palettes by using the *Synchronize window*/*Desynchronize window* toggle button on the *Window Context* toolbar in the *Layers* panel. Alternatively, you can use the *Synchronize Window* or *Desynchronize Window* commands on the Palette context menu.

Related Topics

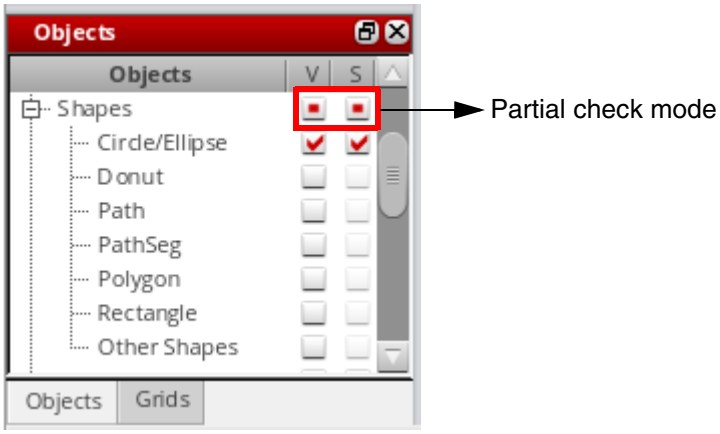
Layer-Purpose Pair Selection Controls

Layers Panel Toolbars

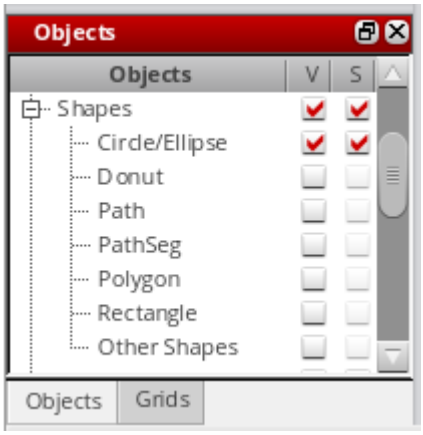
Visibility and Selectability of Parent-Child Objects

In the *Objects* and *Grids* panels, you can set the selectability and visibility of parent and child objects to be in synchronized or desynchronized mode.

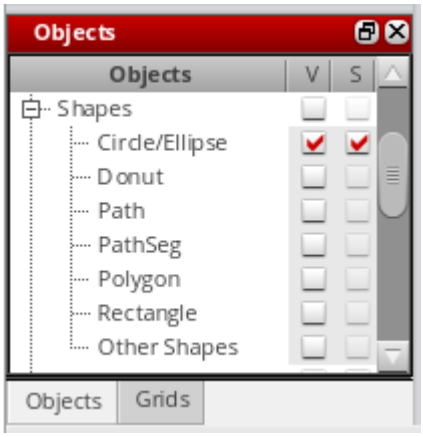
- **Synchronized mode**: This is the default mode where the parent and child items are in a synchronized state. When you reset the visibility and selectability of a parent, by selecting the corresponding check box in the panel, the visibility and selectability setting of the child items is set to coincide with that of the parent. If you now reset the visibility or selectability of a child, the parent is set to a partial check mode to indicate that one or more child items override the visibility or selectability settings of the parent, as shown in the following figure.



- **Desynchronized mode**: In this mode, the parent and child items are in a desynchronized state. The visibility and selectability of a child is not reset when you reset the visibility or selectability of the parent. For example, consider the *Shapes* object (parent) that has several child objects. The figure shows that only the *Circle/Ellipse* child object is set to visible. The other child objects are set to invisible.



If you now turn off the visibility of the parent by deselecting the corresponding *V (Visibility)* check box, the visibility and selectability states of the child objects are not affected. As a result, the *V (Visibility)* check box for the *Circle/Ellipse* child object stays selected, as shown in the following figure, but the child object would no longer be visible on the canvas.



If you now turn on the visibility of the parent, the visibility and selectability states of the child objects again remain unchanged, but the *Circle/Ellipse* child object becomes visible on the canvas.

Note: A change in the visibility and selectability state of a child affects the visibility and selectability state of the parent.

Related Topics

Palette Assistant Panels

Switching Between Synchronized and Desynchronized Modes of Parent-Child Objects

Switching Between Synchronized and Desynchronized Modes of Parent-Child Objects

To switch between synchronized and desynchronized modes of parent-child objects in the *Objects* and *Grids* panels, use any of the following methods:

- Use the `pteApplyParentState` environment variable.
- Use the `pteSetOptionString` SKILL function.
- Use the CIW to run the following commands:

```
pteOpenForm("Options")
```

```
pteOptionForm->objectGridSynchro->value = t
pteOptionForm->OK->value = t
```

- Use the Options form.

  In the Options form, the *Sync visibility/selectability by parent* check box is selected by default, which implies that the parent and child items are in the synchronized state. Deselect the check box to switch to the desynchronized state of parent-child items.

Related Topics

Palette Options Form

Customizing the Palette Environment

Visibility and Selectability of Parent-Child Objects

Managing Layers

You can manage layer-purpose pairs according to your design requirements by using the *Layers* panel in the Palette. You can set a layer-purpose pair as active. You can quickly search for layers using filter and find modes and control how layers are sorted and grouped in the panel. Further, you can change the appearance of layer-purpose pairs by defining attributes such as fill colors and styles.

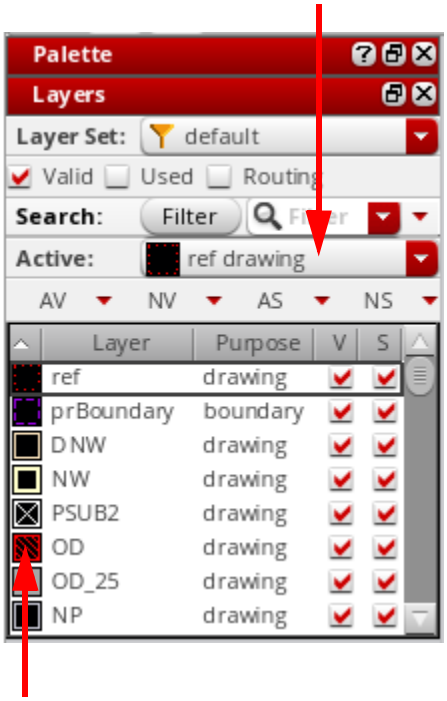
Changing the Active Layer

In the *Layers* panel, the layer-purpose pair listed on the *Active Layer* toolbar is the one that is currently active.

➥ To set another layer-purpose pair as active, click the layer-purpose pair in the *Layers* panel.

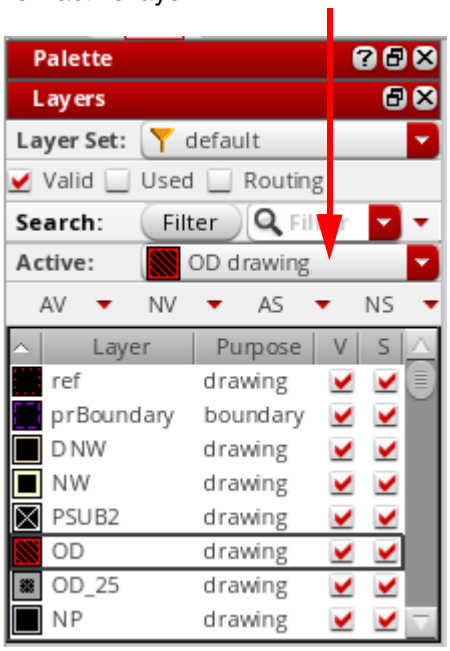
For example, the first figure shows that *ref drawing* is set as the active layer. When you click *OD drawing* in the list, it is set as the new active layer. The active layer-purpose pair is displayed with a black border around it in the layer-purpose pair list.

A. Current active layer



B. Click a layer to make it active

C. The layer you choose becomes the new active layer



The active layer can be marked invisible or invalid with a single click. When you make the active layer invisible or invalid, the next appropriate layer is automatically set as the active layer.

Related Topics

Searching for a Layer

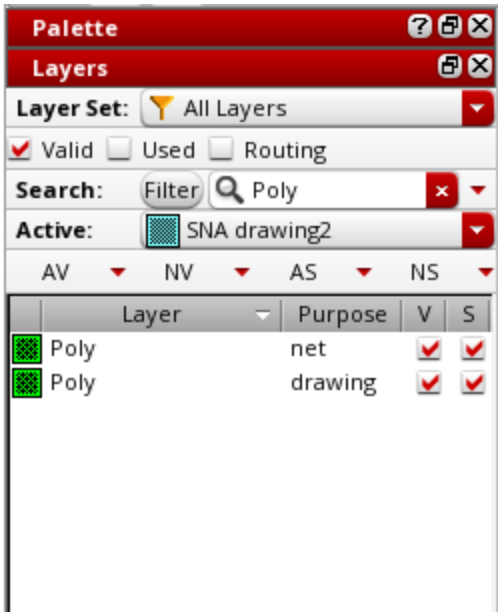
Modifying Layer Appearance

Viewing Layer-Purpose Pairs in a Tree Structure

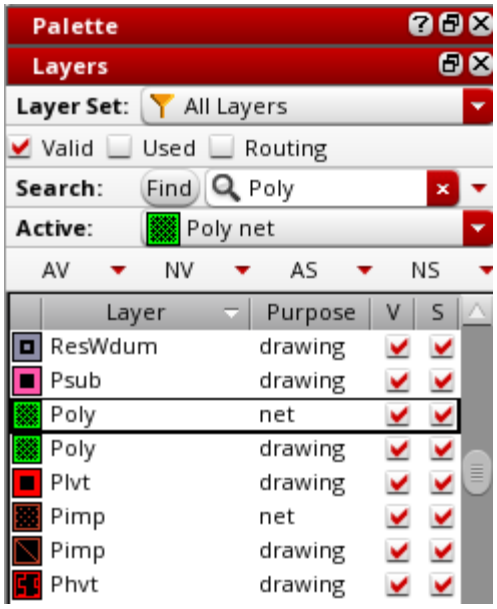
Searching for a Layer

Using the Search toolbar, you can search for specific layer-purpose pairs in the *Layers* panel. You can perform the search in *Filter* and *Find* modes.

In *Filter* mode, only the layer-purpose pairs that match the specified search criteria are listed in the *Layers* panel and the active layer does not change. In *Find* mode, all layers continue to be listed in the *Layers* panel and the first layer that matches the search criteria becomes the active layer. If you now press `Enter`, the next layer that matches the search criteria becomes the active layer. You can continue to press `Enter` to move through the list of matching layer-purpose pairs in a cyclic manner.



Search mode set to *Filter*



Search mode set to *Find*

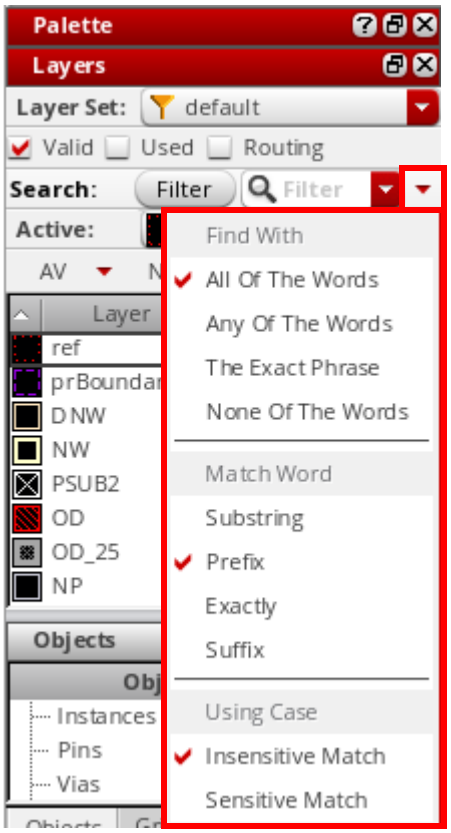
Additionally, in *Find* mode, search is performed only on the layers that are currently listed in the *Layers* panel. For example, consider a layer set named *ls1* that contains layers *via1* to *via10*. Of these, only *via1* to *via3* are listed in the *Layers* panel if the *Used* check box is selected. At this point, if you search for *via5* by using *Find*, the search will be unsuccessful.

In the *Objects* and *Grids* panels, you can use the *Search* toolbar to search for specific objects and grids, respectively.

To search for a layer-purpose pair:

1. On the *Search* toolbar in the *Layers* panel, set the search mode as *Find* or *Filter*. The default search mode is *Filter*.

2. Optionally, click the Advanced arrow icon on the toolbar to display advanced search options. Then, select the required options in the *Find With*, *Match Word*, and *Using Case* search categories. By default, the search operation is case-insensitive and looks for all values that begin with the specified string (prefix).



3. Type a search string in the *Filter* or *Find* field.

   As you type individual characters, you can see the information in the *Layers* panel getting updated. Finally, the search returns all layer-purpose pairs that contain the specified string in any of the columns displayed in the applicable panel. The advanced search options determine the results that a search operation returns.

   If a search string contains a space, it is interpreted as two strings. In such cases, the search operation searches one by one for each string in all the displayed columns and returns layer-purpose pairs that have a column value starting with one of the two strings and another column value starting with the other string. This is the default behavior.

Related Topics

pteClearSearchHistory

pteSetSearchText

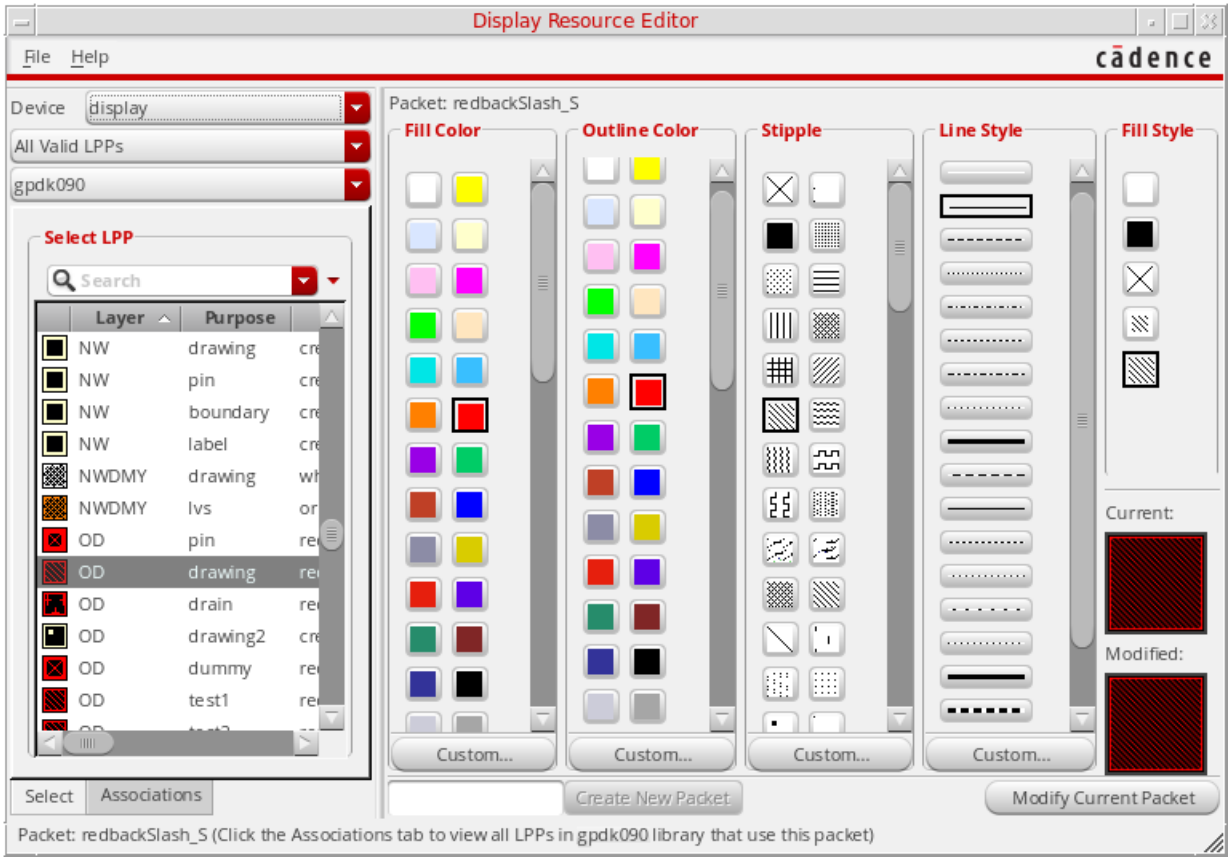
pteFindNext

pteFindPrev

Modifying Layer Appearance

The appearance of layer-purpose pairs in the layout window and in Palette panels is defined in the technology file and the `display.drf` file. The `display.drf` file defines display resources, including colors, stipples, line styles, and packets. Each packet is a named combination of fill color and style, outline color, stipple, and line style. Packets are associated with one or more layer-purpose pairs in the technology file.

You use the Display Resource Editor form to change layer-purpose pair definitions in the `display.drf` file. You can change the color, stipple, and line style of layer-purpose pairs.



To change the appearance of a layer:

1. Choose *Edit Display Resources* from the Palette context menu. You can access the menu by right-clicking any toolbar in the *Layers* panel or anywhere in the *Objects* and *Grids* panels except the title bar and column headers.

   Alternatively, in CIW, choose *Tools – Display Resource Manager*. Then, in the Display Resources Tool Box window, click *Edit*.

   The Display Resource Editor form appears.

2. Select *All LPPs to* view all available layers.
3. Select the layer for which you want to change the appearance.
4. Select the *Fill Color*, *Outline Color*, *Stipple*, *Line Style*, and *Fill Style* options that you want to use for that layer.

   The *X Stipple* and *X Fill Style*  are supported only for rectangles.

5. Click *Modify Current Packet*.

   The updated color or pattern for the layer is instantly displayed in the layout window if the layer is visible.

Related Topics

Display Resource Editor

Display Resource Editor (DRE) Form

Viewing Layer-Purpose Pairs in a Tree Structure

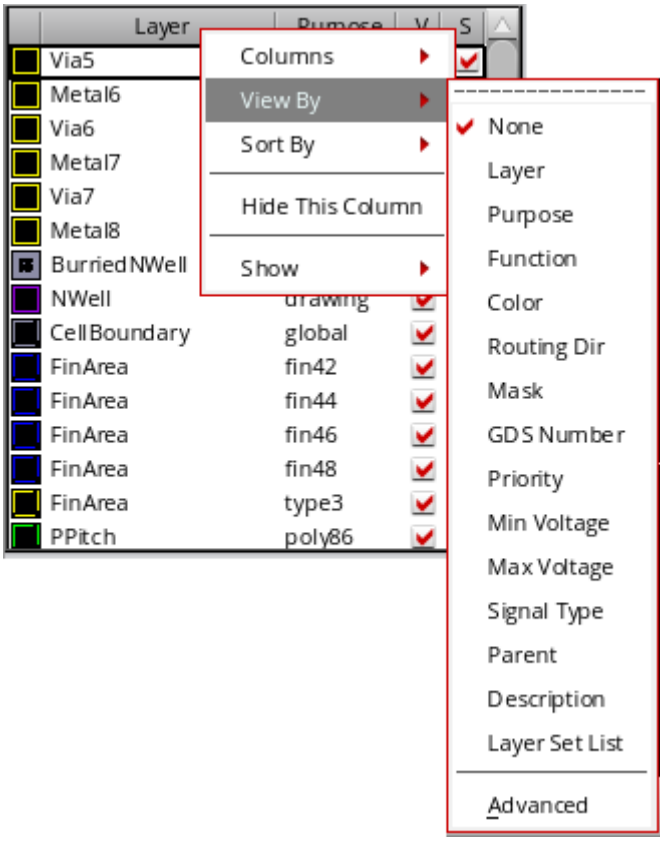
In the *Layers* panel, you can displays layer-purpose pairs in a tree structure by grouping them based on a single or multiple columns. For example, you can choose to display layers-purpose pairs based on the *Layer* column. This groups the layers with the same name, but different purposes. This helps you to quickly control the visibility and selectability of a layer and all the purposes associated with that layer. For example, if *Metal1* layer has different purposes such as *drawing*, *slot*, and *label*, you can control the visibility and selectability of all *Metal1* layer-purpose pairs together by selecting or deselecting the *V (Visibility)* and *S (Selectability)* check boxes corresponding to the *Metal1* layer. You can also modify the visibility and selectability of individual layer-purpose pairs, if required.

