

# DFMA CAM Compare User Guide

Release NPI11.0

May 2019

---

**Unpublished work © 2008-2019 Mentor Graphics Corporation  
All rights reserved.**

This document contains information that is confidential and proprietary to Mentor Graphics Corporation, Siemens Product Lifecycle Management Software Inc., and their affiliates (collectively, "Siemens"). The original recipient of this document may duplicate this document in whole or in part for internal business purposes only, provided that this entire notice appears in all copies. In duplicating any part of this document, the recipient agrees to make every reasonable effort to prevent the unauthorized use and distribution of the proprietary information.

Note - Viewing PDF files within a web browser causes some links not to function. Use HTML for full navigation.

This document is for information and instruction purposes. Siemens reserves the right to make changes in specifications and other information contained in this publication without prior notice, and the reader should, in all cases, consult Siemens to determine whether any changes have been made.

The terms and conditions governing the sale and licensing of Siemens products are set forth in written agreements between Siemens and its customers. No representation or other affirmation of fact contained in this publication shall be deemed to be a warranty or give rise to any liability of Siemens whatsoever.

SIEMENS MAKES NO WARRANTY OF ANY KIND WITH REGARD TO THIS MATERIAL INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

SIEMENS SHALL NOT BE LIABLE FOR ANY INCIDENTAL, DIRECT, INDIRECT, SPECIAL, OR CONSEQUENTIAL DAMAGES WHATSOEVER (INCLUDING BUT NOT LIMITED TO LOST PROFITS) ARISING OUT OF OR RELATED TO THIS PUBLICATION OR THE INFORMATION CONTAINED IN IT, EVEN IF SIEMENS HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

**U.S. GOVERNMENT LICENSE RIGHTS:** The software and documentation were developed entirely at private expense and are commercial computer software and commercial computer software documentation within the meaning of the applicable acquisition regulations. Accordingly, pursuant to FAR 48 CFR 12.212 and DFARS 48 CFR 227.7202, use, duplication and disclosure by or for the U.S. Government or a U.S. Government subcontractor is subject solely to the terms and conditions set forth in the license agreement provided with the software, except for provisions which are contrary to applicable mandatory federal laws.

**TRADEMARKS:** The trademarks, logos and service marks ("Marks") used herein are the property of Siemens or other parties. No one is permitted to use these Marks without the prior written consent of Siemens or the owner of the Mark, as applicable. The use herein of a third- party Mark is not an attempt to indicate Siemens as a source of a product, but is intended to indicate a product from, or associated with, a particular third party.

The registered trademark Linux<sup>®</sup> is used pursuant to a sublicense from LMI, the exclusive licensee of Linus Torvalds, owner of the mark on a world-wide basis.

# Table of Contents

---

<b>Chapter 1</b>	
<b>CAM Compare .....</b>	<b>7</b>
Exporting CAM files from the CAD Tool.....	7
Comparison Process Configuration .....	8
CAM Compare Window .....	10
CAM Compare Menus and Tools in PADS Environment.....	11
Comparison Tasks .....	16
Performing CAM Compare .....	16
Performing Product Model Compare .....	18
Examining the Comparison Results.....	20
Examining Differences Using the CAD Tool .....	20
Re-running the Comparison with Edited Reference Files .....	21
Comparing the Netlists .....	21
Viewing Information about Components or Features .....	22
Features Filter .....	25
Using the Features Filter.....	26
Using the Advanced Filter .....	30
Filtering by Component .....	31
Filtering by Attribute .....	33
Using the Histogram to Filter .....	35
Browsing and Selecting Filtered Features .....	37
Setting Display Colors.....	37
Troubleshooting.....	40
An Entire Small Board is Reported as a Difference .....	40



## List of Tables

---

Table 1-1. CAM Compare Configuration Parameters .....	8
Table 1-2. Functionality of the Features Search Dialog Box .....	26



# Chapter 1

## CAM Compare

---

CAM Compare enables you to compare a design stored in ODB++ with equivalent reference files, to identify differences.


The reference files can be an equivalent CAM output, or a similar ODB++ product model.

<b>Exporting CAM files from the CAD Tool .....</b>	<b>7</b>
<b>Comparison Process Configuration .....</b>	<b>8</b>
<b>CAM Compare Window .....</b>	<b>10</b>
<b>CAM Compare Menus and Tools in PADS Environment .....</b>	<b>11</b>
<b>Comparison Tasks .....</b>	<b>16</b>
Performing CAM Compare .....	16
Performing Product Model Compare .....	18
<b>Examining the Comparison Results .....</b>	<b>20</b>
<b>Examining Differences Using the CAD Tool .....</b>	<b>20</b>
<b>Re-running the Comparison with Edited Reference Files .....</b>	<b>21</b>
<b>Comparing the Netlists .....</b>	<b>21</b>
<b>Viewing Information about Components or Features .....</b>	<b>22</b>
<b>Features Filter .....</b>	<b>25</b>
Using the Features Filter .....	26
Using the Advanced Filter .....	30
Filtering by Component .....	31
Filtering by Attribute .....	33
Using the Histogram to Filter .....	35
Browsing and Selecting Filtered Features .....	37
<b>Setting Display Colors .....</b>	<b>37</b>
<b>Troubleshooting .....</b>	<b>40</b>
An Entire Small Board is Reported as a Difference .....	40

## Exporting CAM files from the CAD Tool

Many CAD tools can output a design in a CAM format such as Gerber-274X. You can create CAM files and compare them with a design stored in ODB++ format, by exporting the design to CAM format from the original CAD tool.

### Note

 If you are performing an ODB++ product model comparison, instead of a CAM comparison, this procedure is not necessary.

---

## Procedure

1. Open the CAD tool and load the design to be exported to ODB++.
2. Export the design in CAM format.
3. If necessary, set up graphic synchronization with the CAD tool.

# Comparison Process Configuration

You can set configuration parameters to control the CAM Compare process. It is recommended that you use the default values. If you edit the configuration file after opening CAM Compare, the new values are not used.

Configuration parameters are defined in the file *config* that is installed in *<inst\_loc>\dfm\genesis*. Typically, this is *C:\MentorGraphics\<version>\SDD\_HOME\dfm\genesis*.

Lines of the *config* file have format *<parameter\_name>=<parameter\_value>*.

For example:

```
...  
iol_gbr_polygon_break=1  
ia_ignore_text_diff=no  
iol_gbr_arc_as_full_circle=no  
...
```

**Table 1-1. CAM Compare Configuration Parameters**

Parameter	Type	Description
ia_box_size	float	Area size on which graphic compare is run. The smaller the area the more exact the comparison but the longer the process will take. Range = 100 - 600. Default = 200.0 (mil)
ia_ignore_text_diff	boolean	Controls whether text lines are ignored during layer comparison. Default = no
ia_tolerance	float	Tolerance used in identifying a difference during layer comparison. Default = 1.0 (mil)

