

OptiSystem

User's Reference

Optical Communication System Design Software

Version 5.0
for Windows® 2000/XP



OptiSystem

User's Reference

Optical Communication System Design Software

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Installing OptiSystem

Before installing OptiSystem, ensure the system requirements described below are available.

Hardware and software requirements

OptiSystem requires the following minimum system configuration:

- PC with Pentium 3 processor or equivalent
- Microsoft Windows 2000, or Windows XP with Service Pack 1
- 400 MB free hard disk space
- 1024 x 768 graphic resolution, minimum 65536 colors
- 128 MB of RAM (recommended)
- Internet Explorer 5.5 or higher
- DirectX 8.1 or higher

Protection key

A hardware protection key is supplied with the software.

Note: Please ensure that the hardware protection key is NOT connected during the installation of OptiSystem.

To ensure that OptiSystem operates properly, verify the following:

- The protection key is properly connected to the parallel/USB port of the computer.
- If you use more than one protection key, ensure that there is no conflict between the OptiSystem protection key and the other keys.

Note: Use a switch box to prevent protection key conflicts. Ensure that the cable between the switch box and the computer is a maximum of one meter long.

OptiSystem directory

By default, the OptiSystem installer creates an OptiSystem directory on your hard disk. The OptiSystem directory contains the following subdirectories:

- **\bin** — executable files, dynamic linked libraries, and help files
- **\components** — OptiSystem component parameters from vendors
- **\doc** — OptiSystem support documentation
- **\libraries** — OptiSystem component libraries
- **\samples** — OptiSystem example files
- **\toolbox** — MATLAB related files

Installation

OptiSystem can be installed on Windows 2000/XP. We recommend that you exit all Windows programs before running the setup program.

Windows 2000/XP installation

To install OptiSystem on Windows 2000/XP, perform the following procedure.

Step	Action
1	Log on as the Administrator, or log onto an account with Administrator privileges.
2	Insert the OptiSystem CD into your CD ROM drive.
3	On the Taskbar, click Start and select Run . <i>The Run dialog box appears.</i>
4	In the Run dialog box, type F:\setup.exe , where F is your CD ROM drive.
5	Click OK and follow the screen instructions and prompts.
6	When the installation is complete, reboot your computer.

Technical support

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Project structure overview

The OptiSystem project consists of a maximum of fifteen layouts. Within the same project file you can have multiple layouts with different components and component properties (see [Figure 1](#)).

Sweep iterations

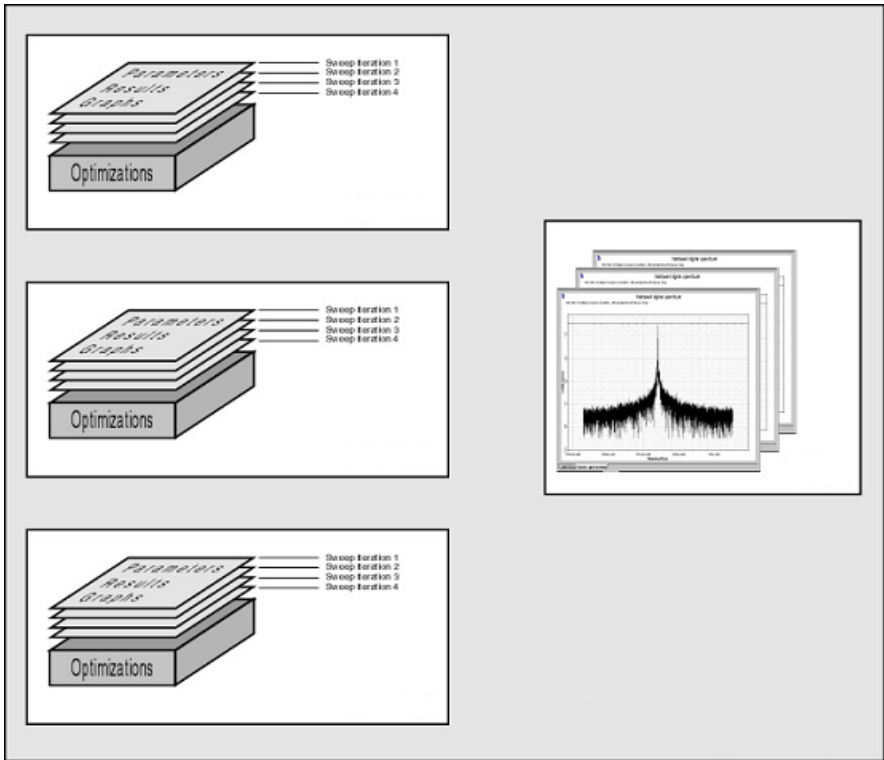
Each layout can have certain component parameters assigned to be in sweep mode. You can define the number of sweep iterations to be performed on the selected parameters. The parameter value changes through each sweep iteration; this produces a series of different calculation results based on the changing parameter values.

The parameter sweep dependent elements of a layout are: **Parameters** and **Results**.

Optimizations

Each layout has optimizations. Use optimizations to change the values of certain parameters during calculation so your system can reach the desired state. Optimizations are independent of parameter sweeps, but can be performed for each individual parameter sweep iteration.

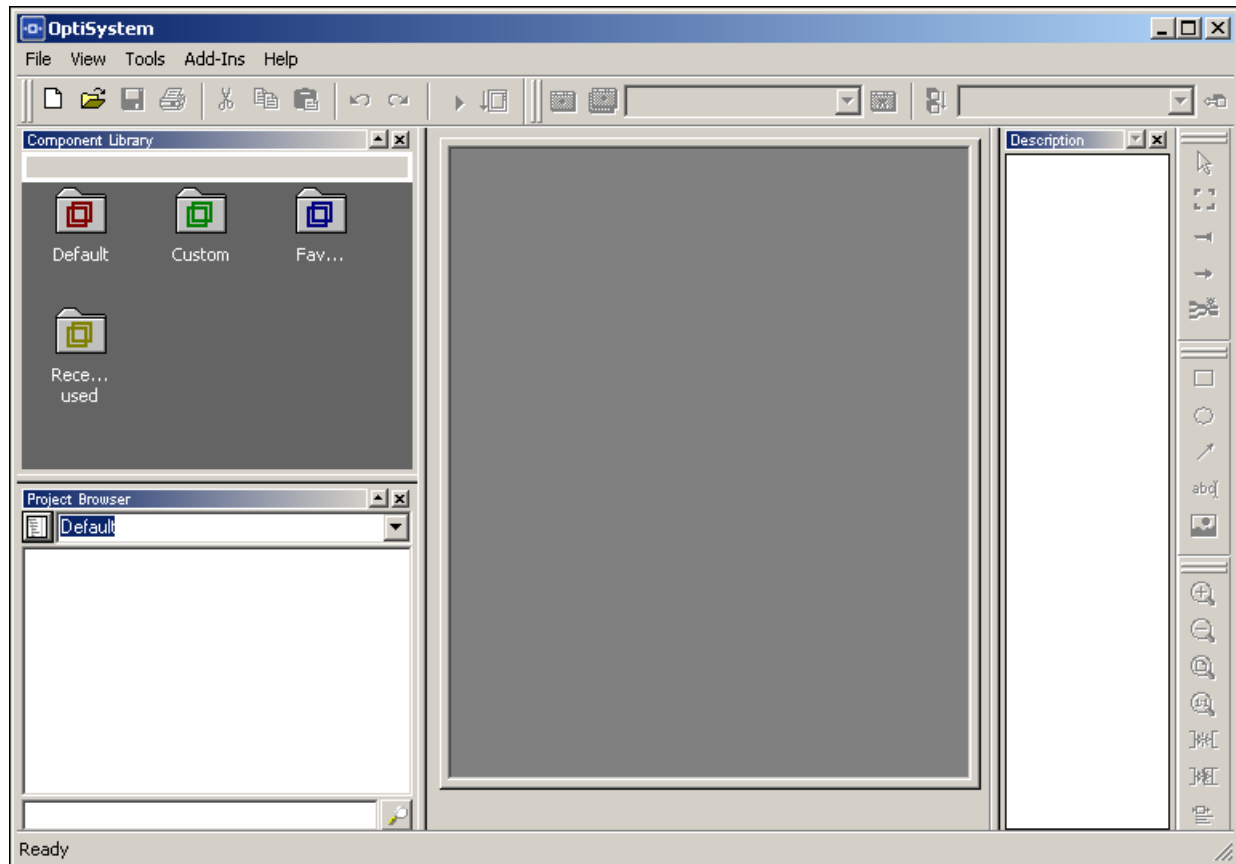
Figure 1 Project structure



OptiSystem GUI

When you open OptiSystem, the application looks like [Figure 1](#).

Figure 1 OptiSystem graphical user interface (GUI)



Main parts of the GUI

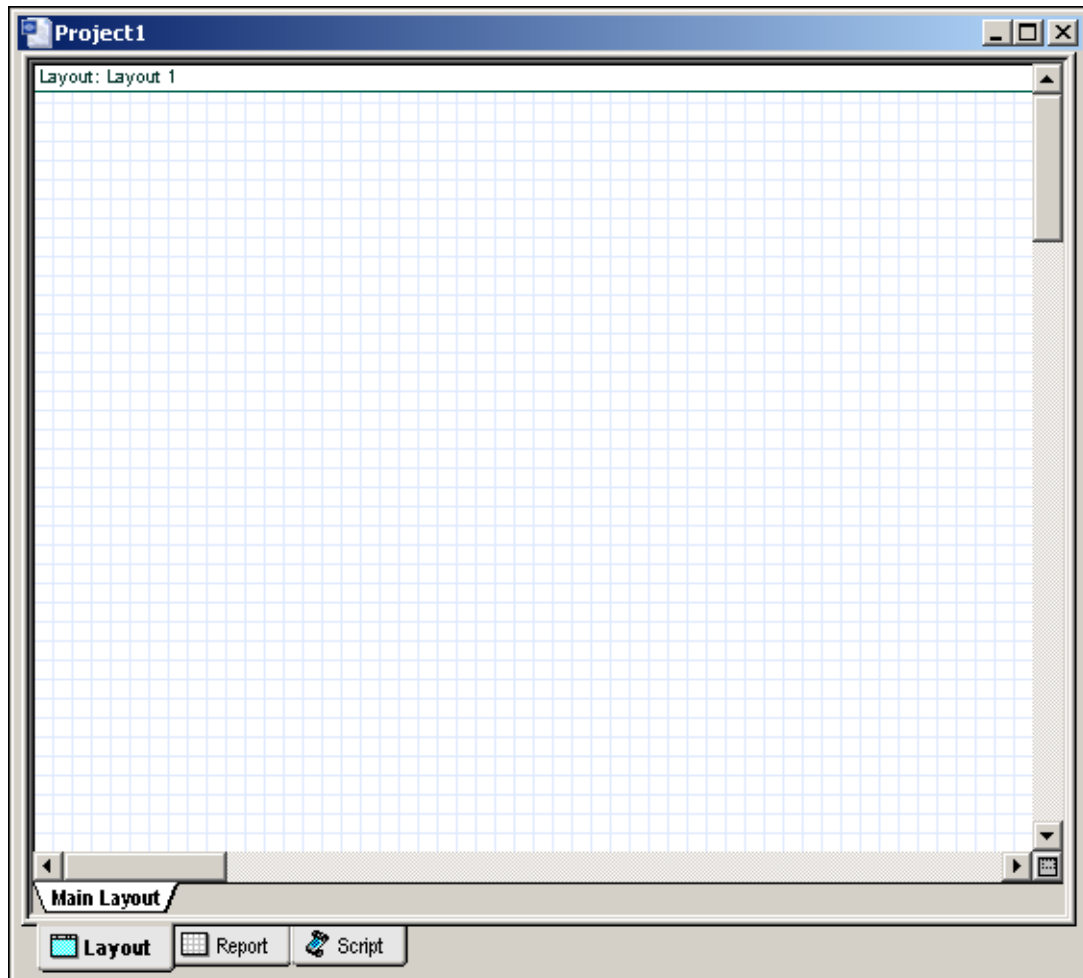
The OptiSystem GUI contains the following main windows:

- [Project layout](#)
- [Dockers](#)
 - [Component Library](#)
 - [Project Browser](#)
 - [Description](#)
- [Status Bar](#)

Project layout

The main working area where you insert components into the layout, edit components, and create connections between components (see [Figure 2](#)).

Figure 2 Project layout window



Dockers

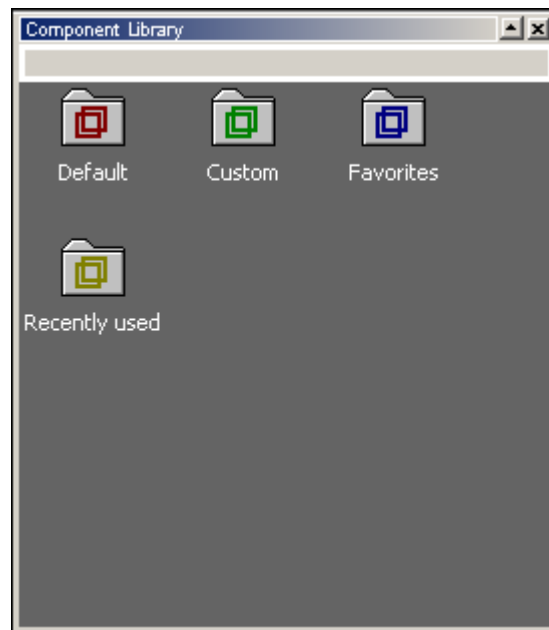
Use dockers, located in the main layout, to display information about the active (current) project:

- [Component Library](#)
- [Project Browser](#)
- [Description](#)

Component Library

Access components to create the syst design (see [Figure 3](#)).

