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# Allegro X 3DX Canvas User Guide

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# Allegro X 3DX Canvas

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Allegro 3DX Canvas displays 3D models of design objects using high-quality graphical 3D engine to address scale and complexity issues related to large designs involving performance and memory in Allegro 3D Canvas. The new 3DX engine is integrated with the Allegro board design database. Using the 3DX canvas, you can analyze the design before creating manufacturing outputs or for exchanging information between other 3D applications.

Allegro 3DX Canvas displays in its own canvas, letting you continue to work with the two-dimensional view in the main canvas. The 3DX Canvas view is in sync with all the changes made to the Allegro database. Physical violations between models, the PCB, and the rigid-flex objects can be verified. You can interactively zoom, pan, and rotate the design in the 3DX canvas.

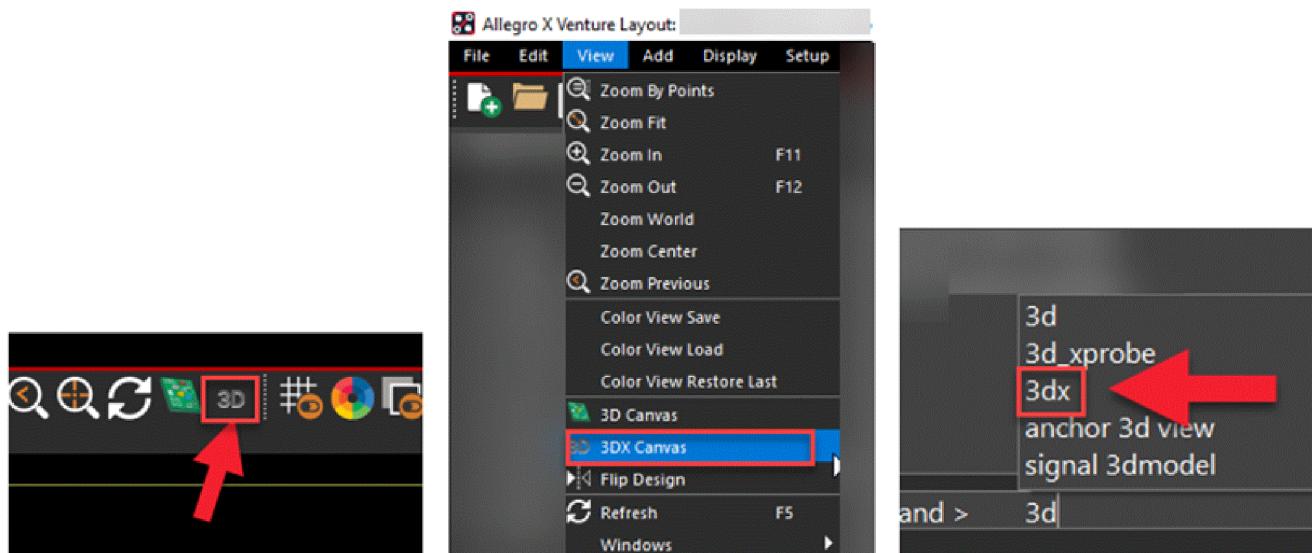
Related topics describe the features and functionality of 3DX Canvas available with the following products:

- Allegro X Artist Layout
- Allegro X Designer Layout
- Allegro X Venture Layout

# Opening Allegro 3DX Canvas

To open 3DX canvas, follow these steps:

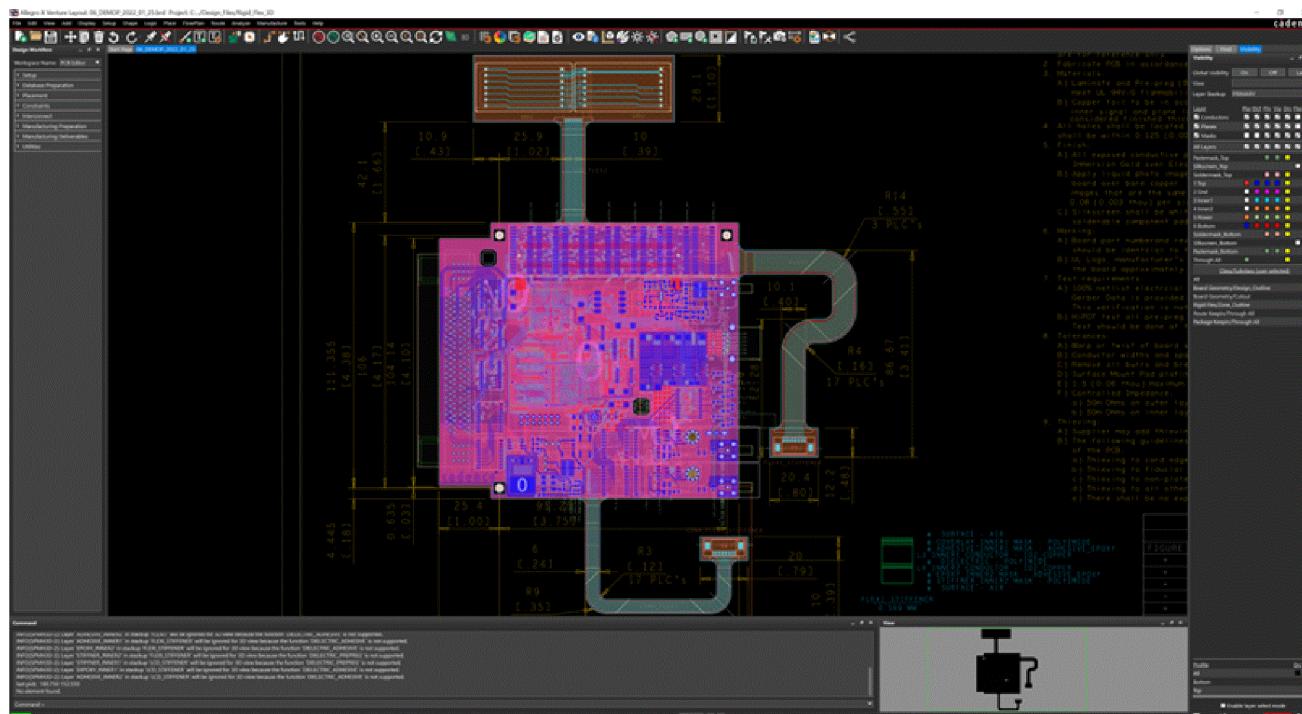
1. Choose the *View – 3DX Canvas* menu command.
2. Alternatively, click the 3DX toolbar icon in the *View* toolbar or type `3DX` and press `Enter` in the Command window.



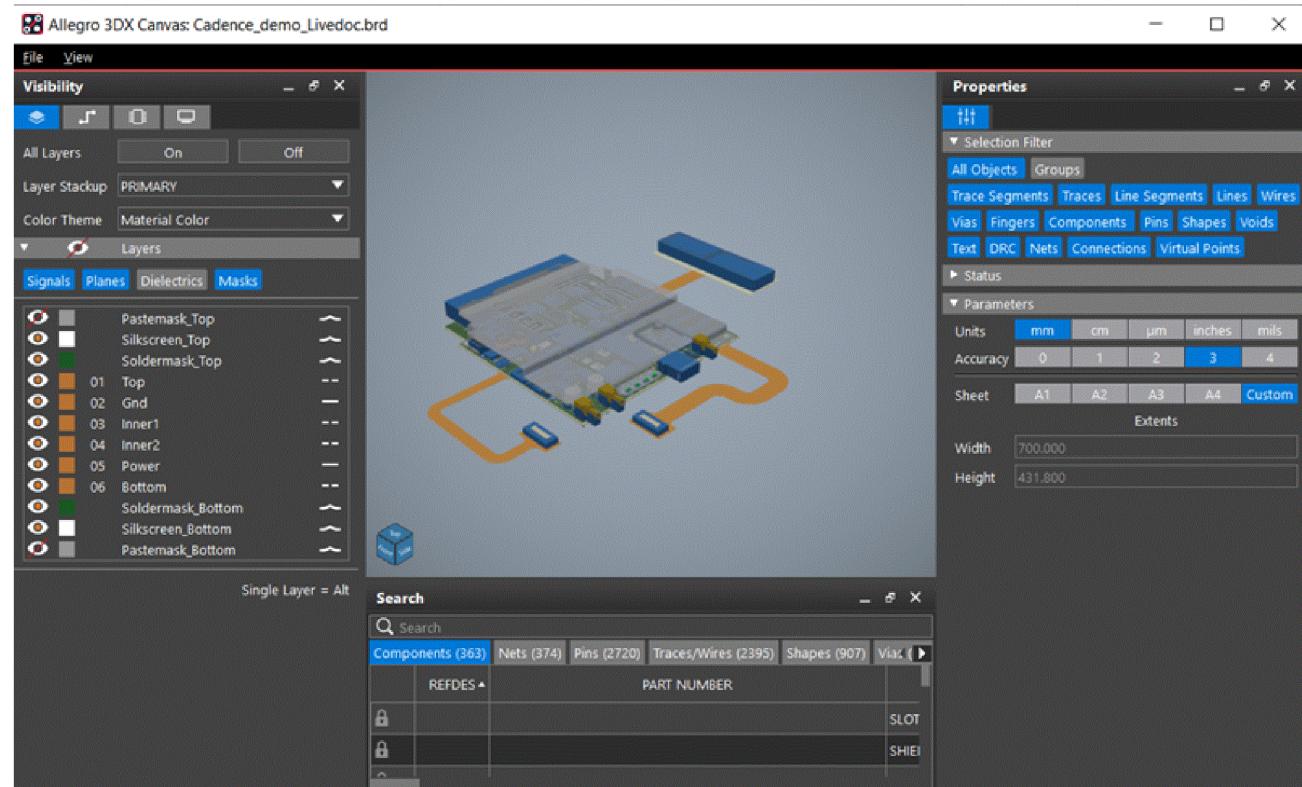
Allegro 3DX Canvas opens in a separate window and works in tandem with Allegro X PCB Editor. Any changes made in the layout propagate to 3DX Canvas and the objects selected in the 3DX Canvas window are also selected in the 2D layout, simultaneously.

⚠ To open 3DX Canvas, OpenGL version 4.3 or higher is required by graphics device.

## Cadence Allegro Rigid-Flex Board Design



## Allegro 3DX Canvas View of Allegro Rigid-Flex Design



 3DX Canvas works only with board (.brd) files. The symbol designs (.dra) are currently not supported.

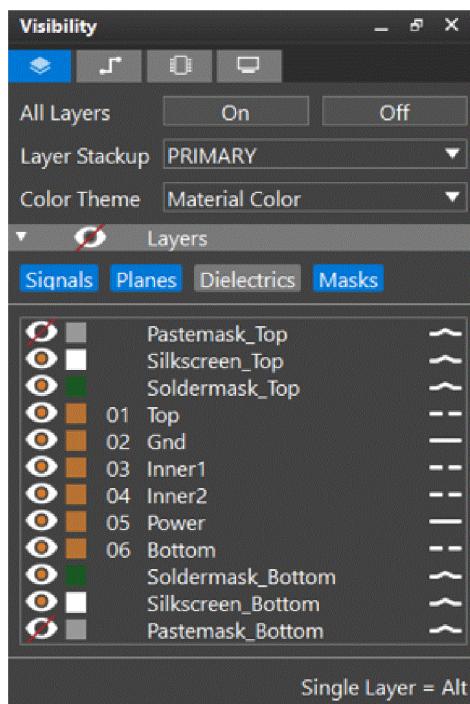
# Allegro 3DX Canvas User Interface

Allegro 3DX Canvas is intuitive and easy to use. It includes the three main panels:

- [Visibility](#)
- [Properties](#)
- [Search](#)

Use the *Visibility* panel in the 3DX Canvas to tailor the canvas visually with the layers, objects, and any information that needs to be shown.