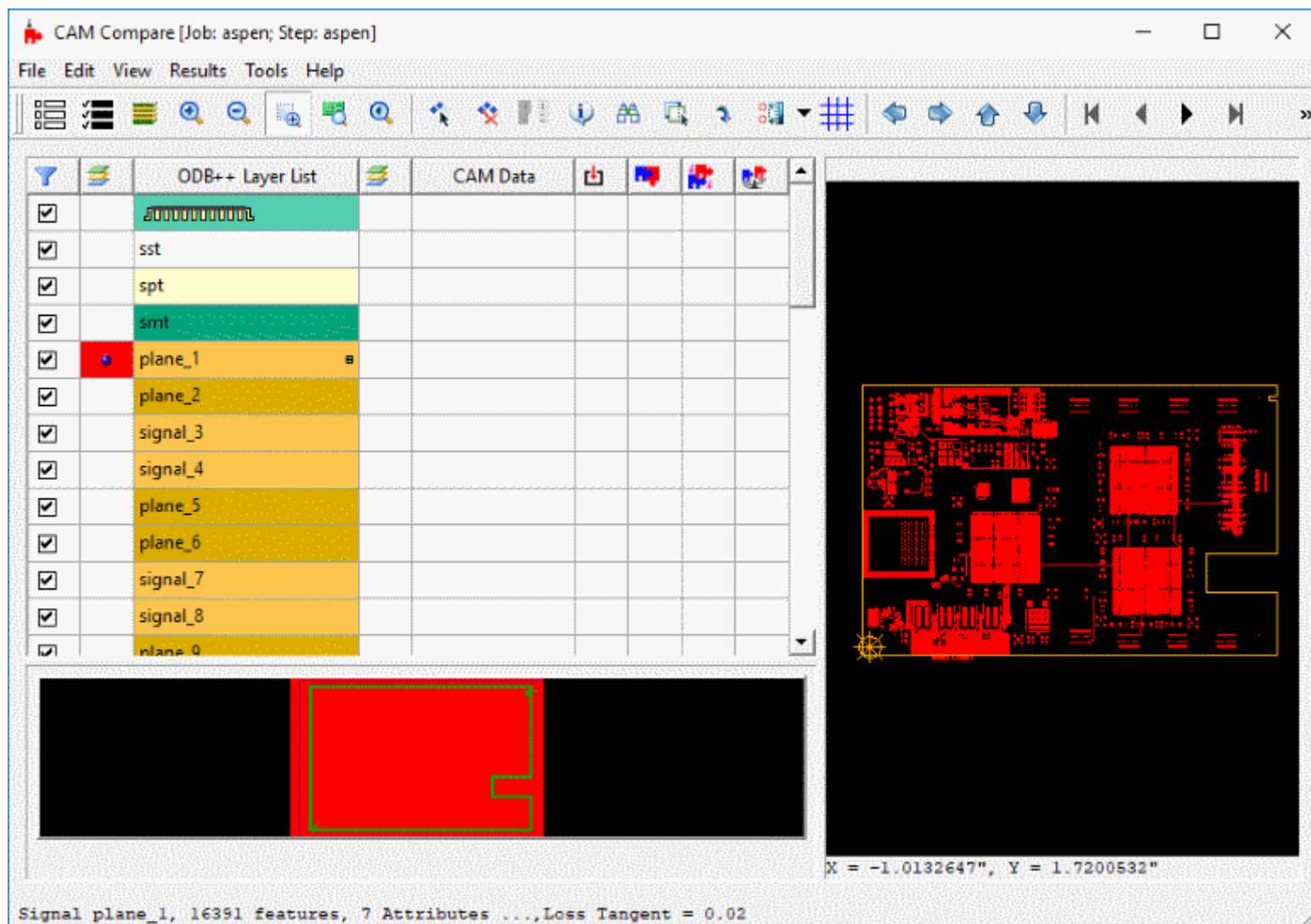


**Table 1-1. CAM Compare Configuration Parameters (cont.)**

Parameter	Type	Description
edt_compare_lyrs_grid_size	float	<p>Size of the raster grid for layer comparison.</p> <p>The allowable range below the defined comparison tolerance beyond which a feature can be reported as different from the corresponding feature in the other layer.</p> <p>Default = 0.2 mil</p>
edt_enable_editing_tools	boolean	Controls whether selection options are enabled.
iol_gbr_arc_as_full_circle	boolean	<p>Controls whether zero degree arcs are translated into full circles.</p> <ul style="list-style-type: none"> <li>• <b>Yes</b> — Zero degree arcs are translated as a full circle.</li> <li>• <b>No</b> — Zero degree arcs are translated as zero length lines.</li> </ul> <p>Default = Yes</p>
iol_gbr_polygon_break	integer	<p>Controls treatment of a polygon area fill block that contains a D02 command before it is closed.</p> <p>The Gerber Format Guide states “D02 closes and fills the polygon”. Continuing with new points after the D02 is technically legal (it starts a new polygon) but is not always recommended. By default, files containing this anomaly are rejected.</p> <p>This parameter applies to both Gerber and RS-274X formats.</p> <ul style="list-style-type: none"> <li>• <b>1 = Allow</b> — Closes the current polygon and starts a new one when D02 is encountered.</li> <li>• <b>2 = Don’t allow</b> — Rejects input of files that break polygons with D02 (default).</li> <li>• <b>3 = Ignore</b> — The D02 command is ignored and the current polygon remains open.</li> </ul>




# CAM Compare Window















To access: Open the CAM Compare window as appropriate for the application you are using.  
From the CAM Compare window, you perform all actions necessary to compare a design with the equivalent reference files.



## Objects

The comparison pane of the CAM Compare window contains these columns:

Object	Description
	Indicates the layers to be used in the comparison.  You can use <b>Tools &gt; Deselect All Layers</b>  and <b>Tools &gt; Select All Layers</b>  , and you can select and clear individual layers.






Object	Description
	Indicates whether this ODB++ layer is displayed in the graphic pane.
ODB++ Layer List	Lists the names of the ODB++ layers.
	Indicates whether this reference layer is displayed in the graphic pane.
CAM Data	Lists the names of the reference layers.
	Indicates the status of the translation stage: <ul style="list-style-type: none"> <li> green — The reference file listed in the CAM Data column was translated successfully.</li> <li> red — Translation of the reference file failed. Move the mouse pointer over the red symbol to see messages such as this: Translation failed for layer rout.</li> </ul>
	Indicates the status of the matching stage: <ul style="list-style-type: none"> <li> green — The reference file was successfully matched with the layer.</li> <li> red — The reference file could not be matched with a layer. Move the mouse pointer over the red symbol to see messages such as this: Poor match for layer rout.</li> </ul>
	Indicates the status of the registration stage: <ul style="list-style-type: none"> <li> green — The reference file was successfully registered with the layer.</li> <li> red — The reference file could not be fully registered with a layer. Move the mouse pointer over the red symbol to see messages such as this: Approximate registration for layer sst.</li> </ul>
	Indicates the status of the compare stage: <ul style="list-style-type: none"> <li> green — The reference file is identical to the layer.</li> <li> red — The comparison revealed differences between the reference file and the layer. Move the mouse pointer over the red symbol to see a message displaying the number of differences found: 18 differences found for layer drill.</li> </ul>

## CAM Compare Menus and Tools in PADS Environment

CAM Compare menus and tools are used to control the comparison.









## Edit Menu Options




Options on the Edit menu are used to highlight, move, measure, or rotate features.

Edit Menu Tool	Option	Explanation
	Highlight Features	Highlighting features. Use the Shift key for additive highlighting.
	Clear Highlighted	Clear the highlighting.
	Move Layer	Move the layer.
	Rotate Layer	Rotate the layer.
	Measure	Measure between two features.

## View Menu Options




Options on the View menu are used to adjust your view in the graphic pane.

View Menu Tool	Option	Explanation
	Zoom Mode > Auto Zoom	Zoom automatically while browsing the results.
	Zoom Mode > Pan Only	Pan only.
	Zoom Mode > No Zoom	Do not zoom or pan.
	Zoom In Zoom Out	Zoom in to view a small area of the board in detail, or zoom out to view a larger area of the board.
	Zoom by Area	Zoom to the area within a rectangle you drag.
	Zoom Home	Zoom to display the entire board.
	Previous Zoom	Return to the zoom factor that was in effect before the most recent zoom action.
	Pan Left, Pan Right Pan Up, Pan Down	Pan in the indicated direction.

View Menu Tool	Option	Explanation
	View properties	Open the Feature Information dialog box or the Component Properties dialog box. See “ <a href="#">Viewing Information about Components or Features</a> ” on page 22.
	Feature Filter	Open the Feature Filter dialog box. See “ <a href="#">Features Filter</a> ” on page 25.
	Color Settings	Define colors that display items in the graphic area. See “ <a href="#">Setting Display Colors</a> ” on page 37.



## Results Menu Options












Options on the Results menu are used to navigate through the results of the comparison.




Results Menu Tool	Option	Explanation
	Show First Result Show Previous Result Show Next Result Show Last Result	Navigate to results. Click <b>Show Next Result</b>  at any time to perform the remaining stages of the comparison process.
	Show all	Show all results of the selected category.

## Tools Menu Options

Options on the Tools menu are used to perform the comparison and to access other functionality.

Tools Menu Tool	Option	Explanation
	Deselect all layers Select all layers	Clear or select all layers.
	Matrix	Open the product model matrix—a representation of product model layers where the rows are the layers of the step and the columns contain additional information. See “ <a href="#">Job Matrix User Guide</a> ”.