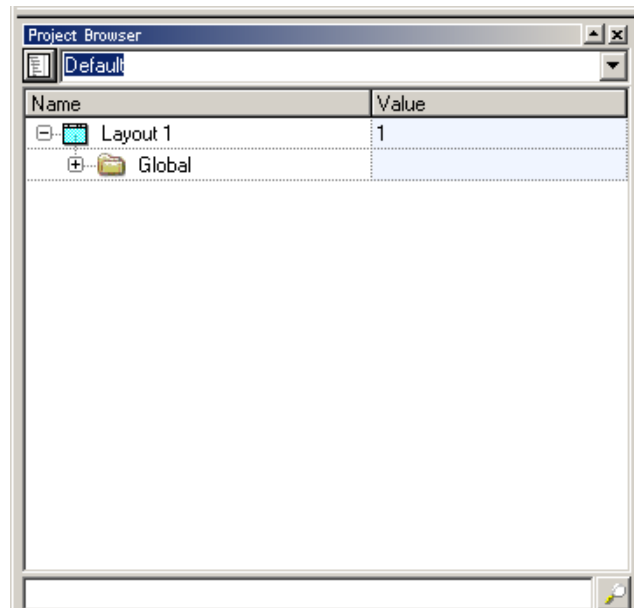
Figure 3 Component Library window



Project Browser

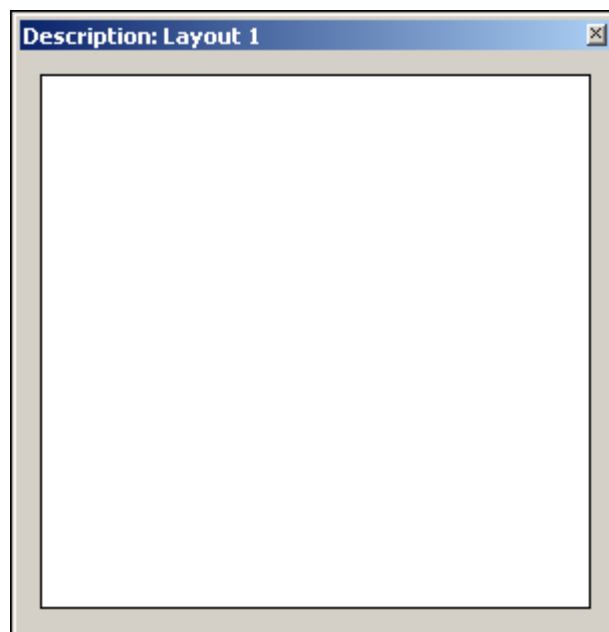
Organize the project to achieve results more efficiently, and navigate through the current project (see [Figure 4](#)).

Figure 4 Project Browser window

**Description**

Display detailed information about the current project (see [Figure 5](#)).

Figure 5 Description window



Status Bar

Displays useful hints about using OptiSystem, and other help. Located below the **Project layout** window.

Figure 6 Status Bar

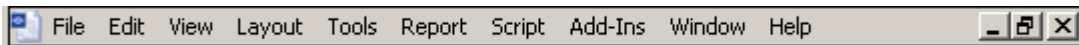


[CTRL] - Duplicate, [SHIFT] - Add to selection, [CTRL + SHIFT] Resize layout.

Menu bar

Contains the menus that are available in OptiSystem (see [Figure 7](#)). Many of these menu items are also available as buttons on the toolbars or from other lists.

Figure 7 Menu bar



Toolbars

You can select the toolbars that you want to have available in the main layout window. The toolbar options include:

Standard		Contains the buttons to perform all typical windows application actions, in addition to project calculation options.
Layout		dd, delete, duplicate layouts in a project, set sweep iterations, and customize the layout. A
Docker		Enable or disable dockers in the main layout.
Layout Tools		Move, connect, and modify components, add and remove monitors from components, draw input and output ports on components, and draw a path.
Draw Objects		Draw rectangles, circles, lines, text, or import bitmap images in the layout.
Layout Operations		Click the addition and subtraction buttons to zoom into or out of the project, or zoom to window. Enable or disable the autoconnect features, and control the layout display.
Script		Run, generate, save, and load script files.



OptiSystem menus and buttons

This section describes the menus and buttons available in OptiSystem.

File menu

File menu item	Toolbar button	Description
New (Ctrl+N)		Create a new project.
Open (Ctrl+O)		Open an existing project. Select the project from the Open dialog box.
Close	—	Close the active (current) project. You are prompted to save changes.
Save (Ctrl+S)		Save the active (current) project under the current name in the default location.
Save As	—	Save the active (current) project with a different name and in a location that you select. The SaveAs dialog box contains a special feature that allows you to save monitor data as part of the project.
Print (Ctrl+P)		Print the active (current) project.
Print Setup	—	Set up the printer, page size, orientation, and other printing options.
Calculate (Ctrl+F5)		Calculate the active (current) project.
Calculate Visualizers		Calculate the visualizer components in the active (current) layout.
Import	—	Import external component libraries/components into OptiSystem.
Export		
Export Selected Components	—	Save a selected component in a separate component library file that can be used in another project/application.
OptiPerformer		
Settings	—	Opens the OptiPerformer Export Settings dialog box. Allows you to attach files, import logos or other graphics, and select global parameters to export to an OptiPerformer project file.
Export	—	Exports the OptiPerformer project file to a selected location. Uses the SaveAs dialog box.
Recent files	—	List the most recent files that you worked on.
Exit	—	Close OptiSystem. You are prompted to save changes to the project.



Edit menu

Edit menu item	Toolbar button	Description
Layout Tools		
Layout		Move components around the layout, place components in the layout, connect components, and perform other layout operations.
Monitor		Create and remove monitors from the layout.
Draw - Input Port		Draw an input port tool on a subsystem. Only active in a subsystem.
Draw - Output Port		Draw an output port on a subsystem. Only active in a subsystem.
Draw Rectangle		Draw a rectangle in the layout.
Draw Circle		Draw a circle in the layout.
Draw - Line		Draw a line/arrow in the layout.
Draw - Text Label		Put text in the layout.
Draw - Bitmap		Place a bitmap in the layout (insert a bitmap file).
Component		
Create Subsystem		Create a subsystem in the layout.
Look Inside		Open a new layout showing the components in the subsystem.
Close Subsystem		Close the current subsystem in the layout.
Back One		Move the component or subsystem one layer back in the layout.
Forward One		Move the component or subsystem one layer forward in the layout.
To Front		Move the component or subsystem to the front of the layout.
To Back		Move the component or subsystem to the back of the layout.
Properties (Alt+Enter)		Open the properties dialog box for the selected component or subsystem.



Edit menu item	Toolbar button	Description
Undo (Ctrl+Z)		Undo the last change made in the active (current) layout. You can undo all actions until the last saved operation.
Redo (Ctrl+Y)		Redo the last change made in the active (current) layout. You can redo an action immediately after you undo an action to reverse the effect of the undo action.
Cut (Ctrl+X)		Remove all selected objects and place them on the clipboard.
Copy (Ctrl+C)		Copy selected objects to the clipboard. The selected objects remain in the active project.
Paste (Ctrl+V)		Copy objects from the clipboard and paste them in a user-defined location—the same layout, a new subsystem, or a new layout.
Duplicate	—	Use to duplicate a selected component, subsystem, or layout within the active (current) layout.
Delete		Allows you to delete selected objects in the active (current) layout.
Delete All Links		Delete all links attached to a selected component.
Select All		Selects all components in the active (current) layout.
Flip (Ctrl+F)		Flip the selected object(s) horizontally.

View menu

View menu item	Toolbar button	Description
Toolbars		
Standard	—	Select to display the Standard toolbar in the main layout.
Dockers	—	Select to display the Dockers toolbar in the main layout.
Layout	—	Select to display the Layout toolbar in the main layout.
Layout Tools	—	Select to display the Layout Tools toolbar in the main layout.
Draw Objects	—	Select to display the Draw Objects toolbar in the main layout.
Layout Operations	—	Select to display the Layout Operations toolbar in the main layout.
Script	—	Select to display the Script toolbar in the main layout.
Component Library (Ctrl+1)		Select to display the Component Library docker in the main layout.
Project Browser		Select to display the Project Browser docker in the main layout.
Description		Select to display the Description docker in the main layout.



View menu item	Toolbar button	Description
Status Bar	—	Select to display the Status Bar in the main layout.
Zoom Percent		Select the zoom percentage: 10, 50, 75, 100, 150, 200, 400, or 800.
Zoom In		Zoom in on the active (current) layout.
Zoom Out		Zoom out on the active (current) layout.
Zoom to Window		Zoom to the active (current) layout window.
Zoom 1:1		Return the active (current) layout to default size with no zoom.
Display Properties		
View Signal Data		Select to display calculated port signal data in the active (current) layout.
View Parameters		Select to display calculated component parameter data in the active (current) layout.
Autoconnect		
Autoconnect on Drop		Select to automatically create connections from the input port of a component to the output port of another component (the closest one in the layout) when placing components in the active (current) layout.
Autoconnect on Move		Select to automatically create connections from the input port of a component to the output port of another component (the closest one in the layout) when moving components around in the layout.
Refresh Layout (Ctrl+W)		Update displayed port/component data on the active (current) layout.

Layout menu

Layout menu item	Toolbar button	Description
Add Layout		Create a new blank project layout in the active (current) project. Note: The new layout is added to the list of project layouts in the Project Browser.
Duplicate Layout		Create a copy of the active (current) project layout, including all components, parameters, views, and results. Note: The new layout is added to the list of project layouts in the Project Browser.
Delete Layout		Delete the active (current) layout from the project. Note: This operation cannot be undone.
Set Current Sweep Iteration		Change the parameter sweep iteration displayed in the active (current) project layout.



Layout menu item	Toolbar button	Description
Set Total Sweep Iterations (Ctrl+Home)		Add or remove sweep iterations to the active (current) layout.
Previous Sweep Iteration (Ctrl+Page Up)		Display the sweep iteration prior to the active (current) iteration.
Next Sweep Iteration (Ctrl+Page Down)		Display the sweep iteration after the active (current) iteration.
Parameter sweeps		Open the Parameter Sweeps dialog box.
Parameter Groups		Open the Parameter Group dialog box.
Layout Size		Open the Layout Size dialog box for the active (current) layout.
Parameters		Open the parameter dialog box for the active (current) layout.
Properties		Open the Layout Properties dialog box for the active (current) layout.
Bill of Materials		Open the Bill of Materials dialog box for the active (current) layout.

Tools menu

Tools menu item	Toolbar button	Description
Optimizations		Open the Optimization dialog box.
Calculation Schedulers		Open the Calculation Scheduler dialog box.
Search Engines		Open the Search Engine dialog box.
Library Management		Open the Library Management dialog box. Note: The Library Management dialog box can only be accessed when there are no projects open in OptiSystem.
Customize		Open the Customize dialog box.
Options		Open the Options dialog box.



Report menu

Window menu item	Toolbar button	Description
Add Report (Ctrl+Shift + A)		Arranges all open project layouts in a cascading format.
Remove Report (Ctrl+Shift + R)		Arranges all open project layouts in a tile format.
Report Options		Open the Report option dialog box.

Script menu

Add-Ins menu item	Toolbar button	Description
Run		Runs the current script.
Generate		Generates script, overwrites existing script.
Save		Opens SaveAs dialog box, to save script in a text file.
Load		Loads an existing script text file into active (current) project file.

Add-Ins menu

Add-Ins menu item	Toolbar button	Description
Add-In Manager		Open the Add-In Manager dialog box.

Window menu

Window menu item	Toolbar button	Description
Cascade		Arranges all open project layouts in a cascading format.
Tile		Arranges all open project layouts in a tile format.
(List of) Open OptiSystem files		List of all open OptiSystem project files.



Help menu

Help menu item	Toolbar button	Description
Help topics		Displays help topic information about OptiSystem.
About OptiSystem		Provides information about Optiwave—mailing address, telephone and fax numbers, e-mail address, and URL.



Notes:



Application layout

In OptiSystem, the layout and visibility of the toolbars and dockers can be changed.

You can create customized toolbars, and add or remove different commands on the toolbars.

Note: Create a customized toolbar with a selection of components or commands that you use often.

Customizing toolbars

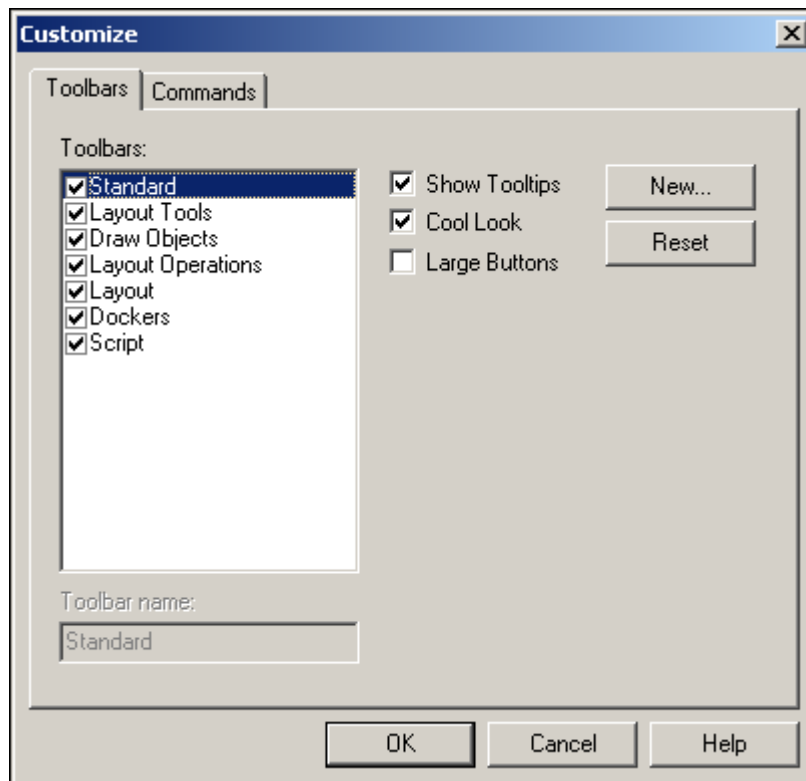
To customize toolbars, perform the following procedure.

Step Action

- 1 From the **Tools** menu, select **Customize**.
*The **Customize** dialog box appears (see [Figure 8](#)).*
- 2 Make selections and click **Reset**.
The selected toolbars are modified.

Note: You can modify toolbars on the **Main layout**. To add components or commands, hold down the **Alt** key, select the button to be added, and drag the button onto the toolbar. To remove buttons from the toolbar, hold down the **Alt** key, select the button to be removed, and drag the button away from the toolbar.