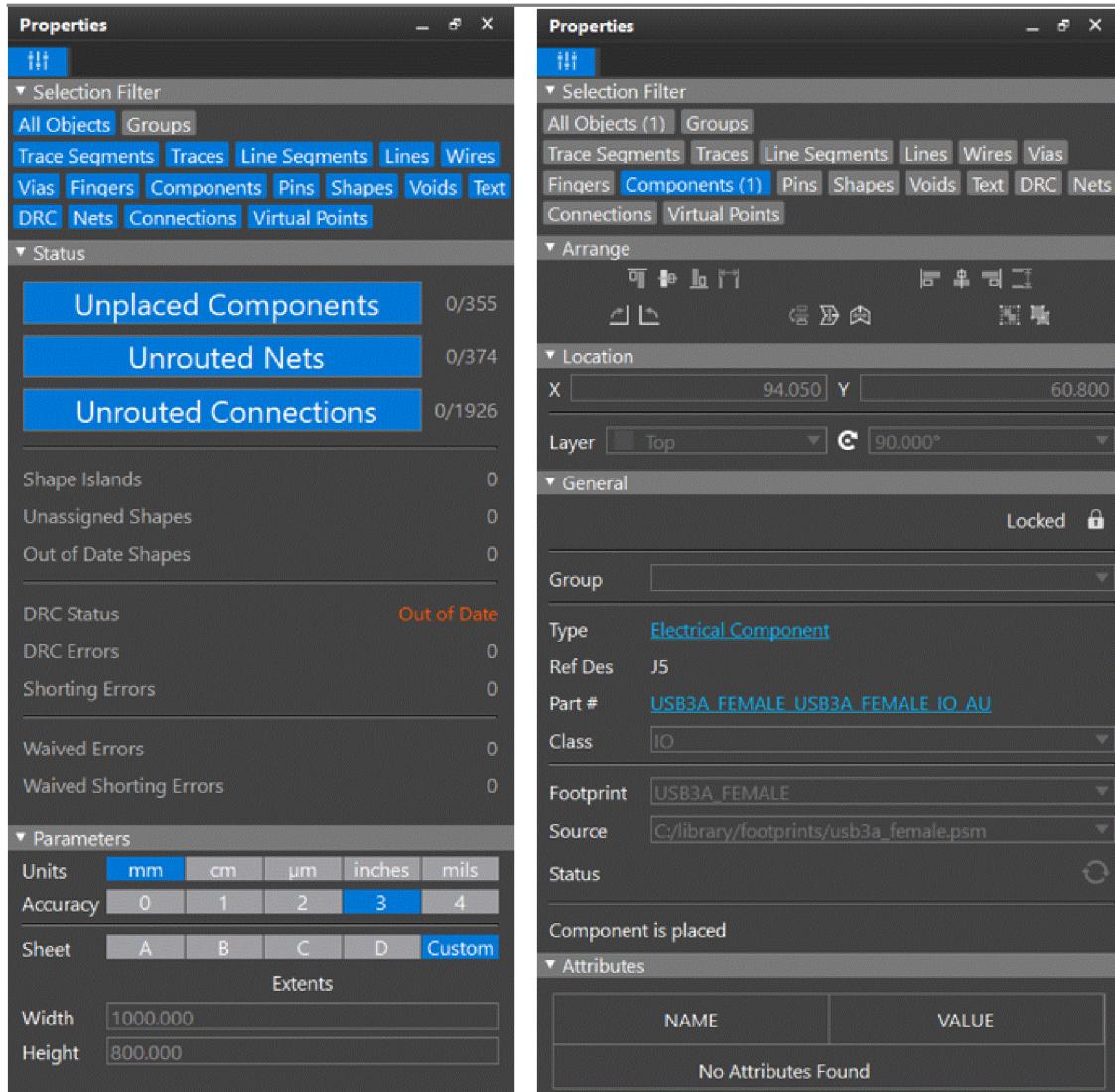
## 3D X Canvas Visibility Panel



The *Properties* panel in the 3DX Canvas provides important information about the design when no object is selected, and about the selected object or objects when an object or objects are selected. This panel changes dynamically as you select objects on the canvas. This panel also lets you choose the type of objects to select on the canvas.

The following image illustrates two examples of the *Properties* panel. The image on the left displays the *Properties* panel when no object is selected on the canvas. In this state, all the information provided is about the design. The image on the right, is an example of the *Properties* panel when a component *J5* is selected. The information displayed in the right image is all about *J5*.

## 3DX Canvas Properties Panel



From the *Search* panel you can access all the objects that are available in the loaded design. This panel consists of multiple tabs — offers capability to locate *Components*, *Nets*, *Pins*, *Traces/Wires*, *Shapes*, *Vias*, and *Groups* to help you locate the corresponding design objects. You can also type in the *Search* field to locate a specific object such as *J5*. When a search is performed, the panel information changes to show only information that matches the search criteria. As a result, all the tabs are only visible if they contain information regarding the searched object. You can also double-click any row in the *Search* panel to select objects. The objects are selected in the 3DX Canvas and the canvas zooms into the selected objects.

## 3DX Canvas Search Panel

The screenshot shows the 'Search' panel with a table of search results. The table has columns: REFDES, PART NUMBER, FOOT PRINT, LAYER, ROTATION, X LOCATION, Y LOCATION, and CL. There are 9 rows of data, each representing a component named C5 through C9. All components have a part number of CAPC2012X71N and are located on the Bottom layer at 0.000° rotation.

REFDES	PART NUMBER	FOOT PRINT	LAYER	ROTATION	X LOCATION	Y LOCATION	CL
C5	CAP_CAPC2012X71N_DISCRETE_3300	CAPC2012X71N	Bottom	0.000°	66.300	39.900	DISCRETE
C6	CAP_CAPC2012X71N_DISCRETE_3300	CAPC2012X71N	Bottom	0.000°	66.300	31.500	DISCRETE
C7	CAP_CAPC2012X71N_DISCRETE_3300	CAPC2012X71N	Bottom	0.000°	66.300	37.800	DISCRETE
C8	CAP_CAPC2012X71N_DISCRETE_3300	CAPC2012X71N	Bottom	0.000°	66.300	29.400	DISCRETE
C9	CAP CAPC2012X71N DISCRETE 3300	CAPC2012X71N	Bottom	0.000°	66.300	35.700	DISCRETE

- i** The information in the 3DX Canvas panels is read-only. The *Properties* and *Search* panels show detailed information about the selected objects. However, you can double-click any *Search* panel entry and select those objects selected on the canvas.

During the design process, when both Allegro X PCB Editor and the 3DX Canvas are open, the 3DX Canvas view changes as changes occur in the layout. Global changes, such as changes to the board outline, cutouts, and stack-up may incur a slightly longer refresh of the 3DX Canvas to be visualized.

- ⚠** Propagation of changes is unidirectional from the layout to the 3DX canvas. Objects selected in the 3DX Canvas are also selected in the 2D layout. However, design changes can only be made in the 2D layout.

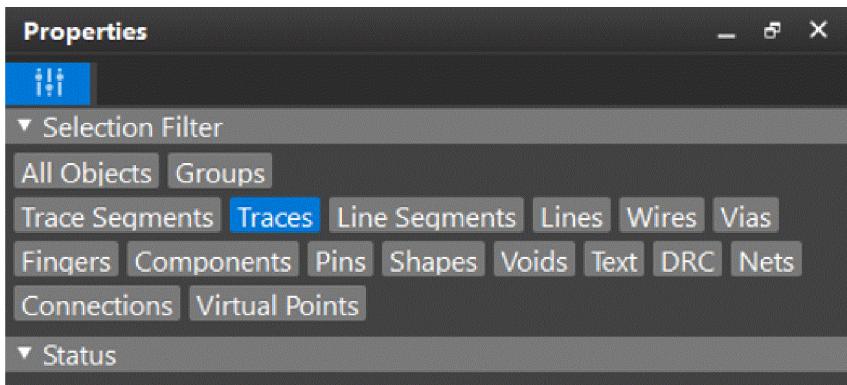
# Working with Allegro 3DX Canvas

The 3DX Canvas is used in the same way as the 3D Canvas to view and analyze designs in a 3D environment. The 3DX Canvas interacts with objects in a design using *Properties*, *Visibility*, and *Search* panels.

## Working with Properties Panel

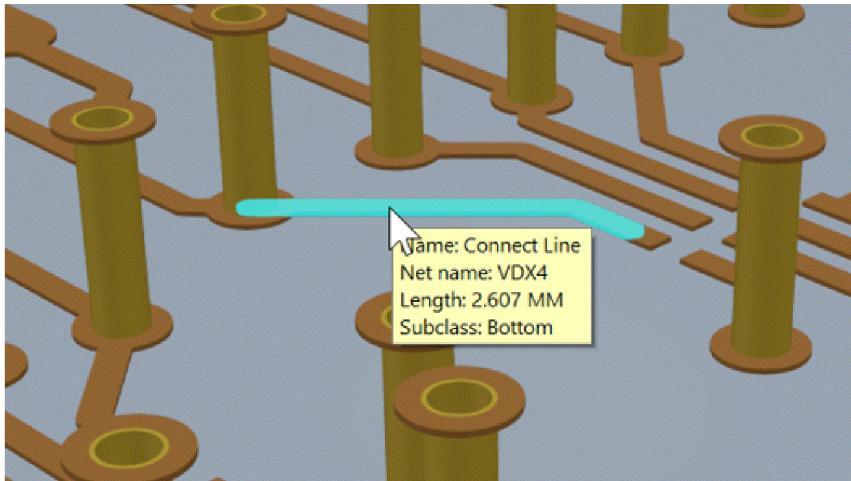
The *Properties* panel *Selection Filter* buttons can be used to select the objects you want to interact with. Buttons (for the object types) can be turned on or off individually. The *All Objects* button turns all the object buttons on or off at once. The objects in the *Groups* category are treated as a separate entity and are not part of the *All Objects* control. In the following illustration, only *Traces* is selected (indicated in blue) in the *Selection Filter*. As a result, only traces can be acted on in the 3DX Canvas.

### Selection Filter When Only Traces are Selected



Hovering over any traces in the canvas provides important information in the datatip text.

## Datatip for a Trace

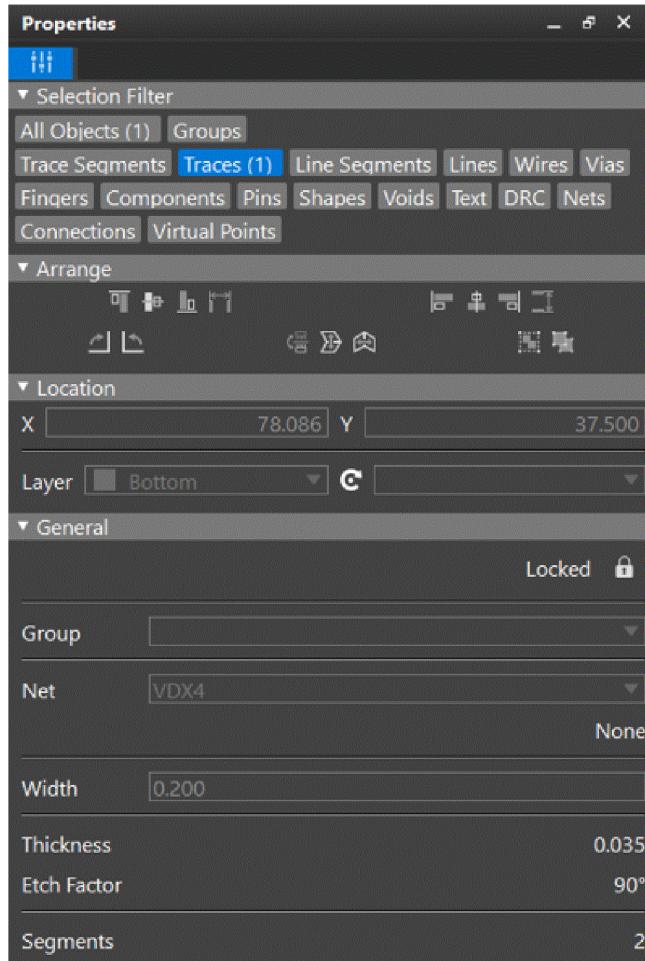


Clicking any trace selects it in the canvas (object is highlighted in red) and information about the selected object is displayed in the dynamic *Properties* panel. This information is read-only and includes:

- X and Y starting location
- The layer the object is placed
- The lock status of the object
- Whether the object is part of a group
- The net for the selected trace
- The width of the selected trace
- Other important information, such as copper thickness, etch factor, the number of segments in the selected object, the length of the selected object, and any attributes associated with the selected object.

⚠ The *Properties* panel information varies based on the object or objects selected in the canvas.