To display layer-purpose pairs in a tree structure in the *Layers* panel:

1. In the *Layers* panel, right-click any column name.

   The column header context menu appears.

2. Display the *View By* submenu and choose the column based on which you want to group layer-purpose pairs.



   The layer-purpose pairs are grouped based on the selected column and that column appears as the first column in the *Layers* panel.

3. Optionally, choose *View By – Advanced* to group layer-purpose pairs based on multiple columns.

   The View By form appears.

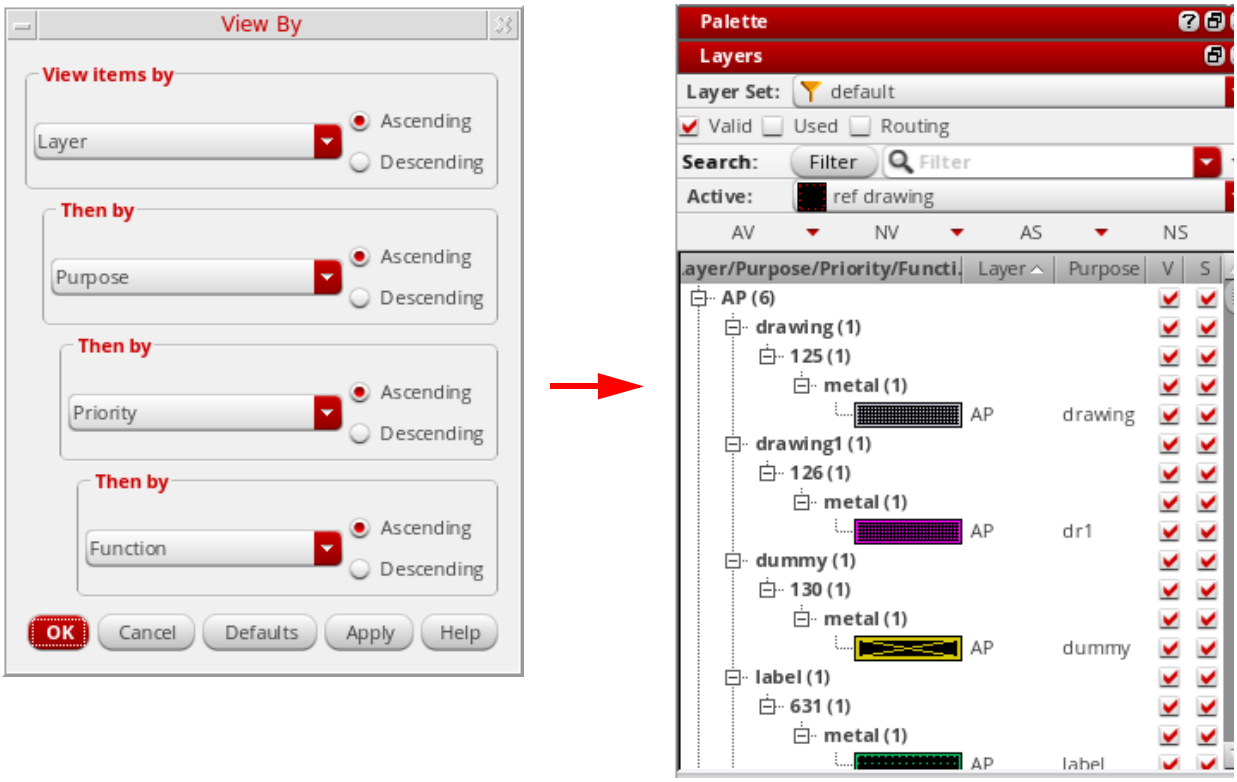
4. Select the top-level grouping column from the *View items by* list.

5. Choose *Ascending* or *Descending* to specify the display order of layer-purpose pairs.

6. Similarly, specify the second, third, and fourth grouping column, if required, by choosing from the corresponding *They by* list in the form.

7. Click *OK*.

The layer-purpose pairs are grouped based on the criteria you specified.



Related Topics

View By Form

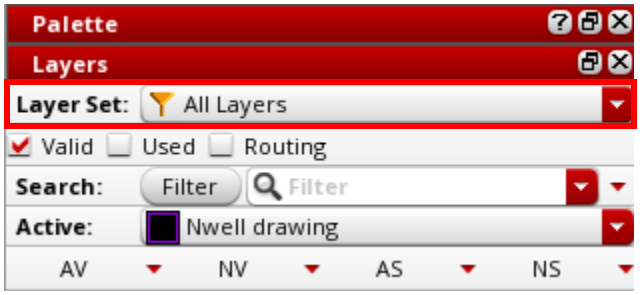
Layers Panel Column Header Context Menu

Layer Sets

A layer set is a subset of layer-purpose pairs. It lets you group layers according to your design requirements and work on a subset of layers. Using the Palette assistant, you can import, export, reload, save, and delete layer sets. You can set a layer set as active for the current design. When a layer set is active, all layers, objects, and grids associated with that layer set are displayed in the Palette.

In the *Layers* panel, the *Layer Set* toolbar lists all the layer sets available in the current design and displays the name of the one that is currently active. The *All Layers* layer set is

a system-defined layer set. You can apply filters to this layer set, but you cannot add or remove layers from it.



Related Topics

Layers Panel Toolbars

Creating a Layer Set

Deleting a Layer Set

Importing a Layer Set

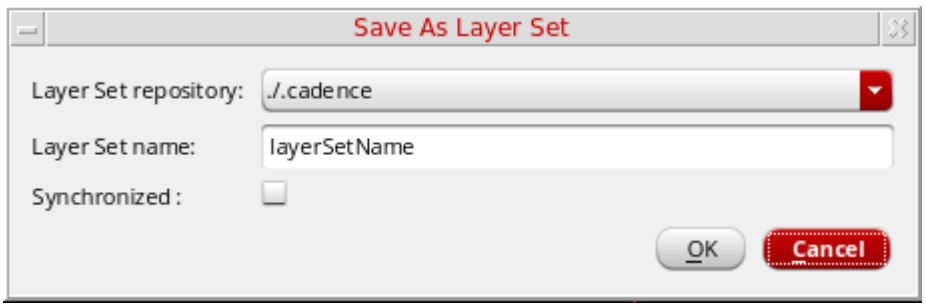
Exporting a Layer Set

Creating a Layer Set

To create a layer set:

1. From the Palette context menu, choose *Layer Set – Save As*.

   The Save As Layer Set form appears.



2. Select the repository or directory in which you want to save the layer set file by choosing from the *Layer Set repository* list. For example, if you select `./.cadence`, the file is saved at the following location:

`./.cadence/dfII/layerSets/<technology library name>`

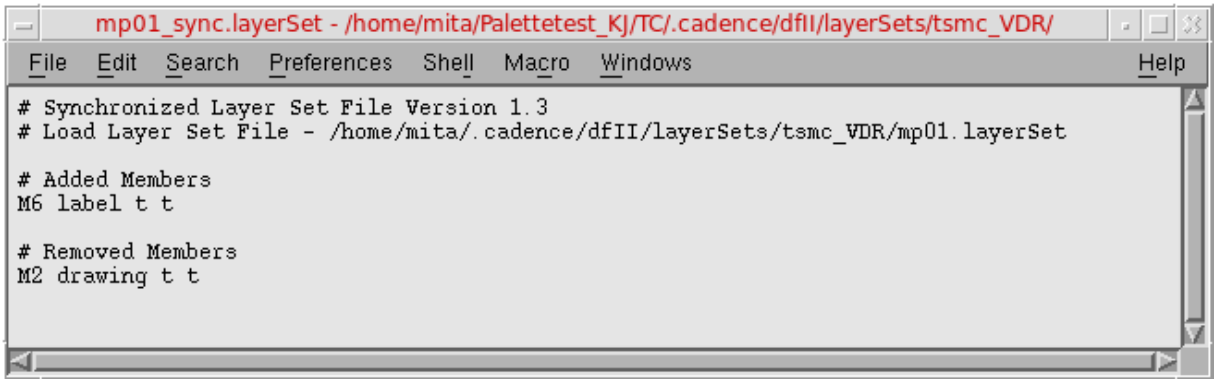
Note: The Palette assistant includes layer sets defined in several `.cadence` directories, for example, the present working directory, the home directory, and the shared directory. The list of candidate directories and their order of precedence is defined in the `setup.loc` file. When displayed in the *Layer Set Manager* and the *Layer Set* list, a suffix comprising a number enclosed in parentheses is added to the layer set name to indicate where a layer set is defined. This helps avoid ambiguity if a layer set is saved with the same name in several directories. The order of precedence specified in `setup.loc` determines the value of the suffix. An exception to this rule are the layer sets stored in the `.cadence` directory listed first in the order of precedence. These layer sets are displayed without the suffix (1). The `setup.loc` file is stored in the `.cadence` directory.

3. Specify a layer set name in the *Layer Set name* field.

   If you specify the layer set name as `default`, this layer set is set as the active layer set, instead of the *All Layers* layer set, when a cellview is first opened. Palette searches for the *default* layer set in the layer set repositories in the order specified in the `setup.loc` file. If the `setup.loc` file is unavailable, Palette searches for the *default* layer set in the `.cadence` repository located in the present working directory. When the first layer set named *default* is found, the search stops.

4. Select the *Synchronized* check box if you want to keep the layer set synchronized with the base layer set. As a result, any updates made to the base layer set are automatically reflected in your personalized layer set when you reload your layer set or start a new Virtuoso session.

   The following figure shows the `.layerSet` file for a synchronized layer set. Any layer-purpose pairs that you add or remove locally are listed in this file.



   SKILL function: `pteSaveAsSynchronizedLayerSet`

5. Click *OK*.

A layer set file is created with the specified name (<*layersetname*>.layerSet) in the selected layer set repository. The newly created layer set is automatically set as active and is displayed in the *Layer Set* list and *Layer Set Manager*.

SKILL function: `pteSaveAsLayerSet`

The following is a sample layer set file.

default.layerSet

```
# Layer Set File With Attributes Version 1.1
ref drawing t t
prBoundary boundary t t
DNW drawing t t
NW drawing t t
PSUB2 drawing t t
OD drawing t t
OD_25 drawing t t
NP drawing t t
PP drawing t t
PO drawing t t
CO drawing t t
M1 drawing t t
VIA1 drawing t t
M2 drawing t t
VIA2 drawing t t
M3 drawing t t
VIA3 drawing t t
M4 drawing t t
VIA4 drawing t t
M5 drawing t t
VIA5 drawing t t
M6 drawing t t
VIA6 drawing t t
M7 drawing t t
VIA7 drawing t t
M8 drawing t t
RV drawing t t
AP drawing t t
UBM drawing t t
```

Related Topics

Cadence Setup Search File: setup.loc

Deleting a Layer Set

Importing a Layer Set

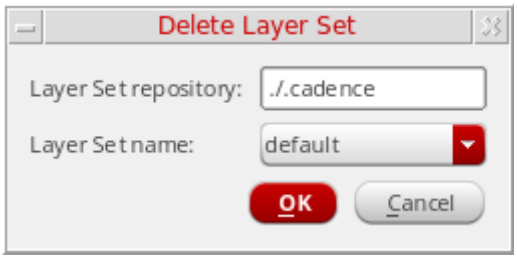
Exporting a Layer Set

Deleting a Layer Set

To delete a layer set:

1. From the Palette context menu, choose *Layer Set – Delete*.

   The Delete Layer Set form appears. The *Layer Set repository* field displays the name of the repository from which the layer set will be deleted. This is a non-editable field.



2. Select the layer set that you want to delete by choosing from the *Layer Set name* list.
3. Click *OK*.

   The layer set is deleted from the specified layer set repository and is no longer displayed in the *Layer Set* list and *Layer Set Manager*.

Related Topics

pteDeleteLayerSet

Creating a Layer Set

Importing a Layer Set

Exporting a Layer Set

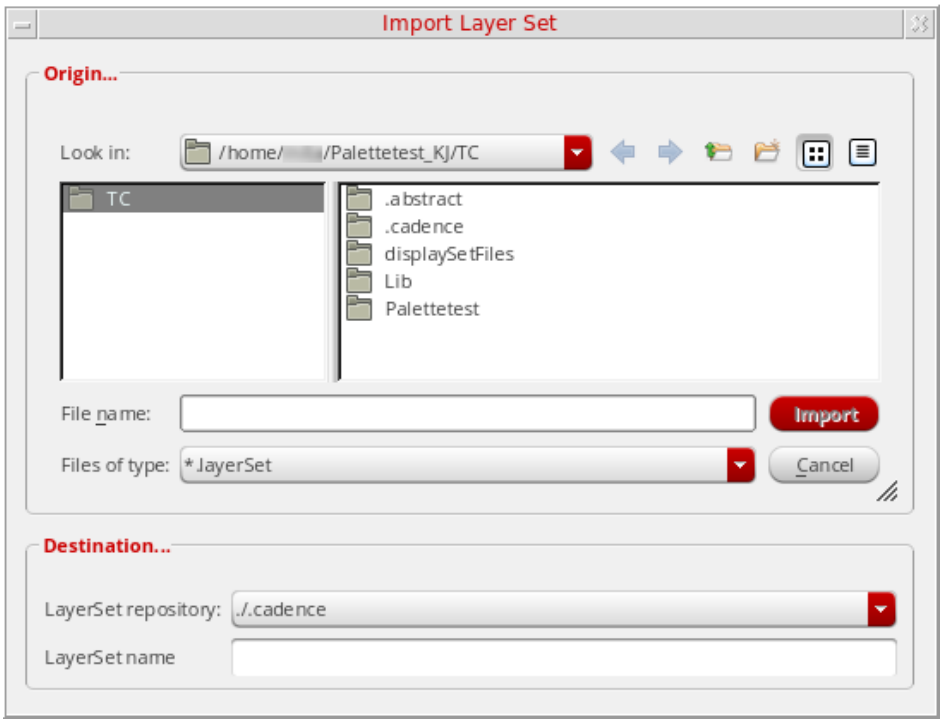
Importing a Layer Set

You can import a layer set file from the file system to the layer set repository.

To import a layer set:

1. From the Palette context menu, choose *Layer Set – Import*.

The Import Layer Set form appears.



2. Select the layer set file that you want to import. Specify the path if you want to import a layer set file that is stored outside your current directory. The selected file name is automatically displayed in the *File name* field in the *Origin* section as well as in the *LayerSet name* field in the *Destination* section.
3. Select the layer set repository in which you want to save the layer set file, by choosing from the *LayerSet repository* list. The layer set file is saved in the selected repository with the name that appears in the *LayerSet name* field.
4. Click *Import*.

   The imported layer set is added to the *Layer Set* list in the *Layers* panel.

Related Topics

pteImportLayerSet

Exporting a Layer Set

Creating a Layer Set

Deleting a Layer Set

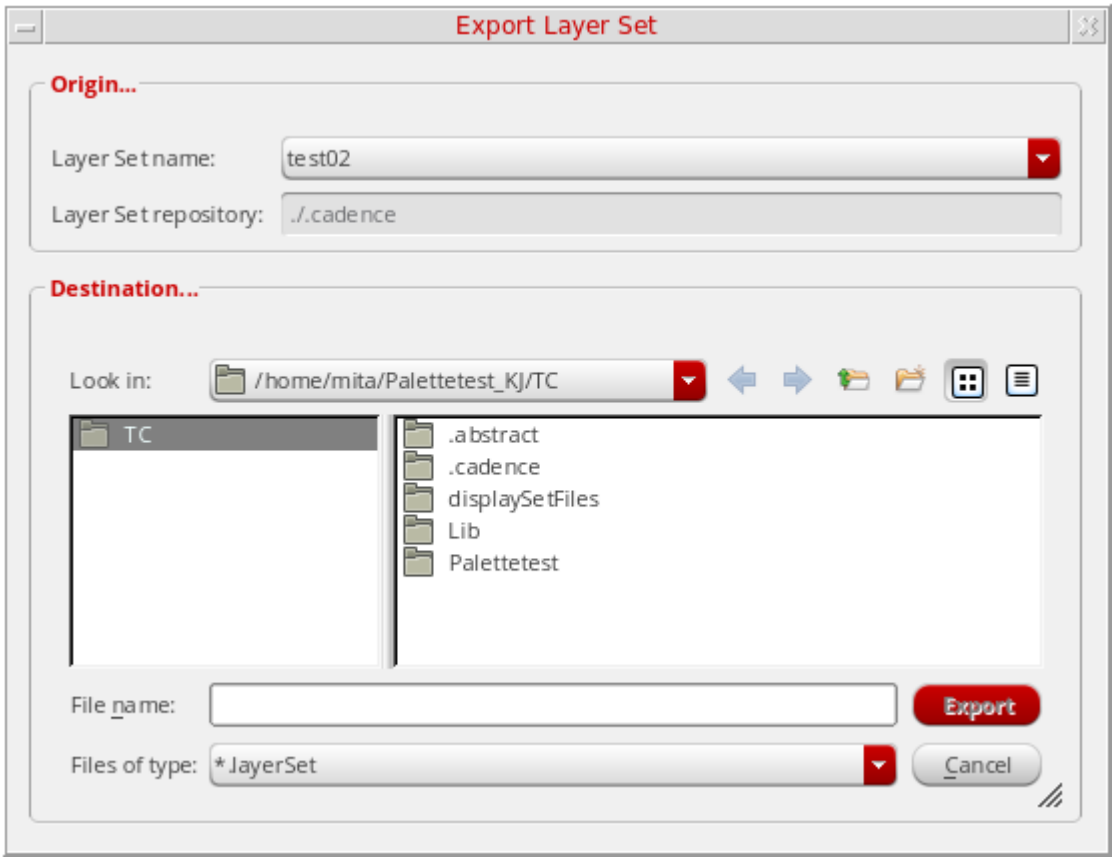
Exporting a Layer Set

Exporting a Layer Set

To export a layer set:

1. From the Palette context menu, choose *Layer Set – Export*.

   The Export Layer Set form appears. The *Layer Set repository* field in the *Origin* section displays the repository in which the layer set is stored. This is a non-editable field.