Figure 8 Customize dialog box—Toolbars tab



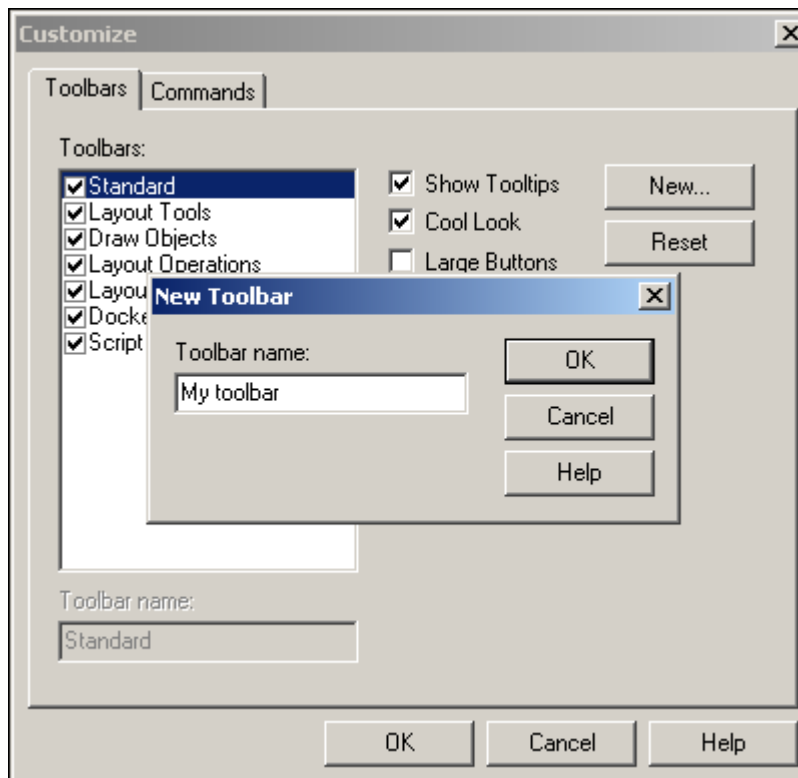
Creating a new toolbar

To create a toolbar, perform the following procedure.

Step Action

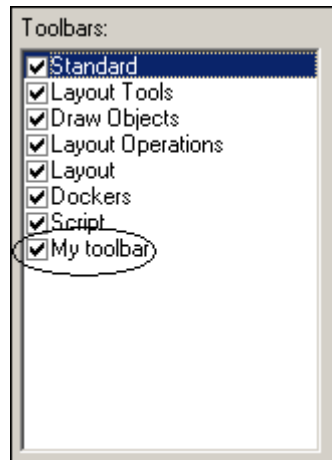
- 1 From the **Tools** menu, select **Customize**.
*The **Customize** dialog box appears (see [Figure 8](#)).*
- 2 Click **New**.
*The **New Toolbar** dialog box appears.*
- 3 Type the new toolbar name (in this example, **My toolbar**) in the **Toolbar name** field (see [Figure 9](#)).

Figure 9 New Toolbar dialog box



- 4 Click **OK**.
*The new toolbar (in this example, **My toolbar**) appears in the list of available toolbars in the **Customize** dialog box (see [Figure 10](#)) and as a new toolbar on the current project layout.*



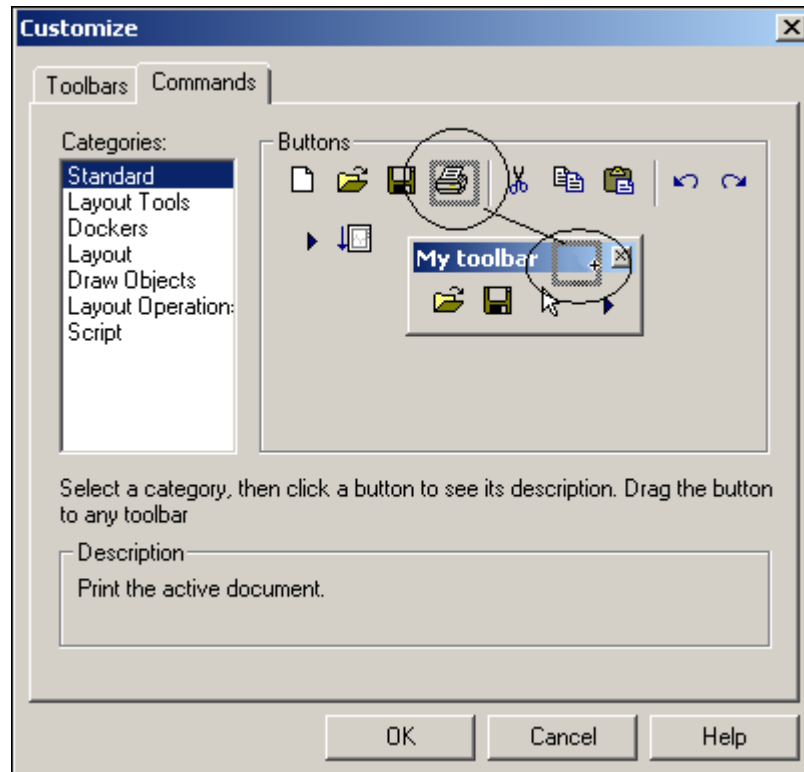
Figure 10 Customize dialog box with new toolbar

- 5 To add commands to the new toolbar, select **My toolbar** in the **Toolbar** list (see [Figure 10](#)), and click the **Commands** tab in the **Customize** dialog box.
- 6 Select the type of tool in the **Categories** list, select the desired button, and drag the button onto the toolbar (see [Figure 11](#)).
The button appears in the customized toolbar.

Note: Selections can be made from more than one category.

- 7 Click **OK**.
- 8 To place the new toolbar on the OptiSystem main layout, click and drag the toolbar to the desired location.

Figure 11 Dragging button into customized toolbar



Display properties

The display properties of the OptiSystem application can be changed.

Note: The options made available for you to change the display properties is based on the specific application (OptiSystem) and the specific logged-on user (based on the Windows logon name).

There are four different categories:

- [General](#)
- [Grid](#)
- [Workspace](#)
- [Folder Setting](#)

Changing the application properties

To change application properties, perform the following procedure.

Step	Action
------	--------

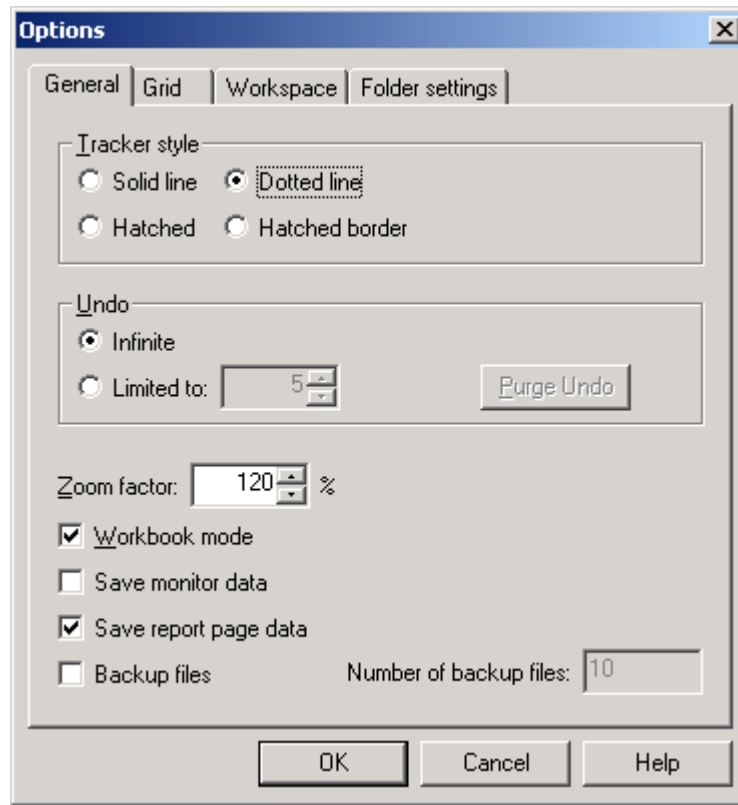
- | | |
|---|---|
| 1 | Select Tools > Options .
<i>The Options dialog box appears (see Figure 12).</i> |
| 2 | Select the General , Grid , Workspace , or Folder Setting tab, make your changes, and click OK .
<i>The Options dialog box closes and any changes are applied.</i> |



General

Use the **General** tab to change the global attributes of OptiSystem.

Figure 12 Options—General tab



Tracker Style: available options include **Solid Line**, **Dotted Line**, **Hatched** or **Hatched Border**. The default tracker style is **Dotted Line**.

Undo: determines the number of 'undo' operations allowed in the application.

- **Infinite:** allows an infinite number of 'undo' operations
- **Limited to:** specify the number of 'undo' operations

Purge Undo: allows you to clear the 'undo' stack.

Zoom factor: changes the zoom factor. The default value is 120%. This affects the amount of zoom activated by the plus and minus zoom factor buttons. The percentage of zoom must be between 100 and 150%.

Note: If the **Zoom Factor** is set to 100%, nothing changes when the plus and minus zoom buttons are pressed because, in effect, you are asking to see the layout at 100% of normal size.

Workbook mode: determines whether the tabs available along the bottom of the project layout window appear. The tabs are used to switch between projects. You can still move between projects by selecting the project from the **Customizing** toolbars menu if the tabs are not visible. The default **Workbook mode** is selected.

Save Monitor Data: saves generated monitor data when OptiSystem is closed.

Save Report Page Data saves generated report data when OptiSystem is closed.

Backup files: saves a backup copy of the current project to the 'Local settings' folder: Documents and Settings\ Username\ Local Settings\ Temp \OptiSystemTempDir.

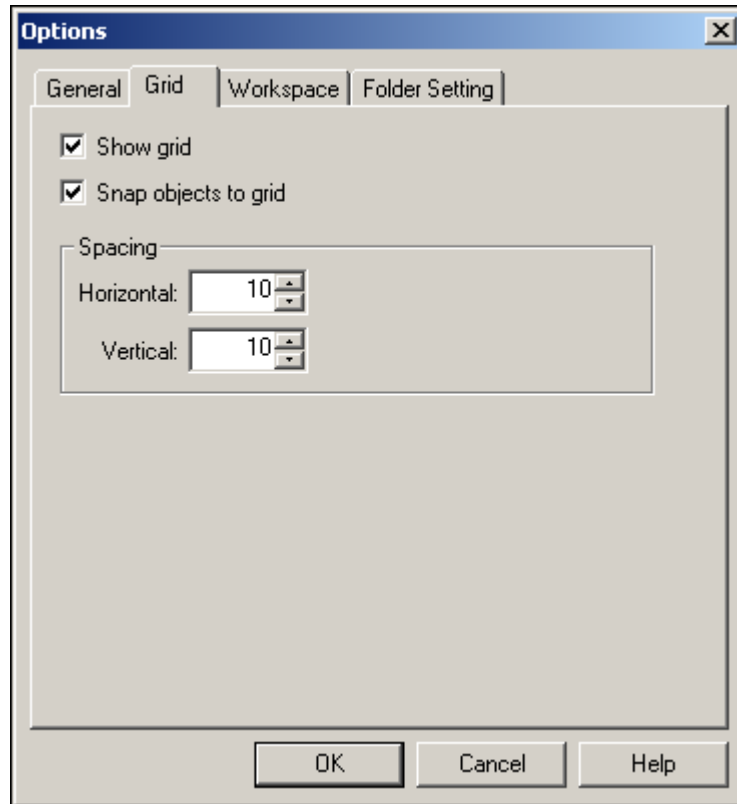
Number of backup files: determines the maximum number of backup files.



Grid

Use the **Grid** tab to change the properties of the grid in the project layout.

Figure 13 Options—Grid tab



Show grid: determines whether the grid is visible or not. The default is selected.

Snap objects to grid: determines whether the components in the layout are forced to conform to the squares of the grid. If **Snap to Grid** is not selected, the drawn components are free to rest over the grid in any position. The default is selected.

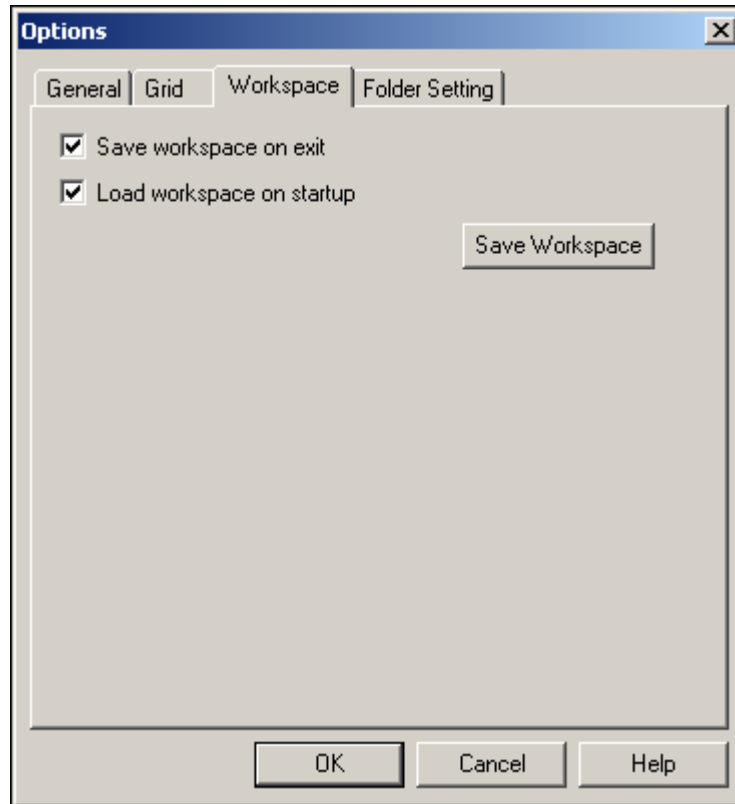
Spacing

Horizontal/Vertical: determines the size of the squares in the grid. The number must be between 1 and 100. The default values are 10.

Workspace

Use the **Workspace** tab for editing the properties of the workspace.

Figure 14 Options— Workspace tab



Save workspace on exit: determines whether the layout of the workspace is automatically saved. The default is selected.

Load workspace at startup: determines whether the last saved workspace layout is loaded on startup. This includes any changes made to the toolbars. The default is selected.

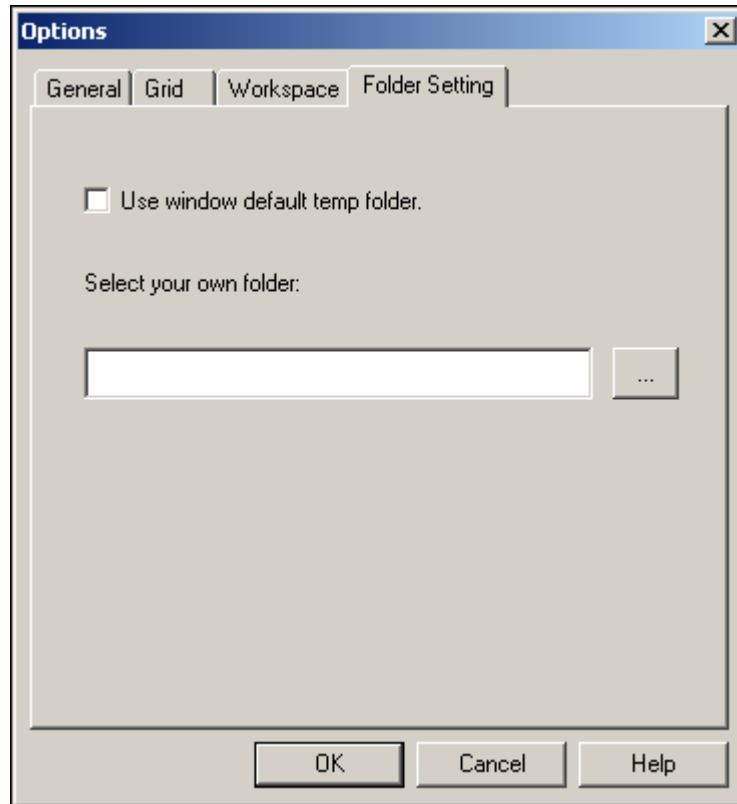
Save Workspace: saves the (active) current layout (including toolbar placement and tools in the toolbars).