## Properties Panel When a Trace is Selected



## Working with Search Panel

The *Search* panel can be used to select the required object or objects on the canvas. When a design is first loaded into the 3DX Canvas, the *Search* panel contains information on all of the objects for that design as shown in the next image:

## Search Panel Displaying Design Information

The screenshot shows the Allegro X 3DX Canvas search interface. At the top, there's a search bar labeled "Search" with a magnifying glass icon and a dropdown menu. Below it is a navigation bar with tabs: Components (366), Nets (374), Pins (2720), Traces/Wires (2397), Shapes (1156), Vias (1242), and Group (2). The "Components (366)" tab is selected. The main area is a table with columns: REFDES, PART NUMBER, FOOT PRINT, LAYER, ROTATION, X LOCATION, Y LOCATION, CLASS, and TYPE. There are five rows of data:

REFDES	PART NUMBER	FOOT PRINT	LAYER	ROTATION	X LOCATION	Y LOCATION	CLASS	TYPE
MTG125		Top	0.000°	0.000	106.000		Mechanical	
STEP3D_MECH_TOPCOVER		Top	0.000°	0.000	0.000		Mechanical	
C1	CAP_CAPC1608X86N_DISCRETE_47 PF	CAPC1608X86N	Top	90.000°	89.631	-0.003	DISCRETE	Electrical Component
C2	CAP_CAPC1608X86N_DISCRETE_47 PF	CAPC1608X86N	Top	90.000°	89.631	15.475	DISCRETE	Electrical Component
C3	CAP_CAPC2012X71N DISCRETE 3300	CAPC2012X71N	Bottom	0.000°	66.300	42.000	DISCRETE	Electrical Component

You can type into the *Search* input area and if a match is found, the *Search* panel changes to reflect information only for the matching object. In the following illustration, *J5* was searched. The search table shows that only one component is labeled as *J5* and there are 16 pins associated with *J5*.

## Search Panel Displaying Search Results for J5

The screenshot shows the Allegro X 3DX Canvas search interface after searching for "J5". The search bar now contains "J5". The "Components (1)" tab is selected, while "Pins (16)" is also visible. The main area is a table with columns: Match, REFDES, PART NUMBER, FOOT PRINT, and LAYER. There is one row of data:

Match	REFDES	PART NUMBER	FOOT PRINT	LAYER
100%	J5	USB3A_FEMALE_USB3A_FEMALE_IO_...	USB3A_FEMALE	Top

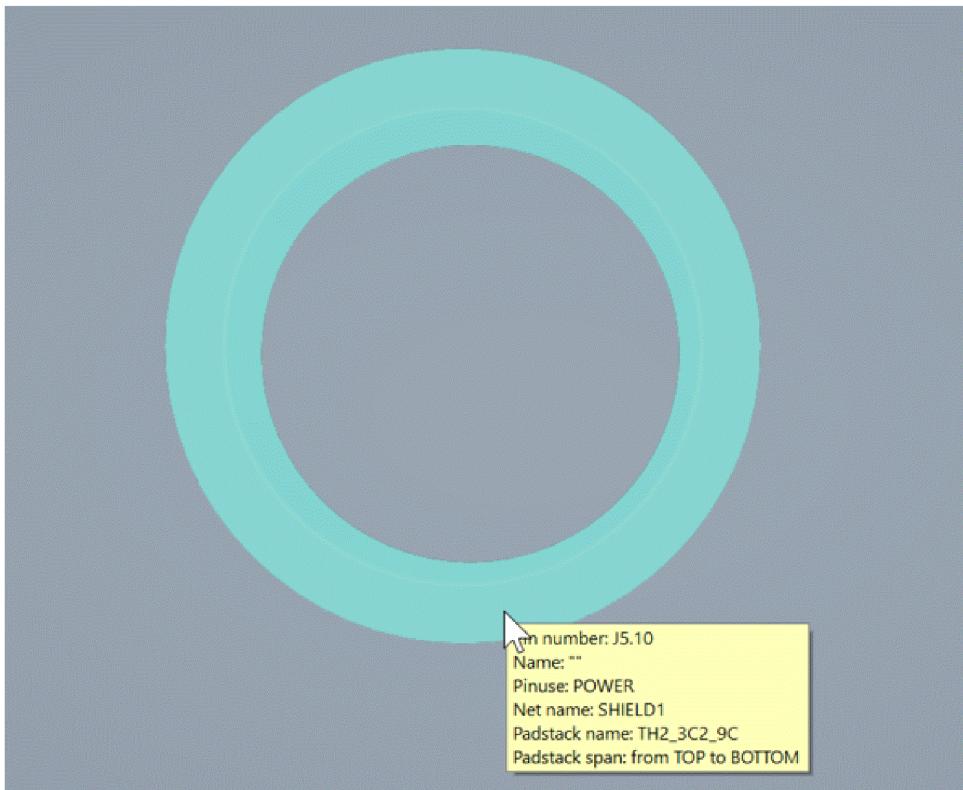
You can click the row displaying information about *J5* in the *Components* tab. The component *J5* is selected in the canvas. You can switch to the *Pins* tab and select an individual pin, for example, *J5.10*. The selected row changes to blue.

## Search Panel Displaying Pin Information for Component J5

Search									
Q J5									
Components (1) Pins (16)									
Match		REFDES	PIN NUMBER	NAME	PIN USE	NET	LAYER	TES	
100%	🔒	J5	J5.11		POWER	SHIELD2	Top		
100%	🔒	J5	J5.10		POWER	SHIELD1	Top		
100%	🔒	J5	J5.4	\GND\	POWER	0	Top		
100%	🔒	J5	J5.7	\GND_...	POWER	0	Top		
100%	🔒	J5	J5.1	\VBUS\	POWER	VCC	Top		

The selected pin is highlighted on the canvas and the canvas is refreshed with the selected entity centered in the view. The 3DX Canvas flips to the correct layer where the selected object is placed. The view is flipped if the selected object is on the opposite layer. The hover-over datatip can be used to confirm the selection.

## Datatip Information for J5 Pin 10

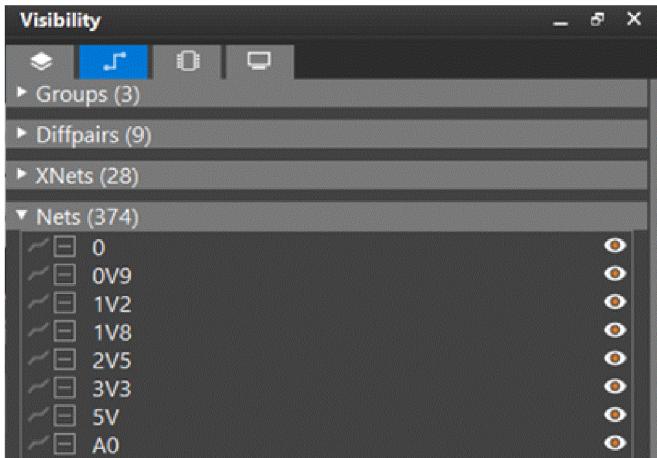


The **Search** panel is a powerful tool that can be used effectively to illustrate the necessary information quickly on the 3DX Canvas.

## Working with Visibility Panel

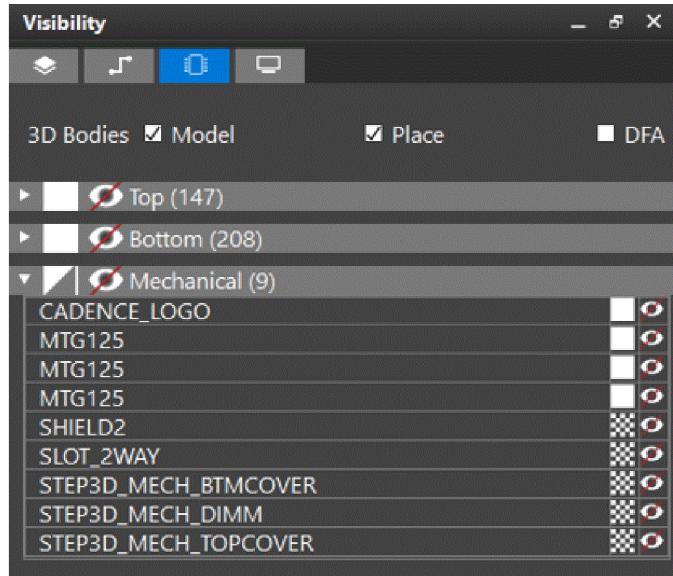
The **Visibility** panel is used to select nets or components on the canvas. Switching to the **Nets** tab displays all of the *Groups*, *Diffpairs*, *XNets*, and *Nets* (if in the design). By double-clicking any entry, the selection is highlighted and zoomed in to on the 3DX Canvas.

### Visibility Panel Nets Tab



The components and mechanical symbols can be selected and viewed in the same way from the **Components** tab. The **Components** tab lets you turn on or off models assigned to components using the eye icon. The components can also be turned opaque or translucent using the box to the left of the eye icon. The visibility of all the components can also be turned on or off globally using the eye icon on the top-level headers: *Top*, *Bottom*, or *Mechanical*.

## Visibility Pane Component Tab

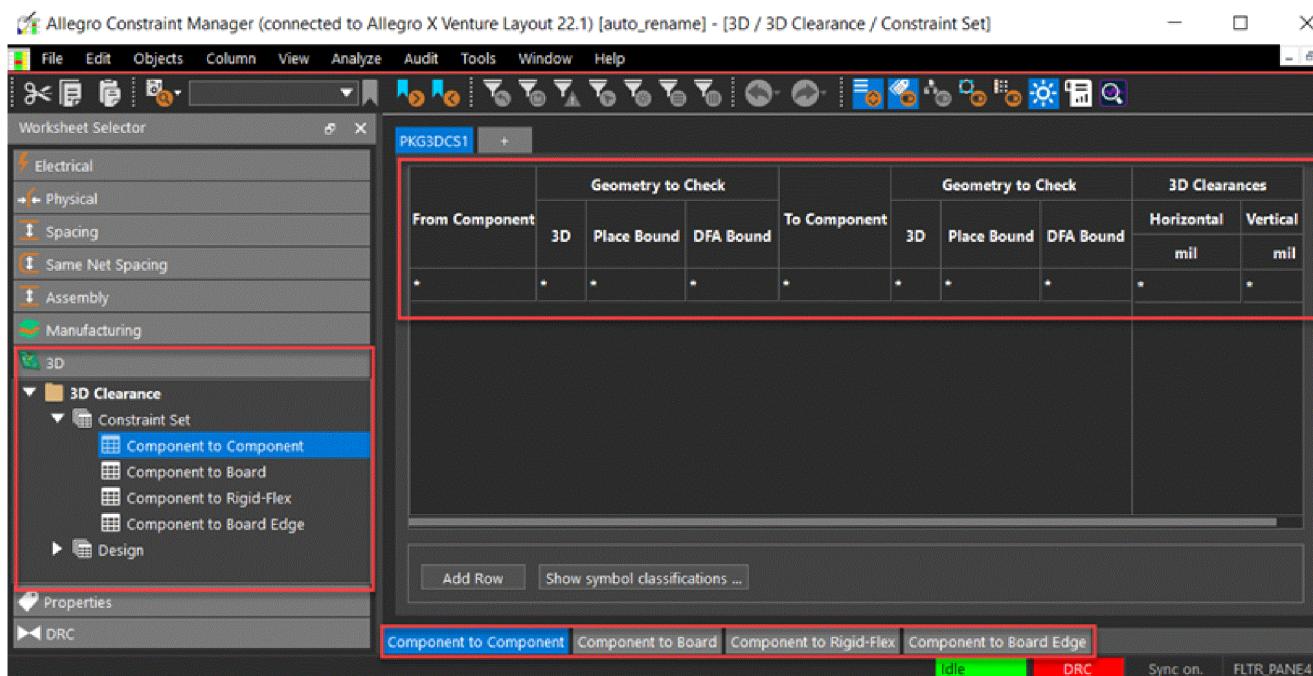


**⚠** Changes in the 3DX Canvas views (turning on/off visibility of layers, objects, and so on) are not saved between sessions. Closing the 3DX Canvas resets the view.

## 3D DRCs

The 3D DRC is supported for the individual and different component categories, such as mechanical, connector, discrete, QFN, SOP, and BGA. The clearance values between component footprints can be checked for different types of CAD models and shapes (Place Bound and DFA Bound extrusion).