Tools Menu Tool	Option	Explanation
	Snap (Ctrl-S)	You can control how features snap to positions on the grid or to other features. You can control whether the grid is displayed, and in what form.  See “ <a href="#">Setting Snap Options, Grid Options, and Graphic Origin</a> ” in <i>Valor NPI Graphic Station User Guide</i> .
	Import reference CAM files	See step 2 in “ <a href="#">Performing CAM Compare</a> ” on page 16.
	Open a reference ODB++ Job	Import a similar ODB++ product model for comparison.  See step 2 in “ <a href="#">Performing Product Model Compare</a> ” on page 18.
	Match layers	If you are performing a CAM compare, see step 3 in “ <a href="#">Performing CAM Compare</a> ” on page 16.   <b>Note:</b> For a product model comparison this is not done.
	Register layers	If you are performing a CAM compare, see step 4 in “ <a href="#">Performing CAM Compare</a> ” on page 16.   <b>Note:</b> For a product model comparison this is not done.
	Compare layers	If you are performing a CAM compare, see step 5 in “ <a href="#">Performing CAM Compare</a> ” on page 16.  If you are performing a product model compare, see step 4 in “ <a href="#">Performing Product Model Compare</a> ” on page 18.
	Show SIPs	If this tool is enabled after you run a comparison, it means that CAM Compare has found self-intersecting polygons in the design. To display the SIPs, click this tool.
	Clear CAM layers	You can clear the data that has been read in, so that you can read in different data.
	Netlist Analyzer	Compare netlists.  See “ <a href="#">Comparing the Netlists</a> ” on page 21.

Tools Menu Tool	Option	Explanation
	IPC356 Compare	 <b>Restriction:</b> This option is available only if your site has the appropriate license.
	EDA Sync Mode	Set synchronization mode to one of these: <ul style="list-style-type: none"> <li>• <b>Manual</b> — Synchronization will be performed when you click EDA Synchronize Now! or press Ctrl + J.</li> <li>• <b>Automatic</b> — Synchronization will be performed automatically when the view in one of the applications changes.</li> <li>• <b>Off</b> — Synchronization will not be performed.</li> </ul>
	EDA Synchronize Now!	If you have set up synchronization with an EDA tool, and EDA Sync Mode = Manual, click this tool or press Ctrl + J to perform synchronization.

## Comparison Tasks

---

Basic CAM Compare tasks.

<b>Performing CAM Compare .....</b>	<b>16</b>
<b>Performing Product Model Compare .....</b>	<b>18</b>

## Performing CAM Compare

Comparing an ODB++ product model with CAM files consists of reading in the reference data, matching layers, registering layers, and comparing.

---

### Note




In many cases, CAM Compare stages are performed automatically.

---

---

### Tip



You can click the **Show Next Result** tool  at any time to perform the remaining stages of the comparison process.

---

## Prerequisites

You have extracted reference CAM files from the CAD tool as described in “[Exporting CAM files from the CAD Tool](#)” on page 7.

## Procedure


1. Open CAM Compare as appropriate for the application you are running.

The comparison pane of the CAM Compare window lists the layers of the current product model in the ODB++ Layer List column.

---

### Tip



If you have previously imported data, and you want to read in different data instead, click the **Clear CAM Layers** tool .

---

2. Import CAM files of the design:

- a. Click the **Import reference CAM files** tool .














The Select one or more input files dialog box opens.

- b. Select the CAM files and click **Open**.

The CAM files are listed in the CAM Data column in the order in which they were read in.




















The Import column indicates the status.

		ODB++ Layer List		CAM Data				
<input checked="" type="checkbox"/>				legend2.pho_gerberinfo				
<input checked="" type="checkbox"/>	sst			resist1.pho_gerberinfo				
<input checked="" type="checkbox"/>	sst+1			screen.pho_gerberinfo				
<input checked="" type="checkbox"/>	spt			stencil1.pho_gerberinfo				
<input checked="" type="checkbox"/>	smt							
<input checked="" type="checkbox"/>	sig							
<input checked="" type="checkbox"/>	sigb							
<input checked="" type="checkbox"/>	smb							
<input checked="" type="checkbox"/>	ssb							
<input checked="" type="checkbox"/>								















3. Match each CAM file with the corresponding layer in the ODB++ product model.
  - a. Click the **Match layers** tool .


CAM Compare matches the CAM layers to the CAD layers by their geometry properties and layer name. If a CAM layer name is the same as a CAD layer name, those layers are set as a match, regardless of how well the layer geometry matches. The layer name suffix in the CAM data is ignored.

		ODB++ Layer List		CAM Data				
<input checked="" type="checkbox"/>								
<input checked="" type="checkbox"/>	sst			screen.pho_gerberinfo				
<input checked="" type="checkbox"/>	sst+1							
<input checked="" type="checkbox"/>	spt			stencil1.pho_gerberinfo				
<input checked="" type="checkbox"/>	smt			resist1.pho_gerberinfo				
<input checked="" type="checkbox"/>	sig							
<input checked="" type="checkbox"/>	sigb							
<input checked="" type="checkbox"/>	smb							
<input checked="" type="checkbox"/>	ssb			legend2.pho_gerberinfo				
<input checked="" type="checkbox"/>								

- b. Check that the CAM layers have been re-arranged to match the layers of the product model.
  - c. If necessary, drag layers into the correct position.
4. Line up the information on one or more layers before comparing.
  - a. Select the layers to be registered.

- b. Click the **Register layers** tool .

	ODB++ Layer List	CAM Data				
<input checked="" type="checkbox"/>						
<input checked="" type="checkbox"/>	sst	screen.pho_gerberinfo				
<input checked="" type="checkbox"/>	sst+1					
<input checked="" type="checkbox"/>	spt	stencil1.pho_gerberinfo				
<input checked="" type="checkbox"/>	smt	resist1.pho_gerberinfo				
<input checked="" type="checkbox"/>	sigt					
<input checked="" type="checkbox"/>	sigb					
<input checked="" type="checkbox"/>	smb					
<input checked="" type="checkbox"/>	ssb	legend2.pho_gerberinfo				
<input checked="" type="checkbox"/>						

5. Click the **Compare** tool  to compare the reference layers to the ODB++ product model layers.


## Results

You can review the results of CAM Compare as described in “[Examining the Comparison Results](#)” on page 20.



## Performing Product Model Compare

You can use CAM Compare to compare two versions of an ODB++ product model. The comparison process consists of reading in the reference data, matching copper layers (if required), and comparing.

### Note

 In many cases, comparison stages are performed automatically.

### Tip



 You can click the **Show Next Result** tool  at any time to perform the remaining stages of the comparison process.

## Procedure

1. Open CAM Compare as appropriate for the application you are running.

The comparison pane of the CAM Compare window lists the layers of the current product model in the ODB++ Layer List column.

### Tip

-  If you have previously imported data, and you want to read in different data instead, click the **Clear CAM Layers** tool .

## 2. Import the reference ODB++ product model:

- a. Click the **Open Reference ODB++ job** tool  and select the product model.

The Job list dialog box opens.


























- b. Select the product model and click **OK**.

The Step list dialog box opens.


- c. Select the step and click **OK**.

The layers of the reference product model are matched with the layers of the original product model, based on their position in the product model matrix, and on their type and context. They are listed in the CAM Data column.

The Match column indicates the status.

		ODB++ Layer List		CAM Data				
<input checked="" type="checkbox"/>								
<input checked="" type="checkbox"/>		spt		spt				
<input checked="" type="checkbox"/>		sst		sst				
<input checked="" type="checkbox"/>		smt		smt				
<input checked="" type="checkbox"/>		top		ffk				
<input checked="" type="checkbox"/>		int1		int1				
<input checked="" type="checkbox"/>		int2		int+1				
<input checked="" type="checkbox"/>		int3		int3				
<input checked="" type="checkbox"/>		int4		int4				
<input checked="" type="checkbox"/>		bottom		bottom				
<input checked="" type="checkbox"/>		smb		smb				
<input checked="" type="checkbox"/>		ssb		ssb				
<input checked="" type="checkbox"/>		spb		spb				
<input checked="" type="checkbox"/>								

## 3. If necessary, drag layers into the correct position.

4. Click the **Compare** tool  to compare the reference layers to the original layers.

## Results

You can review the results of CAM Compare as described in “[Examining the Comparison Results](#)” on page 20.