Folder Setting

Use the **Folder Setting** tab for editing the properties of the workspace.

Figure 15 Options— Folder Setting tab



Use window default temp folder: uses the default folder location for saving/locating data folders. The default is selected.

Select your own folder: allows you to select an alternative folder location for saving/locating data folders. Click the Browse button to open the determines whether the last saved workspace layout is loaded on startup. This includes any changes made to the toolbars. The default is selected.

Save Workspace: saves the (active) current layout (including toolbar placement and tools in the toolbars).

Project layout

Project layout window

The **Project layout** window is the largest area in the OptiSystem application (see [Figure 1](#)). When you open OptiSystem, the **Project layout** window area is empty. Once you create a new project or you open an existing project, the **Project layout** window area displays the contents of that project (see [Figure 2](#) for an example of a newly opened project).

Figure 1 OptiSystem GUI

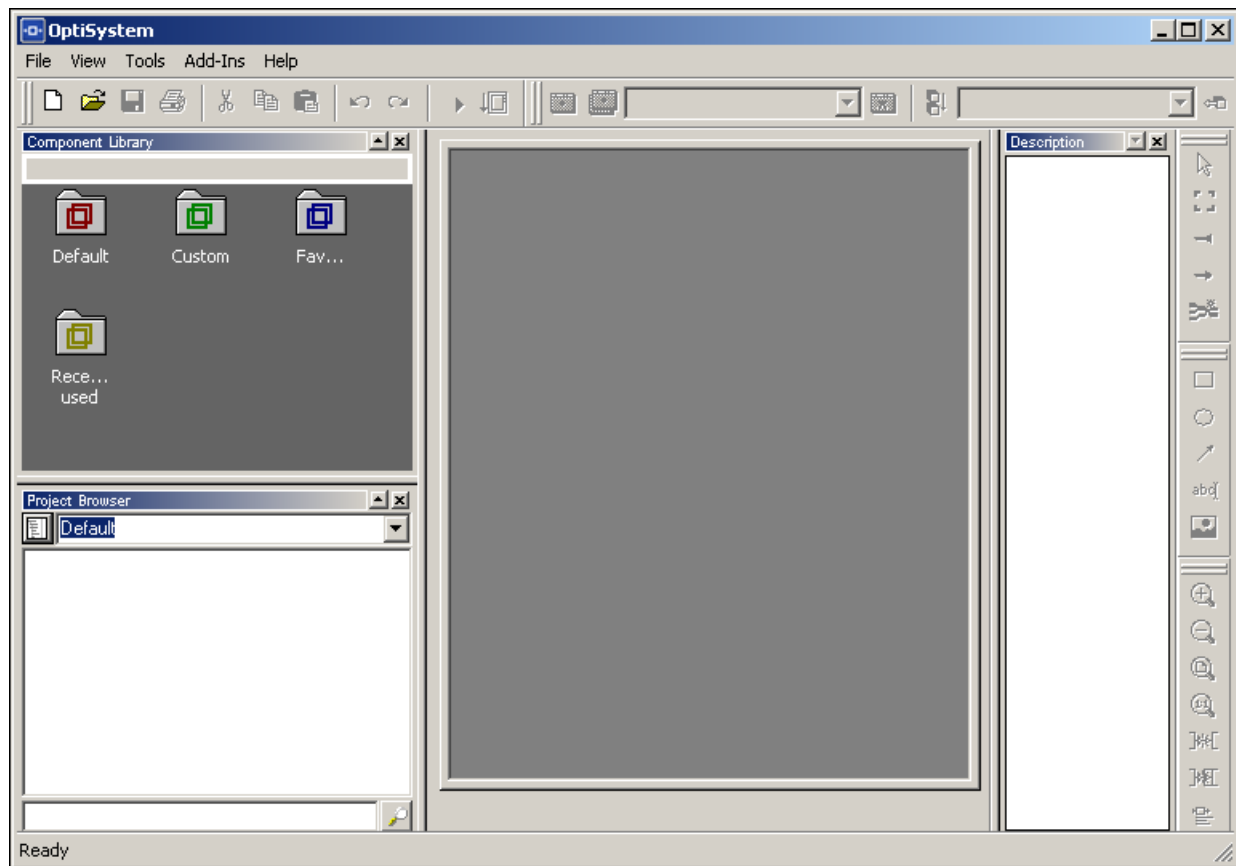
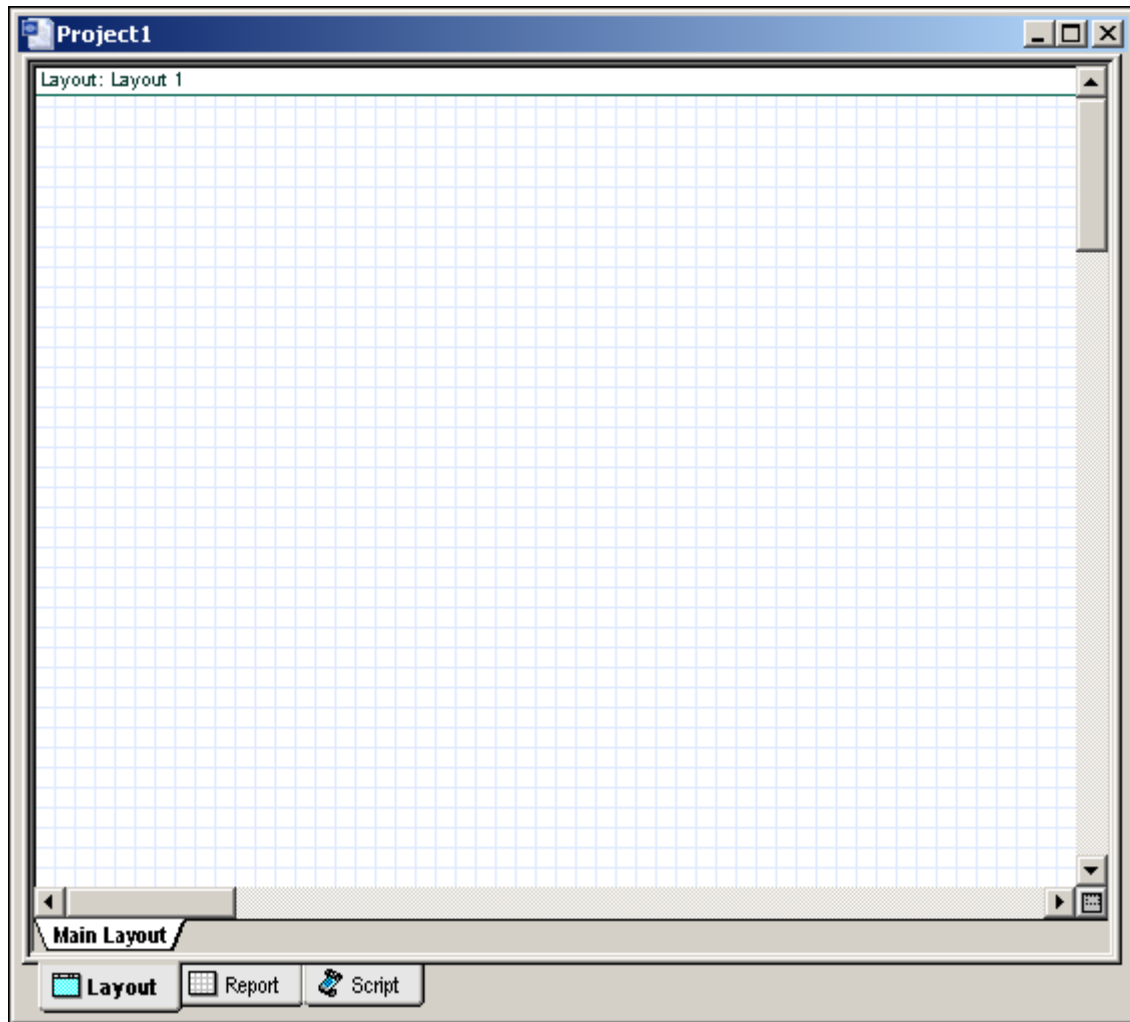


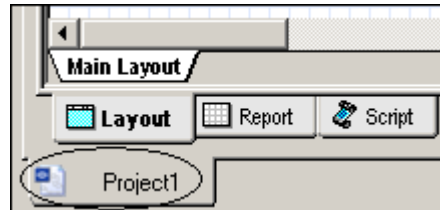
Figure 2 Project layout window



Project layout window tabs

When you open a new project, several sub-tabs become visible at the bottom of the work area (see [Figure 3](#)).

Figure 3 Project layout — sub-tabs



Project tab

The first level of tabs displays the name of the project. In [Figure 4](#), there is only one project open, called **Project 1**.

When more than one project is open at the same time, you can use the tabs to switch between them. In [Figure 4](#), there are three projects, **Project 1**, **Project 2**, and **Project 3**. **Project 3** is currently selected.

Figure 4 Main Layout — Multiple project tabs



Project window tabs

In the project window, there are three tabs:

Layout: displays the current project layout.

Report: displays the report editing window.

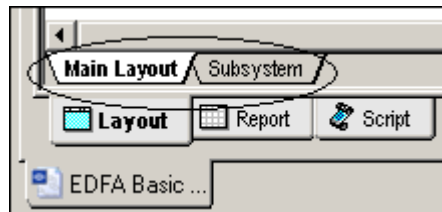
Script: displays the script editing window.

Layout tab

The **Layout** tab shows all of the components that are in the project. The **Layout** tab itself has several sub-tabs located directly above it, including the **Main Layout** tab and any tabs for subsystems that have been created and opened (see [Figure 5](#)).



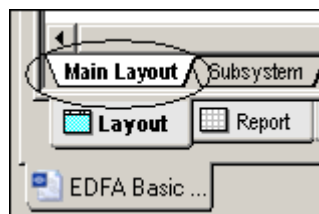
Figure 5 Layout tab



Main Layout tab: displays the top level of the project in the **Project Layout** window (see [Figure 6](#)).

Note: You must select the **Layout** tab before you can select the **Main Layout** tab.

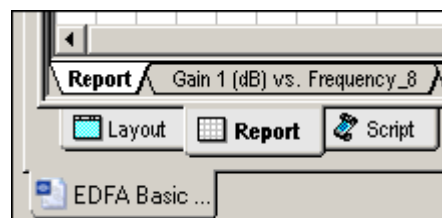
Figure 6 Main Layout tab



Report tab

The **Report** tab displays the report editing window and all associated report sub-tabs (see [Figure 7](#)).

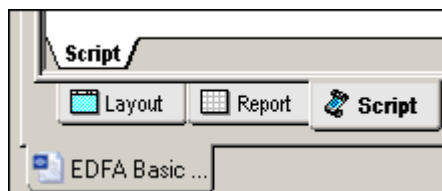
Figure 7 Report tab



Script tab

The **Script** tab displays the script editing window (see [Figure 8](#)).

Figure 8 Script tab

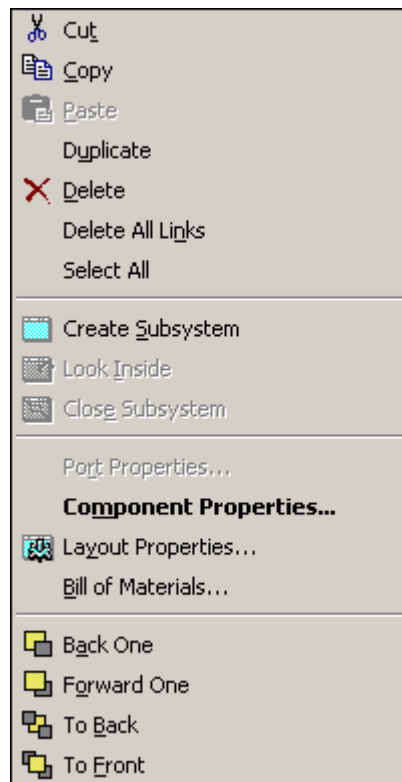


Project layout context menu

The **Project layout context menu** lists available actions for the active project in the **Project layout** window, and actions also found in the **Edit** menu.

Note: The items available in the menu are dependent on the current status of the project, component, or layout. For example, if a component in the **Project layout** is selected, options are available relevant to components, in addition to the general items listed.

Figure 9 Project layout context menu example



Edit menu items

The following items are defined in the [OptiSystem menus and buttons](#) section:

- [Cut \(Ctrl+X\)](#)
- [Copy \(Ctrl+C\)](#)
- [Paste \(Ctrl+V\)](#)
- [Duplicate](#)
- [Delete](#)
- [Delete All Links](#)
- [Select All](#)
- [Create Subsystem](#)



- Look Inside
- Close Subsystem
- Bill of Materials
- Back One
- Forward One
- To Front
- To Back

Port Properties

Opens the **Port properties** dialog box for the selected port in the **Project layout**.

Component Properties

Opens the **Component properties** dialog box for the selected component in the **Project layout**.

Layout Properties

Opens the Layout properties dialog box for the active project layout in the **Project layout** window.