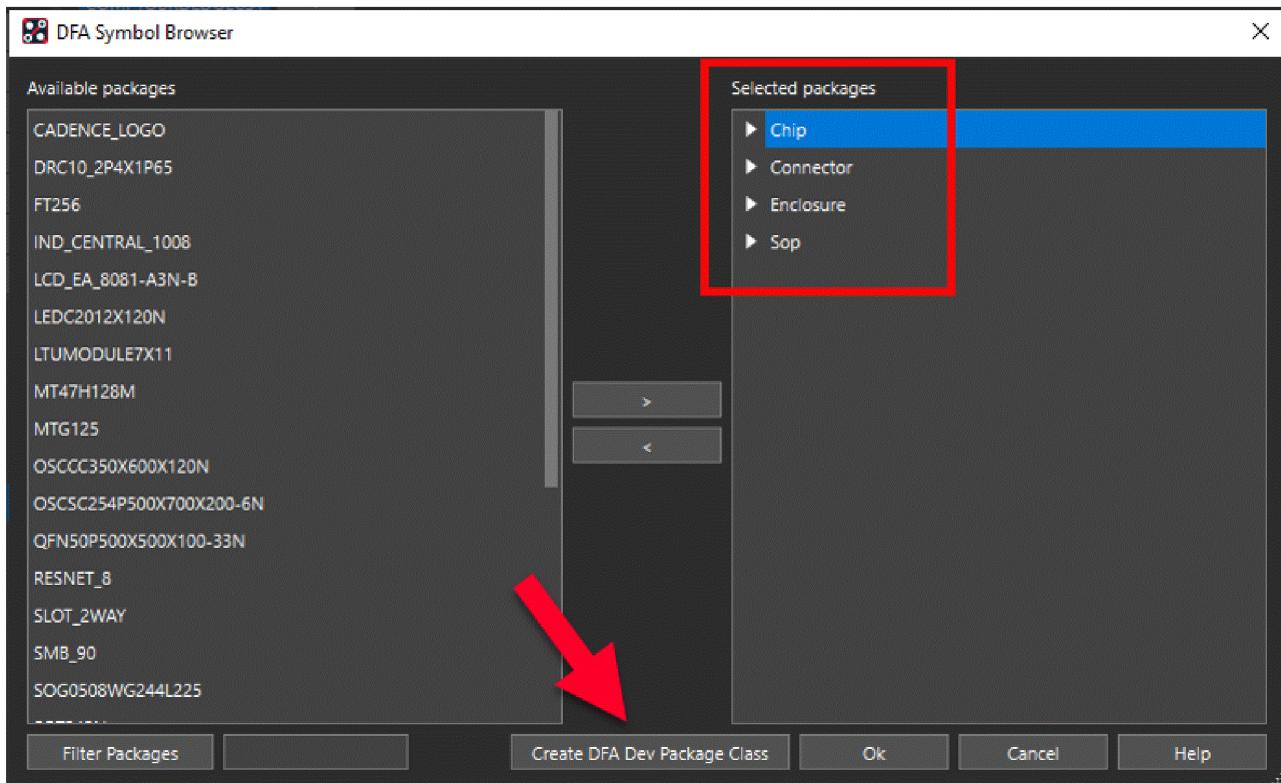
You can specify 3D clearance values in Constraint Manager for horizontal and vertical spacing between components.



Any combination of geometries can be checked. In the following example, for both of the checks (`Sop` against `Sop` and `Lcd_Ea_8081-A3n-b` against `Enclosure`), the 3D CAD model is checked against 3D CAD model.

From Component	Geometry to Check			To Component	Geometry to Check				
	3D	Place Bound	DFA Bound		3D	Place Bound	DFA Bound		
*	*	*	*	*	*	*	*	*	*
<code>Sop</code>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<code>Sop</code>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
<code>Lcd_Ea_8081-A3n-b</code>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<code>Enclosure</code>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		

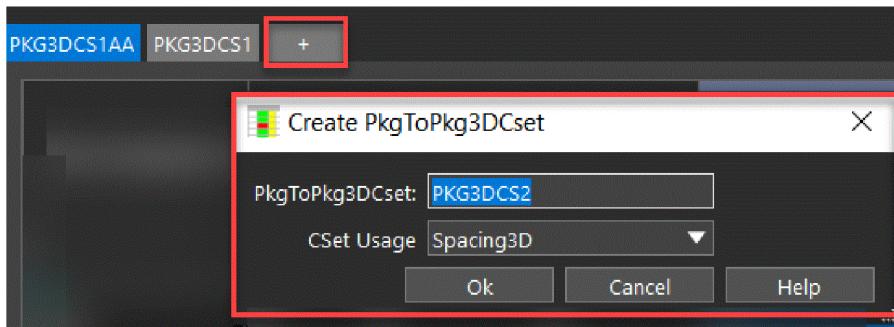
**⚠** For any of these checks, individual components can be specified to be checked against other individual components, or against the DFA Dev Package classes.



## Specifying 3D Constraints

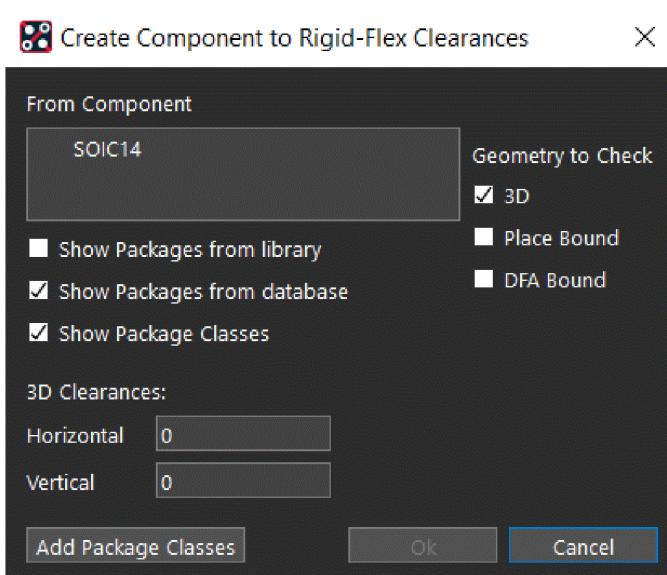
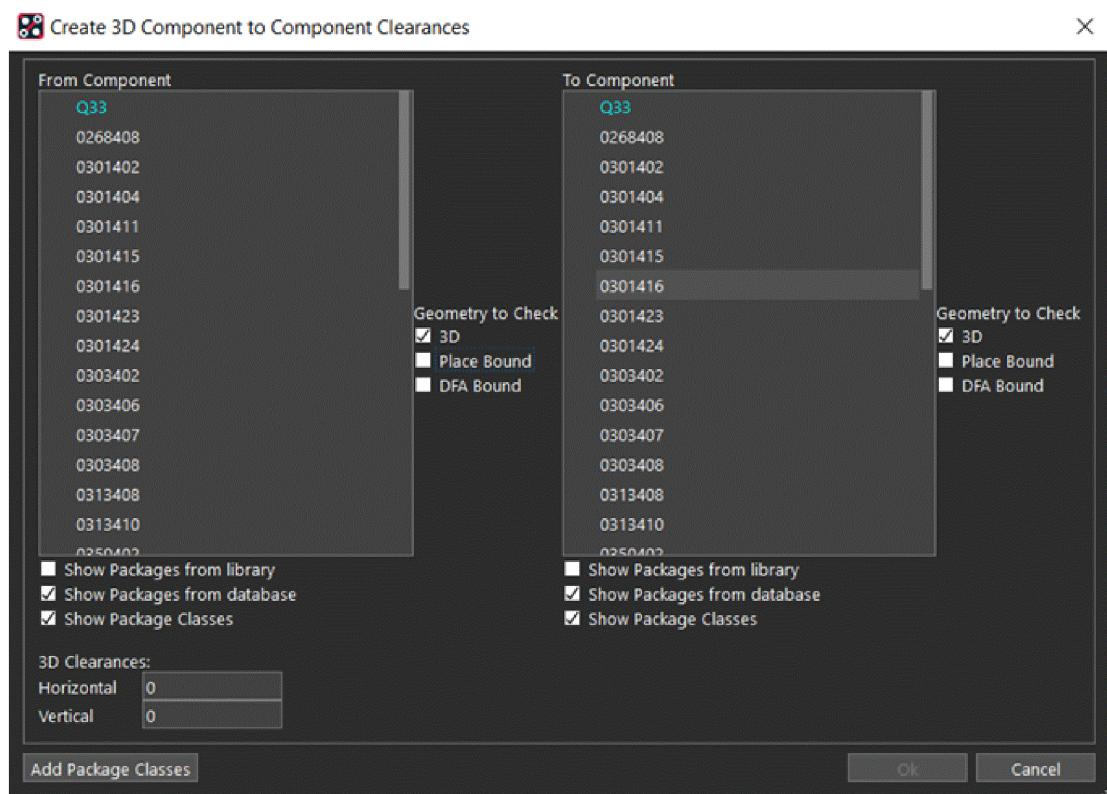
To specify 3D spacing checks, do the following:

1. In Constraint Manager, under the *3D* domain, expand the *3D Clearance* folder.
2. Expand the *Constraint Set* workbook and select a worksheet.
3. Click the plus (+) icon to create a new CSet.
4. Specify a name or use the default and click *OK* in the dialog box.



5. *Component to Component* worksheet.

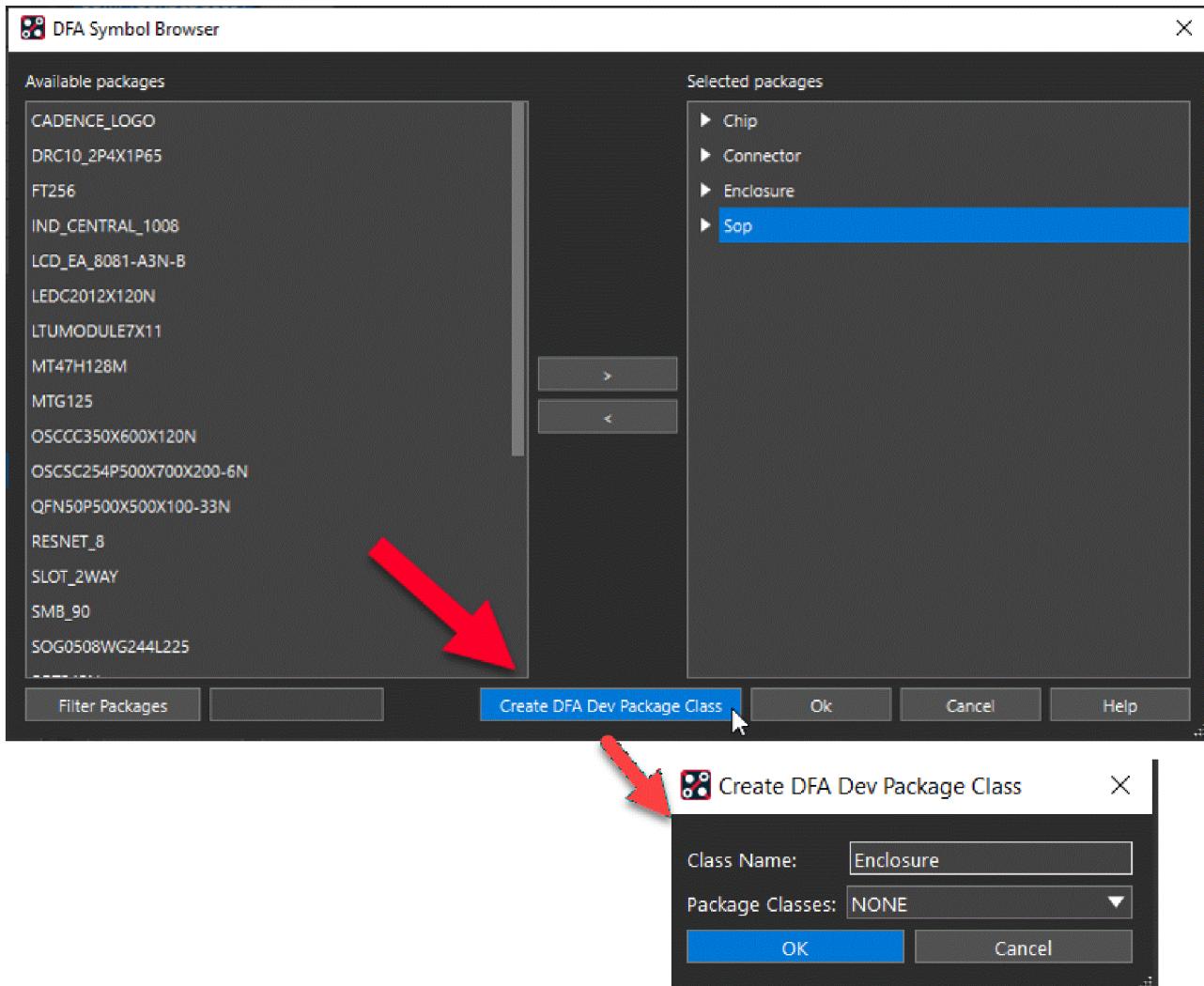
Depending on the 3D DRC, a dialog box opens to specify the clearance. The following image shows *Create 3D Component to Component Clearances* and *Create Component to Board Edge* dialog boxes.