# Examining the Comparison Results

You can examine the results of the comparison in the graphic area.

## Prerequisites

You have performed one of the tasks listed in “[Comparison Tasks](#)” on page 16.


## Procedure

1. Click cells in the ODB++ Layer List column and the CAM Data column to display layers of the ODB++ product model and the reference files, in the graphic area.
2. Use the tools on the CAM Compare toolbar to examine each difference found between the product model and the reference files.
3. Where the ODB++ design does not match the reference data, you can examine the design in the CAD tool, and if necessary, edit the design in the CAD tool. See “[Examining Differences Using the CAD Tool](#)” on page 20.

# Examining Differences Using the CAD Tool


You can synchronize the graphic display in CAM Compare with the graphic display in the CAD tool. In the CAD tool, you can examine each location for which the product model does not match the CAM files.

## Prerequisites

- You have set up graphic synchronization in the CAD tool.
- You have set **Tools > EDA Sync Mode** to the appropriate value:
  - **Manual** — Synchronization is performed when you click **EDA Synchronize Now!**  or press Ctrl + J.
  - **Automatic** — Synchronization is performed automatically when the view changes.
  - **Off** — No synchronization is performed.

## Procedure

1. Make sure that the CAD tool is running and that the appropriate design is open.

2. In CAM Compare, display an area of the board that contains a discrepancy between the design and the reference files, as described in “[Examining the Comparison Results](#)” on page 20.
3. Press Ctrl + J or another defined shortcut, or click **EDA Synchronize Now!** , to display the same area of the board in the CAD tool.







## Re-running the Comparison with Edited Reference Files

If you have edited the design in the CAD tool, and re-exported the CAM files, you can import just the modified CAM files to CAM Compare, and re-run the comparison on the layers for which the CAM files have changed.

### Prerequisites

You have compared the ODB++ product model with the CAM files output from the CAD tool as described in “[Performing CAM Compare](#)” on page 16 and found discrepancies that require modification in the original CAD tool.

### Procedure

1. In the CAD tool, make the required changes and export CAM files.
2. Use the **Import reference CAM files** tool  to import CAM files that have changed to CAM Compare.
3. To select the layers for which the CAM files have changed, in the filter column , clear all check boxes using the Filter Out All Layers tool  and select individual check boxes.
4. Match the layers using the **Match layers** tool .
5. Register the layers using the **Register layers** tool .
6. Compare the product model with the reference files using the **Compare Layers** tool .

## Comparing the Netlists


You can compare the netlist of the product model with the netlist of the reference files.

### Procedure

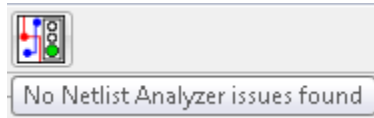
1. Choose **Tools > Netlist Analyzer** or click the **Netlist Analyzer** tool .

A message box pops up and displays the number of shorts, breaks, missing and extra nets.

2. Click **OK**.

The Netlist Analyzer tool  indicates the result of the analysis.

3. Move the mouse pointer over the Netlist Analyzer tool to display a tooltip.

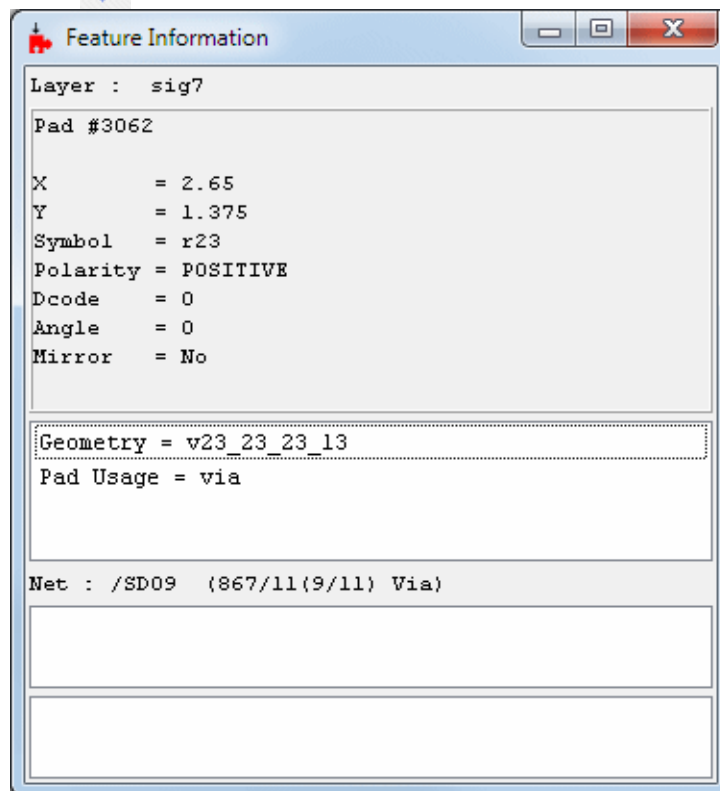


## Viewing Information about Components or Features


You can view information about a component or feature that is highlighted in the graphic area.

### Procedure

1. To view information about a feature, highlight a feature in the graphic area and click the View properties  tool.



While the dialog box is open, each time you click on a feature in the board viewer, information about that feature are displayed.

2. To view information about a component, highlight a component in the graphic area and click the View properties  tool.


Component Properties

—
□
×

**Top Components**

Comp # 93 : C22  
Part : 2912650  
EDA Package : 0603  
  
BOM INFO:  
CPN : 20-565-1097\_GENERATED  
IPN : 20-565-1097  
MPN : GRM188R71C104KA01D  
Manufacturer : MURATA  
BOM Package :  
  
VPL INFO:  
MPN : GRM188R71C104KA01D  
Mcode : MURATA  
VPL Package : \*EXD-R2/X-L16W8T8  
Package Type : DISCRETE  
Part SubType : Capacitor or Networks  
Lead Type : Wraparound

**DESCRIPTION**



Description: C100NF 25 X7R 10 603,100N+10%/-10%  
ElectricalType: Undefined  
Part Status: Approved

**ATTRIBUTES**

Filter:

Height = 0.04 " (C)  
Mount Type = smt (C)  
Polarity = non\_polarized (C)  
Rotation Neutralization = 0 (C)  
VPL Package name (VPL1) = XEXD-R2/XC-L16W8T8 (P)

**PROPERTIES**

Filter:

PART\_NUMBER = 29L2650  
PLACE = POP  
ROOM = ALL  
SIGNAL\_MODEL = C100NF  
VALUE = 100N  
TOL = +10%/-10%  
ALT\_SYMBOLS = (0603)  
VENDOR\_PART = GRM188R71E104KA01D  
VENDOR = MURATA

While the dialog box is open, each time you click on a component in the board viewer, information about that component are displayed.

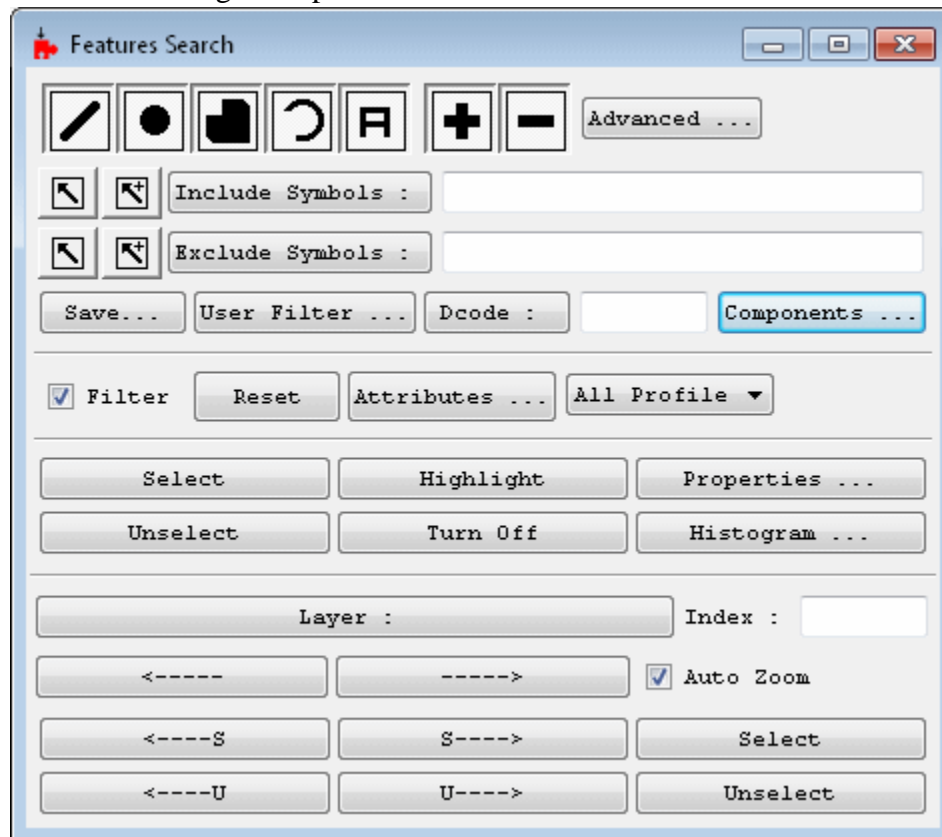


## Features Filter

You can filter features according to feature type, symbol (include or exclude), attributes, Dcode, components, and profile (within or outside).