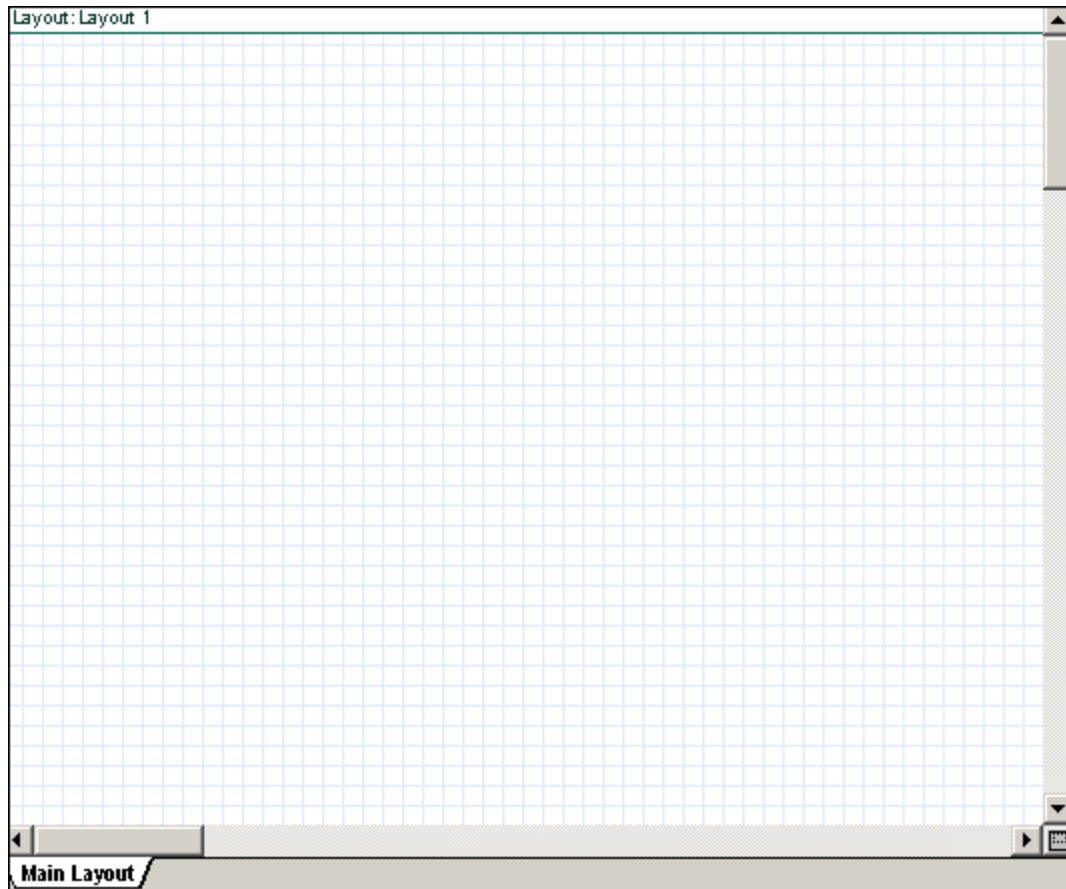


Main layout

Layout size

The **Main layout** work area is initially set to 3000 X 2000 units. This is not a fixed size and can be changed to suit the needs of different systems projects. There are several ways to change the size of the layout.

Figure 10 Layout size



Changing the size of the layout

To change the size of the layout, perform the following procedure.

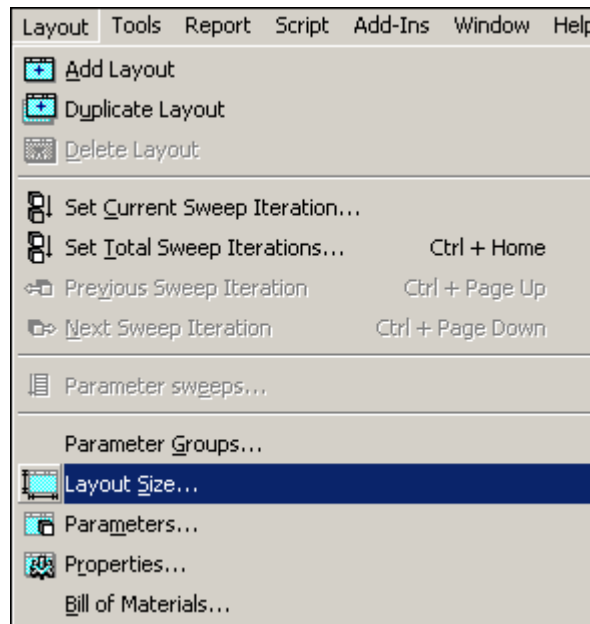
Action

- 1 On the **Layout** toolbar, Select the **Layout Size** tool.
The Layout Size dialog box appears (see [Figure 12](#)).
- 2 Change **Width** and/or **Height** to desired sizes.
- 3 Click **OK**.

OR

Step Action

- 1 On the **Menu** toolbar, select **Layout > Layout Size** (see [Figure 11](#)).
*The **Layout Size** dialog box appears (see [Figure 12](#)).*
- 2 Change **Width** and/or **Height** to desired sizes.
- 3 Click **OK**.

Figure 11 Layout menu**Figure 12 Layout Size dialog box**

Or

Step Action

- 1 On the **Layout Tools** toolbar, select the **Layout** tool.
 - 2 Press and hold the **Shift** and **Ctrl** keys.
 - 3 Click in the layout work area.
 - 4 Drag the mouse in different directions to manipulate the size of the work area.
- Note:** You can use the same methods to change the size of the work area in a subsystem.



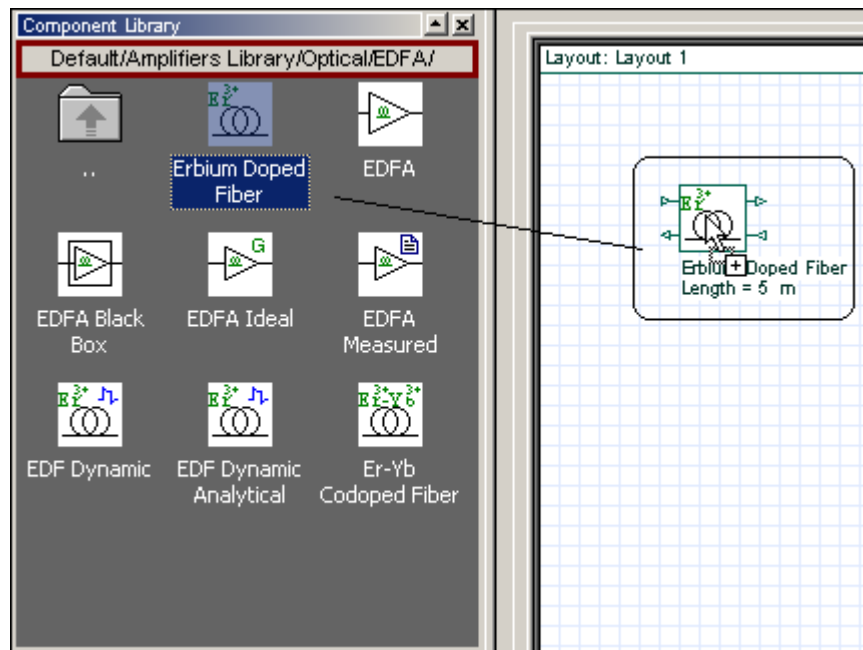
Placing components in the Main layout

To place components into the **Main layout**, perform the following action.

Action

- Drag the component from the **Component Library** to the **Main layout** (see [Figure 13](#)).

Figure 13 Placing components in the Main layout



Auto connect feature

By default, the **Auto Connect on Drop** feature is active. There are two ways that components can auto connect:

- **Auto Connect on Drop:** When you place a component from the **Component Library** in the **Main layout**, the input port of the component connects automatically to the nearest output port of another component.
- **Auto Connect on Move:** When you move a component in the **Main layout**, the input port of the component connects automatically to the nearest output port of another component.

Turning the Auto connect feature off and on

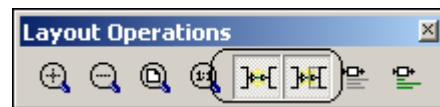
To turn the **Auto connect** feature off and on, perform the following procedure.

Step	Action
1	To turn the Auto connect feature off, click the active Auto Connect on Drop button and the Auto Connect on Move button on the Layout Operations toolbar. <i>The buttons are inactive (see Figure 14) and the components no longer connect automatically to each other.</i>
2	To turn the auto connect feature back on, click the inactive Auto Connect on Drop button and the Auto Connect on Move button on the Layout Operations toolbar. <i>The buttons are active (see Figure 15) and the components connect automatically to each other.</i>

Figure 14 Inactive Auto connect buttons



Figure 15 Active Auto connect buttons



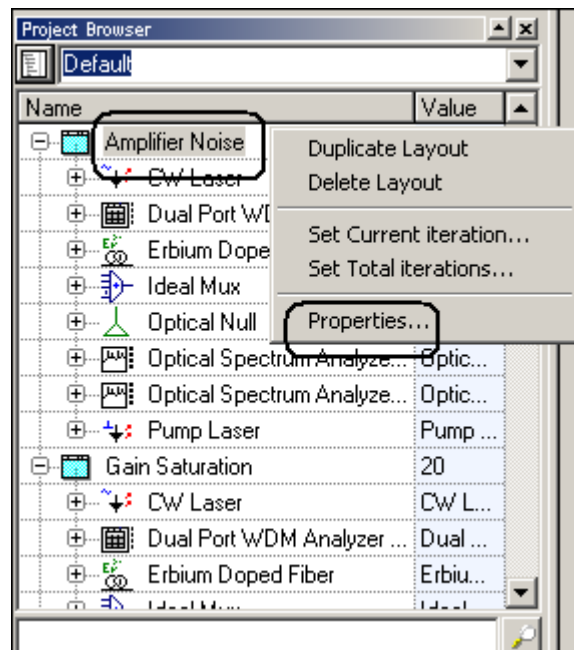
Layout properties

Accessing the layout properties

You can access the project layout properties by several methods:

- | Step | Action |
|------|--|
| 1 | In the Project Browser , right-click on the layout name (see Figure 16).
<i>The Project Browser context menu appears.</i> |
| 2 | Select Properties .
<i>The Layout Properties dialog appears (see Figure 19).</i> |

Figure 16 Project Browser - Layout name > Properties selection

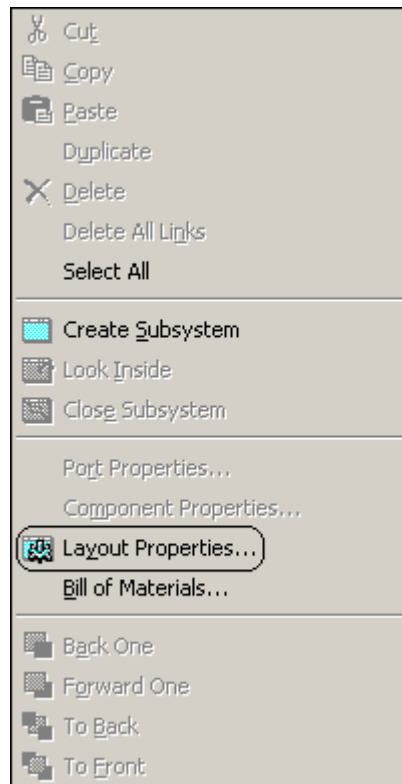


Or

Step	Action
------	--------

- | | |
|---|--|
| 1 | Right-click on the Main layout view. |
| 2 | Select Layout Properties (see Figure 17).
<i>The Layout Properties dialog box appears (see Figure 19).</i> |

Figure 17 Context menu — Layout Properties selection



Or

Action

- From the **Menu** toolbar, select **Layout > Properties** (see [Figure 18](#)).
The **Layout Properties** dialog box appears (see [Figure 19](#)).

Figure 18 Menu bar — Layout > Properties selection

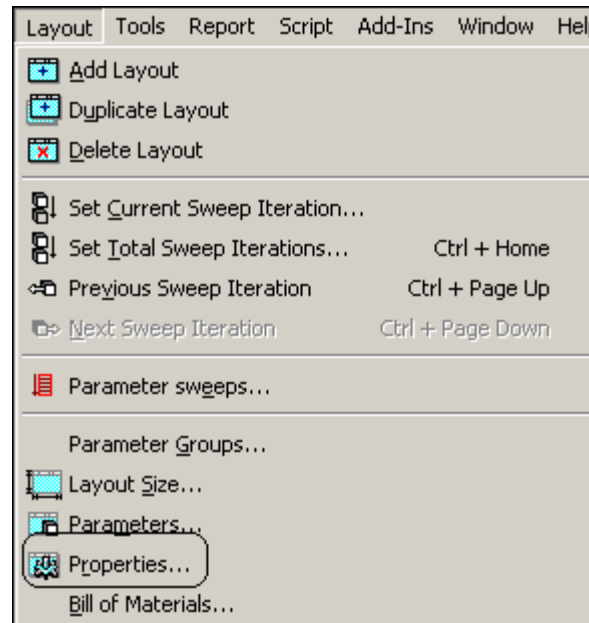
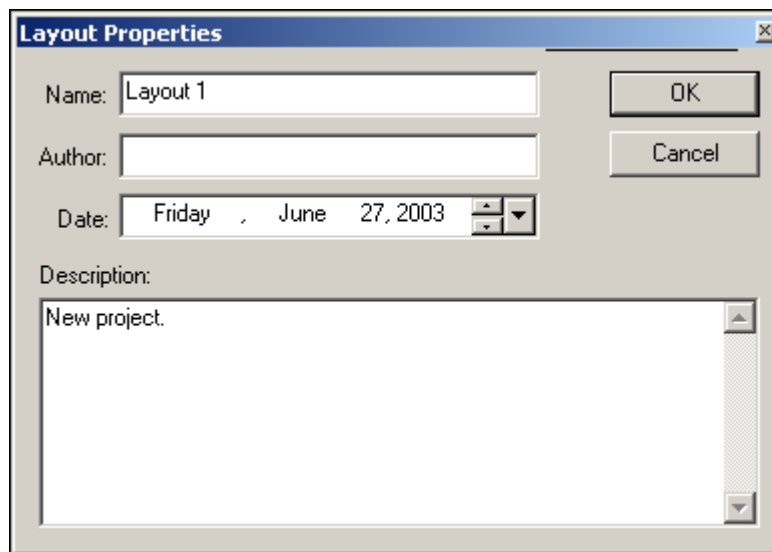


Figure 19 Layout Properties dialog box



Name: displays the name of the layout.

Note: You can input the name of the scripted layout here.



Author: displays the name of the person who created and/or modified the layout.

Date: displays the date that the layout was created/modified. Use the arrow buttons on the right to change the date. The large arrow button opens up a drop down calendar.

Description: allows you to enter a more elaborate description of the current layout.

Layout properties header

The layout properties can also be seen in the header at the top of the **Main layout** view.

Note: **Layout properties** cannot be edited here.

Figure 20 Layout properties header

Layout: Amplifier Noise	Author:	Monday, June 16, 2003	Sweep iteration: 20/20
-------------------------	---------	-----------------------	------------------------

The current sweep iteration and the total number of sweep iterations for the layout are displayed at the far right side of the **Layout properties** header.



Layout parameters

In addition to the generic properties, you can assign specific parameters to a project layout.

Accessing the layout parameters

To access the layout parameters, perform one of the following actions.