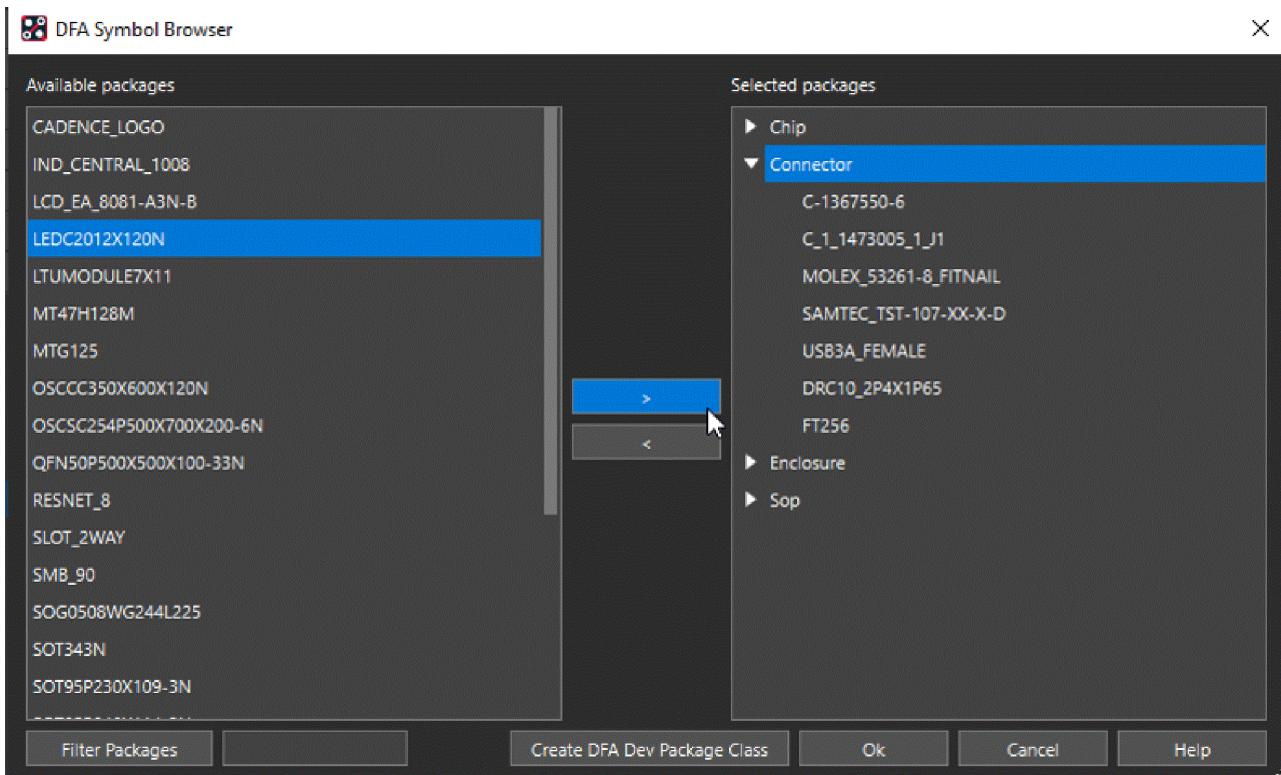
6. Select the check boxes for *Geometry to Check*. By default, only *3D* is selected.
7. Select components from the list.

 To select multiple components, press and hold the `ctrl` key and click the component names from the list. You can also use the `Shift` key to select multiple components.

8. Click the *Add Package Classes* button to select any existing 3D Package classes for create new classes.  
The *DFA Symbol Browser* dialog box opens.
9. To add packages to existing class, select the package from the list of *Available packages*, select the class in the right section, and click the less than button.
10. To create a new package, click *Create DFA Dev Package Class*, specify a name and click *OK*.



11. After selecting all packages and click *OK* in the *DFA Symbol Browser* dialog box.



12. In the create clearances dialog box, specify horizontal and vertical 3D clearance values and click **OK**.  
The selected components are added to the respective worksheet.
13. Specify the 3D clearances for all the components. The following image illustrates 3D clearance values for component to component DRC check.

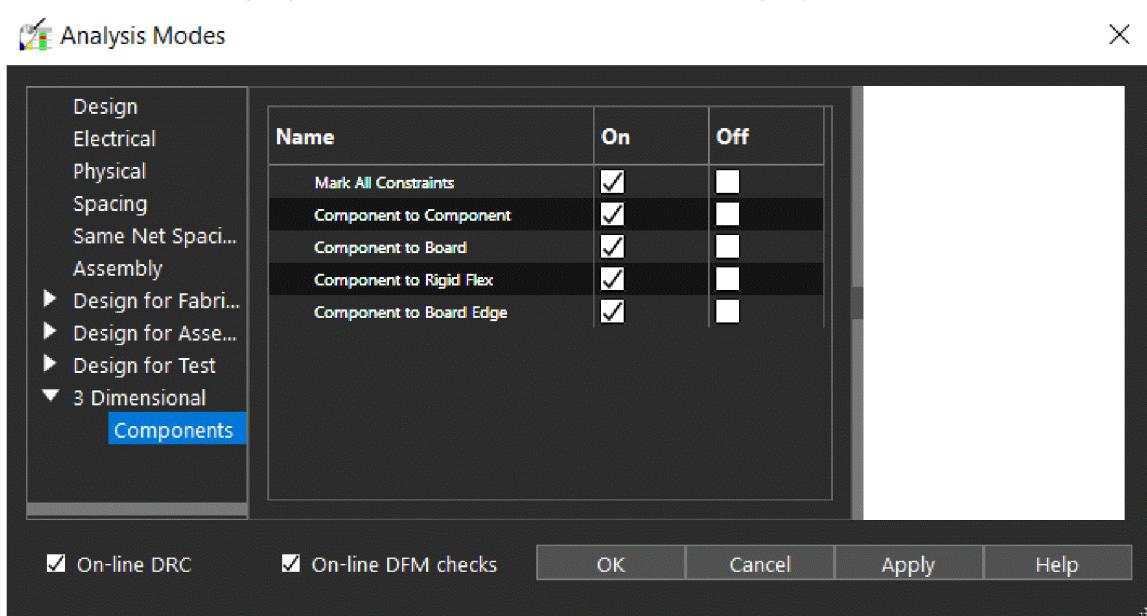
From Component	Geometry to Check			To Component	Geometry to Check			3D Clearances	
	3D	Place Bound	DFA Bound		3D	Place Bound	DFA Bound	Horizontal mil	Vertical mil
*	*	*	*	*	*	*	*	*	*
Q33	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Q33	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	120.0000	100.0000
0301410	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	0604401	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	150.0000	100.0000
0350406	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	0604401	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	200.0000	200.0000

Add Row   Show symbol classifications ...

## Running 3D DRC

To find out the 3D DRC errors, follow these steps:

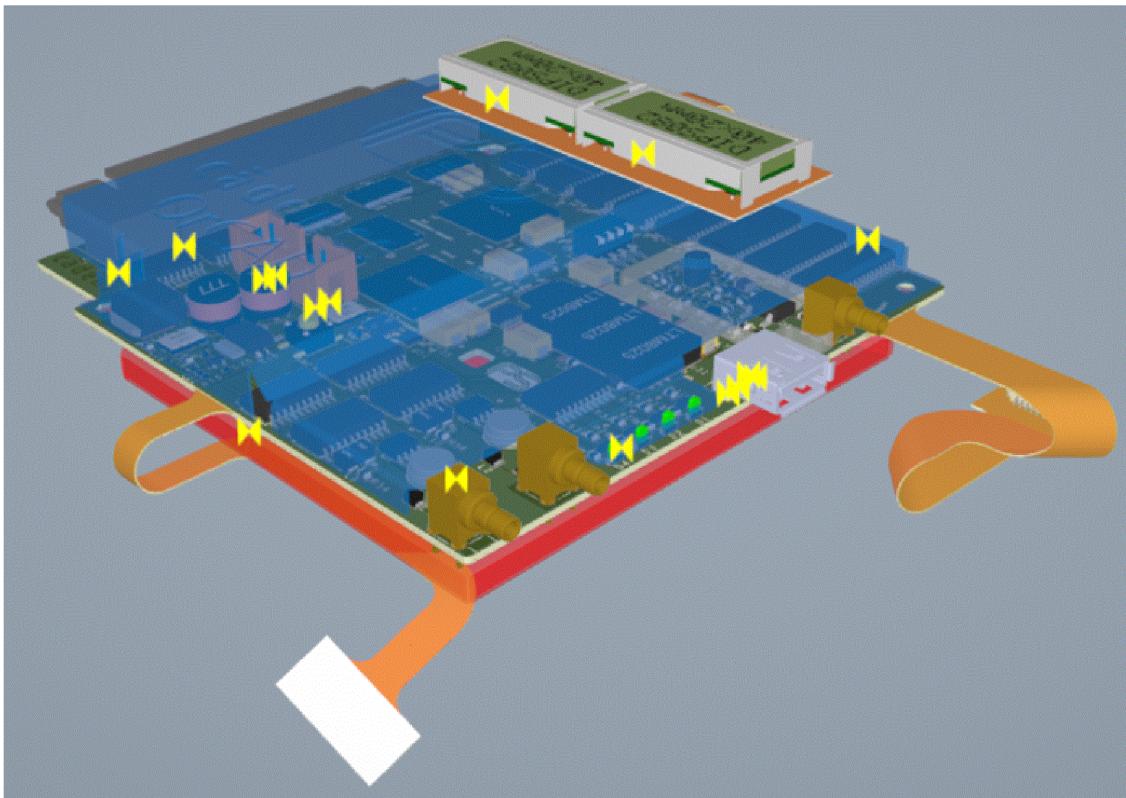
1. In Constraint Manager, choose *Analyze – Analysis Mode*.  
The *Analysis Modes* dialog box opens.
2. Open *Components* page under the *3 Dimensional* category and select the check box.



3. Turn on all component DRC checks.
4. Click *OK* in the *Analysis Modes* dialog box.
5. Close Constraint Manager.
6. In the layout editor, choose *Tools – DRC Update*.  
The DRC errors are updated for the design and indicated by the bow tie marker. The component to component 3D spacing DRC is indicated by t-d.