2. Select the layer set that you want to export, by choosing from the *Layer Set name* list.
3. Specify the layer set name in the *File name* field of the *Destination* section. The layer set is saved with this name.

Important

Specify `.layerSet` as the file extension along with the layer set name.

4. Click *Export*.

   A new layer set is created in your present working directory.

Related Topics

pteExportLayerSet

Importing a Layer Set

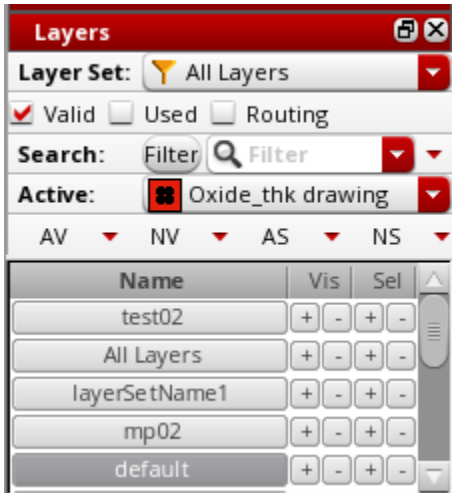
Creating a Layer Set

Deleting a Layer Set

Importing a Layer Set

Layer Set Manager

The *Layer Set Manager* toolbar in the *Layers* panel lists all the layer sets that are available in the current design window.

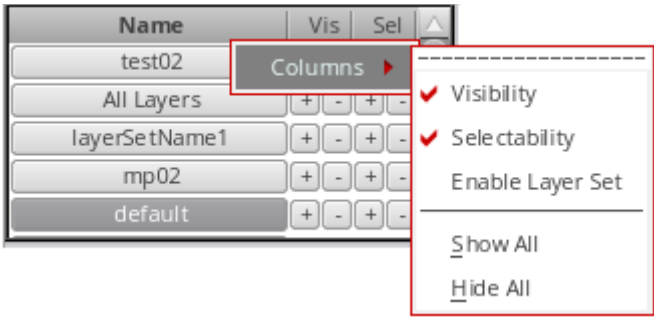


You can use the *Layer Set Manager* to perform the following tasks:

- Reorder layer sets by dragging them up and down the list.
- Select one or more layer sets by using the following methods:
  - To select a single layer set, click that layer set.
  - To select multiple adjacent layer sets, click the first layer set in the sequence, and then hold down the `Shift` key and click the last layer set in the sequence.
  - To select multiple non-adjacent layer sets, select a layer set, and then hold down the `Ctrl` key and click the other layer sets that you want to select.

  All layer sets selected in the *Layer Set Manager* are considered active and a layer-purpose pair is listed in the *Layers* panel if it is a member of at least one of the selected layer sets.
- Turn on or off the visibility or selectability status of all the layers present in a layer set by clicking the corresponding + or – button, respectively. These buttons work with respect to the filter settings defined on the *Scope* and *Filter* toolbars if the `pteLSManagerRespectFilters` environment variable is set to `t`.
- Set a layer set as active and turn on the visibility and selectability of all its member layers by clicking the layer set with the middle mouse button. The visibility and selectability for all other layers is turned off.

- Disable a layer set by deselecting the corresponding check box in the column labeled *E*. This column is displayed when you right-click a column header in the *Layer Set Manager* and choose *Columns – Enable Layer Set* from the shortcut menu.



  The layer set that is currently active cannot be disabled.

- Save the layer set order and status—whether enabled or disabled—in the `layerset.order` file.

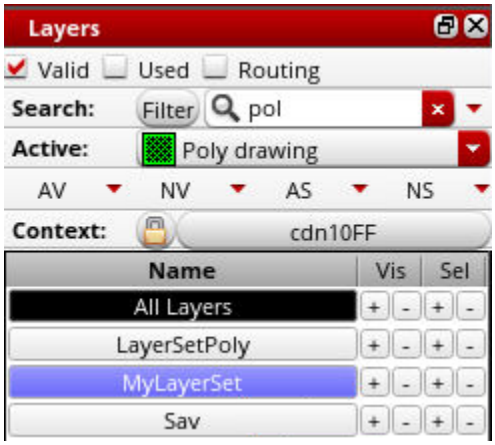
  Names of layer sets that are not synchronized with corresponding layer set files appear italicized.

Colored Layer Set Buttons

In the *Layer Set Manager*, by default, layer set buttons are not shown as colored. You can enable the pteShowColoredLSManager environment variable to show colors. The active layer set button is then shown in black. You can define the button color of an inactive layer set by using the pteSetLayerSetColoredLpp SKILL function.

For example, the following figure shows the active layer set `All Layers` in black. The inactive layer set, `MyLayerSet`, is highlighted in blue, when you set

`pteSetLayerSetColoredLpp` to pick the button color from the `Metal1-Drawing` layer-purpose pair.



Related Topics

Layers Panel

Layers Panel Toolbars

Layer-Purpose Pair Selection Controls

By default, you can change settings, such as the visibility, of only a single layer-purpose pair, object, or grid at a time. To be able to define settings for multiple items at a time, you can use multi-selection mode.

Single-Selection Mode Controls

The following table describes the mouse functions you can use in the *Layers* panel to define the settings of a layer-purpose pair in single-selection mode.

Task	Selection Action
Turn on or off visibility of a layer-purpose pair	Click the layer-purpose pair by using the middle mouse button. This feature is available if the `pteEnableMouseBindings` environment variable is set to `t`.

Task	Selection Action
Turn on or off selectability of a layer-purpose pair	Right-click the layer-purpose pair. This feature is available if `pteEnableMouseBindings` is set to `t`.
Set a layer-purpose pair as current or active	Click the layer-purpose pair. The visibility status of the layer-purpose pair is turned on.
Change appearance of a layer-purpose pair	Hold down the `Shift` key and click the layer-purpose pair. The Display Resource Editor form is displayed, where you can specify the display settings. This feature is disabled if a user-defined trigger is registered using the `pteRegisterUserSelectionTrigger` environment variable.
Make all except one layer-purpose pairs invisible	Hold down the `Shift` key and use the middle mouse button to click the layer-purpose pair that you want to make visible.
Turn off selectability of all layers except one	Hold down the `Shift` key and right-click the layer-purpose pair that you want to make selectable.

Multi-Selection Mode Controls

The following table describes the mouse functions that you can use in the *Layers* panel to define the settings of multiple layer-purpose pairs at the same time. These controls are available when the *Multi-select mode* check box is enabled in the Options form.

Task	Selection Action
Select the first layer-purpose pair and set it as current or active	Click the layer-purpose pair. The visibility status of the layer-purpose pair is turned on.
Extend the selection	Hold down the `Ctrl` or `Shift` key and click the layers that need to be added to the selection.
Add or remove a layer-purpose pair from the current selection	Hold down the `Ctrl` key and click that layer-purpose pair.

Task	Selection Action
Display multi-selection context menu	Right-click a layer-purpose pair. Using the context menu, you can set the visibility, selectability, layer set membership, validity, routing direction, and stipple for the selected layer-purpose pairs.
Reorder layer-purpose pairs	Drag the required layer-purpose pair or a group of layer-purpose pairs up or down the list.

Related Topics

Customizing the Palette Environment

Palette Options Form

Setting Attributes for Multiple Layers in Multi-Selection Mode

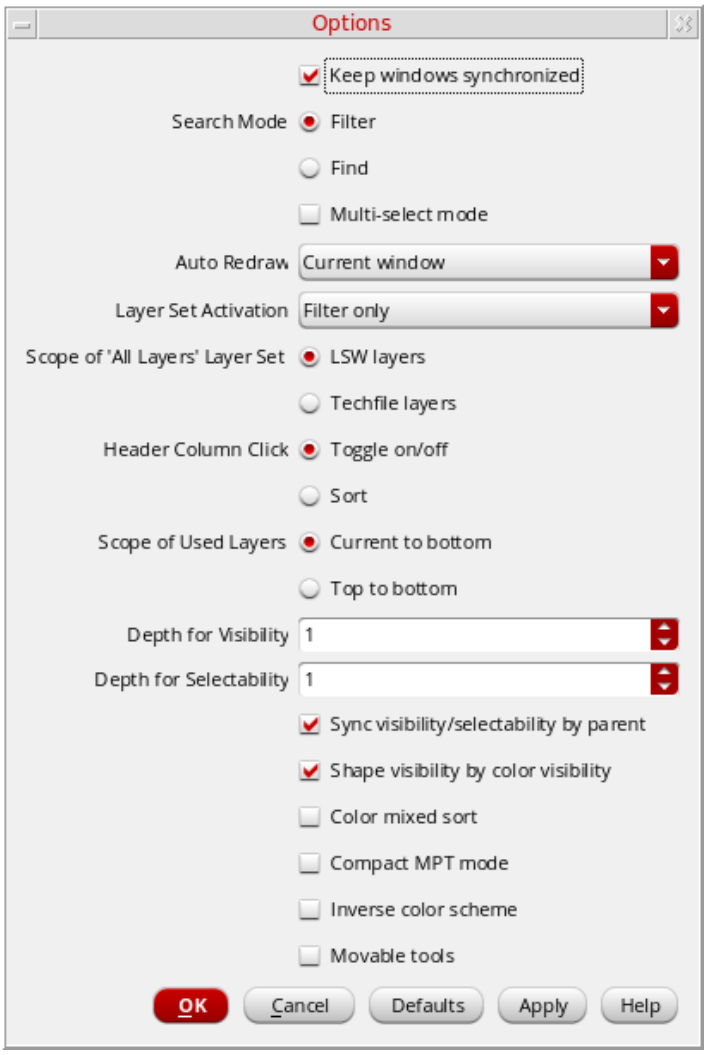
Setting Layer Visibility and Selectability Depth in Single Selection Mode

When single-selection mode is enabled for the Palette assistant, you can set the visibility and selectability depths for layer-purpose pairs. This involves specifying the number of layer-purpose pairs for which the visibility and selectability attributes are affected when you select a layer in the *Layers* panel.

To set visibility and selectability depths for layer-purpose pairs:

1. Choose *Options* from the Palette context menu. You can display the menu by right-clicking any toolbar in the *Layers* panel or anywhere in the *Objects* and *Grids* panels except the title bar and column headers.

The Options form appears.

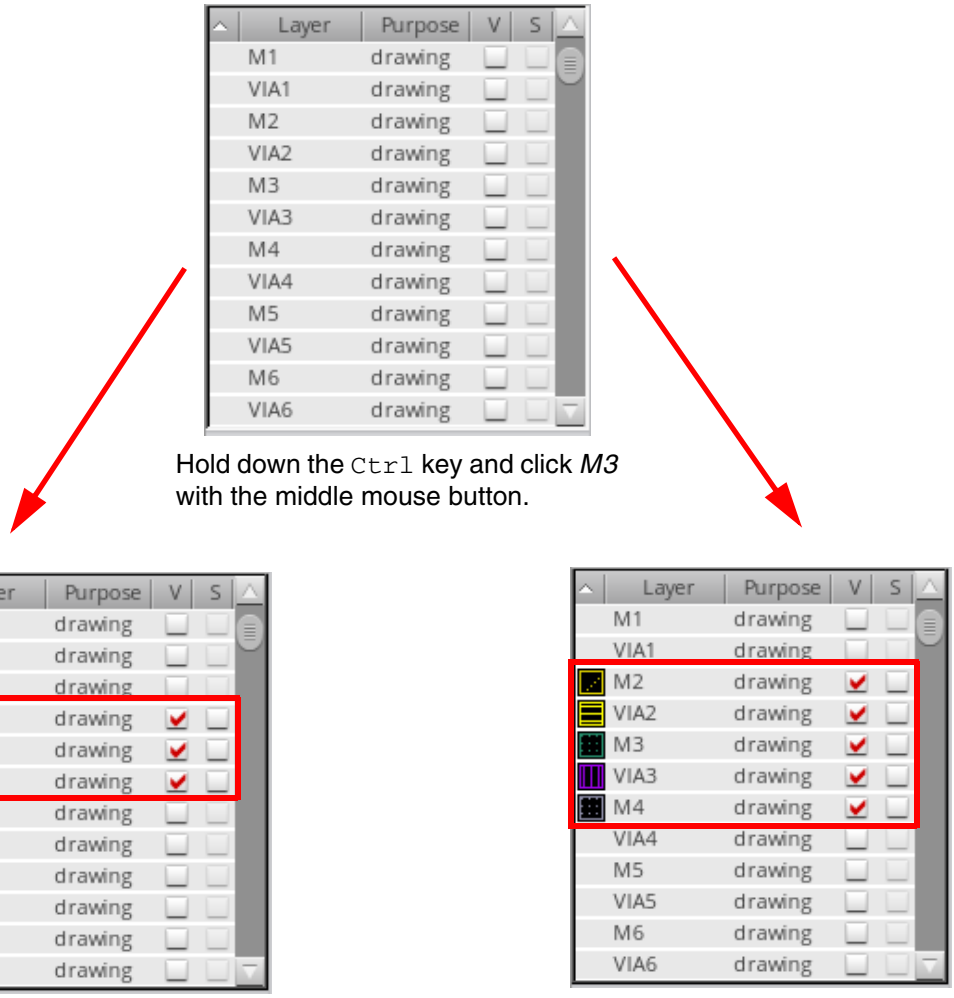


2. Deselect the *Multi-select mode* check box, if selected.
3. In *Depth for Visibility*, specify the number of layer-purpose pairs for which you want the visibility attribute to be affected when you select a layer in the *Layers* panel.
4. In *Depth for Selectability*, specify the number of layer-purpose pairs for which you want the selectability attribute to be affected when you select a layer in the *Layers* panel.
5. Click *OK*.
6. Explore setting the visibility attribute of layer-purpose pairs.

   - Hold down the `Ctrl` key and click a layer-purpose pair with the middle mouse button. This turns on or off the visibility of the layer-purpose pair that is clicked and

n layer-purpose pairs listed both above and below it, where *n* is equal to the value that you specified in the *Depth for Visibility* field.

- Hold down the `Ctrl` and `Shift` keys and click a layer-purpose pair with the middle mouse button. This sets as visible the layer-purpose pair that is clicked and *n* layer-purpose pairs listed both above and below it, where *n* is equal to the value that you specified in the *Depth for Visibility* field. Additionally, this sets the layer-purpose pair that you clicked as active.



Hold down the `Ctrl` key and click *M3* with the middle mouse button.

The result shown is for visibility depth equal to 1 (default). The selectability settings remain unchanged.

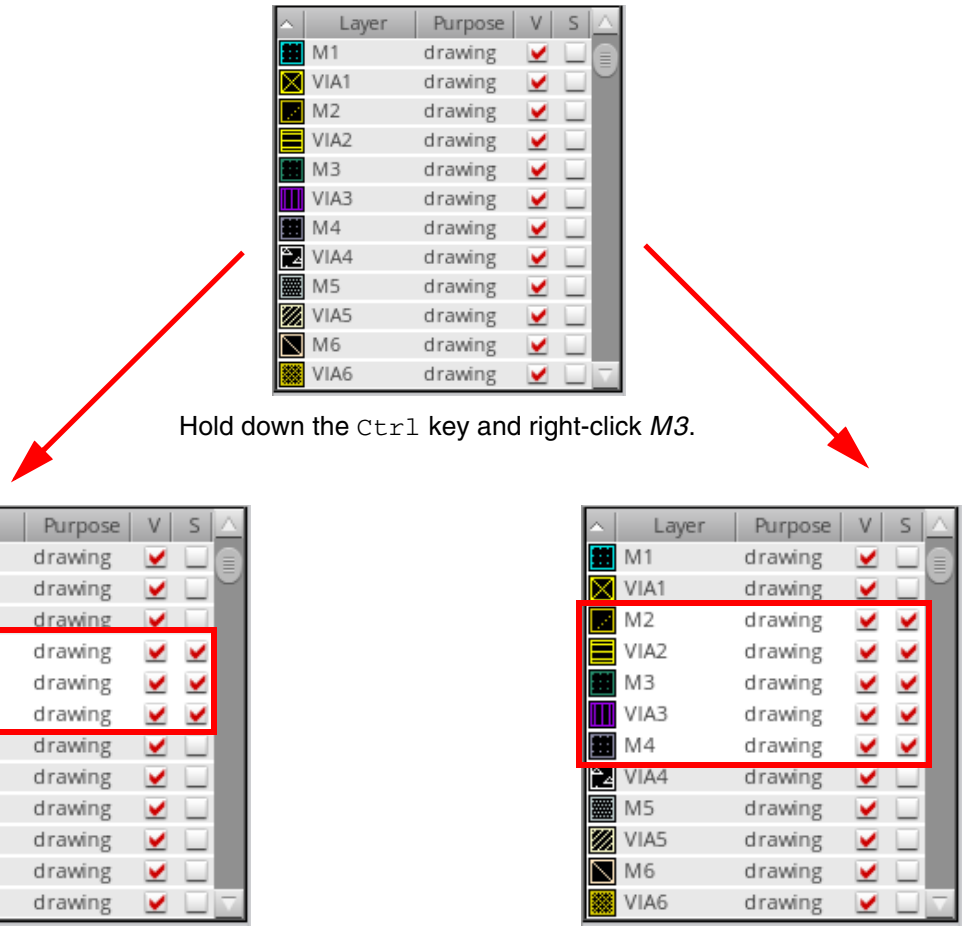
The result shown is for visibility depth equal to 2. The selectability settings remain unchanged.

7. Explore setting the selectability attribute of layer-purpose pairs.

- Hold down the `Ctrl` key and right-click a layer-purpose pair. This turns on or off the selectability of the layer-purpose pair that is clicked and *n* layer-purpose pairs listed

both above and below it, where `n` is equal to the value that you specified in the *Depth for Selectability* field.

- Hold down the `Ctrl` and `Shift` keys and right-click a layer-purpose pair. This turns on the selectability of the layer-purpose pair that is clicked and `n` layer-purpose pairs listed both above and below it, where `n` is equal to the value that you specified in the *Depth for Selectability* field.



Hold down the `Ctrl` key and right-click *M3*.

The result shown is for selectability depth set to 1 (default).

The result shown is for selectability depth set to 2.

Note: This feature is available only in single selection mode, when the *Multi-select mode* check box is not enabled in the Options form.

Related Topics

Managing Layers

Setting Attributes for Multiple Layers in Multi-Selection Mode

Setting Attributes for Multiple Layers in Multi-Selection Mode

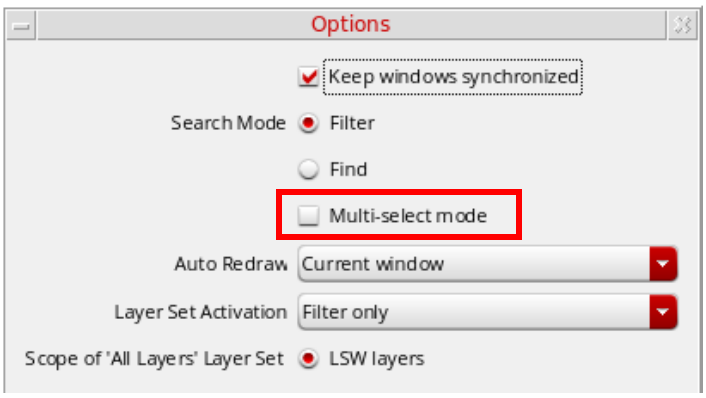
In multi-selection mode, you can set attributes, such as visibility, selectability, layer set membership, validity, routing direction, and stipple, for multiple layers at the same time.