Action

- Double-click in the **Main layout** view.
*The **Layout Parameters** dialog box appears (see [Figure 21](#)).*

Or

Action

- On the **Menu** toolbar, select **Layout > Parameters** .
*The **Layout Parameters** dialog box appears (see [Figure 21](#)).*

The **Layout Parameters** dialog box is similar to the **Component Parameters** dialog box. The parameters are grouped into different categories for easy reference.

You can switch between the categories by selecting the category tabs. Within these categories, there are several different but related layout parameters.

[Figure 21](#) shows the layout called **Layout 1** with five different parameter categories:

- Simulation
- Signals
- Spatial effects
- Noise
- Signal tracing



Figure 21 Layout Parameters dialog box

Layout 1 Parameters [X]

Label:

Name	Value	Units	Mode
Simulation window	<i>Set bit rate</i>		<i>Normal</i>
Reference bit rate	☒		<i>Normal</i>
Bit rate	10000000000	Bits/s	<i>Normal</i>
Time window	1.28e-008	s	<i>Normal</i>
Sample rate	640000000000	Hz	<i>Normal</i>
Sequence length	128	Bits	<i>Normal</i>
Samples per bit	64		<i>Normal</i>
Number of samples	8192		<i>Normal</i>

Layout Parameters dialog box

Table 1 shows describes the information found in the **Layout Parameters** dialog box.

Table 1 Description of columns in the Layout Parameters dialog box

Column	Description
Name	Displays the layout's parameter names. This is a read-only column and cannot be changed.
Value	Displays the value of the parameters. You can edit the value of the parameters from this column.
Units	Displays the units available for each parameter.
Mode	Indicates what mode the parameter is in. The Mode option is limited in the Layout Parameters window since these settings are created by the system. For this reason, you cannot change the Mode of the parameters. You can choose between Normal and Sweep when you create a new layout parameter.

Changing the value of a parameter

To change the value of a parameter, complete the following procedure.

Step Action

- 1 Click in the **Value** column beside the parameter that you want to change.
- 2 Enter the new value.
- 3 Click **OK**.

Note: If you enter an invalid value, the **Value** column beside the parameter that you are changing turns red when you click **OK**. The status box indicates that the value is invalid, and a range of possible valid values appears.

Changing the unit of a parameter

To change the unit of a parameter, perform the following procedure.

Step Action

- 1 Click in the **Unit** column beside the parameter that you want to change.
If there are other units available, they will be shown in a drop-down menu.
- 2 To select a unit, click on the unit name in the drop-down menu.
- 3 Press **Enter**.

*After you press **Enter**, the number in the **Value** column recalculates automatically to display the appropriate value.*

Note: The available units vary according to the parameter. If there is only one unit available for a parameter, you will not see any options when you click in the **Unit** column.



Adding new parameters to the layout

OptiSystem allows you to enter additional project layout parameters in the **Layout Parameters** dialog box (see [Figure 22](#)).

Once you add a new parameter to the layout, it becomes a top-level parameter. You can then use it for scripting by any of the components within the layout.

You can add new parameters under any of the **Layout Parameter** categories. As an option, you can also add a category tab for new parameters. [Table 2](#) describes the **Layout Parameter** categories.

Figure 22 Add Parameter dialog box

The 'Add Parameter' dialog box is shown with the following fields and values:

- Name:** Param1
- Type:** floating-point
- Category:** Image
- Minimum value:** 0
- Maximum value:** 100
- Current value:** 0
- Units:** (empty)
- Choice list:** (empty)

Buttons: Add, Cancel, Help

Table 2 Layout Parameter categories

Category	Description
Name	The name of the parameter.
Type	You can select from the following parameter types. • floating (e.g. 3.21) • integer (e.g. 8) • boolean (e.g. ON/OFF) • string-filename (e.g. "c:\myfile.txt") • string-regular (e.g. "Hello") • choice
Category	Allows you to choose from Simulation , Signals and Noise .
Minimum value	The minimum value of the parameter.

Category	Description
Maximum value	The maximum value of the parameter. Note: OptiSystem will not allow you to set either the Minimum or Maximum values outside the valid range of the parameter.
Current value	The default value of the parameter. The Current value must fall between the Minimum and Maximum values.
Units	User-created parameters can only have one unit. OptiSystem does not allow changing between different units for user-created parameters. Note: OptiSystem does not allow you to edit the system parameters.
Choice list	Displays a list of choices.



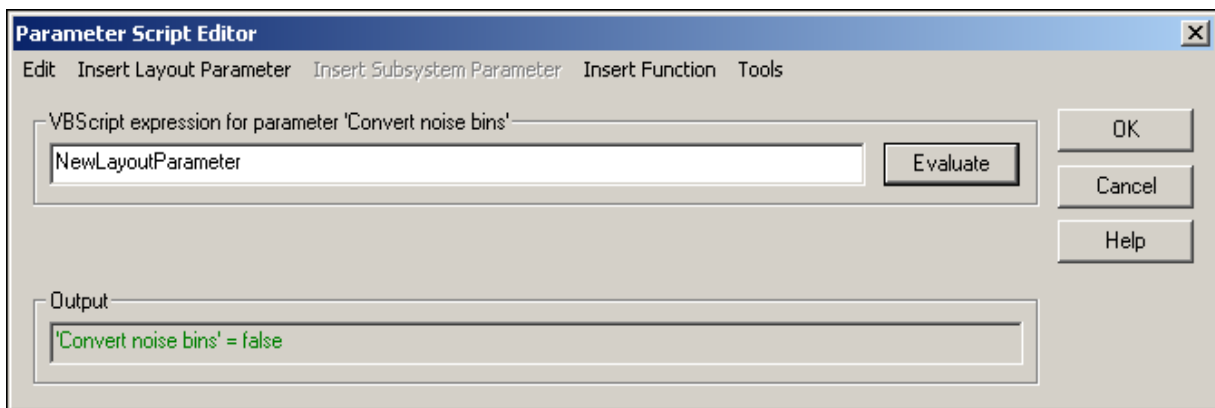
Accessing a new layout parameter for scripting

To access a new layout parameter for scripting, perform the following procedure.

Note: The new layout parameter created for this example is called **NewLayoutParameter**. The component used is the **CW Laser Measured**, and the parameter is **Convert noise bins**.

- | Step | Action |
|------|---|
| 1 | Double-click on the CW Laser Measured component in the Main layout . |
| 2 | Select Script from the Mode column of the parameter you want to change. |
| 3 | Press Enter . |
| 4 | Click the  button in the Value column of the Convert noise bins parameter. |
| 5 | Select Insert Layout Parameter .
<i>The drop-down menu of available layout parameters appears.</i> |
| 6 | Select NewLayoutParameter .
<i>NewLayoutParameter appears in the VBScriptExpression field (see Figure 21).</i> |
| 7 | Click Evaluate .
<i>The results of the script evaluation appears in the Output box in the Parameter Script Editor dialog (see Figure 23).</i> |

Figure 23 Parameter Script Editor dialog box



- | | |
|---|---|
| 8 | Click OK .
<i>The Component Properties dialog appears.</i> |
| 9 | Click Evaluate Script .
<i>The value of the new parameter displays at the bottom of the Component Properties window (see Figure 24).</i> |

Figure 24 Scripted parameter—Component dialog

CW Laser Measured Properties

Label: Cost\$:

Disp	Name	Value	Units	Mode
☐	Noise bandwidth	1	THz	Normal
☐	Noise bins spacing	100	GHz	Normal
☐	Convert noise bins	NewLayoutParameter	5	Script

Iterations = 1
 Parameterized = 0
 Sample rate = 1.6e+011



Removing new parameters from the layout

To remove new parameters that you have created in the **Layout Parameters** dialog box, perform the following procedure.

Note: You cannot remove system parameters.

Step	Action
1	In the Layout Parameters dialog box, click in the Value column beside the parameter that you want to change.
2	Click Remove Par. <i>The parameter is removed.</i>

Editing existing parameters in the layout

To edit the parameters that you create in the **Layout Parameters** dialog box, perform the following procedure.

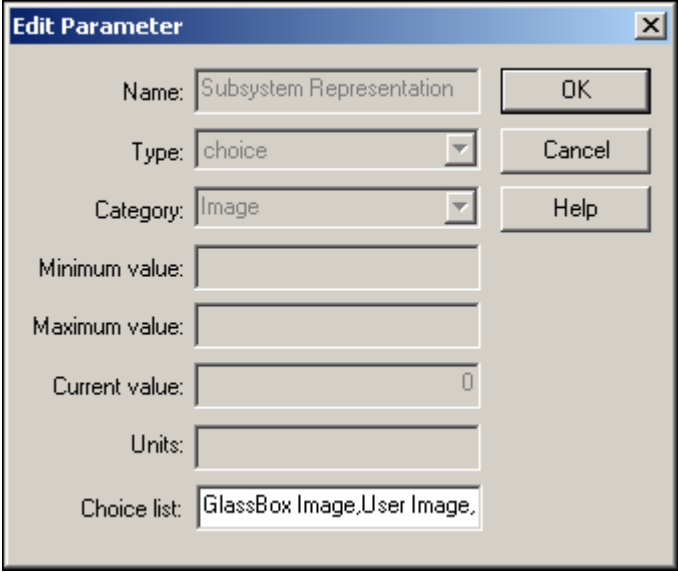
Step	Action
1	In the Layout Parameters dialog box, click in the Value column beside the parameter that you want to change.
2	Click Edit Param. <i>The Edit Parameters dialog appears.</i>

Note: For more information about the parameter categories, see “Layout Parameter categories” on page 46.

Figure 25 Edit Parameter dialog box

Note: The OptiSystem system parameters cannot be edited. If you attempt to do so, the **Edit Parameter** dialog box will appear with all fields read-only (see [Figure 26](#)).

Figure 26 Edit system parameters dialog box



The dialog box is titled "Edit Parameter" and contains the following fields and buttons:

- Name:** Subsystem Representation
- Type:** choice
- Category:** Image
- Minimum value:**
- Maximum value:**
- Current value:** 0
- Units:**
- Choice list:** GlassBox Image, User Image,
- Buttons:** OK, Cancel, Help



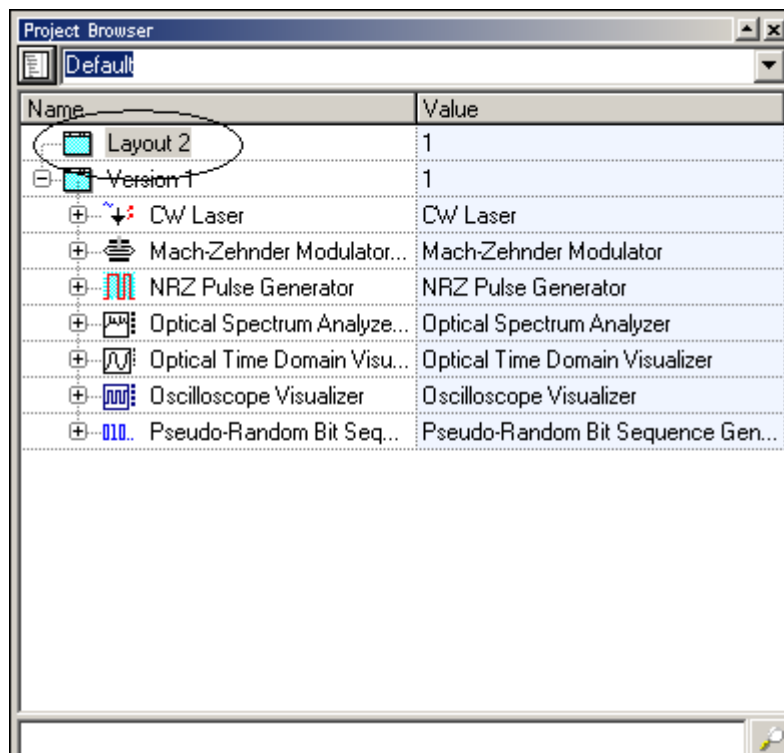
Adding a project layout

To create a new blank project layout, perform the following action.

Action

- Click the **Add Layout** button on the **Layout** toolbar.
A new blank layout is created. The new layout is added to the list of layouts in the projects shown in the **Project Browser** (see [Figure 27](#)).

Figure 27 Project browser— added layout



Deleting a project layout

To delete a project layout, one of the following actions.

Note: There must be at least one layout in a project; you cannot delete all the layouts in a project. **This operation cannot be undone.**

Step Action

- In the **Project Browser**, select the layout and click the **Delete Layout** button on the **Layout** toolbar.
A warning dialog appears (see [Figure 29](#)).
- Click **Yes**.
The selected layout is deleted. The layout is removed from the list of layouts in the projects shown in the **Project Browser**.



OR

- | Step | Action |
|------|--|
| 1 | Right-click on the Project Browser . |
| 2 | Select Delete Layout (see Figure 17).
<i>A warning dialog appears (see Figure 29).</i> |
| 3 | Click Yes .
<i>The selected layout is deleted. The layout is removed from the list of layouts in the projects shown in the Project Browser.</i> |

Figure 28 Project Browser context menu

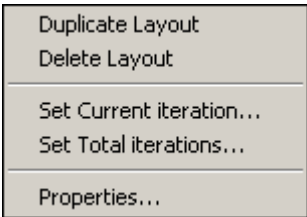
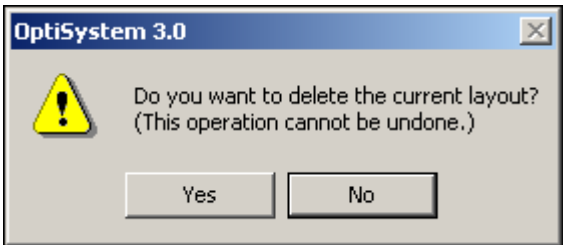


Figure 29 Delete Current Layout — warning dialog



Duplicating a layout

To duplicate a project layout, perform the following action.

- Action**
- In the **Project Browser**, select the project layout, then click the **Duplicate Layout** button on the **Layout** toolbar.
The selected layout is duplicated. The new layout is added to the list of layouts in the projects shown in the Project Browser (see [Figure 31](#)).
Note: The new layout is a copy of all components, parameters, views, and results from the selected layout.

OR

- | Step | Action |
|------|---|
| 1 | Right-click on the Project Browser . |

- 2 Select **Duplicate Layout** (see [Figure 30](#)).

The selected layout is duplicated. The new layout is added to the list of layouts in the projects shown in the Project Browser (see [Figure 31](#)).

Note: The new layout is a copy of all components, parameters, views, and results from the selected layout.