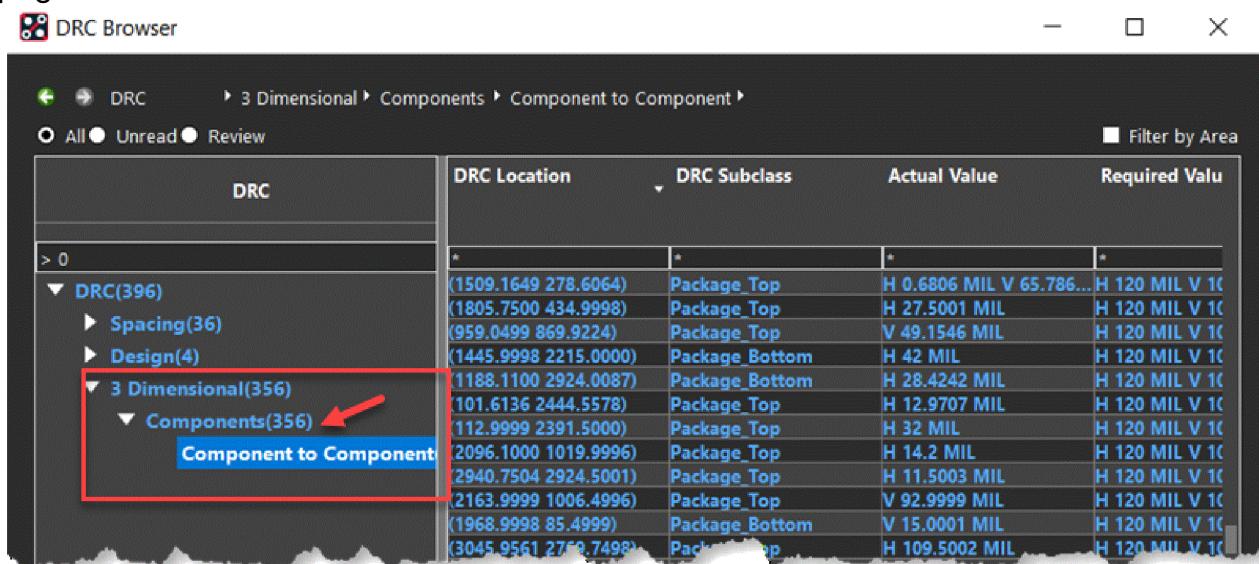
7. Choose *View – 3DX Canvas* to open 3DX Canvas.



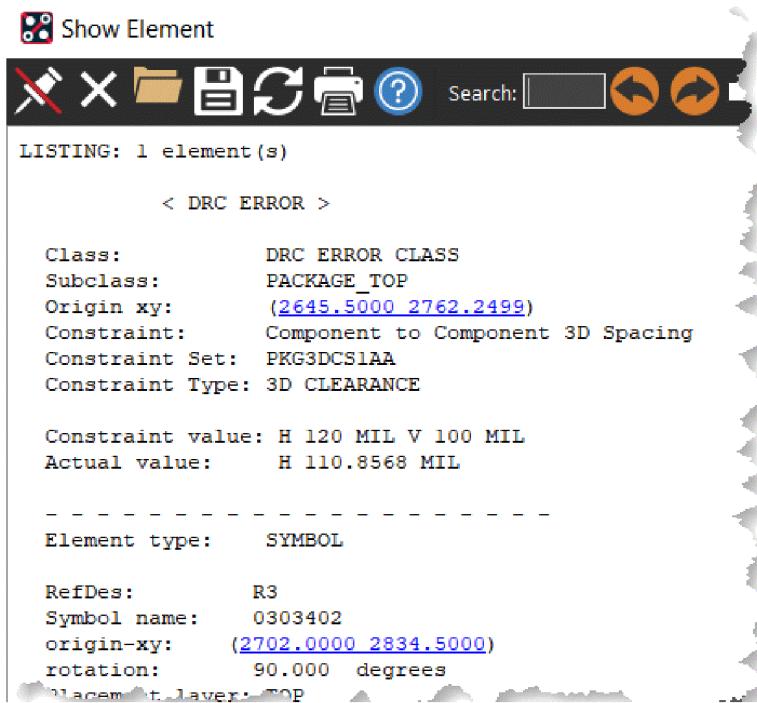
## Viewing 3D DRC in 2D Canvas

To view component to component 3D DRC in layout editor, do the following:

1. In the *Find* filter, select the *DRC errors* check box.
2. Hover the cursor over a DRC marker.  
The marker and the components are highlighted. A tool tip displays the DRC error, actual and required constraint values.
3. The alternate way to view 3D DRC is DRC Browser.
  - a. To open DRC Browser, choose *Tools – DRC Browser*.
  - b. Expand *3 Dimensional* category and select *Components – Component to Component* page.



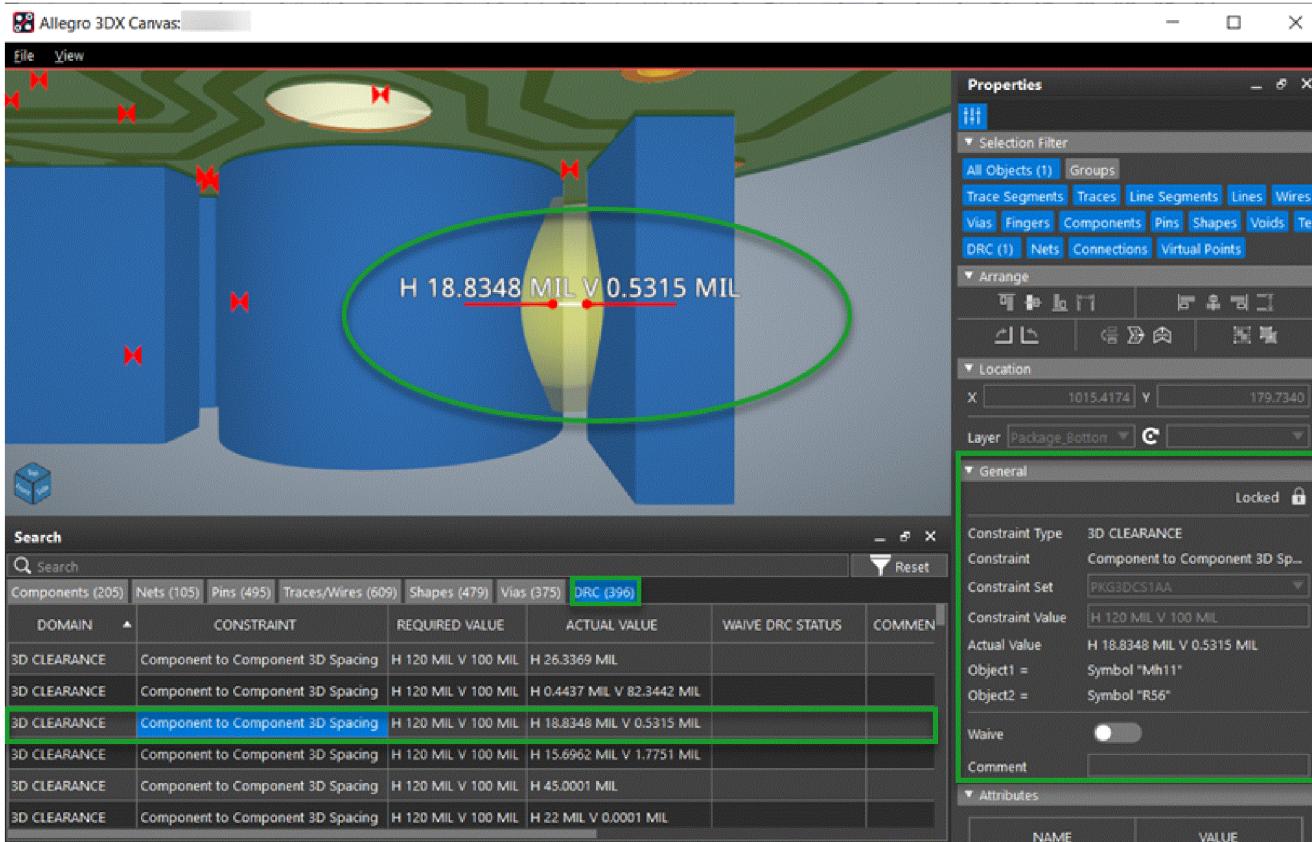
- c. Click any DRC in the right pane to view it in the 2D canvas.
4. Choose *Display – Element* or click the *Show Element* icon from the *Display* toolbar.  
The Show Element window provides the details of the DRC error.



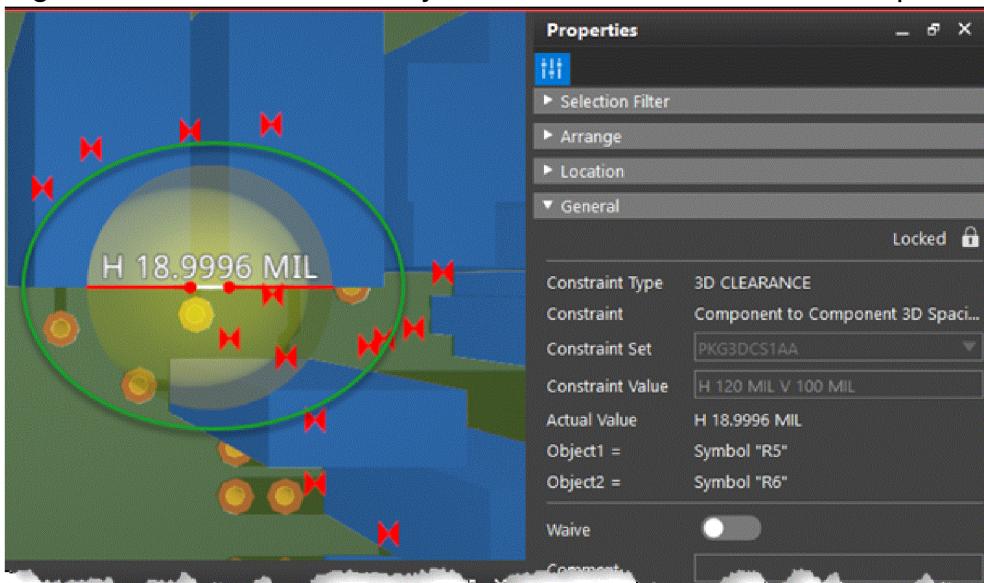
## Viewing 3D DRC in 3DX Canvas

To view 3D DRCs in 3DX Canvas, follow these steps:

1. Choose *View – 3DX Canvas* or click the *3DX Canvas* icon from the *View* toolbar.
2. Allegro 3DX Canvas opens the active design and display all the DRC errors as horizontal bow ties.
3. In the *Search* panel, select the *DRC* tab to view all the 3D DRCs.
4. To view a DRC, click the corresponding row in the search results.  
The DRC error between the components is zoomed into the 3DX Canvas and the *Properties* panel displays the details of the clearance values.

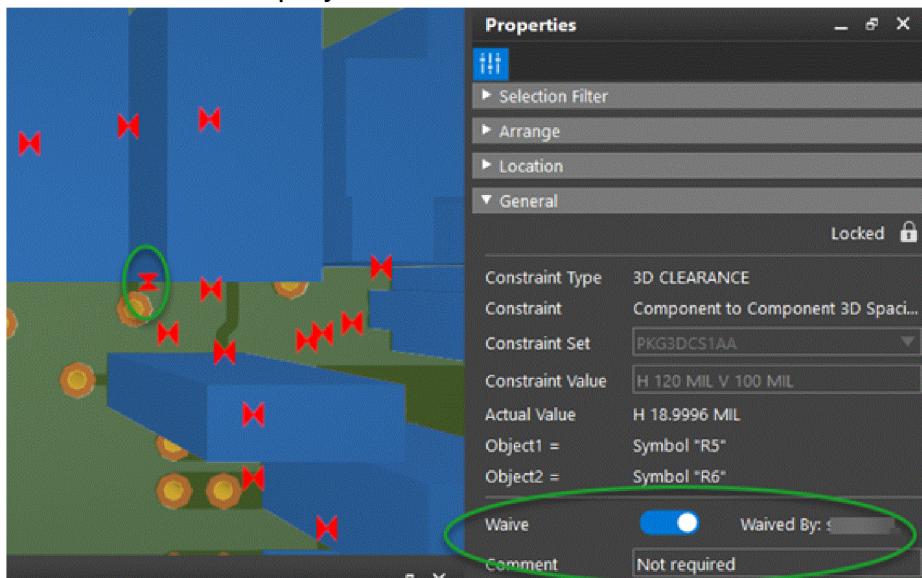


5. Change the camera view to analyze the clearances between components.



6. To waive a 3D DRC, toggle the *Waive* button in the *General* section of the *Properties* panel. You can also add a comment when waiving the DRC.

The waived DRC is displayed as vertical bow tie.