To filter features, click the **Feature Filter** tool  on the CAM Compare toolbar.

The Features Search dialog box opens.



To deactivate all filters, clear **Filter** (no items will be filtered out). Select **Filter** to re-activate and apply defined filters.

To reset to the default values in the Features Filter dialog box, click **Reset**.

Selection options are available only when configuration parameter `edt_enable_editing_tools = Yes`. See “[Comparison Process Configuration](#)” on page 8.

All filters are cumulative. For example, if you activate the Pad filter, then only pads are selected. If you also select a Dcode, this limits the selection to pads with that Dcode.

When any filters are active, a red border is displayed in the filter button on the CAM Compare window. When you click **Reset** to clear all filters the red border disappears.

**Table 1-2. Functionality of the Features Search Dialog Box**

Functionality	Description
Using the Features Filter	The filtering of features, components, or nets is performed from the Features Filter dialog box.
Using the Advanced Filter	You can use the advanced filter to filter features according to their geometric properties.
Filtering by Component	The Component Filter dialog box enables you to specify selection criteria for components or features linked to components. The filtering options you specify in this dialog box determine the selection of components in the specified layers.
Filtering by Attribute	You can specify attributes as filters. The border of the Attributes button in the Features Filter dialog box becomes red when attribute filters are in effect.
Using the Histogram to Filter	The Features Histogram dialog box displays selected features as nodes in a tree, grouped by type (lines, pads, surfaces, and text). A node can be expanded to display the name of each feature, and its polarity, count, resize information, and degree of rotation.
Browsing and Selecting Filtered Features	You can browse through the results.

## Using the Features Filter

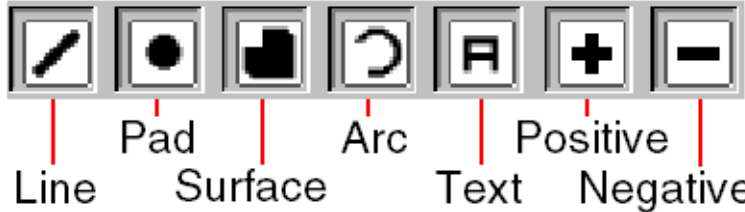


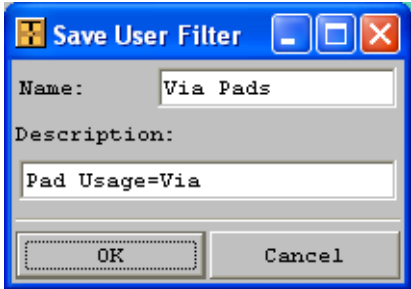
Access: the **Features Filter** tool .

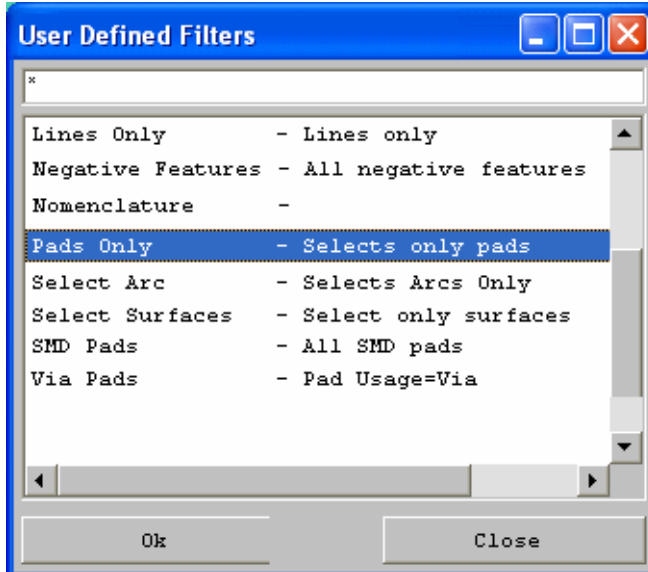
The filtering of features, components, or nets is performed from the Features Filter dialog box.

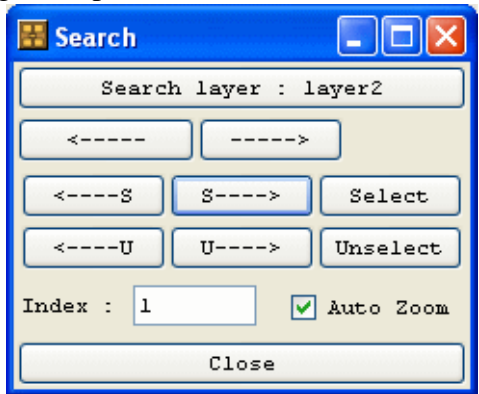
### Procedure

1. Click the **Features Filter** tool  to open the Features Filter dialog box.

2. Use the buttons on the dialog box to create a filter.

If you want to...	Do this:
Filter according to type of feature.	<p>The feature types by which you can filter are line, pad, surface, arc, text, positive features, and negative features.</p>  <p>The initial setting of the features bar is all filters not selected. All lines, pads, surfaces, arcs, text, positive and negative features are selected when selecting with the Area or Polygon selection tools.</p>
Define advanced Filters.	<p>Click <b>Advanced</b>.</p> <p>The Advanced Filter dialog box opens. See <a href="#">“Using the Advanced Filter”</a> on page 30.</p>
Include or exclude features of a specific symbol.	<p>Do one of these:</p> <ul style="list-style-type: none"> <li>Click either the include or exclude arrow, and then click the feature in the graphic area. Its name appears in the field. Only symbols with this name will be included or excluded in selection. Each symbol selected with  replaces the previous symbol. To add a symbol to the presently selected one, choose with the cumulative  button.</li> <li>Click <b>Include Symbols</b> or <b>Exclude Symbols</b> and select a number of symbols to include or exclude from the list. The names, separated by semi-colons (;), display in the field.</li> </ul>
Save a user defined filter.	<p>To save a selection filter to the library, click <b>Save</b>, enter a name and description for the filter in the Save User Filter dialog box, and click <b>OK</b>.</p> 

If you want to...	Do this:
Use a user-defined filter.	<p>Click <b>User Filter</b>, and select a filter from the list in the User Defined Filters dialog box.</p>  <p>The filter name text includes the description. Therefore, to filter the list, enter the name of the filter with an asterisk (*) at the end to ignore the description.</p>
Filter by Dcode.	<p>Click <b>Dcode</b> and select a Dcode from the dialog box.</p> <p>The Dcode applies to the selection, in addition to other filters. The Dcode name appears in the field beside the Dcode button.</p>
Use the Components filter.	Click <b>Components</b> and select components from the Components Filter dialog box. See <a href="#">“Filtering by Component”</a> on page 31.
Deactivate all filters.	Clear the Filter check box (all items will be selected). Select the Filter check box to re-activate and apply defined filters.
Return to the default values of the Features Filter dialog box.	Click <b>Reset</b> .
Filter by attributes.	<p>Click <b>Attributes</b>.</p> <p>The Attributes Filter dialog box opens. See <a href="#">“Filtering by Attribute”</a> on page 33. If an attribute filter is selected, this button appears in red.</p>
Filter according to location relative to the profile.	<p>In the profile field, select one of the options:</p> <ul style="list-style-type: none"> <li>• <b>All Profile</b> — All features inside and outside of the profile.</li> <li>• <b>In Profile</b> — Only features inside the profile are selected.</li> <li>• <b>Out Profile</b> — Only features outside profile are selected.</li> </ul>