Figure 30 Project Browser context menu

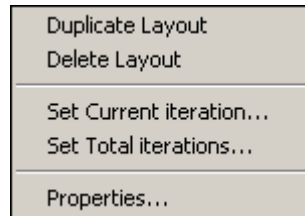
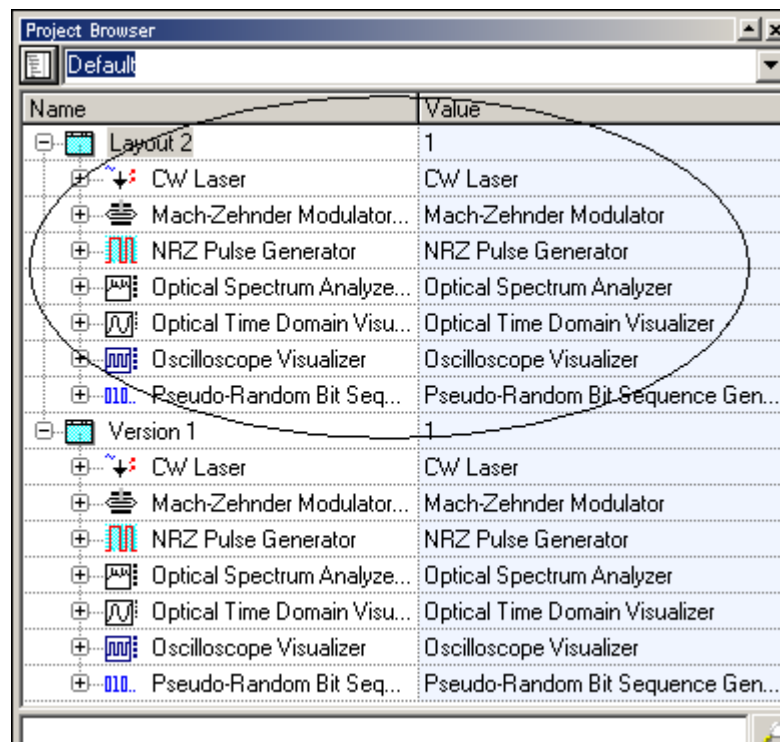


Figure 31 Layout tab — duplicated layout



Selecting multiple components

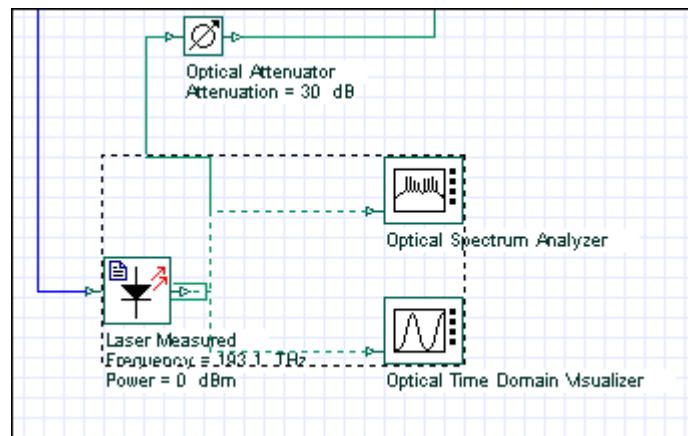
To select multiple components, perform the following procedure.

- 3 Click on a component.
The component is highlighted.
- 4 Press the **Shift** key, hold it, and select another component.
The components are linked together in a selection box (see [Figure 32](#)).
- 5 To release the selection, click outside the selection box in the **Main layout**.

Or

- | Step | Action |
|------|---|
| 1 | Click in the Main layout . |
| 2 | Drag the rubber band selection over all the desired components. |
| 3 | Release the mouse.
<i>All the components within the band are linked together in a selection box (see Figure 32).</i> |
| 4 | To release the selection, click outside the selection box in the Main layout . |

Figure 32 Selecting multiple components



Duplicating components

To duplicate components using the layout tool, perform the following procedure.

- | Step | Action |
|------|---|
| 1 | Press Ctrl and click on a component. |
| 2 | Drag the component to another position in the layout.
<i>The duplicated component contains all the same properties as the initial component.</i> |



Connecting components manually

The only connectable ports are those which have the same type of signal being transferred between them.

The exception to this rule is the ports that can be added to a sub-system and certain components in the library that have ports, which support any type of signal (for example, **Forks**).

Note: You can only connect output to input ports and vice versa.

Figure 33 Rubber Band cursor



The rubber band cursor appears when you place the cursor over a port.

To connect components using the layout tool, perform the following procedure.

Step Action

- 1 Place the cursor over the initial port.
*The cursor changes to the rubber band cursor (chain link) (see [Figure 33](#)).
A tool tip appears that indicates the type of signal that is available on this port (see [Figure 34](#)).*
- 2 Click and drag to the port to be connected.
The ports are connected.

Figure 34 Connecting components symbol

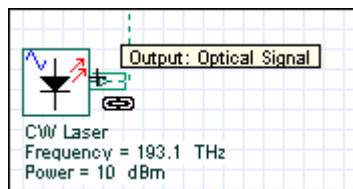
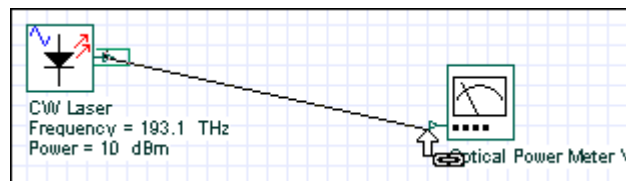


Figure 35 Connecting ports



Selecting links

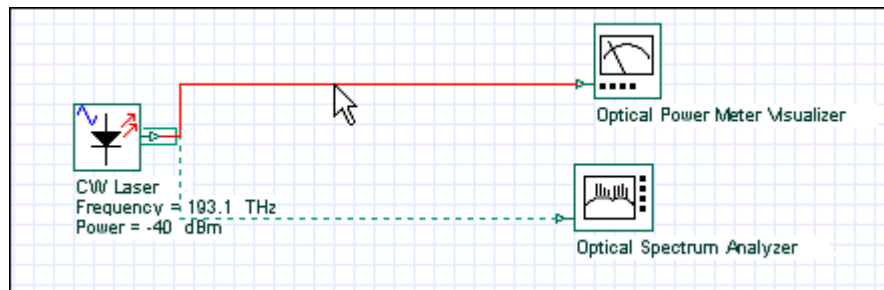
To select a link between components, perform the following procedure.

Action

- Click on the link in the layout.
The link changes from its existing color to a red solid line (see [Figure 36](#)).

Note: There can only be one link selected at a time.

Figure 36 Selecting links



Deleting links

To delete a link between components, perform the following procedure.

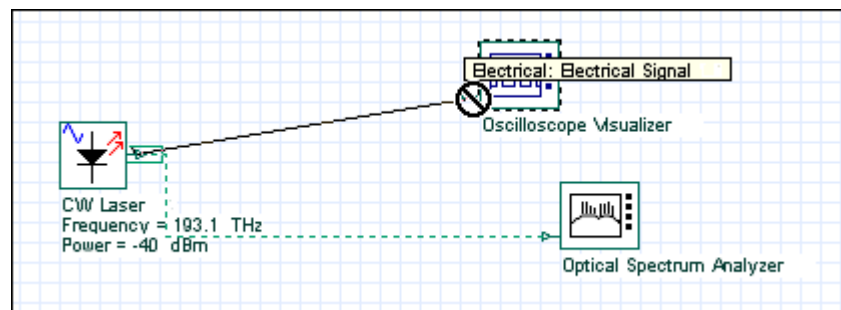
Action

- Right-click on the link in the layout and press **Delete**.
The link is deleted.

Non-compatible connections

If you try to link two non-compatible ports, a special icon appears, and no operation is performed (see [Figure 37](#)).

Figure 37 Non-compatible ports icon



Multiple visualizers connected to a port

Normally, multiple connections cannot be made from the same port to different components. However, if a monitor has been installed on a port, multiple connections can be made to visualizers (see [Figure 38](#)).

If you try to delete a monitor that has visualizers connected to it, a warning is displayed (see [Figure 39](#)).

Figure 38 Port with multiple visualizers

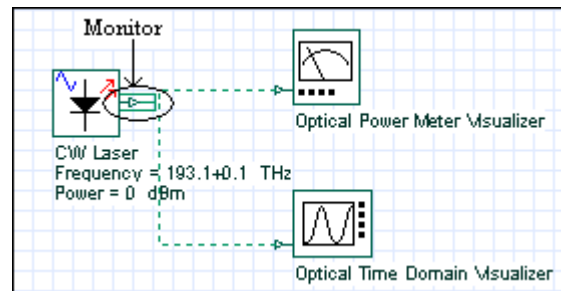
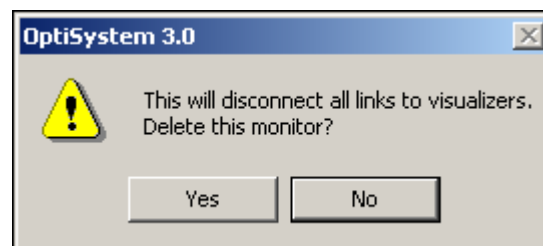


Figure 39 Visualizer disconnection dialog box

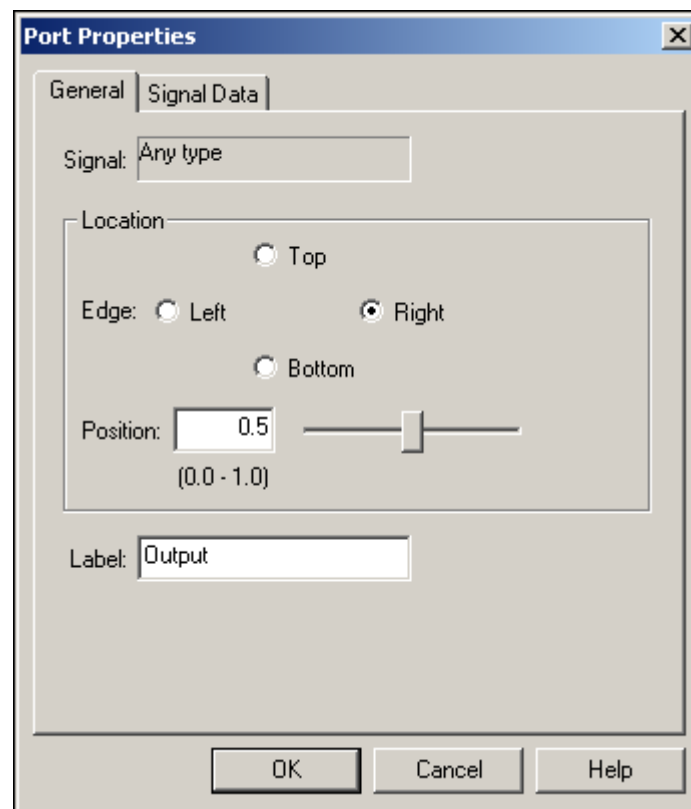


Modifying port properties

To modify the properties of a port, perform the following procedure.

- | Step | Action |
|-------------|---|
| 1 | Select the Layout tool, move the tool over the port and right-click.
<i>The Layout context menu appears.</i> |
| 2 | Select Port Properties .
<i>The Port Properties dialog box appears (see Figure 40).</i> |
| 3 | Modify the port properties. |
| 4 | Click OK . |

Figure 40 Port Properties dialog box



Signal

Indicates the type of signal port.

Location

Top: positions the port at the top of the layout.

Edge: Left, Right, Bottom positions the port on the edge of the layout you select.

Position: type or use the slide bar to specify the exact location position of the port.

Label enter a customized port label.



Drawing a Rectangle in the layout

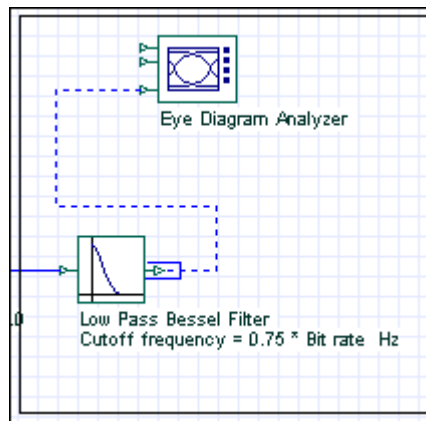
The component selection feature is more effective when used in collaboration with the rectangle tool.

To select components in a layout using the rectangle tool, perform the following procedure.

Step Action

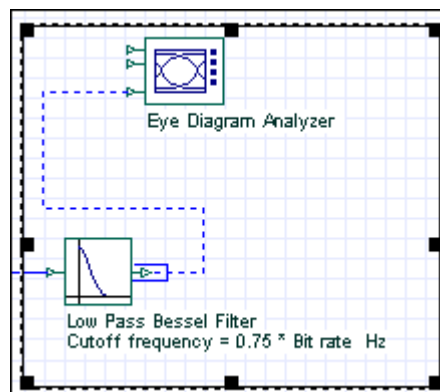
- 1** On the **Draw Objects** toolbar, select the rectangle tool.
- 2** Draw a rectangle over the components you wish to select (see [Figure 41](#)).

Figure 41 Rectangle Tool — selected components



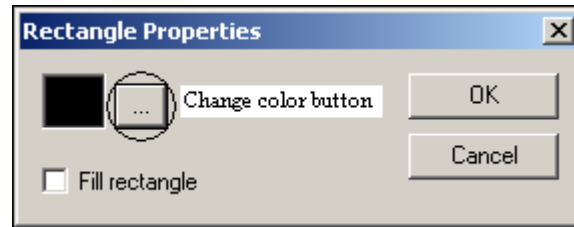
- 3** Select the **Layout** tool on the **Layout Tools** toolbar.
- 4** Click on the rectangle outline
The rectangle is highlighted (see [Figure 42](#)).

Figure 42 Rectangle Tool — highlighted components



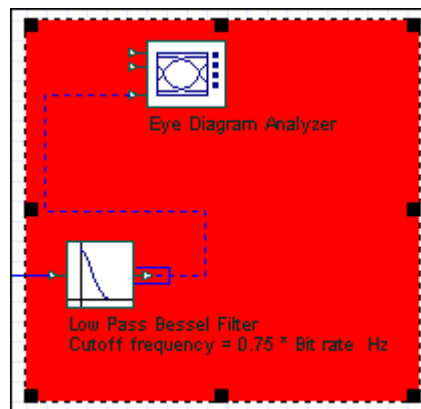
- 5 Double-click inside the rectangle
The **Rectangle Properties** dialog box appears (see [Figure 43](#)).

Figure 43 Rectangle properties dialog box



- 6 Click on the **Change color** button (see [Figure 43](#)).
The **Color** properties dialog box appears.
- 7 Select a color, and click **OK**.
The **Color** properties dialog box closes.
- 8 Select **Fill rectangle**.
- 9 Click **OK**.
The rectangle is highlighted and colored, and the components are not visible.
- 10 Select the rectangle in the layout and right-click.
The **Layout** context menu appears.
- 11 Select **To Back**.
The components become visible inside the highlighted rectangle (see [Figure 44](#)).