To set attributes for multiple layers at a time:

1. Choose *Options* from the Palette context menu.

   The Options form appears.

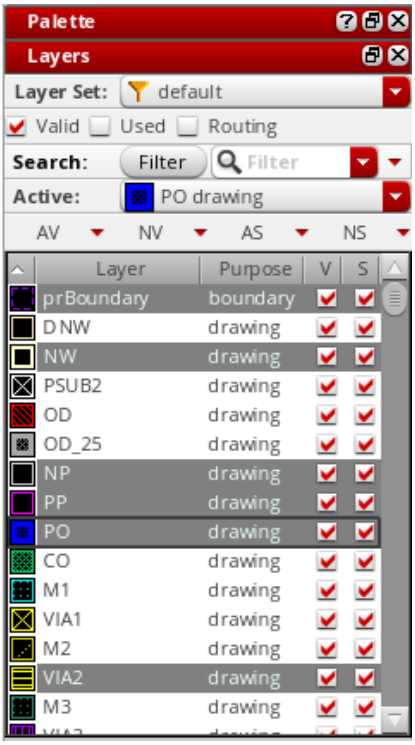
2. Select the *Multi-select mode* check box and click *OK*.



3. Select the layers for which you want to set attributes, in the *Layers* panel.

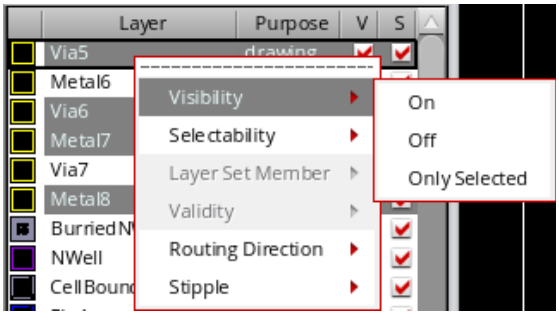
   To select multiple non-adjacent layers, select a layer, and then hold down the `Ctrl` key and click the other layers that you want to select. To select a set of adjacent layer-purpose pairs, click the first layer in the sequence, and then hold down the `Shift` key

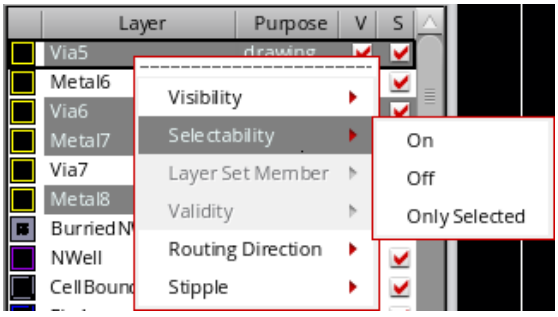
and click the last layer in the sequence. To remove a layer from a multiple-layer selection, hold down the `Ctrl` key and click that layer.



4. Right-click the selection and from the context menu use the *Visibility*, *Selectability*, *Layer Set Member*, *Validity*, *Routing Direction, and Stipple* options to set the corresponding attributes for the selected layers.

   The *Layer Set Member* and *Validity* options are available only when the *Member* and *Validity* check boxes are selected on the *Edit* toolbar. The *Routing Direction* option is available only for routing layers.





Related Topics

Managing Layers

Setting Layer Visibility and Selectability Depth in Single Selection Mode

Controlling the Display Context Using LSW Information File

The Palette assistant is initialized with the display context information defined in the technology file associated with a cellview. You can choose to save the current display context settings of the Palette to an LSW information file and reload it later when required.

You can choose to load the display context from an LSW information file, which stores a snapshot of the Palette. When you load information from an LSW information file, the visibility and selectability settings defined in the file for layer-purpose pairs and objects are loaded into the current display context.

Saving the Display Context to the LSW Information File

To save the current display context of the Palette assistant to an LSW information file:

1. From the Palette context menu, choose *Save – LSW Info*.

   The Save LSW Info form appears.

2. Select the file to which you want to save the settings. Specify a file name if you want to save the file with a different name.

3. Click *Save*.

   The visibility and selectability settings from the current display context are saved in the specified LSW information file.

Loading the Display Context from the LSW Information File

To load the Palette assistant with settings from an LSW information file:

1. From the Palette context menu, choose *Load – LSW Info*.

   The Load LSW Info form appears.

2. Select the LSW information file that you want to load. Specify the path if you want to load a file stored outside your current directory.
3. Click *Load*.

   The visibility and selectability settings defined in the LSW information file are loaded to the current display context.

Related Topics

pteLoadLSWInfo

pteSaveLSWInfo

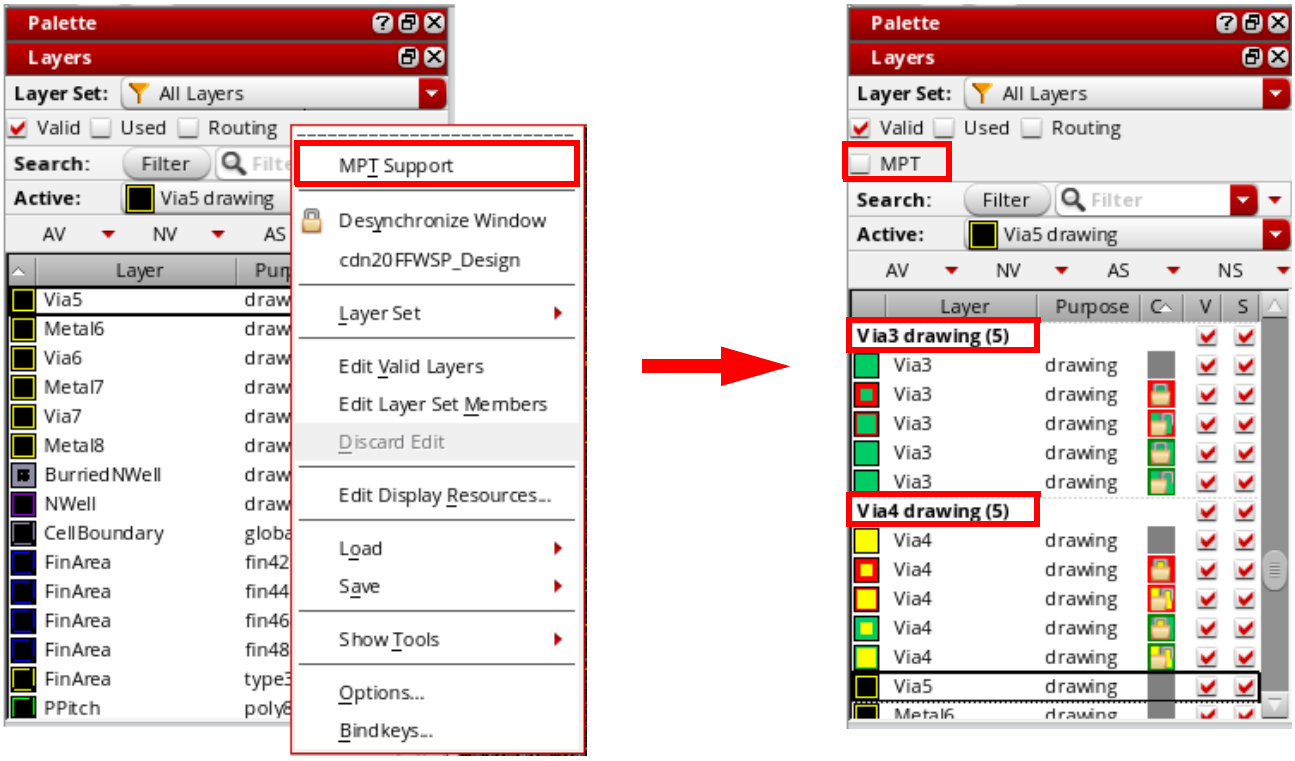
Palette Context Menu

MPT Support

The Palette multi-patterning technology (MPT) feature lets you view all layer-purpose pairs with color. In Layout Editor, it lets you draw shapes, wires, and pins with layer, color, and lock state information. Shapes that you can draw with color include rectangles, polygons, paths, circles, ellipses, and donuts. You cannot draw pins with color in auto mode of pin creation.

To enable MPT in the Palette, choose *MPT Support* from the Palette context menu. This displays the *MPT* check box on the *Scope* toolbar and the *C* (Color) column in the *Layers*

panel. Also, all layer-purpose pairs with color are listed in the *Layers* panel, grouped by their master layer-purpose pair. Layer-purpose pairs with no color are listed at the end.



When MPT support is enabled, you can choose to display only the layer-purpose pairs with color by selecting the *MPT* check box on the *Scope* toolbar.

Each color and lock state combination for a layer-purpose pair is listed as a separate entry. When you set a layer-purpose pair as active, the color and lock state is automatically set for the shapes that you draw on that layer.

Note: For Move and Copy commands, the reference pathseg and via display the color of the width spacing pattern (WSP) track during drag and command commit.

When you open a new layout window, the pteMPTMode environment variable determines whether MPT support is enabled by default, and the pteMPTScope environment variable determines whether all layer-purpose pairs or only the ones with color are displayed. The `pteMPTScope` environment variable is evaluated only if the `pteMPTMode` environment variable is set to `t`. For the `pteMPTMode` and `pteMPTScope` environment variables to take effect in a new layout window, you must set them before you open the window.

Related Topics

pteMPTSupportMode

pteSetMPTSupportMode

pteGetMPTSupportMode

pteCloseMPTSupportMode

pteShowMPTScope

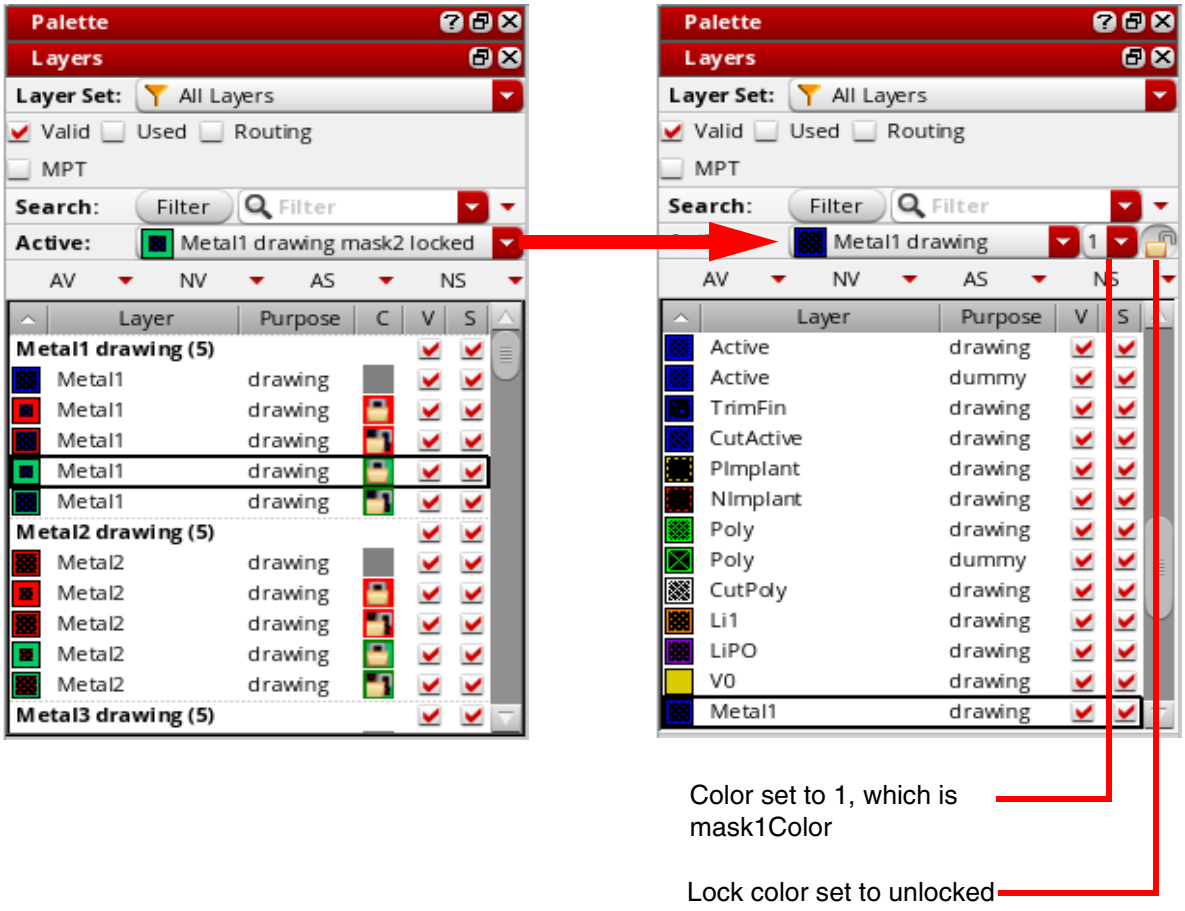
pteMPTAwareSelectionTrigger

Compact MPT Mode

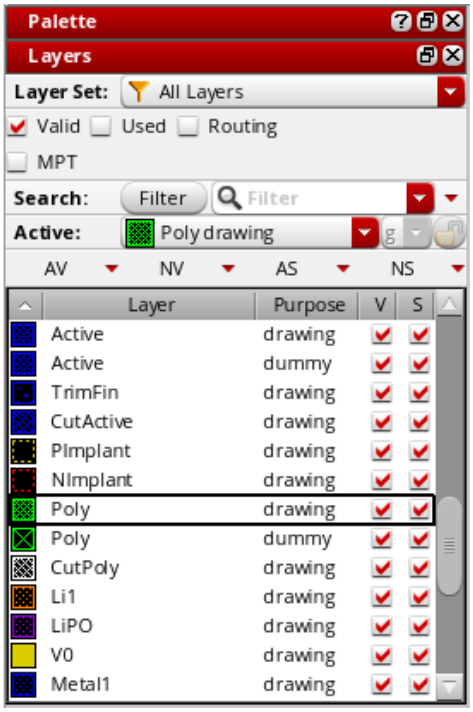
Compact MPT Mode

The compact MPT mode hides the *C (Color)* column in the *Layers* panel and displays the *Color* and *Lock color* options on the *Active Layer* toolbar. You can use these options to select the color and lock state combination for a layer-purpose pair with color. When you

enable compact mode, *Color* is set to *1*, which is `mask1Color`, and *Lock color* is set to the unlocked state for an active layer-purpose pair with color, as shown in the figure.



The *Color* and *Lock color* options are disabled for layer-purpose pairs without color. The *Color* for such layer-purpose pairs is set to `g` (`grayColor`), as shown in the figure.

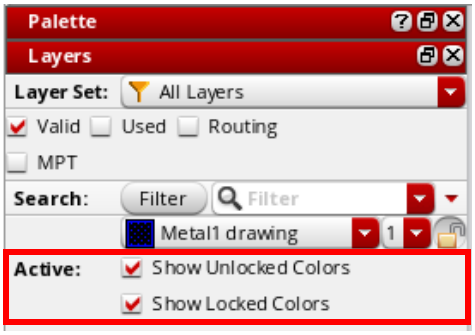


You can use any of the following ways to enable compact mode:

- Enable the *Compact MPT mode* check box in the Options form in an open layout window.
- Set the `pteCompactMPT` environment variable to `t` at the start of a Virtuoso session to ensure that all layout windows have MPT support set to compact mode by default.
- Use the `pteSetOptionString` SKILL function. This propagates a change to the `pteCompactMPT` environment variable in all open layout windows in real time.

In compact mode, to control the visibility of colored shapes based on their lock status, you can use the *Show Unlocked Colors* and *Show Locked Colors* options on the *Active*

Layer toolbar. These options are displayed when the `pteShowColorControlsForMPT` environment variable is enabled.



Related Topics

Palette Options Form

MPT Support

Drawing Shapes with Color

To display shapes with color:

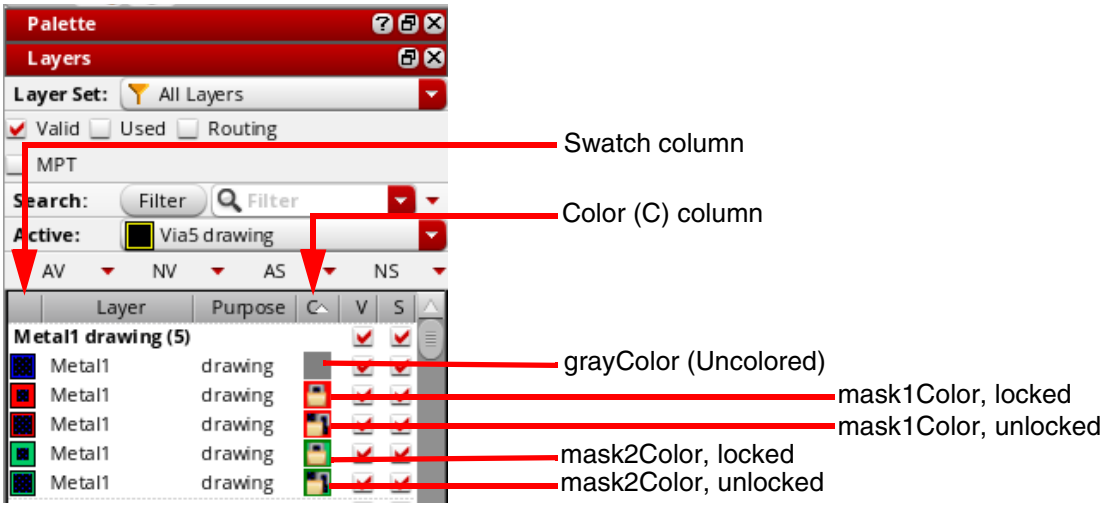
1. From the Palette context menu, choose *MPT Support*.

   This displays the *MPT* check box on the *Scope* toolbar and the *C (Color)* column in the *Layers* panel.

2. Optionally, select the *MPT* check box if you want to display only the layer-purpose pairs with color.

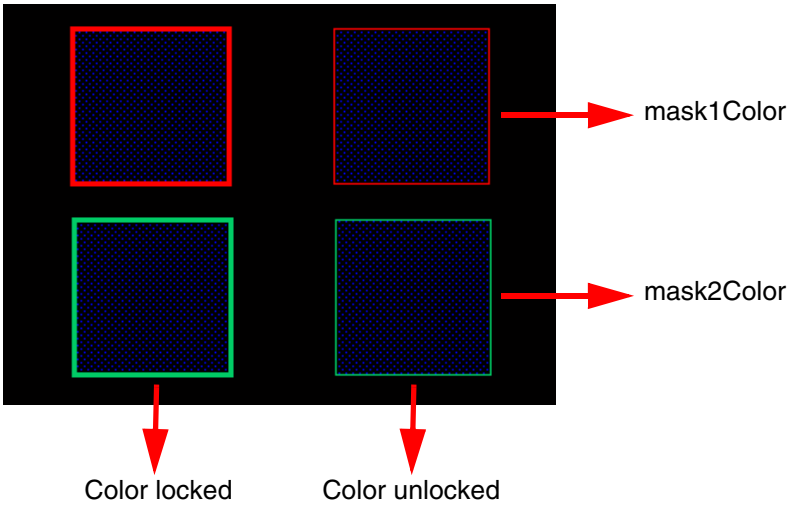
3. Set a layer-purpose pair that has the required color and lock status as active.