If you want to...	Do this:
Select or clear filtered features.	<p>After specifying filters, click <b>Select</b> to select all filtered features in Affected layers subject to the criteria set here and the parameters previously set in the Selection Options dialog box.</p> <p>To remove the selection of all filtered features, click <b>Unselect</b>. This deselects features and does not turn off highlighted features.</p>
Highlight or turn off highlighting.	<p>To highlight all filtered features, click <b>Highlight</b>.</p> <p>To turn off highlighting, click <b>Turn Off</b>. This removes highlight from highlighted features only, and not from selected features.</p>
Search for features.	<p>If it is available, click the <b>Search</b> button.</p> <p>The Search dialog box opens.</p>  <p>Use these buttons to search for features:</p> <ul style="list-style-type: none"> <li>• <b>Search layer</b> — To select the layer to search.</li> <li>• <b>Arrows of the second row</b> — To browse all features in the layer.</li> <li>• <b>Arrows of the Select row and Unselect row</b> — To select or deselect the feature.</li> <li>• <b>Auto Zoom</b> — To change magnification to fit each feature.</li> </ul> <p>The Index field displays the index number of the currently selected feature.</p>
Display feature information.	If it is available, click the <b>Properties</b> button.
Select, highlight, or search in accordance with the set filters.	<p>Click the <b>Histogram</b> button.</p> <p>The Features Histogram dialog box opens, with selection status of all features. See <a href="#">“Using the Histogram to Filter”</a> on page 35.</p> <p>Select features according to defined filters. If you do not use feature selection tools, filters apply to all features in Affected layers.</p>

3. Click **Close** to close the dialog box and retain the filter you defined when you reopen the application, or click **Close & Reset** to reset the filter to default values before closing.

## Using the Advanced Filter

You can use the advanced filter to filter features according to their geometric properties.

The Advanced filter can be applied to features and their limits. The criteria set in the Advanced filter affect only the corresponding feature types. For example, filtering for mirrored pads does not filter out any traces or surface features.

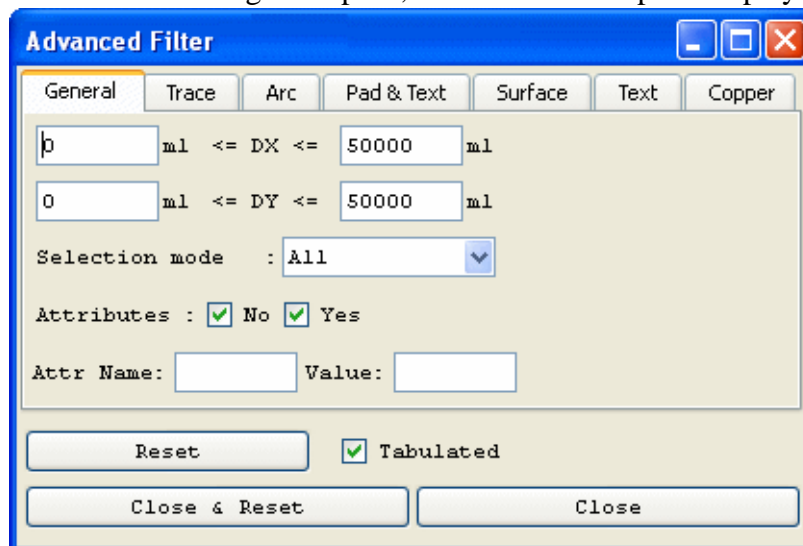
Feature selections are cumulative. Filters can be viewed in tabulated format (as shown), or as a list.

You can return to default values at any time by clicking **Reset**.

### Procedure

1. Click the **Features Filter** tool .
2. In the Features Filter dialog box, click **Advanced**.

The Advanced Filter dialog box opens, with the General pane displayed.



3. Set the bounding box limits for features to be included in the filter. For example, to include only features which fit into a bounding box of 20x40ml, enter 0 in the left DX and DY fields, 20 in the right DX field, and 40 in the right DY field.
4. In Selection mode, select All, Selected or Not Selected to set the filter for all features regardless of selection, only selected features, or only non-selected features.
5. In Attributes, select Yes, No, or both to set the filter for only features with attributes, only features without attributes, or all features, regardless of attributes.

6. In tabs **Trace**, **Arc**, **Pad & Text**, **Surface**, **Text**, and **Copper**, set criteria for each type of feature:

Tab	Criteria
Trace	<ul style="list-style-type: none"><li>• Length, Width</li><li>• Trace Angle</li></ul>
Arc	<ul style="list-style-type: none"><li>• Sweep Angle</li><li>• Diameter</li><li>• Direction</li></ul>
Pad & Text	<ul style="list-style-type: none"><li>• Rotation</li><li>• Angle</li><li>• Mirrored</li><li>• Resize</li></ul>
Surface	<ul style="list-style-type: none"><li>• Number of Islands, Number of Holes, Number of Edges</li><li>• Surface Area</li></ul>
Text	<ul style="list-style-type: none"><li>• Text</li><li>• Font</li><li>• String Length, String Format</li></ul>
Copper	<ul style="list-style-type: none"><li>• Solder Mask Exposure - affecting only outer copper layers</li><li>• Drill Presence - affecting all copper layers</li></ul>

## Filtering by Component

The Component Filter dialog box enables you to specify selection criteria for components or features linked to components. The filtering options you specify in this dialog box determine the selection of components in the specified layers.

This dialog box can be opened only when the loaded product model contains component layers. Component layers are generated after direct input from an EDA system (bypassing Gerber), or by reading a Mentor Graphics neutral file.

Components with the .comp\_ignore attribute do not display regardless of the filter specified.

### Procedure

1. Click the **Features Filter** tool .
2. In the Features Filter dialog box, click **Components**.

The Component Filter dialog box opens.

**Components Filter**

Name : \*

Package :

Part Name :

Net Name :

**BOM INFO:**

CPN :

IPN :

MPN :

Manufacturer:

VPL Pkg :

BOM Pkg :

0 mm <= LENGTH <=  1270 mm

0 mm <= WIDTH <=  1270 mm

0 mm <= PITCH <=  1270 mm

0 <= PIN COUNT <=  20000

Rotation : ☒ 0 ☒ 45 ☒ 90 ☒ 135 ☒ 180  
☒ 225 ☒ 270 ☒ 315 ☒ other

Special Rotation :  Tol:

Mirrored :  Pins :

Side : ☒ Top ☒ Bottom

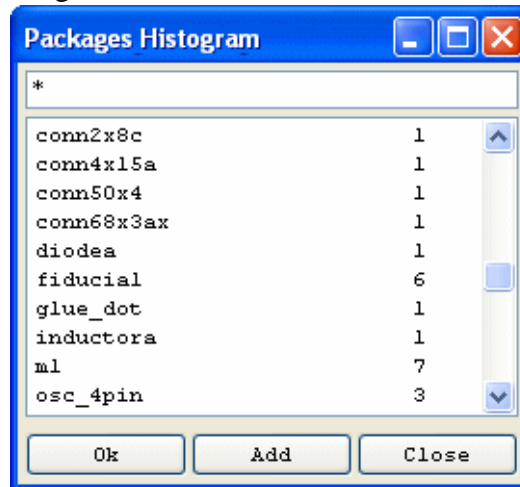
3. Enter the required component properties and BOM information in one of these ways:

- Type a name, a wildcard character (\*) or a list of names/wildcard characters separated by semi-colons (;).

Filtering entries that have associated quantities require a wildcard character because the second column is considered part of the string. Therefore, in the figure below,



entering fiducial does not return any results because it does not include the quantity 6. Entering fiducial\* does return results.



- Click and select an item in the graphic area, or click and select an item to be added to the existing items already in the filter.
  - Click and select an entry from the list.
4. Enter minimum and maximum values for Length, Width, Pitch and Pin Count.
  5. Select one or more rotation options to include in the filter.
  6. Select mirror values to include in the filter: Yes (only mirrored), No (only unmirrored) or All (both mirrored and unmirrored).
  7. From the Pins list, select the pin-type to include in the filter.
  8. From Side, select Top to include components on the top side of the board, and Bottom to included components on the bottom side. By default, both Top and Bottom are selected.