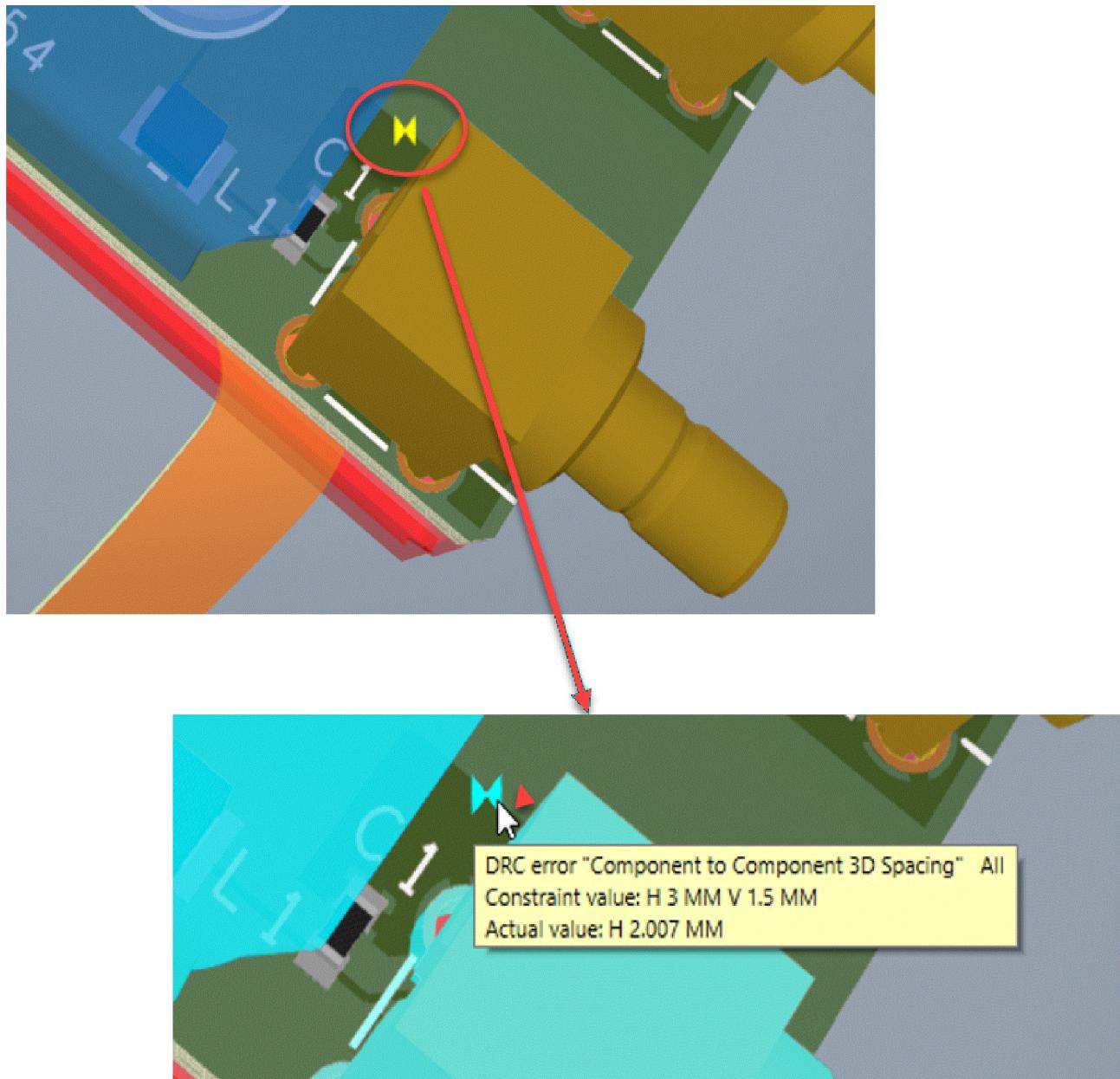


7. To fix a DRC, you can move the component either in 2D or 3DX Canvas.

# 3D DRC Types

## Component to Component

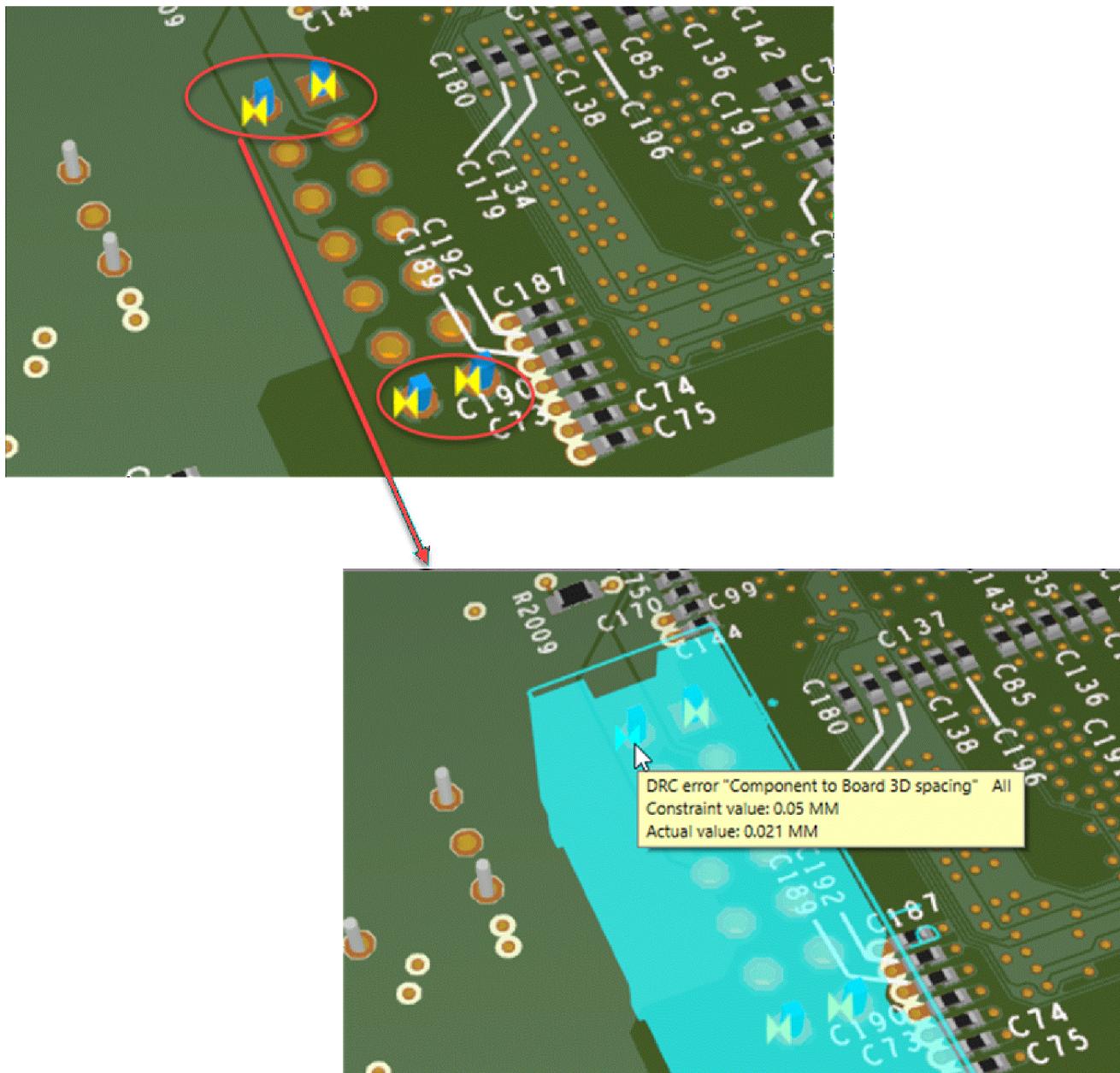
Checks models or shapes of a component against the model or shape of other specified components. In the following example, the DRC error can be resolved by moving the connector to the right.



## Component to Board

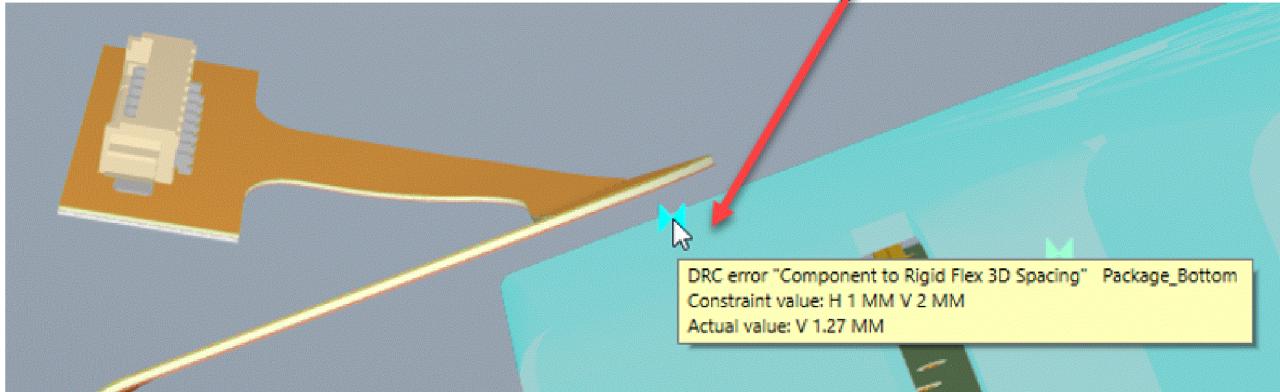
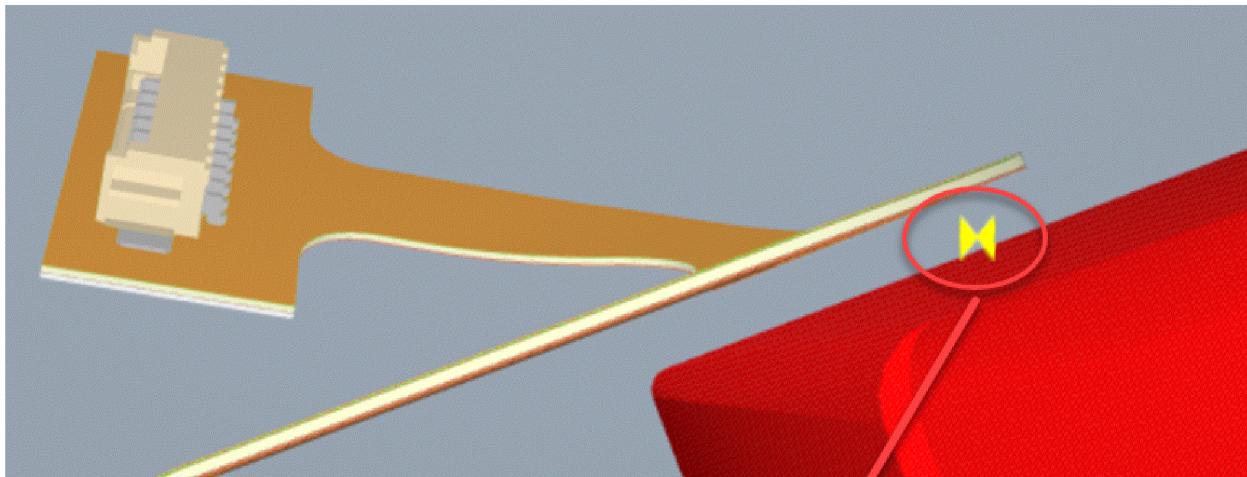
Checks components against the board. For example, component pins to drilled holes, mating surface of components to the intended mating side of the board.

In the following example, highlighted component pins are flagged with a violation. To resolve the error, a connector with narrower pins can be used or the rule can be changed to reflect the actual value.