Notice that the icons listed in the *C (Color)* column for each layer-purpose pair provide color as well as lock information. The swatch displayed in the first column indicates how a shape appears on the canvas.



4. Draw a shape on the canvas.

   The color and lock state are automatically set for the shape.



Related Topics

MPT Support

Controls for Display of Shapes

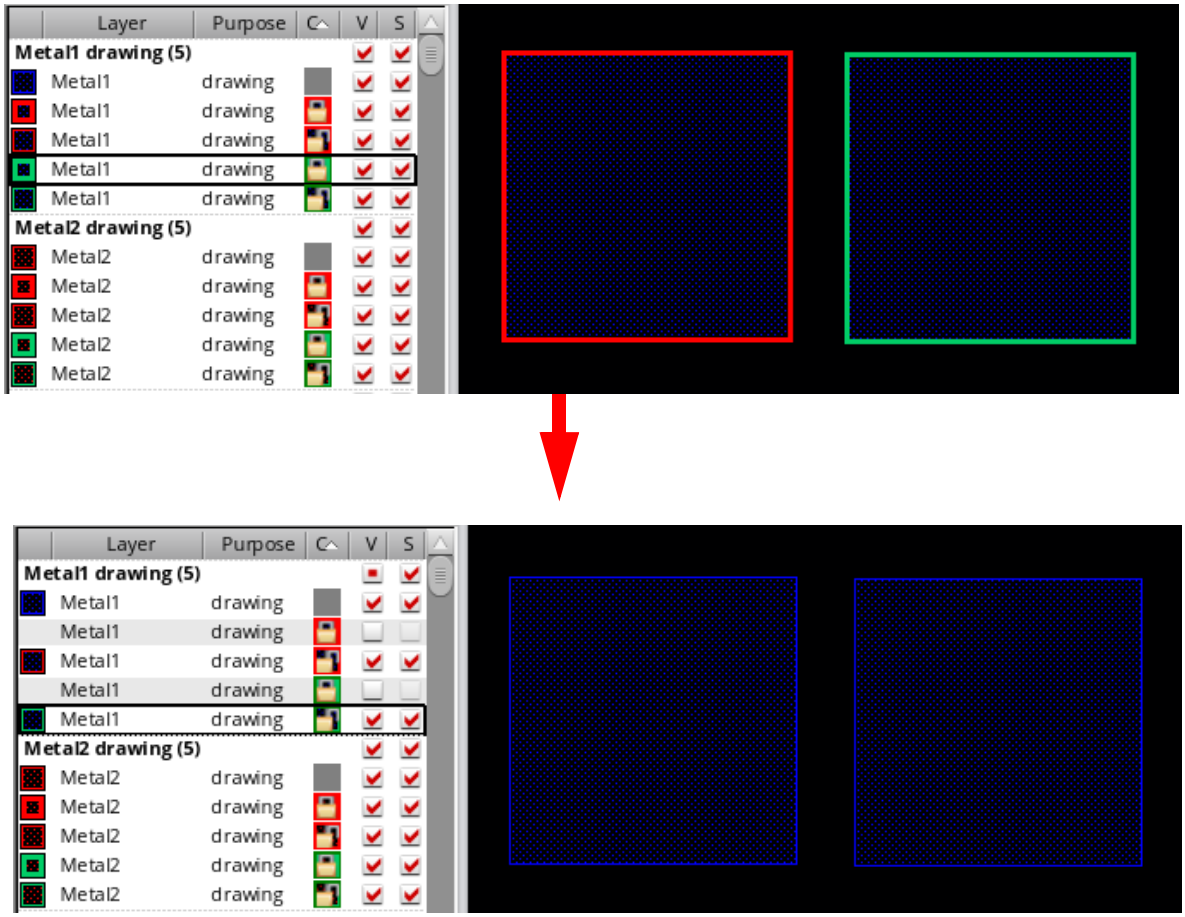
Purpose-Based Display of Color Information

Controls for Display of Shapes

To control the visibility and selectability of shapes drawn on a layer, use the *V (Visibility)* and *S (Selectability)* check boxes corresponding to the layer-purpose pair in the *Layers* panel. Shapes drawn on a layer become invisible if you deselect the *V (Visibility)* check box corresponding to that layer.

However, when shapes are drawn on a layer that supports color, their visibility is controlled by the *Shape visibility by color visibility* check box available in the Options form.

- If *Shape visibility by color visibility* is selected, colored shapes become invisible if you deselect the *V (Visibility)* check box corresponding to the layers on which they are drawn.
- If *Shape visibility by color visibility* is deselected, only the colored outline is hidden; the shapes remain visible.



Related Topics

MPT Support

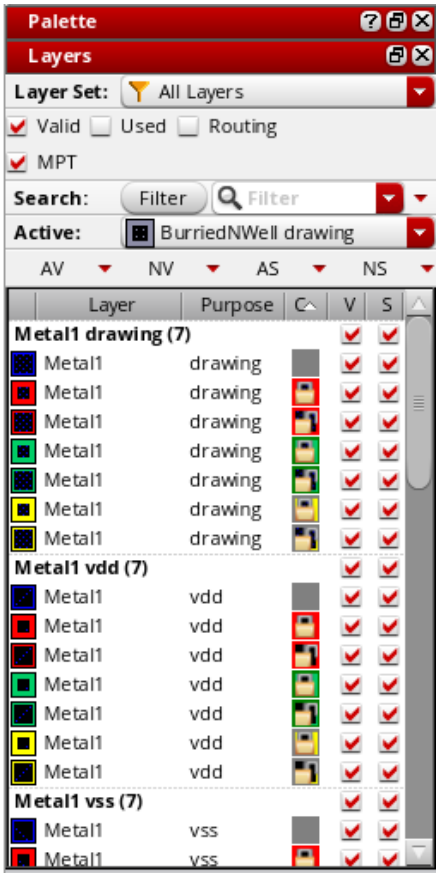
Drawing Shapes with Color

Purpose-Based Display of Color Information

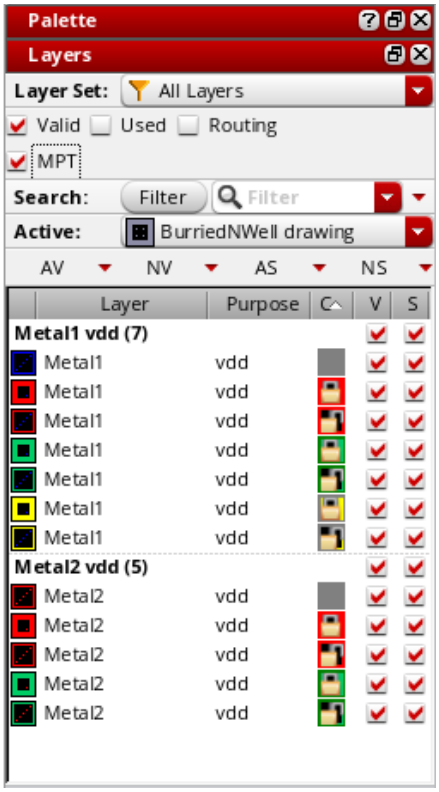
Color and Lock Information-Based Search

Purpose-Based Display of Color Information

When MPT support is turned on, you can choose the purposes for which you want color information to be displayed in the Palette. You can specify the list of purposes by using the `explicitColoredPurposes` environment variable. When this environment variable is set to `" "`, the default value, color information is displayed in the Palette for the `drawing` and `pin` purposes, any purposes specified using the `coloredPurposeTypes` environment variable, and all their child purposes, as shown in the figure.



If you now close the session and reset `explicitColoredPurposes` to, say, "`vdd`", and then reopen the session, color information is listed in the Palette only for layers with the purpose "`vdd`", as shown in the figure.

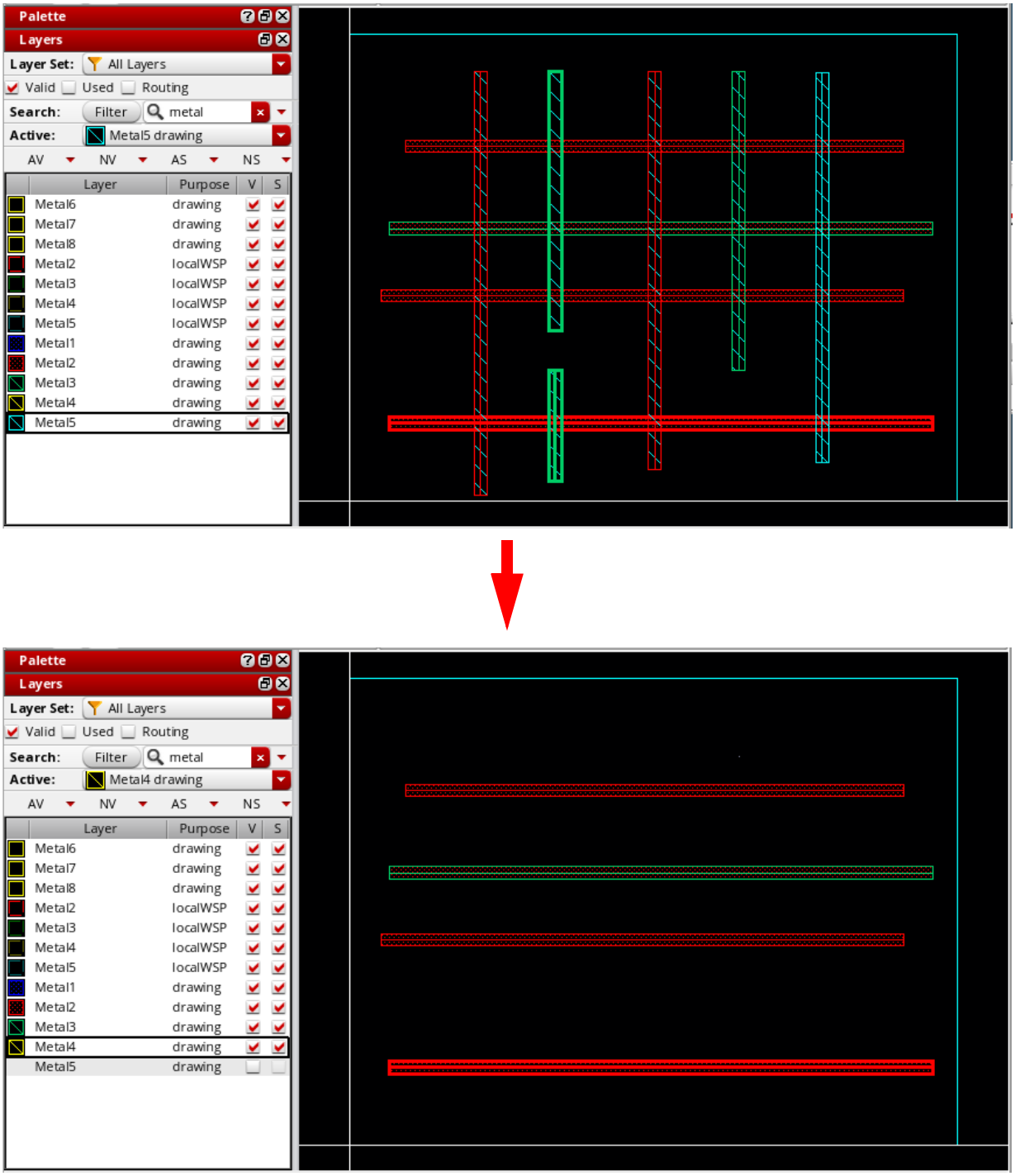


Important

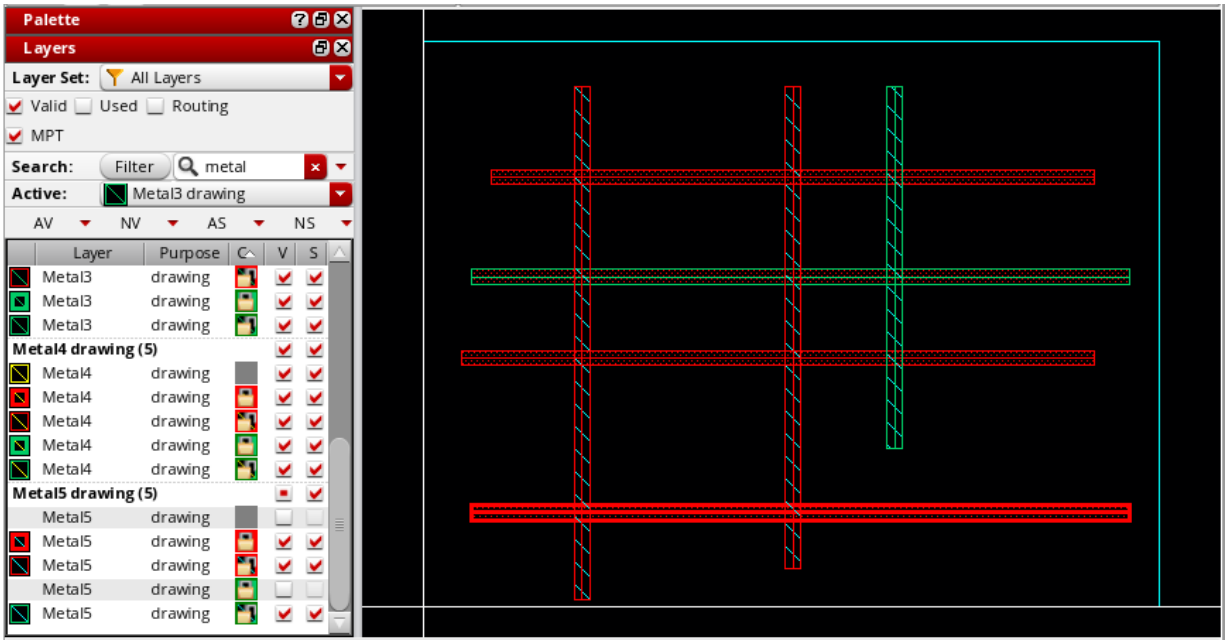
The Palette is not updated if the `explicitColoredPurposes` environment variable is reset during a session. Additionally, when you specify a purpose by using the `explicitColoredPurposes` environment variable, its child purposes are not included automatically. Therefore, you need to explicitly specify all purposes for which you want color information to be displayed in the Palette.

If shapes with color created in previous sessions are excluded in a new session by using this method, the shapes are no longer colorable. The visibility and selectability of such shapes can be controlled through the base layer-purpose pair (`grayColor`), which is listed for all excluded purposes.

For example, when color information for `Metal5` is excluded, the visibility and selectability of all `Metal5` shapes, regardless of color-lock status, is controlled through the base layer-purpose pair.



When color information is available for `Metal5`, visibility and selectability can be controlled individually for each color-lock pair.



Related Topics

Drawing Shapes with Color

Color and Lock Information-Based Search

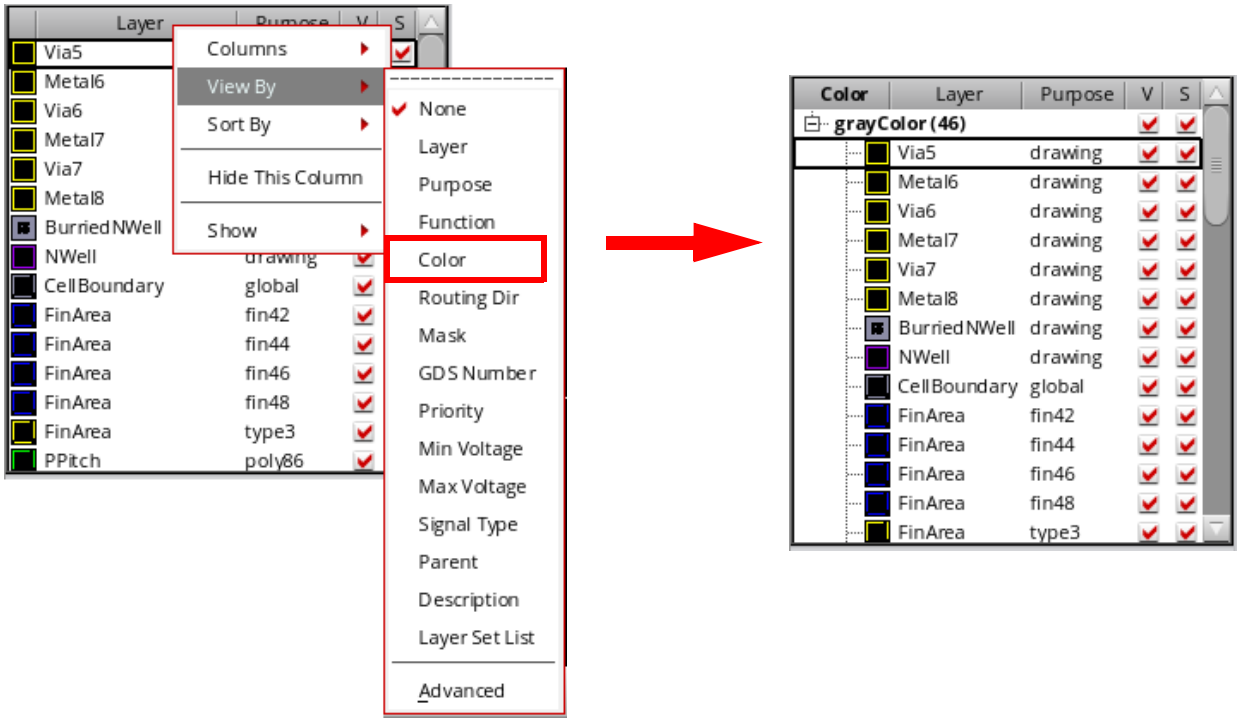
Color-Based Display of Layers

Color-Based Display of Layers

Note: The *View By* command is not listed on the column header context menu when full MPT scope is enabled; layer-purpose pairs are listed in the *Layers* panel grouped by layer-purpose name.

You can use the View By feature to customize the listing of layer-purpose pairs in the Layers panel based on various views such as layer, purpose, mask, and color. When MPT support

is disabled, if you choose *View By – Color*, only the layer-purpose pairs without color are listed in the *Layers* panel, grouped by the color name (`grayColor`), as shown in the figure.



If you choose an option other than *Color* on the *View By* menu, color and lock state information for layer-purpose pairs is not displayed.

Related Topics

Layers Panel Column Header Context Menu

Viewing Layer-Purpose Pairs in a Tree Structure

Color and Lock Information-Based Search

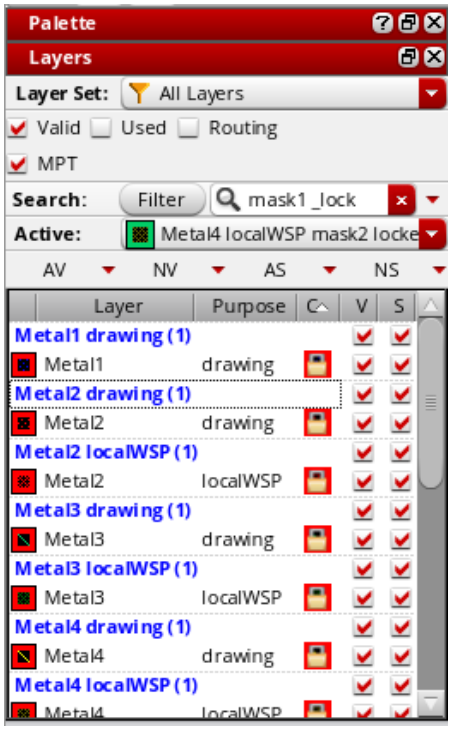
Note: The search functions listed in this topic are available only when the *C (Color)* column is displayed in the *Layers* panel.