## Filtering by Attribute

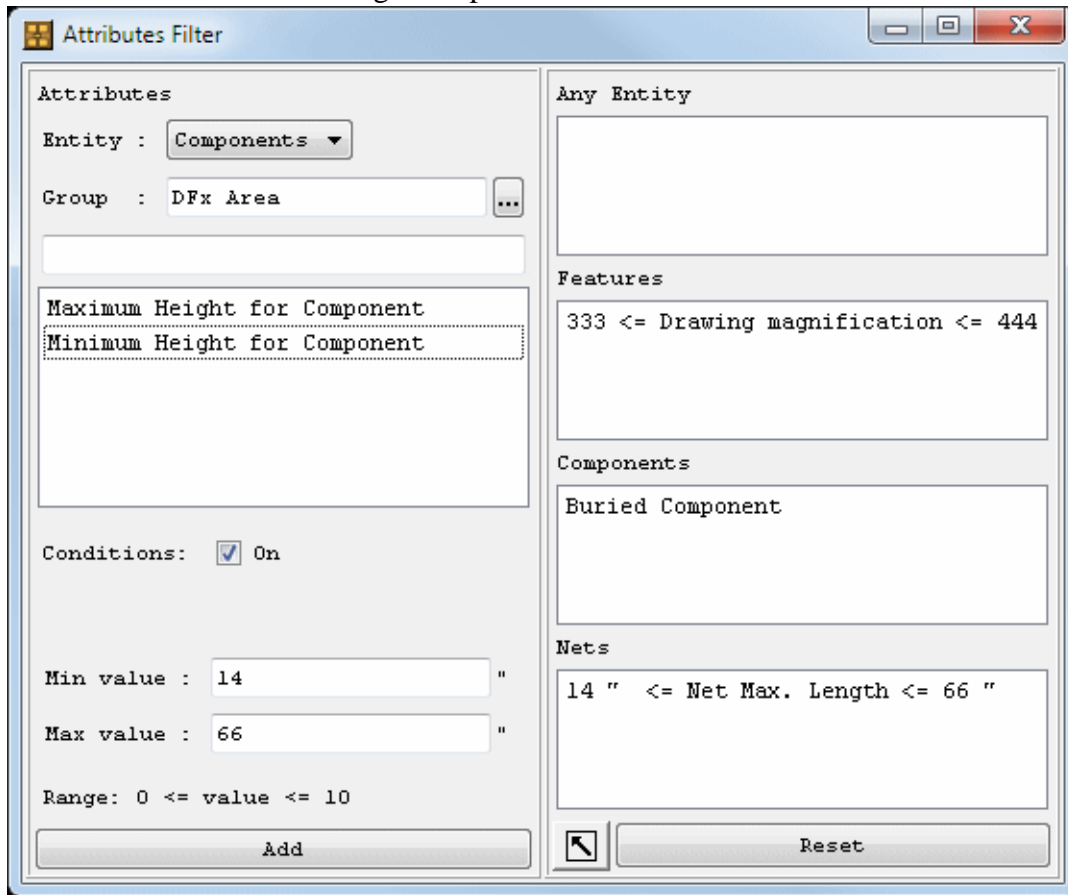
You can specify attributes as filters. The border of the Attributes button in the Features Filter dialog box becomes red when attribute filters are in effect.

The Attributes Filter relates only to assigned attributes. It cannot be used to filter for descriptions. To change component descriptions to attributes, run line mode command `comp_attr_from_desc_param` with parameter = `part_desc1` and selected = `yes`.

### Procedure

1. Click the **Features Filter** tool to open the Features Filter dialog box as discussed in “Using the Features Filter” on page 26.
2. In the Features Filter dialog box, click **Attributes**.

The Attributes Filter dialog box opens.




3. Set these values.

Field	Description
Entity	<p>The entity type of the attributes by which you want to filter, according to the value of ENTITY in the attribute definition.</p> <ul style="list-style-type: none"> <li>• <b>All</b> — Attributes having ENTITY = FEATURE or COMPONENT or NET.</li> <li>• <b>Features</b> — Attributes having ENTITY = FEATURE.</li> <li>• <b>Components</b> — Attributes having ENTITY = COMPONENT.</li> <li>• <b>Nets</b> —Attributes having ENTITY = NET. Filtering by a net attribute will select or highlight all affected layer features that are part of the EDA net to which the attribute is assigned.</li> </ul>
Group	<p>The group containing the attributes by which you want to filter, according to the value of GROUP in the attribute definition.</p> <ul style="list-style-type: none"> <li>• <b>All Groups</b> — All attributes of the specified entity, of all groups.</li> <li>• <b>Custom</b> — Attributes that do not have GROUP defined in the attribute definition.</li> <li>• <b>&lt;group&gt;</b> — Attributes having GROUP = &lt;group&gt;.</li> </ul>

Field	Description
[filter]	A string by which the listed attribute names are filtered.
[attributes]	List of attributes matching the specified entity type, group, and filter string.
Conditions	Select On to activate. Conditions display in this area when applicable. You can set one or more conditions to apply to a filter.  For these attributes you can filter by a value that you enter as a text string: CADStar Package Name, Package Type, VPL Package Name, Zuken Package Info, Lead Form, Package Name for ALE.
Any Entity Features Components Nets	List of attributes of each entity type, with conditions currently used to filter.

4. Use these buttons to build the Filter list:

Button	Explanation
Add	Adds the selected attribute to the Filter pane.
Select Existing 	To create a filter using the attributes of a specific component or package, click the select arrow beside Reset, and click the component or package in the graphic area that has the attributes you want for a filter.
Reset Remove	If no attribute is selected in the Filter pane, click <b>Reset</b> to clear all attributes.  If an attribute is selected in the Filter pane, click <b>Remove</b> to clear that attribute.

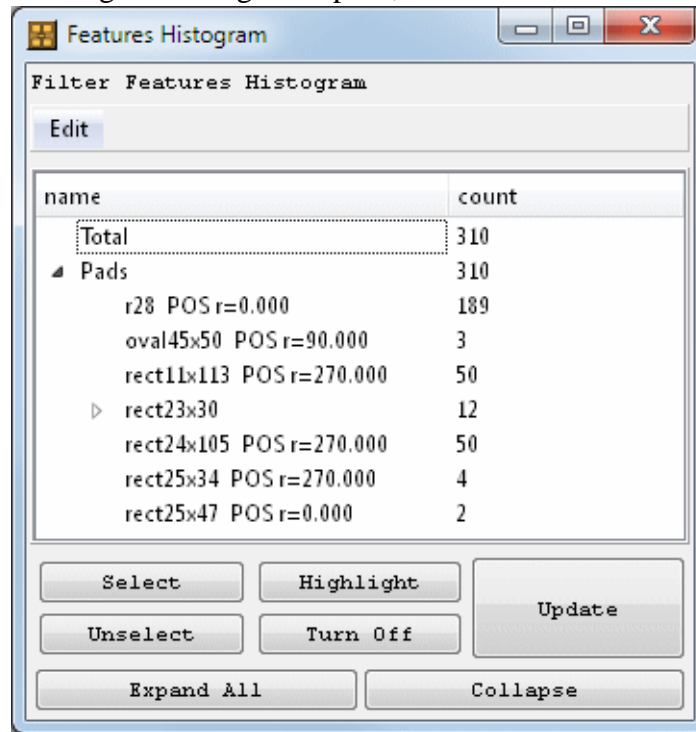
## Using the Histogram to Filter

The Features Histogram dialog box displays selected features as nodes in a tree, grouped by type (lines, pads, surfaces, and text). A node can be expanded to display the name of each feature, and its polarity, count, resize information, and degree of rotation.

### Procedure

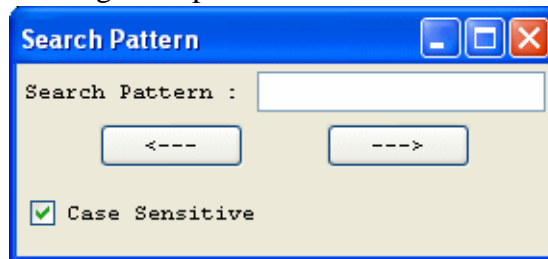
1. Click the **Features Filter** tool .
2. In the Features Filter dialog box, click the **Histogram** button.