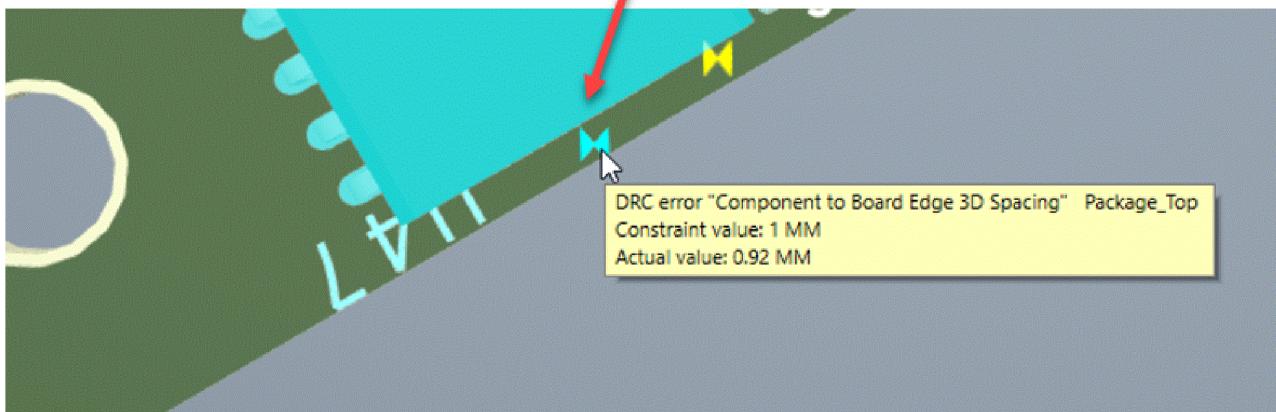
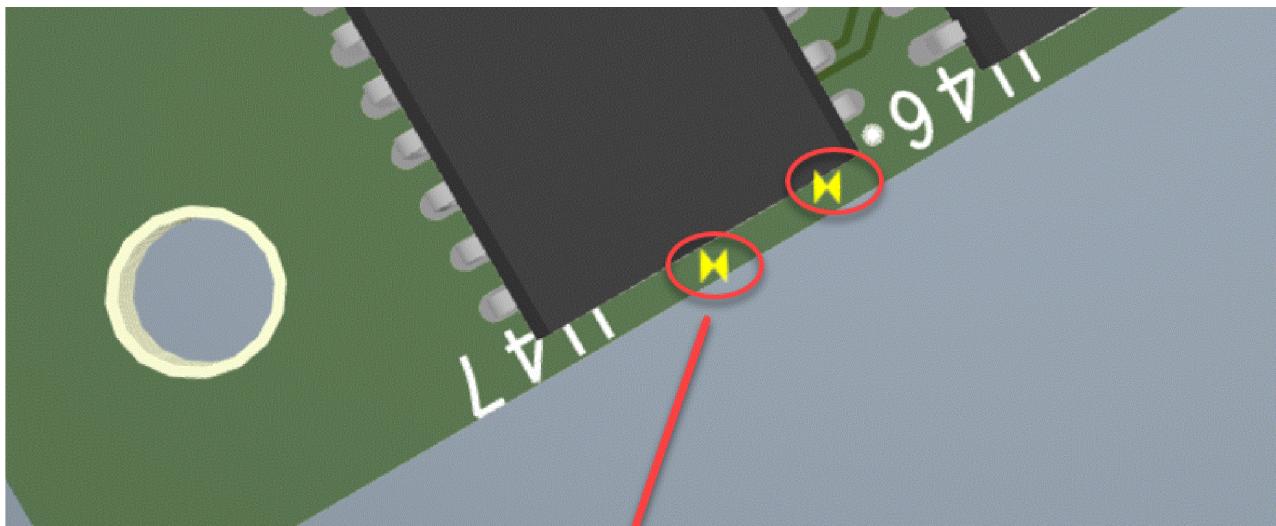
## Component to Rigid-Flex

Checks models or shapes of a component against the outer surface of a rigid-flex. In the following example, a DRC is shown because the rigid-flex portion is measured vertically from the top of the cover with a value which is less than that specified in the rule. Changing the inner radius of the bend resolves the error by positioning the flex portion higher above the cover.



## Component to Board Edge

Checks models or shapes of a component against the proximity to a board edge or the edge of board cutout. In the following example, the DRC error can be removed by moving the component slightly away from the board edge.

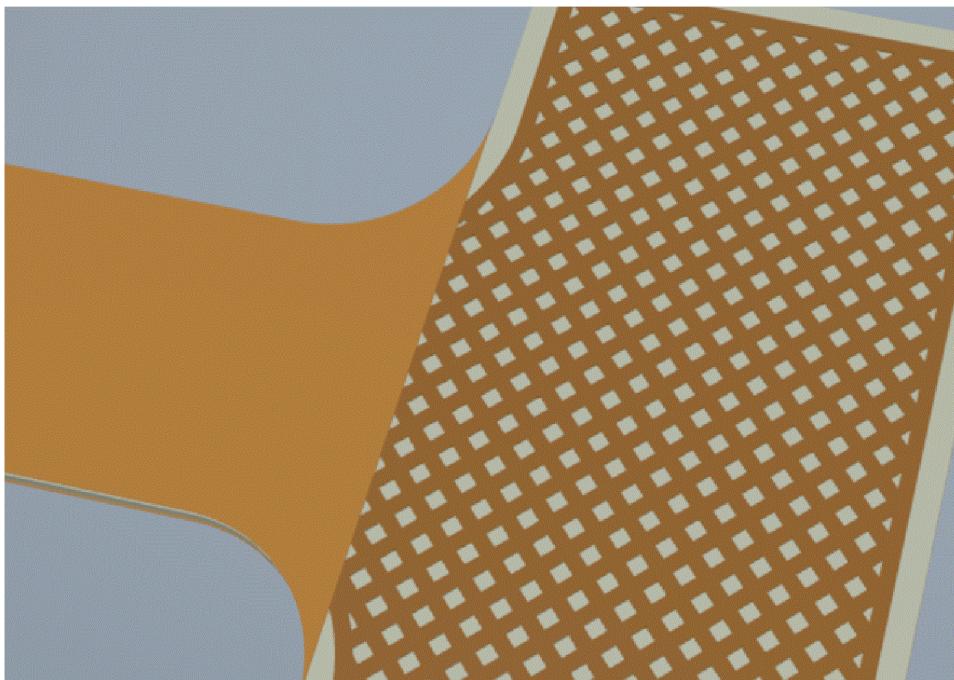


# Features and Benefits of 3DX Canvas

The 3DX Canvas addressed performance and memory usage issues while analyzing designs in 3D. The new 3DX engine also offers additional functionality that exists in the current 3D Canvas. Some of the advantages of using 3DX Canvas over the 3D Canvas include:

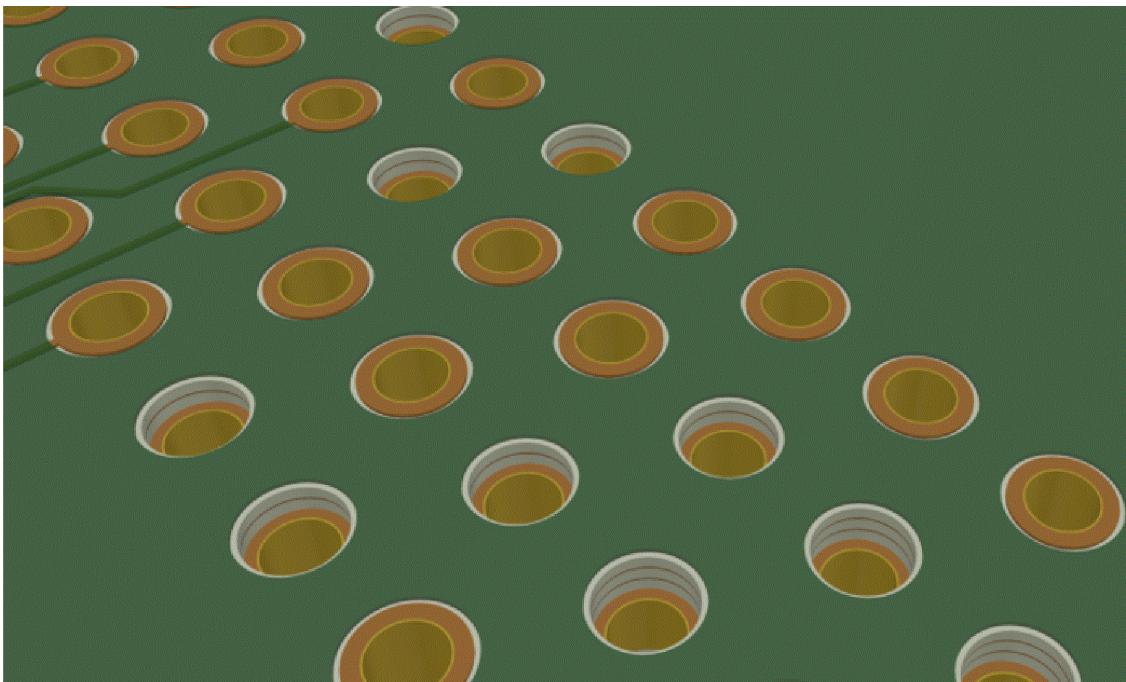
- Visualization of cross-hatched copper

## Cross Hatch Copper Visualization



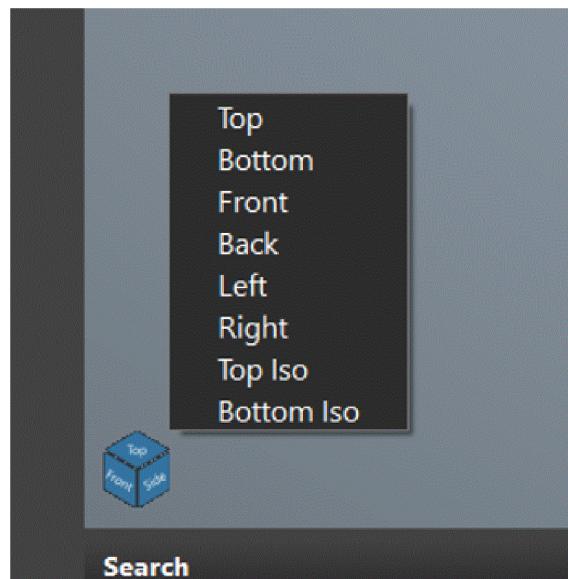
- Visualization of backdrilled holes

## Backdrill Hole Visualization



- Preset View Widget: Select preset views quickly by clicking the blue cube at the bottom-left corner of the canvas.

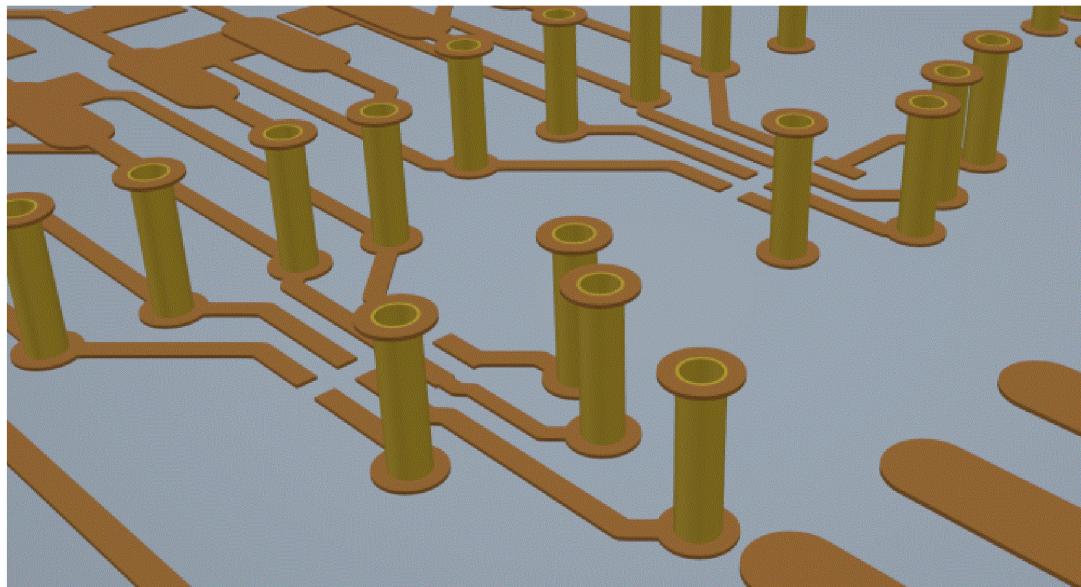
## Widget for Preset Views



- Plated hole barrels: When two or more layers are visible in the 3DX Canvas, the barrels of

plated holes and vias can be automatically visualized between those layers.

### Copper-Plated Barrels Visualization between Selected Layers



- Interactive measurement: You can interactively measure the distance between two objects that are currently selected in the *Selection Filter*, indicated by blue. To measure the distance, select an object in the canvas, hold down the `ALT` key, and hover the cursor over another object. The 3DX Canvas shows the minimum distance between those two objects.

## 3DX Canvas Measurement Example