You can filter layer-purpose pairs based on color and lock state by using the *Search* toolbar. With search mode set to *Filter*, you can specify any of the following search criteria:

- `mask`*`N`* to search for layer-purpose pairs with `mask`*`N`*`Color`, where *`N`* refers to the value `1`, `2`, or `3`.

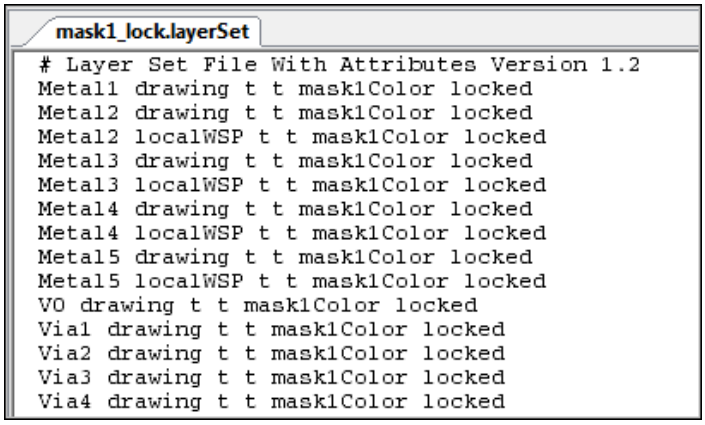
- `_lock` to search for layer-purpose pairs with color set to `locked`.
- `_unlock` to search for layer-purpose pairs with color set to `unlocked`.
- `mask`*`N`* `_lock` or `_lock mask`*`N`* to search for layer-purpose pairs with `mask`*`N`*`Color` and color state `locked`.
- `mask`*`N`* `_unlock` or `_unlock mask`*`N`* to search for layer-purpose pairs with `mask`*`N`*`Color` and color state `unlocked`.

All layer-purpose pairs that meet the search criteria are listed in the *Layers* panel. You can toggle the visibility and selectability of all filtered layers together by clicking the *V (Visibility)* and *S (Selectability)* column headers.



After filtering layer-purpose pairs based on color and lock state, you can save them to a layer set file. This helps to limit the number of layer-purpose pairs displayed in the *Layers* panel.

The color and lock state is saved in the `.layerset` file along with the other attributes, as shown in the figure.



The newly created layer set is automatically set as the current layer set and is displayed in the *Layer Set* list and the *Layer Set Manager*.

Related Topics

Layers Panel Toolbars

MPT Support

Creating a Layer Set

Sort Order of Layer-Purpose Pairs in MPT Mode

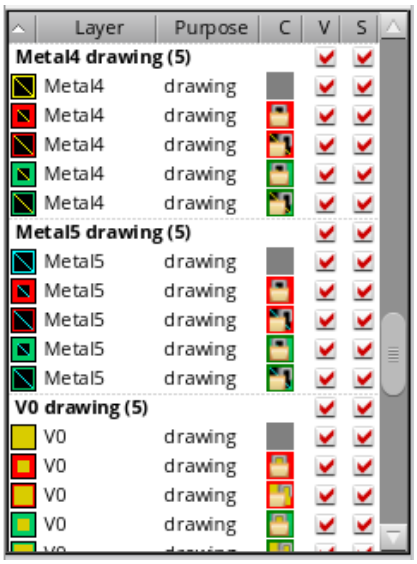
When MPT support is enabled, by default the layer-purpose pairs listed in the *Layers* panel are sorted by color. As a result, layer-purpose pairs are organized into two distinct groups:

- Layer-purpose pairs with color
- Layer-purpose pairs without color

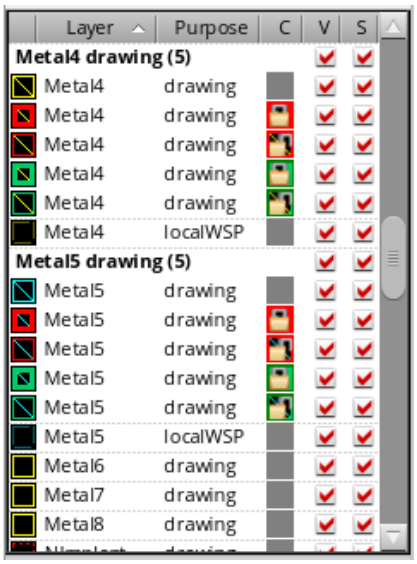
All layer-purpose pairs with color, grouped by their master layer-purpose pair, are sorted in the alphabetical order. All layer-purpose pairs without color are sorted based on the sort attribute selected on the Sort By submenu in the *Layers* panel.

Sorting Colored and Uncolored Layer-Purpose Pairs

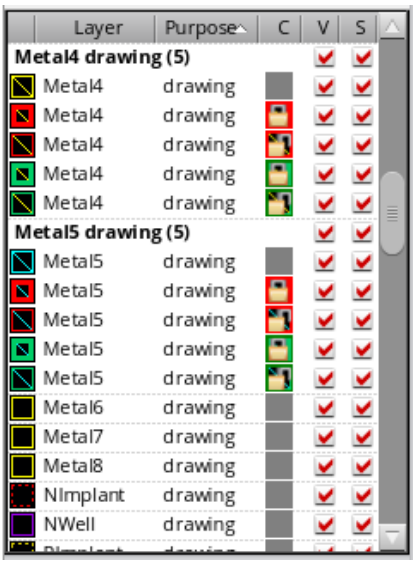
You can sort all layer-purpose pairs, colored and uncolored, together as a single group. You can define this by selecting the *Color mixed sort* check box in the Options form or by enabling the `pteColorMixedSort` environment variable. As a result, layer-purpose pairs when sorted are listed in the order defined by the sort attribute selected on the Sort By submenu, such as swatch, layer name, purpose, and priority.



Sorted by swatch

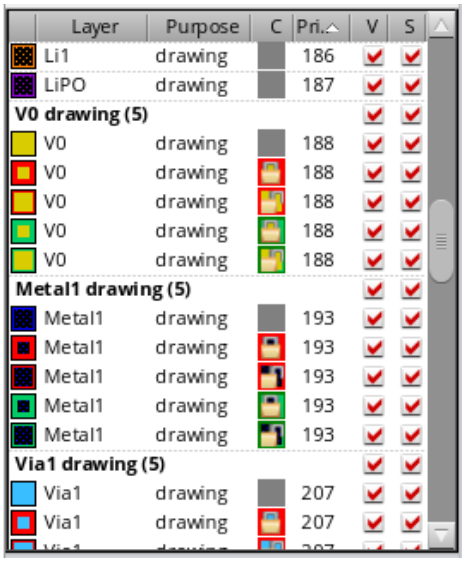


Sorted by layer name



Sorted by purpose

Layer-purpose pairs with color stay grouped by their master layer-purpose pair because each layer-purpose pair in a group has the same priority irrespective of color, as shown in the figure.

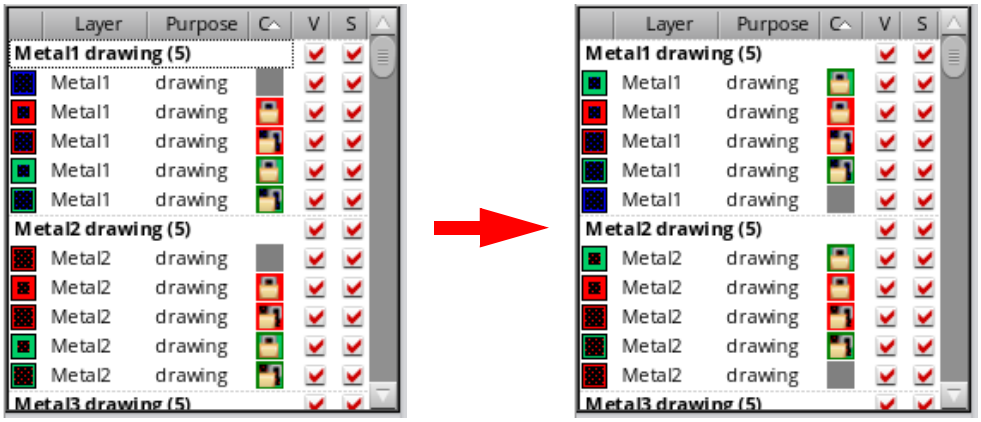


Sorting within a Master Layer-Purpose Pair Group

Layer-purpose pairs within each master layer-purpose pair group, by default, are listed in the following order: `grayColor`, `mask1Color locked`, `mask1Color unlocked`, `mask2Color locked`, `mask2Color unlocked`, and so on. You can specify a different sort order by using the `pteColoredLppSortOrder` environment variable.

For example, if you set this environment variable as shown below, the layer-purpose pairs within each master layer-purpose pair group are listed as follows: `mask2Color locked`, `mask1Color locked`, `mask1Color unlocked`, `mask2Color unlocked`, `grayColor`.

```
envSetVal("layout" "pteColoredLppSortOrder" 'string "m2l m1l m1u m2u g")
```



The layer-purpose pairs that are not included in the argument list follow the default sort order. For example, if you set the environment variable as shown below, the layer-purpose pairs within each master layer-purpose pair group are listed as follows: `mask1Color locked`, `mask2Color locked`, `grayColor`, `mask1Color unlocked`, `mask2Color unlocked`.

```
envSetVal("layout" "pteColoredLppSortOrder" 'string "m1l m2l")
```

Related Topics

MPT Support

A

Layout Viewer Forms

The following table describes the forms that are available in Layout Viewer.

Form	Description
Background Cellview Form	Use the form to display two superimposed cellviews in the same window.
Create Measurement Form	Use the form to create rulers.
Custom Show Layer/ Purpose Form	Use the form to define the criteria to filter layers based on the values of specific columns in the Layers panel.
Delete Configuration Form	Use the form to delete a selected configuration.
Descend Options Form	Use the form to enable the functionality that allows you to choose the view to be opened when descending into instances.
Display Options Form	Use the form to control the appearance of objects and the behavior of commands in a cellview.
Dynamic Display Form	Use the form to control the information displayed about objects in information balloons and during dynamic measurement.
Dynamic Selection Assistant Options Form	Use the form to specify how selected objects are displayed in the Dynamic Selection assistant and the mode used when opening a cellview from the context menu of the assistant.
Find Form	Use the form to search for objects with specific attributes or property values. In Layout Viewer, the Replace functionality is not available.
Highlight Options Form	Use the form to control the objects highlighted when a net is selected or probed. You can choose to selectively display or hide probes for specified nets.

Form	Description
Magnifier Options Form	Use the form to magnify or zoom in a specific part of the design display area instead of zooming in the entire design display area.
Palette Options Form	Use the form to set local and global options for the Palette assistant.
Print Hierarchy Tree Form	Use the form to specify details of the cellview for which you want to print the hierarchy of cellview instances.
Restore View Form	Use the form to choose the view that you want to restore. You can choose from the last three saved views in a session.
Save/Restore Selection Set Form	Use the form to save the objects selected in the canvas as a selection set so that you can restore them later.
Save Configuration Form	Use the form to save the configuration for displaying information about shapes and objects.
Select Area Shape Type Form	Use the form to specify the type of shape within which you want to select objects. You can choose to draw a rectangle or a polygon to define the area for selecting objects.
Selection Options Form	Use the form to set controls for object selection.
Selection Protection Highlight Options Form	Use the form to specify the protection highlight options during the selection of objects.
Set Default Application Form	Use the form to set the default application for opening the current cellview and all cellviews with the same view type as the current cellview.
Show Selected Set Window	Use the form to view information about each type of object that is selected in the current cellview.
Summary Window	Use the window to view the statistics related to the current cellview, such as the instance, layer object, wire, and blockage statistics.
Transparency Options Form	Use the form to control the transparency of tracks, FinFET/WSP shapes, regions, and wire editor tracks.
Tree Form	Use the form to set the levels of instances hierarchy to be listed for the current cellview.

B

Layout Viewer Assistants

Layout Viewer provides various assistants to enable you to work on your designs effectively and efficiently. The following table provides an overview of the assistants.

Assistant	Description
Palette Assistant	Lets you manage the display context and control the visibility and selectability of layer-purpose pairs, objects, grids in your designs.
Dynamic Selection Assistant	Identifies and selects specific objects of interest from a densely-populated design window that has many overlapping or hierarchical objects.
World View Assistant	Displays a complete picture of your entire design and marks the part of the design that is currently displayed in the drawing area. It acts as a navigation tool, especially useful in large designs.
Navigator Assistant	Provides features to view objects across the design hierarchy using a tree representation. It provides a convenient method of selecting sets, expanding, viewing, and interacting with the objects in it, such as instances, nets, and pins across a schematic hierarchy.
Property Editor Assistant	Provides a flexible framework for defining a collection of objects and their associated properties. It lets you view object property values based on the components in your design.
Search Assistant	Provides a wide range of design search features, including dynamic context search categories, fast, keyword-directed searching with immediate feedback, and an intuitive user interface that makes searching for design data simple and productive.

Related Topics

Layout Viewer

Palette Assistant

Use the Palette assistant to manage layer-purpose pairs, objects, grids, and the window display context in a design.

The Palette assistant user interface comprises the following major panels and components.

Layers Panel	Lets you manage layer-purpose pairs. For example, you can control the visibility and selectability of layers, set a layer as active, and create layer sets.
Objects Panel	Lets you manage the visibility and selectability of objects such as instances, pins, and vias in a design.
Grids Panel	Lets you manage the visibility and selectability of tracks and grids in a design.
Palette Context Menu	Lets you manage the Palette assistant and define the local and global settings.

Related Topics

Layout Viewer Assistants

Layers Panel

Use the *Layers* panel to manage layer-purpose pairs. The user interface can be categorized into the following major components:

- Layers Panel Columns
- Layers Panel Column Header Context Menu
- Layers Panel Toolbars

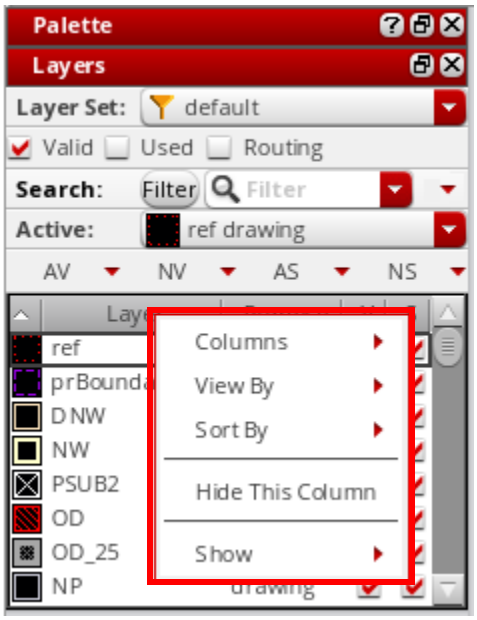
Layers Panel Columns

The following table describes the default columns available in the *Layers* panel.

Column	Description
Swatch	Sorts layer-purpose pairs in the order in which they appear in the `leLSWLayers` section of the technology file. The swatch indicates how a shape appears on the canvas.
Layer	Displays layer names.
Purpose	Displays the purpose associated with each layer.
V (Visibility)	Determines whether the instances and objects on a layer are visible on the canvas. To turn on or off the visibility of all layer-purpose pairs, objects, or elements together, you can click the *V* column header. To sort the layer-purpose pairs, objects, or elements based on their visibility, hold down the `Ctrl` key and click the *V* column header. This default behavior can be modified by using the *Header Column Click* option in the Options form.
S (Selectability)	Determines whether the instances and objects on a layer are selectable on the canvas. To turn on or off the selectability of all layer-purpose pairs, objects, or elements together, you can click the *S* column header. To sort the layer-purpose pairs, objects, or elements based on their selectability, hold down the `Ctrl` key and click the *S* column header.

Layers Panel Column Header Context Menu

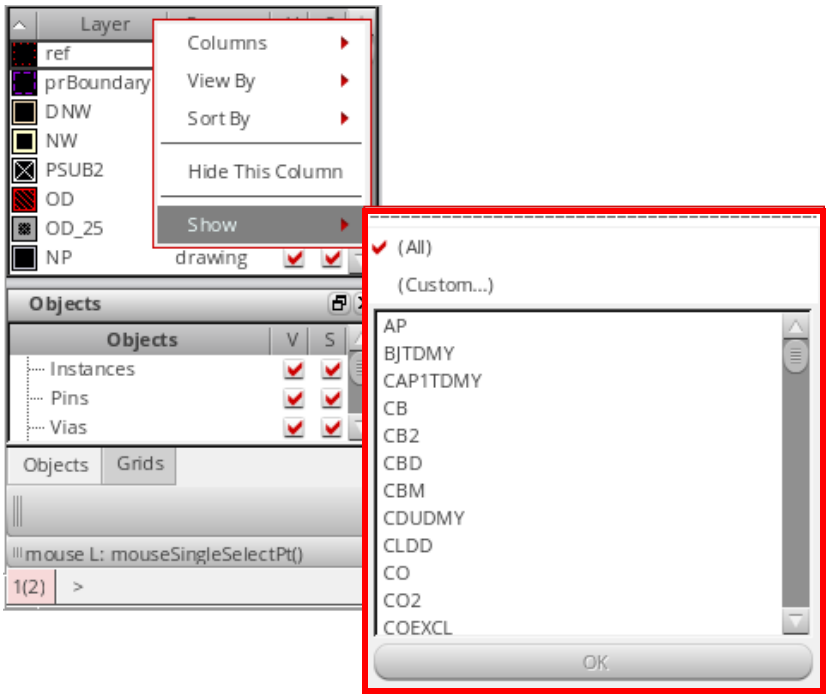
Use the column header context menu to define the settings used for listing layer-purpose pairs in the *Layers* panel. The menu is displayed when you right-click any column header in the *Layers* panel.



The following table describes the commands available in the column header context menu in the *Layers* panel.

Command	Description
Columns	Lists the columns that can be displayed in the *Layers* panel. You can selectively display any column. You can hide or display all columns, except *Swatch*, by selecting the *Hide All* or *Show All* commands, respectively. All columns except *V (Visibility)* and *S (Selectability)* can be resized by dragging the column margin separator.

Command	Description
View By	Displays layer-purpose pairs in a tree structure in the *Layers* panel. You can display layer-purpose pairs based on the following columns: *Layer*, *Purpose*, *Function*, *Color*, *Routing Dir, Mask*, *GDS Number*, *Priority*, *Min Voltage*, *Max Voltage*, *Signal Type*, *Parent*, *Description*, *Layer Set List*, and *None*. The column based on which layer-purpose pairs are grouped appears as the first column in the *Layers* panel. ■ *View By – None*: Displays layer-purpose pairs based on the column on which layer-purpose pairs are sorted. For example, if layer-purpose pairs are sorted on the *Layer* column and you select *View By – None,* the layer-purpose pairs are displayed in the alphabetical order by layer name. ■ *View By – Advanced*: Displays layer-purpose pairs in a tree structure based on multiple columns that you select. ■ *LPP Group*: Groups layers by specific purposes. This command is available for groups on the *View By* submenu, when the `pteLppGroup` environment variable is set.
Hide This Column	Hides a column in the *Layers* panel. To hide a column, right-click the column header and choose *Hide This Column*.