The Features Histogram dialog box opens, with selection status of all features.



3. Choose **Edit** > **Search** or press Ctrl-S.

The Search Pattern dialog box opens.



4. Define the Search Pattern:
5. Specify whether the search should be case sensitive or not.
6. Click the button of the requisite action in the Features Histogram dialog box.

Field	Description
Select	Select features according to a pattern.
Unselect	Remove the selection of all filtered features.
Highlight	Highlight all filtered features.
Turn Off	Remove highlighting of features.

Field	Description
Update	Refresh the histogram to reflect the features selected in the graphic area. Update can be configured to be continuous.
Expand All	Expand the feature tree to all levels.
Collapse	Collapse the feature tree.

## Browsing and Selecting Filtered Features

You can browse through the results.

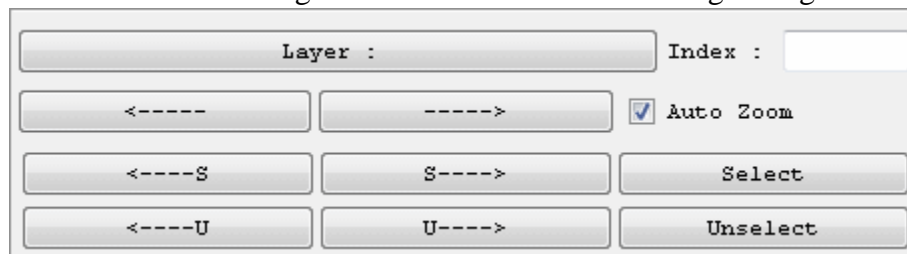
### Prerequisites

You have set up filters as described in .

### Procedure

1. Click the **Feature Filter** tool .

The Features Search dialog box contains tools for browsing through filtered features.



2. Click the **Layer** bar and select one of the displayed layers to search.
3. Click the forward and back arrows of the Select row to select the feature then move to the next or previous feature.
4. In Index, note the Index number of the currently selected feature.
5. To change the zoom to fit each feature, select **Auto Zoom**.

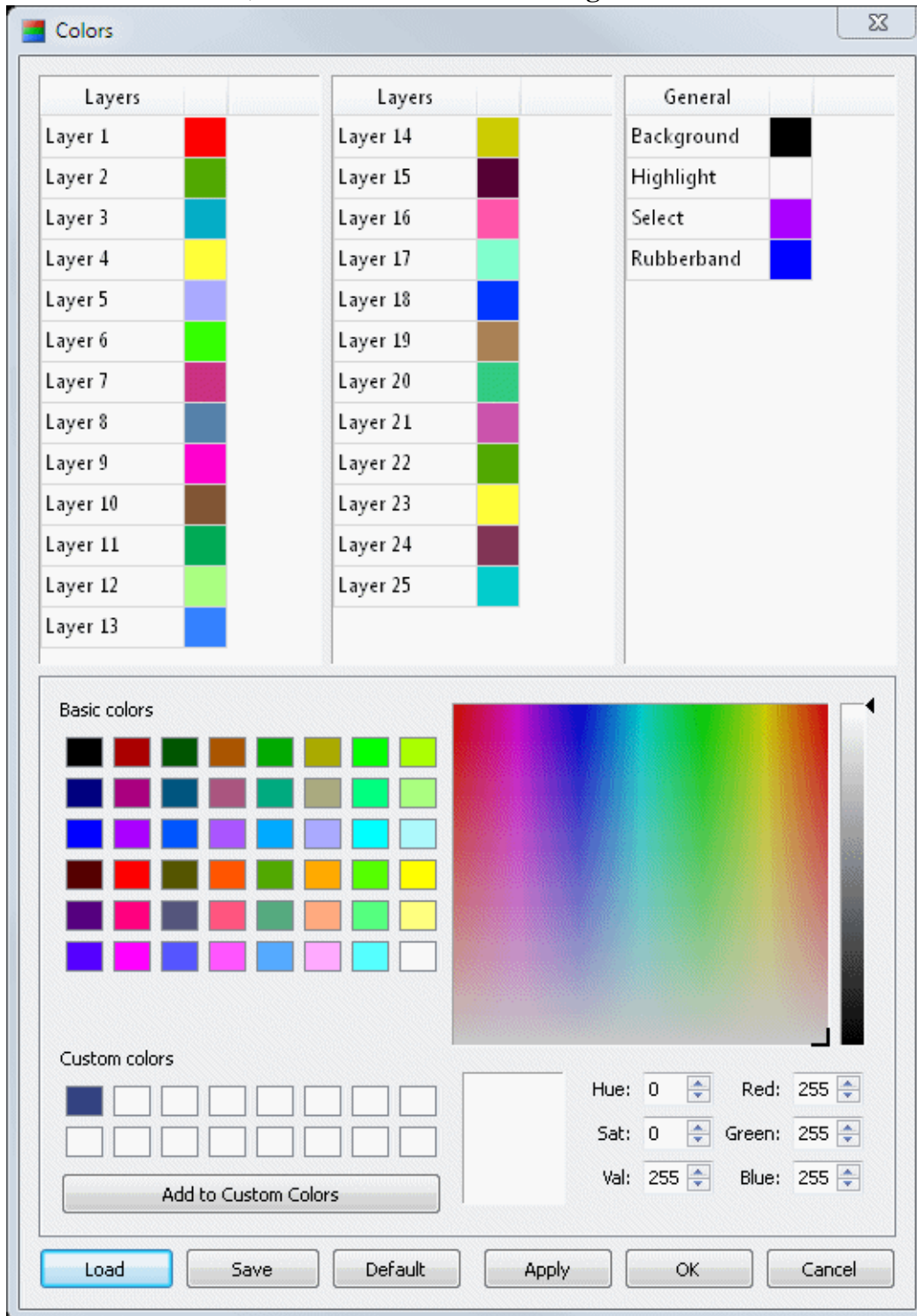
## Setting Display Colors

You can customize the colors used to display items in the graphic area. You can define, save, and load multiple custom color schemes.

For best results, use a dark color for the background, bright colors for layer features and components, and light colors for Rubberband, Highlight, and Select.

## Procedure

1. Open the Colors dialog box as appropriate for the viewer you are using.
  - In Valor NPI Graphic Station, choose **Options > Colors**.
  - In other viewers, choose **View > Color Settings**.



2. Select the item for which you want to set the color:

Entity	Explanation
Layer 1 - Layer 25	Colors used for features or components in the displayed layers.
Background	Color of the work area background.
Highlight	Color of highlighted features and components. The color of Valor NPI Netlist Analyzer netpoints on the bottom.
Select	Color of selected features and components. The color of Valor NPI Netlist Analyzer netpoints on the top.
Rubberband	Color used for rubberbands.

3. Select a color in the bottom pane.
4. Use the action buttons to perform these tasks:

Action Button	Explanation
Apply or OK	The selected color is applied to the specified items in the graphic area. The color scheme remains throughout the session. If you do not save the color scheme before checking in the product model, it will revert to the last saved scheme or to system default colors, if there is no saved scheme.
Save	Saves your changes in your own user-defined color file.
Default	Reverts back to the system default colors.
Load	Loads your user colors.
Cancel	Closes the dialog box without changing the color.
OK	Closes the Colors dialog box.

## Troubleshooting

---

This troubleshooting topic is discussed:

**An Entire Small Board is Reported as a Difference** ..... **40**

### An Entire Small Board is Reported as a Difference

When you are running CAM Compare on a small board, you might need to adjust the box size to avoid having the whole board reported as a difference.

#### Symptoms

CAM Compare reports a whole small board as being different rather than isolating the specific points that are different.

#### Causes

CAM Compare combines adjacent differences to minimize the number of issues that the user must examine when inspecting the report. For a board that is small relative to the default box size, all differences on the whole board might be grouped.

#### Solution

Change the configuration parameter `ia_box_size` to 100 (mil) for small boards, so that the individual differences are reported. On large board this setting would cause CAM Compare to report many more individual differences - many of them from the same source.

See “[Comparison Process Configuration](#)” on page 8.