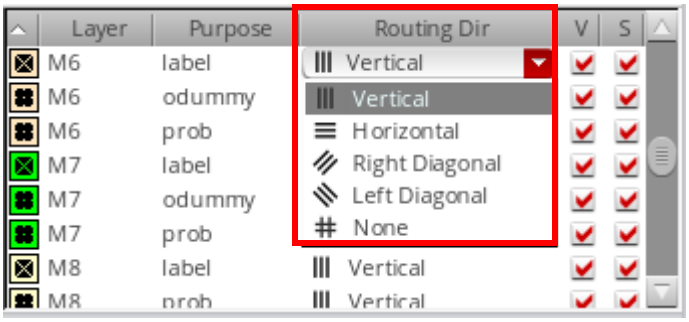
Command	Description
Show	Provides an extended filter mechanism to filter layers based on the values of specific columns. The filter options are displayed when you right-click a column header, except *V (Visibility)* and *S (Selectability)*, and choose *Show*. The *Show* menu includes the following filter options: ■ *All*: Displays all layers. No filter is applied. ■ *Custom*: Lets you define the criteria based on which layers are filtered. For example, selecting the *Custom* option for the *Purpose* column displays the Custom Show Purpose form. You can define the filter criterion by selecting an operator and a purpose. You can add multiple criteria by using the *Add Criteria* button in the form. Depending on your requirement, you can choose to match any or all specified criteria. ■ `List of values`: Lets you select a specific column value from the list, for example a specific purpose, that you want to display. You can use the `Ctrl` key to select multiple values in the list. Layers with the selected value are displayed in the *Layers* panel. The following figure displays the *Show* menu for the *Purpose* column. 

Command	Description
Sort By	Sorts layer-purpose pairs based on the selected column. Each command on the *Sort By* menu corresponds to a column that can be displayed in the *Layers* panel. By default, the layer-purpose pairs are sorted in the order in which they are defined in the `leLswLayers` section of the technology file. For information about the sort columns, see Sort By Columns.

Sort By Columns

The following table describes the columns, which are available on the *Sort By* context menu, based on which you can sort layer-purpose pairs in the *Layers* panel.

Column	Description
Swatch	Sorts layer-purpose pairs in the order in which they appear in the `leLSWLayers` section of the technology file. If this section is not available, layers are sorted based on their priorities.
Layer	Sorts layer-purpose pairs in the alphabetical order by layer name. Layers with the same name but different purposes are sorted in the order of their priority. Layers for which a name is not specified are listed first, followed by layers with names.
Purpose	Sorts layer-purpose pairs by their purpose, in the alphabetical order. Layers with the same purpose but different names are sorted in the order of their priority. Layers for which a purpose is not specified are listed first, followed by the layers with purposes.
Function	Sorts layer-purpose pairs by their function, in the alphabetical order. Layer-purpose pairs for which the function is not specified are listed first, followed by the layer-purpose pairs for which the function is specified. If none of the layer-purpose pairs have functions specified, the layer-purpose pairs are sorted in the order of their priority.

Column	Description
Routing Dir	Sorts layer-purpose pairs by their routing direction. Layer-purpose pairs for which the routing direction is not defined are listed first, followed by the layer-purpose pairs with the routing direction defined. Layer-purpose pairs are sorted in the following order of routing direction: *Horizontal*, *Left Diagonal*, *None*, *Right Diagonal*, and *Vertical.* You can change the routing direction by clicking in the *Routing Dir* column for a layer-purpose pair and selecting a routing direction from the list. 
Mask	Sorts layer-purpose pairs in the ascending order of the mask number assigned to them in the `Layer Definition` section of the technology file. Layer-purpose pairs that do not have mask numbers assigned are listed first, followed by the layer-purpose pairs with mask numbers. If none of the layer-purpose pairs have mask numbers assigned, the layer-purpose pairs are sorted in the order of their priority.
GDS Number	Sorts layer-purpose pairs in the increasing order of their GDS numbers. The GDS Number column displays both the Layer Stream Number and the Datatype Stream Number separated by a ':'. These numbers are present in the optional `<techLibName>.layermap` file that is stored in the technology library directory. If this file is not found, the Palette automatically searches for a `<techLibName>.gdsnumber` file in the `.cadence/dfII/gdsnumber` directory. If both these files are not available, nothing is displayed in the *GDS Number* column.

Column	Description
Priority	Sorts layer-purpose pairs in the descending order of the priorities assigned to them in the `Layer Definition` section of the technology file. Layer-purpose pairs with priority *0* are displayed first.
Min Voltage	Sorts layer-purpose pairs in the ascending order of the minimum voltage assigned to them in the `Layer Definition` section of the technology file. The value is either an integer or a float value. The layer-purpose pairs for which the minimum voltage is not specified are listed first, followed by the layer-purpose pairs for which the minimum voltage is specified.
Max Voltage	Sorts layer-purpose pairs in the ascending order of the maximum voltage that is assigned to the layer-purpose pair in the `Layer Definition` section of the technology file. The value is either an integer or a float value. Layer-purpose pairs for which the maximum voltage is not specified are listed first, followed by the layer-purpose pairs for which the maximum voltage value is specified.
Signal Type	Sorts layer-purpose pairs in the alphabetical order by signal type. The signal type indicates the signal that is carried by the nets routed with the layer-purpose pair. The signal type for a layer-purpose pair is specified in the `Layer Definition` section of the technology file. Layer-purpose pairs for which a signal type is not defined are listed first, followed by layer-purpose pairs with a signal type defined.
Parent	Sorts layer-purpose pairs by the parent purpose of the layer-purpose pair, in the alphabetical order. The parent purpose is the main purpose of the layer from which you can define other purposes. The parent purpose for the layer is defined in the `Layer Definition` section of the technology file. The layer-purpose pairs for which the parent purpose is not defined are listed first, followed by the layer-purpose pairs for which the parent purpose is defined.
Description	Sorts layer-purpose pairs by their descriptions, in the alphabetical order. The description field provides additional information about each layer-purpose pair, as specified in the `Layer Definition` section of the technology file. The layer-purpose pairs for which a description is not specified are listed first, followed by the layer-purpose pairs with a description.

Column	Description
V (Visibility)	Sorts layer-purpose pairs by their visibility status. Layer-purpose pairs with the *Visibility* check box deselected are listed first, followed by the layer-purpose pairs with the check box selected.
S (Selectability)	Sorts layer-purpose pairs by their selectability status. Layer-purpose pairs with the *Selectability* check box deselected are listed first, followed by layer-purpose pairs with the check box grayed out. Layer-purpose pairs with the check box selected are listed last.
Stipple	Sorts layer-purpose pairs by their stipple patterns. Layer-purpose pairs with the *Stipple* check box deselected are listed first, followed by layer-purpose pairs with the check box selected.
LS Order	Sorts layer-purpose pairs in the increasing order of their layer set order numbers.
Reverse	Reverses the order in which the layer-purpose pairs are currently displayed.

Layers Panel Toolbars

The *Layers* panel includes the following toolbars: *Layer Set*, *Scope*, *Search*, *Active Layer*, *Control Buttons*, *Edit*, *Window Context*, and *Layer Set Manager.*

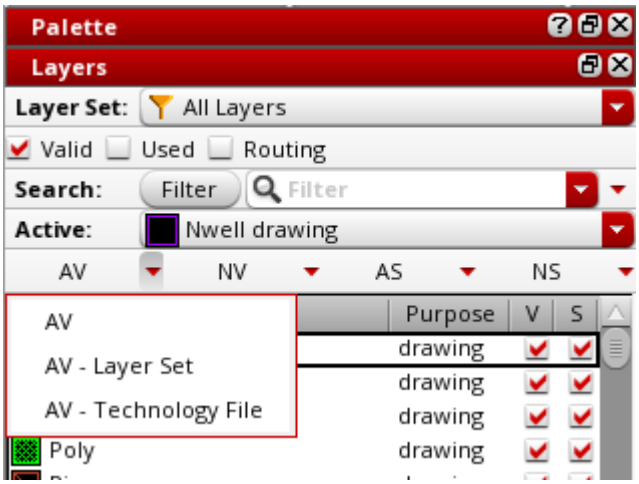
The following table describes each of these toolbars, which you can access by choosing *Show Tools* from the Palette context menu.

Toolbar/Command	Description
***Layer Set* toolbar**	This toolbar lists all layer sets available in the design and displays the name of the layer set that is currently active. Layers belonging to the active layer set are listed in the *Layers* panel.

Toolbar/Command	Description
All Layers	Is a system-defined layer set. You can apply filters to this layer set, but you cannot add or remove layers from it. SKILL function: `pteSetLSActive` On the Layer Set toolbar, you can select only one layer set at a time for your design. To set multiple layer sets as active at a time, use the *Layer Set Manager* toolbar.
***Scope* toolbar**	This toolbar provides the following options for filtering layers: *Valid*, *Used*, and *Routing*.
Valid	Displays only valid layers in the *Layers* panel.
Used	Displays only the layers that contain design objects of the type shape. You need to reapply the filter to refresh the display in the *Layers* panel if you add a design object to a previously unused layer while the filter is still applied. If you want to view layers that contain all types of design objects, such as blockages, boundaries, instances, mosaics, markers, and rows, set the `pteShowUsedSystemLpps` environment variable to `t`, and then select the *Used* check box. When `pteShowUsedSystemLpps` is set to `t`, the *Used* filter is not dynamic and you need to reapply the filter, for example while switching to another tab or window, editing in place, or descending into a hierarchy.

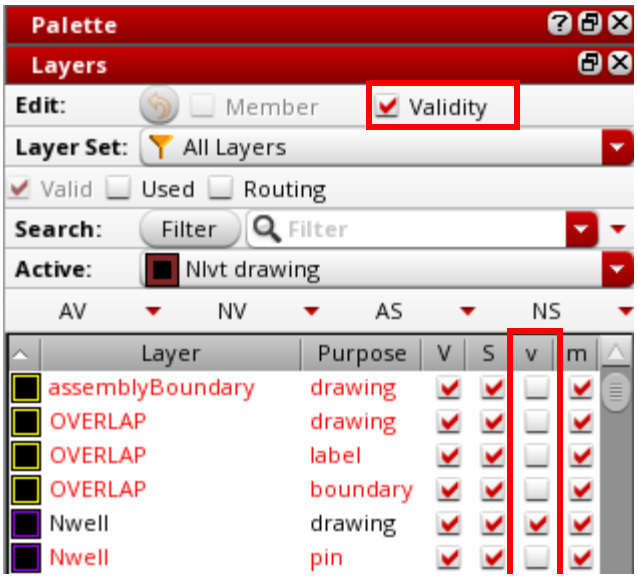
Toolbar/Command	Description
Routing	Displays only the routing layers. Routing layers are identified at the start of a Virtuoso session. By default, the following layers are identified as routing layers: ■ All layers with function *metal*, *cut*, and *poly* and purpose *drawing* through *drawing9*. You can exclude *cut* layers from routing layers by using the `pteIncludeCutLayers` environment variable. The value of this variable must be set before opening a design. Once set, it is applicable for the entire session. ■ All layers with purpose *drawing* through *drawing9* present in the `validRoutingLayers` constraint. ■ All combinations of layers and purposes present in the `validRoutingLPPs` constraint. For example, you can add layer purpose pairs, `diff/net` and `ndiff/pin`, to the `validRoutingLPPs` constraint. This means that the following layer purpose pairs are treated as routing layer-purpose pairs: `diff/net`, `diff/pin`, `ndiff/net`, and `ndiff/pin`.
***Search* toolbar**	This toolbar lets you search for specific layer-purpose pairs in the *Layers* panel.
Filter/Find toggle button	Lets you find or filter layer-purpose pairs. You can toggle between *Filter* and *Find* search modes. ■ *Filter*: Displays only the layer-purpose pairs that match the specified search criteria. The active layer does not change. This is the default search mode. ■ *Find*: Continues to display all layers and the first layer that matches the search criteria becomes the active layer. If you now press `Enter`, the next layer that matches the search criteria becomes the active layer. You can continue to press `Enter` to move through the list of matching layer-purpose pairs in a cyclic manner. In this mode, search is performed only on the layers that are currently listed in the *Layers* panel. SKILL functions: `pteFindNext`, `pteFindPrev`

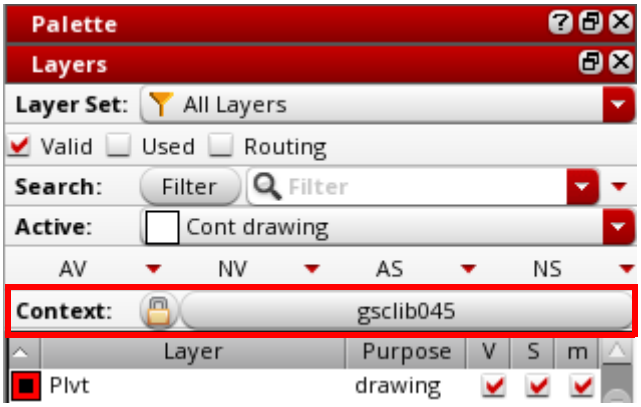
Toolbar/Command	Description
Filter/Find field	Lets you specify the search criteria. As you type individual characters, the information in the *Layers* panel gets updated. Finally, the search returns all layer-purpose pairs that contain the specified string in any of the displayed columns. By default, the search operation is case-insensitive and looks for values that begin with the specified string (prefix). The search operation considers only the columns that are displayed in the panel in which you perform the search.
Search History	Displays the search history for the current session. The *Search History* icon appears next to the *Filter*/*Find* field. Once you choose a search criterion, the Clear icon replaces the Search History icon. Use the *Clear* icon to clear contents of the *Filter*/*Find* field. SKILL function: `pteClearSearchHistory`
Advanced	Lets you refine the search results. The following advanced search options are available for *Filter* and *Find* modes: ■ *Find With*: Lets you specify the default operator for a search operation: AND (*All Of The Words*), OR (*Any Of The Words*), EXACTLY (*The Exact Phrase*), or NOT (*None Of The Words*). SKILL function: `pteSetSearchOperator` ■ *Match Word*: Lets you further refine the search by specifying whether a partial or an exact match is required. You can choose from any of the following options: *Substring*, *Prefix, Exactly*, and *Suffix*. SKILL function: `pteSetSearchMatchType` ■ *Using Case*: Lets you specify whether the search operation is case-sensitive *(Sensitive Match)* or the casing of the specified search string can be ignored (*Insensitive Match)*. For example, to display search results that include the string `M1` and not `m1`, you need to select the *Sensitive Match* option. SKILL function: `pteSetSearchMatchCase`
***Active Layer* toolbar**	This toolbar displays the name of the layer that is currently active. The *Active* list stores the history of up to 10 active layers for the current session.

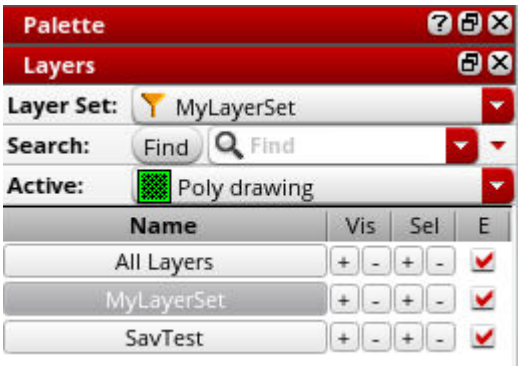
Toolbar/Command	Description
Show Unlocked Colors	Displays unlocked colors on shapes. This option is displayed when the `pteShowColorControlsForMPT` environment variable is enabled.
Show Locked Colors	Displays locked colors on shapes. This option is displayed when the `pteShowColorControlsForMPT` environment variable is enabled.
***Control Buttons* toolbar**	This toolbar lets you manage the visibility and selectability of layer-purpose pairs in the *Layers* panel. It includes the *AV*, *NV*, *AS*, and *NS* control buttons.
AV	Controls visibility of layers in the *Layers* panel. *AV* refers to All Visible. The *AV* list contains the following options: ■ *AV*: Turns on visibility of all layers currently listed in the *Layers* panel. Clicking *AV* on the *Control Buttons* toolbar also performs the same function. SKILL Function: `pteSetAllVisible` ■ *AV - Layer Set*: Turns on visibility of all layers of the active layer set, irrespective of the layers displayed in the *Layers* panel. ■ *AV - Technology File*: Turns on visibility of all layers defined in the technology file. 

Toolbar/Command	Description
NV	Turns off visibility of layers in the *Layers* panel. *NV* refers to None Visible. The *NV* list contains the following options: ■ *NV*: Turns off visibility of all layers currently listed in the *Layers* panel. SKILL Function: `pteSetNoneVisible` ■ *NV - Layer Set*: Turns off visibility of all layers of the active layer set, irrespective of the layers displayed in the *Layers* panel. ■ *NV - Technology File*: Turns off visibility of all layers defined in the technology file.
AS	Controls selectability of layers in the *Layers* panel. *AS* refers to All Selectable. The *AS* list contains the following options: ■ *AS*: Turns on selectability of all layers currently listed in the *Layers* panel. SKILL Function: `pteSetAllSelectable` ■ *AS - Layer Set*: Turns on selectability of all layers of the active layer set, irrespective of the layers displayed in the *Layers* panel. ■ *AS - Technology File*: Turns on selectability of all layers defined in the technology file.
NS	Turns off selectability of layers in the *Layers* panel. *NS* refers to None Selectable. The *NS* list contains the following options: ■ *NS*: Turns off selectability of all layers currently listed in the *Layers* panel. SKILL Function: `pteSetNoneSelectable` ■ *NS - Layer Set*: Turns off selectability of all layers of the active layer set, irrespective of the layers displayed in the *Layers* panel. ■ *NS - Technology File*: Turns off selectability of all layers defined in the technology file.
***Edit* toolbar**	This toolbar lets you add or remove layers from layer sets.

Toolbar/Command	Description
Member	Displays the *m (Membership)* column in the *Layers* panel. To a layer or remove it from the current layer set, you need to select or deselect the corresponding check box in the *m* column. SKILL functions: pteSetAllLayerSetMember, pteSetLayerSetMember, pteSetNoneLayerSetMember, pteEditLayerSet, pteCloseLayerSetEdition, pteToggleAllLayerSetMember

Toolbar/Command	Description
Validity	Displays both valid and invalid layers in the *Layers* panel. Also displays the *v (Validity)* and *m (Membership*) columns in the panel. Invalid layer-purpose pairs are displayed in red. Layers are specified as valid or invalid in the technology file. You cannot set a layer-purpose pair as valid by using the *Layers* panel if following settings are defined in the technology file: ■ The layer or the purpose is set as invalid, that is, the `valid` attribute is set to `nil`. ■ The layer, purpose, or layer-purpose pair is locked, that is, the `allowSetToValid` and `allowSetToValidInSession` attributes are set to `nil`. You cannot set an invalid layer as the active layer because such layers cannot be used effectively in a design. However, you can use the *Layers* panel to set a locked layer-purpose pair as invalid.  SKILL functions: `pteEditLayerSetValidity`, `pteSetAllValidity`, `pteSetNoneValidity`, `pteSetValidity`, `pteShowValidLPP`, `pteToggleAllValidity`, `pteToggleLayerSetValidityEdition`, `pteCloseLayerSetEdition`

Toolbar/Command	Description
Discard Edits 	Lets you discard all changes made to the membership and validity status of layers. SKILL function: `pteDiscardLayerSetEdition`
***Window Context* toolbar**	This toolbar lets you synchronize or desynchronize the Palette.
Context	Displays the name of the current display context. By default, it is the name of the technology file. 
Synchronize/ Desynchronize 	Lets you synchronize or desynchronize the Palette. Palettes with the same window context name are synchronized.
***Layer Set Manager* toolbar**	This toolbar lets you manage the layer sets available in the current design window. It contains three columns: *Visibility* (*Vis*), *Selectability* (*Sel*), and *Enable Layer Set* (*E*).

Toolbar/Command	Description
Visibility (Vis)	Lets you to turn on or off the visibility of all the layers in a layer set by clicking the corresponding + or – button, respectively. These buttons work with respect to the filter settings defined on the *Scope* and *Filter* toolbars if the pteLSManagerRespectFilters environment variable is set to `t`. 
Selectability (Sel)	Lets you to turn on or off the selectability of all the layers in a layer set by clicking the corresponding + or – button, respectively. You can set a layer set as active and turn on the visibility and selectability of all its member layers by clicking the layer set with the middle mouse button. The visibility and selectability for all other layers is turned off.
Enable Layer Set (E)	Lets you to disable a layer set by deselecting the corresponding check box. This column is displayed when you right-click a column header in *Layer Set Manager* and choose *Columns – Enable Layer Set* from the context menu. The layer set that is currently active cannot be disabled.

Related Topics

LPP Validity

techIsLPValidBase

View By Form

Custom Show Layer/Purpose Form

Palette Assistant Panels

Palette Assistant

Objects Panel

Use the *Objects* panel to manage the visibility and selectability of objects such as instances, pins, and vias in a design.

The *Objects* panel user interface can be categorized into the following major components: columns, column header context menu, and toolbars.

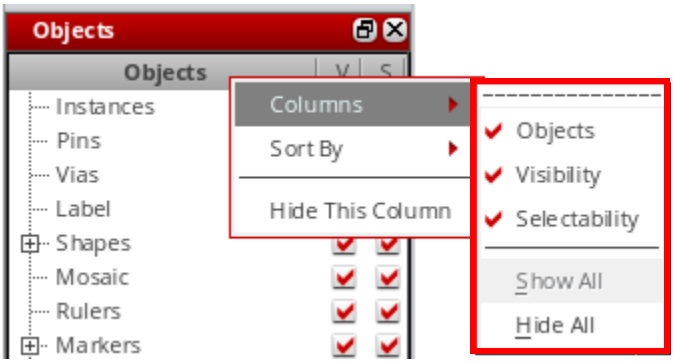
Objects Panel Columns

The following table describes the default columns displayed in the *Objects* panel. You cannot resize columns in the *Objects* panel.

Column	Description
Objects	Lists the objects in a hierarchical tree structure.
V (Visibility)	Lets you control the visibility of objects. To make an object visible, you need to select the corresponding check box in the *V (Visibility)* column. You cannot change the visibility of objects such as fluid guard rings, fluid shapes, and soft blocks. For such objects, the *V (Visibility)* check box is unavailable.
S (Selectability)	Lets you control the selection of objects. To make an object selectable, select the corresponding check box in the *S (Selectability)* column. An invisible object cannot be selected. In the *Objects* panel, the behavior of instance, via, and fig group objects is different from that of other objects because these are second-level objects. These objects can be selected even if they are invisible.

Objects Panel Column Header Context Menu

The following table describes the commands available on the column header context menu in the *Objects* panel. You can access the context menu by right-clicking a column header in the panel.

Command	Description
Columns	Lets you selectively hide or display columns in the *Objects* panel. The *Hide All* and *Show All* commands hide or display the *Visibility* and *Selectability* columns. The *Objects* column is not hidden from view when you choose the *Hide All* command. 

Command	Description
Sort By	Lets you sort objects by object name, visibility, or selectability. ■ *Objects*: Sorts objects in the alphabetical order by name. ■ *Visibility*: Sorts objects by visibility status. The objects that cannot be made visible are listed first, followed by the objects for which the visibility check box is deselected. The objects for which the visibility check box is selected are listed last. ■ *Selectability*: Sorts objects by selectability status. The objects for which the selectability check box is deselected are listed first, followed by the objects for which the selectability check box is selected. ■ *Default*: Sorts objects in the default order. The default order is as follows: Instances, Pins, Vias, Label, Shapes, Mosaic, Rulers, Markers, Fluid Guardring, Fluid Shapes, Fig Groups, Boundaries, Soft Blocks, Blockages, Symmetric Axes, and Rows. ■ *Reverse*: Reverses the order in which the objects are currently displayed.
Hide This Column	Hides a column in the *Objects* panel. To hide a column, right-click the column header and choose *Hide This Column*.

Objects Panel Toolbars

The following table describes the toolbars available in the *Objects* panel. For more information about the functionality available in these toolbars, see Layers Panel Toolbars.

Toolbar	Description
Search	Lets you search for specific objects in the *Objects* panel.
Control Buttons	Lets you manage the visibility and selectability of objects in the *Objects* panel.

By default, the *Objects* panel does not display toolbars. You can display a toolbar by selecting it from the *Show Tools* submenu in the Palette context menu.

Related Topics

Layers Panel

Grids Panel

Palette Context Menu

Palette Assistant

Grids Panel

Use the *Grids* panel to manage the visibility and selectability of tracks and grid elements.

The *Grids* panel user interface can be categorized into the following major components: columns, column header context menu, and toolbars.

Grids Panel Columns

The following table describes the columns displayed in the *Grids* panel.

Column	Description
Grids	Displays elements in a hierarchical tree structure.
V (Visibility)	Lets you control the visibility of elements. To make an element visible, select the corresponding check box in the *V (Visibility)* column.

Grids Panel Column Header Context Menu

The following table describes the options available on the column header context menu of the *Grids* panel. You can access the context menu by right-clicking a column header in the panel.

Command	Description
Columns	Lets you selectively hide or display columns in the *Grids panel*. The *Hide All* and *Show All* commands hide or display the *V (Visibility)* column. The *Grids* column is not hidden from view when you choose the *Hide All* command.

Command	Description
Sort By	Lets you sort the elements displayed in the *Grids* panel by element name and visibility. ■ *Grids:* Sorts elements in the alphabetical order by name. ■ *Visibility:* Sorts elements by visibility. The elements for which the visibility check box is deselected are listed first, followed by the elements for which the check box is selected. ■ *Default:* Sorts elements in the default order, which is *Tracks* and then *Grids*. ■ *Reverse:* Reverses the order in which the elements are currently displayed.
Hide This Column	Hides a column in the *Grids* panel. To hide a column, right-click the column header and choose *Hide This Column*.

Grids Panel Toolbars

The following table describes the toolbars available in the *Grids* panel. For more information about the functionality available in these toolbars, see Layers Panel Toolbars.

Toolbar	Description
Search	Lets you search for specific grids and tracks in the *Grids* panel.
Control Buttons	Lets you manage the visibility and selectability of grids and tracks in the *Grids* panel.

By default, the *Grids* panel does not display toolbars. You can display a toolbar by selecting it from the *Show Tools* submenu in the Palette context menu.

Related Topics

Layers Panel

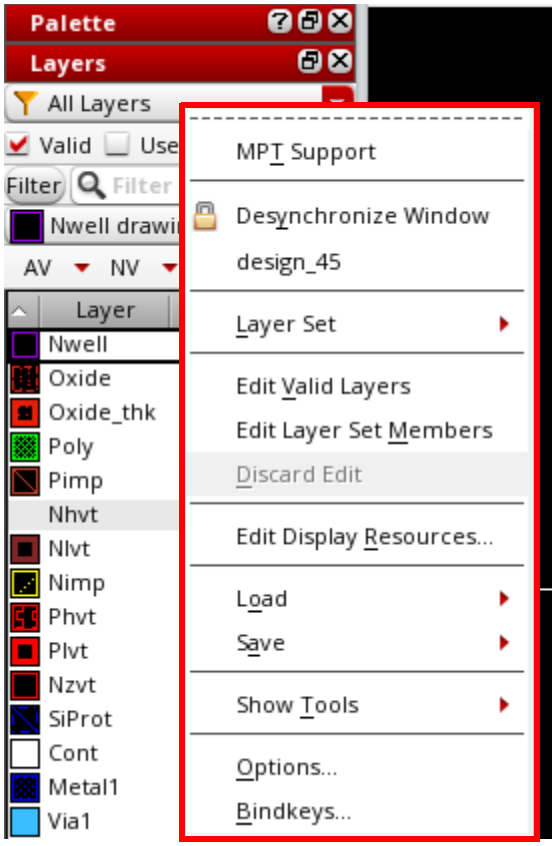
Objects Panel

Palette Context Menu

Palette Assistant

Palette Context Menu

Use the Palette context menu to manage settings such as toolbars, layer sets, and window synchronization. You can access the context menu by right-clicking any toolbar in the *Layers* panel or anywhere in the *Objects* and *Grids* panels except the title bar and column headers.



The following table describes the commands available on the Palette context menu of the Palette assistant.

Column	Description
MPT Support	Lets you draw shapes, wires, and pins with layer, color, and lock state information. When you enable *MPT Support*, the *MPT* check box on the *Scope* toolbar and the *C* (*Color)* column are displayed in the *Layers* panel. This displays all layer-purpose pairs with color, grouped by their master layer-purpose pair.

Column	Description
Synchronize/ Desynchronize Window	Lets you toggle between synchronized and desynchronized modes of Palette assistants across layout windows. When two Palette assistants are synchronized, changes made in one palette are reflected in the other. This command works in the same manner as the *Synchronize/ Desynchronize* button available on the *Window Context* toolbar. SKILL Function: `pteSetWindowSynchro`
Context	Shows the name of the display context of the Palette. By default, it is the name of the technology file.

Column	Description
Layer Set	Lets you manage layer sets. The *Layer Set* submenu includes the following commands: ■ *Save*: Saves the changes made to a layer set file. The *Save* command is disabled when the *All Layers* layer set is selected because *All Layers* is a system-generated layer set and cannot be modified. SKILL function: `pteSaveLayerSet` ■ *Save As*: Saves the layer set as a *<layersetname>*`.layerSet` file in the specified layer set repository. The newly created layer set is automatically set as active and is displayed on the *Layer Set* and *Layer Set Manager* toolbars. SKILL functions: `pteSaveAsLayerSet`, `pteSaveAsSynchronizedLayerSet` ■ *Reload*: Reloads the layer set that is currently in use. After making changes to the layer attributes, you can use the reload operation to re-synchronize the layer, object, and grid items. The visibility and selectability status of layer, object, and grid items are also re-synchronized if the *Layer Set Activation* field is set to *Filter and apply visibility,selectability* in the Options form. SKILL function: `pteReloadLayerSet` ■ *Delete*: Deletes a layer set from the *Layers* panel as well as from the layer set repository. SKILL function: `pteDeleteLayerSet`

Column	Description
	■ *Import*: Imports a layer set file from the file system to the layer set repository. The imported layer set is added to the *Layer Set* list in the *Layers* panel. SKILL function: `pteImportLayerSet` ■ *Export*: Helps save a layer set that exists in the layer set repository to the file system. SKILL function: `pteExportLayerSet` ■ *Save Layer Set List*: Saves the layer set order and status in the `layerset.order` file in the `.cadence` directory at the specified location. This option displays the Save Layer Set List form, where you can select the location from the *Layer Set repository* list. When you start a new Virtuoso session, the `layerset.order` file is loaded automatically based on the order of precedence defined in the `setup.loc` file. SKILL function: `pteSaveLayerSetListInRepository`
Edit Valid Layers	Displays the *m (Membership)* and *v (Validity)* columns in the *Layers* panel. SKILL functions: `pteEditLayerSetValidity`, `pteCloseLayerSetEdition`
Edit Layer Set Members	Displays the *m (Membership)* column in the *Layers* panel. SKILL functions: `pteEditLayerSet`, `pteCloseLayerSetEdition`
Discard Edit	Discard all changes made to the membership and validity status of layer-purpose pairs during the current layer set editing session. SKILL function: `pteDiscardLayerSetEdition`
Edit Display Resources	Displays the Display Resource Editor form, where you can modify the appearance of the icon that is displayed for a layer in the *Swatch* column in the *Layers* panel.
Load	Lets you update the current display context with information from one of the following file types: LSW information file, technology file, or GDS number file. SKILL functions: `pteLoadLSWInfo`, `pteLoadFromTechFile`, `pteLoadGDSNumber`

Column	Description
Save	Lets you save the current display context information to one of the following file types: LSW information file, technology file, or GDS number file. SKILL functions: `pteSaveLSWInfo`, `pteSaveToTechFile`, `pteSaveGDSNumber`
Show Tools	Lets you display or hide the toolbars. You can display or hide all toolbars by using the *Show All* or *Hide All* commands, respectively. The options available on the *Show Tools* submenu vary depending on the panel in which you invoke the menu.
Options	Displays the Options form, where you can define the local and global settings for the Palette assistant. SKILL function: `pteSetOptionString`
Bindkeys	Opens the *Bindkey Editor*, which displays the list of default bindkeys, including the ones defined for Palette-related options. You can use the *Bindkey Editor* to modify existing bindkeys or to define new bindkeys.

Related Topics

Configuring Application Bindkeys

Layers Panel

Objects Panel

Grids Panel

Palette Assistant

Dynamic Selection Assistant

Use the Dynamic Selection assistant to view a list of all the objects currently under the mouse pointer in the design display area, ordered by the layer-purpose pair on which a particular object is drawn.

The Dynamic Selection assistant user interface has three major components: columns, object types, and the context menu.

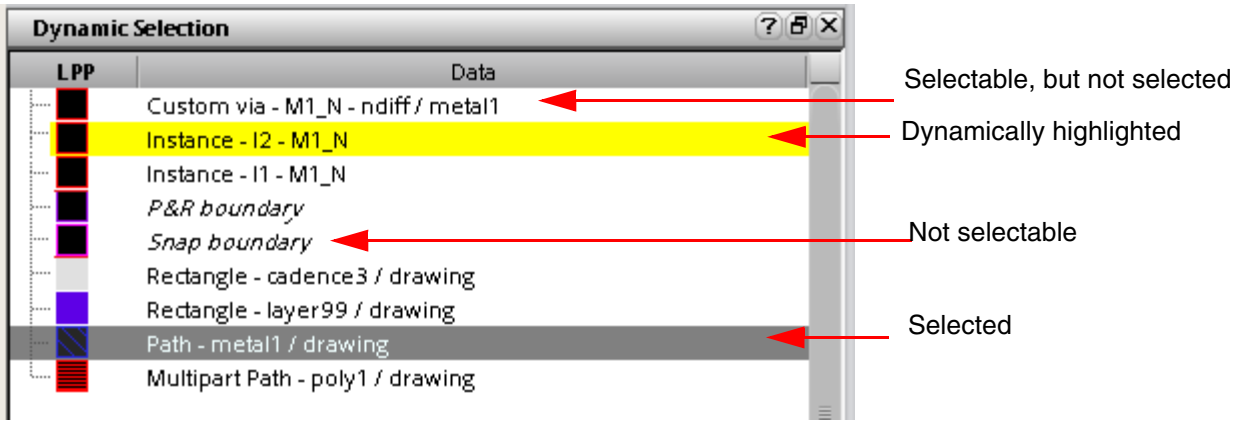
Dynamic Selection Assistant Columns

The following table describes the different columns available in the Dynamic Selection assistant.

Column	Description
LPP	Specifies the layer-purpose pair on which the object is drawn.
Data	Provides a short description of the selected object.
Color	Displays the color information of the selected object.
State	Displays the lock state of the selected shape.
Hierarchy	Displays the hierarchical path of the objects under the mouse pointer. For hierarchical objects, the *LPP*, *Data*, and *Hierarchy* columns are displayed in the Dynamic Selection assistant.

Dynamic Selection Assistant Object Types

The following image shows the Dynamic Selection assistant listing the layer-purpose pairs on which objects are drawn. Different fonts and background colors are used to display an object depending on its selection state.



The following table describes the kind of information displayed for each object type in the *LPP* and *Data* columns of the Dynamic Selection assistant.

Object Type	Description
Instance	Name and master name.
Instance array	Name, master name, and the number of rows and columns in the array.
Via	Name of layer 1, layer 2, and the net to which the via is attached.
Via array	Name of layer 1, layer 2, and the net to which the via array is attached, and the number of rows and columns in the array.
Shape	Name of the layer-purpose pair on which the shape is drawn and the net to which it is attached.
Label	Text attached to the label.
Row	Site name and the number of sites used in the row.
Group	Name and type of the group.
Guide	Name of layer 1, layer 2, and the net to which the guide is attached.
Pin	Information on associated objects and the name of the net to which the pin is attached.
Blockages	Name of the placement band routing blockages and other related objects such as placement halos, routing, fill, and slot objects.
Routing	Name of transmission lines, bends and tapers, steiners, multi-part paths.
Boundary	Name of the boundary type, for example, area, snap, or cluster.
Row Region	Name of the row region and row template.
Row	Name and orientation of the row, site name, and the number of sites used in the row.
Custom Row	Name, orientation, and height of the row.
Rail shape/ Background shape	Name of the layer-purpose on which the shape is drawn.

Dynamic Selection Context Menu

The following table describes the commands available on the context menu of the Dynamic Selection assistant.

Command	Description
Freeze / Unfreeze DSA	Freezes or unfreezes the display in the assistant. When you select an object in the Dynamic Selection assistant with a frozen display, the object is automatically cross-selected in the layout window. If you move the pointer over an object in the assistant, that object is dynamically highlighted in the layout window.
Options	Opens the Dynamic Selection Assistant Options form where you can specify the display of the selected objects in the assistant and specify the default open mode.
Settings	Lets you save and load your display preferences for the Dynamic Selection assistant. This ensures that the order of fields that you choose for the assistant and the show or hide states are retained even after you close the current Virtuoso session. ■ *Load*: Lets you load the assistant settings. ■ *Save*: Saves your preferences in the `*.ini` file.

Related Topics

Selecting Objects Using the Dynamic Selection Assistant

Dynamic Selection Assistant Options Form

World View Assistant

Use the World View assistant to display a complete picture of your entire design and mark the part of the design displayed on the canvas. You can access the World View assistant by selecting *Window – Assistants – World View*.

The following table describes the user interface of the World View assistant.

View box	Marks the part of the design that is currently displayed on the canvas in the layout window

Black bars	Appear on each side of the view box as a handle that you can use to zoom in or out the design.
Context menu	Lets you zoom and redraw the design. ■ *Redraw*: Refreshes the display in the current window. ■ *Zoom In*: Increases the size of the view box and zooms in the cellview corresponding to the size of the view box. ■ *Zoom Out*: Decreases the size of the view box and zooms out the cellview corresponding to the size of the view box. ■ *Fit All*: Fits the entire design into the World View window. ■ *Pattern*: Selects the percentage of the color luminosity of the view box. You can set it to *Solid, 75%, 50%, 25%*, or *Hollow*.

Related Topics

Navigating a Design Using the World View Assistant