Figure 44 Layout Order — highlighted

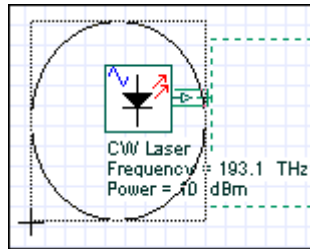


Drawing a circle in the layout

To draw a circle in the layout, perform the following procedure.

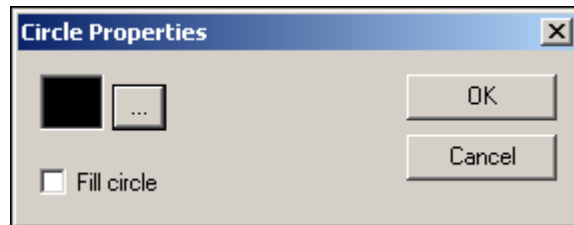
- | Step | Action |
|-------------|---|
| 1 | On the Draw Objects toolbar, select the Circle tool.
<i>The cursor changes to a cross.</i> |
| 2 | Move the cursor into the layout and draw a circle of the desired size. |

Figure 45 Layout — circle



- | | |
|----------|--|
| 3 | Select the Layout tool on the Layout Tools toolbar. |
| 4 | Double-click inside the circle.
<i>The Circle Properties dialog box appears (see Figure 46).</i> |

Figure 46 Circle Properties dialog box



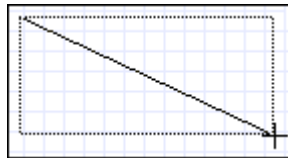
Note: In this box, you can change the properties as well as the fill color of the circle.

Drawing a line in the layout

To draw a line in the layout, perform the following procedure.

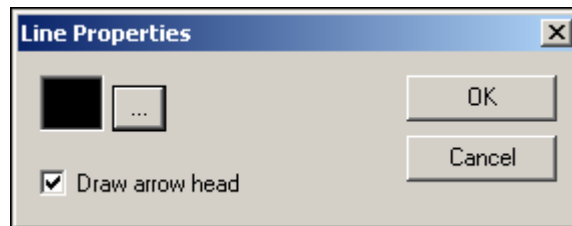
Step	Action
1	On the Draw Objects toolbar, select the Line Arrow tool.
2	Click in the layout and draw a line. <i>The line is created with an arrow head (see Figure 47).</i>

Figure 47 Layout — line



- | | |
|---|--|
| 3 | Select the Layout tool on the Layout Tools toolbar. |
| 4 | Double-click on the line.
<i>The Line Properties dialog box appears (see Figure 48).</i> |

Figure 48 Line Properties dialog box



- | | |
|---|---|
| 5 | If you do not want an arrow head on the line, clear the Draw Arrow Head checkbox.
<i>The arrow head is removed from the line.</i> |
|---|---|

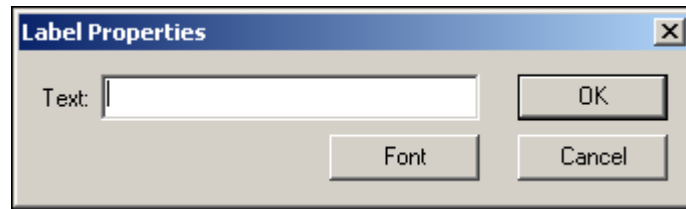
Adding text to the layout

To add text to the layout, perform the following procedure.

Step	Action
1	On the Draw Objects toolbar, select the Draw Text Label tool. <i>The cursor becomes a cross.</i>
2	Click in the layout. <i>The Label Properties dialog appears (see Figure 49).</i>
3	Type any text to be displayed on the layout.
4	Click OK . <i>The text appears in the layout.</i>



Figure 49 Label Properties dialog box

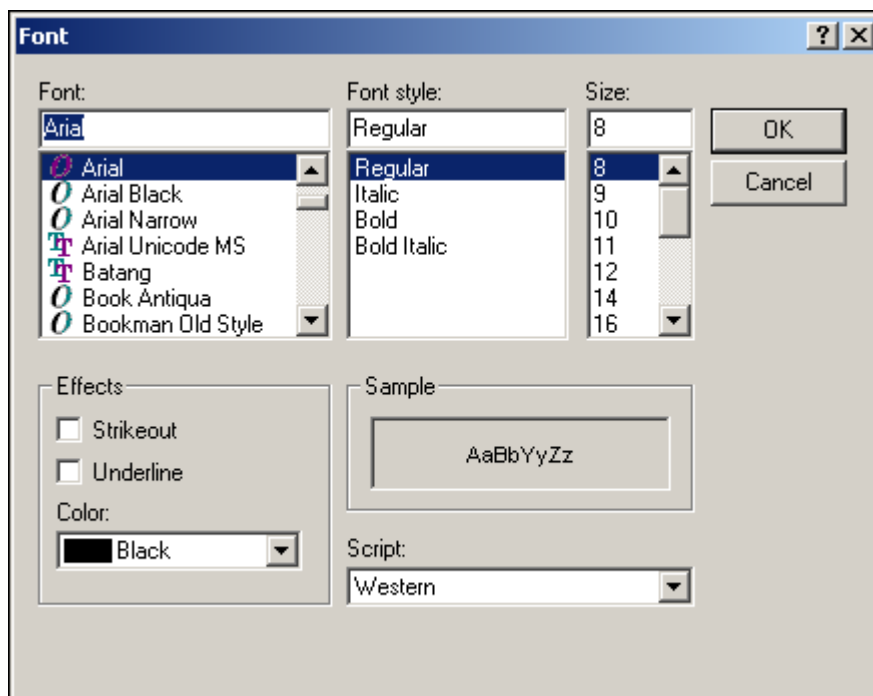


Modifying the text in the layout

To modify the text in the layout, perform the following procedure.

Step	Action
1	On the Layout Tools toolbar, select the Layout tool.
2	Double-click on the text in the layout. <i>The Label Properties dialog box appears.</i>
3	Click Font . <i>The Font dialog box appears (see Figure 50).</i>
4	Make font choices and click OK . <i>The font is changed in the layout.</i>

Figure 50 Font dialog

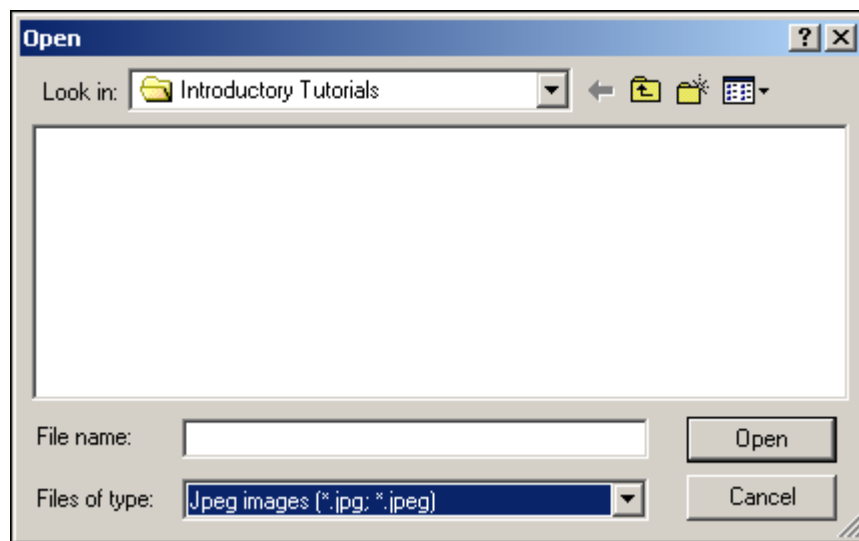


Drawing a Bitmap in the layout

To draw a bitmap in the layout, perform the following procedure.

- | Step | Action |
|-------------|---|
| 1 | Select the Draw Bitmap tool on the Draw Objects toolbar. |
| 2 | Draw a rectangle in the layout where you want to insert the bitmap.
<i>The Open dialog box appears (see Figure 51).</i> |
| 3 | Select the file to insert (Jpeg, Windows Bitmap, PC Exchange). |
| 4 | Click Open . |

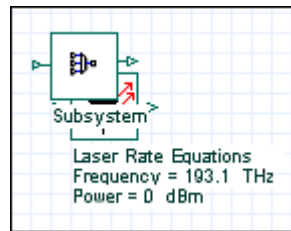
Figure 51 BitMap Image - Open dialog



Layout depth order

Sometimes, components are placed in the same position in the **Main layout** work area, a situation that can become quite confusing if it is a particularly complicated layout.

Figure 52 Layout Depth Order



Choosing the layout depth order position

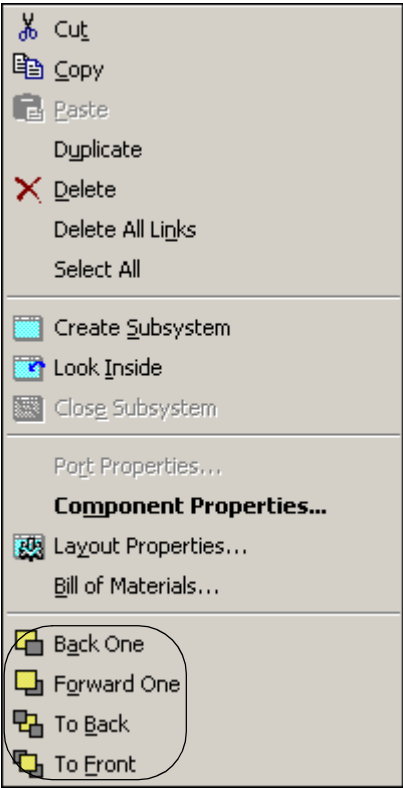
There are several methods available to determine the layout depth order position.

To choose the layout depth order position, perform one of the following procedures.

Step Action

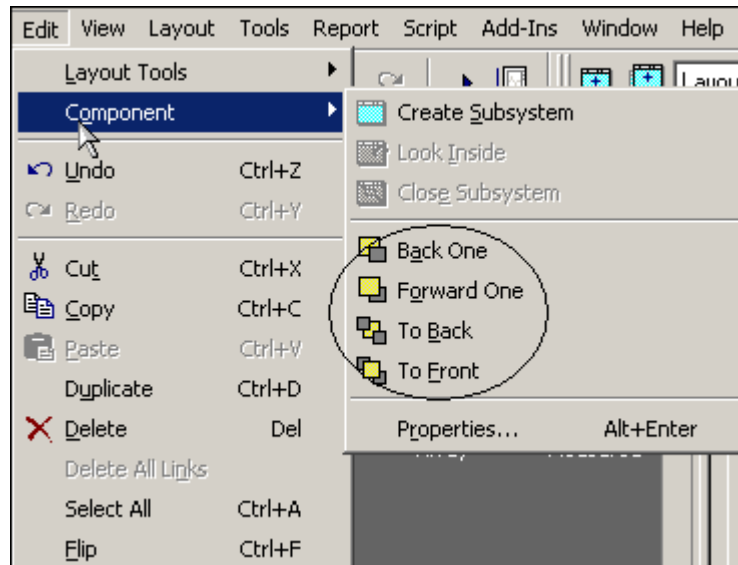
- 1** Select the component you wish move.
The component is highlighted.
- 2** Right-click on the component.
The layout context menu appears (see [Figure 53](#)).
- 3** Select **Back One** or **Forward One** to move the component or subsystem one layer only in the layout. Select **To Back** or **To Forward** to move the component or subsystem to the back or front of the layout.

Figure 53 Layout Depth Order—component context menu



Or

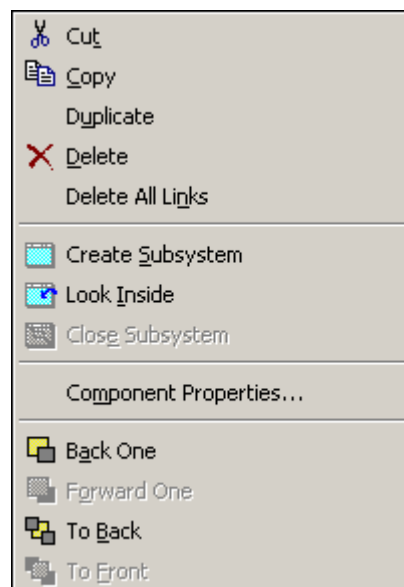
- | Step | Action |
|------|---|
| 1 | Select Edit > Component (see Figure 54). |
| 2 | Select Back One or Forward One to move the component or subsystem one layer only in the layout. Select To Back or To Forward to move the component or subsystem to the back or front of the layout. |

Figure 54 Layout Depth Order — main menu access

Or

Step Action

- 1** On the **Project Browser** docker, select **Layout**.
- 2** Select the component or subsystem in the project layout list and right-click. *The layout context menu appears.*
- 3** Select **Back One** or **Forward One** to move the component or subsystem one layer only in the layout. Select **To Back** or **To Forward** to move the component or subsystem to the back or front of the layout.

Figure 55 Layout Depth Order—Project Browser access

Subsystems

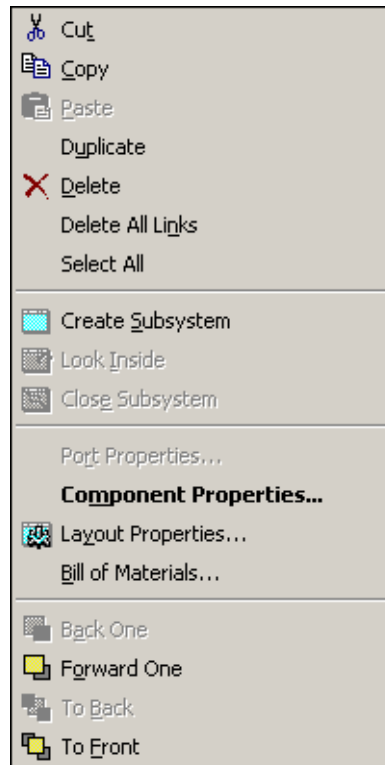
A subsystem simplifies the layout of the components. A designated amount of components can be in the layout, but by grouping certain ones into subsystems, you get a better overview of their functionality within the system.

Creating a subsystem

To create a subsystem perform the following procedure.

- | Step | Action |
|------|--|
| 1 | Select the component(s) in the Main layout view. |
| 2 | Right-click inside the selection box around the components.
<i>The layout context menu appears (see Figure 56).</i> |
| 3 | Select Create Subsystem from the menu. |

Figure 56 Layout context menu



Creating an empty subsystem

To create an empty subsystem, perform the following procedure.

- | Step | Action |
|------|---|
| 1 | Right-click in the Main layout view. |

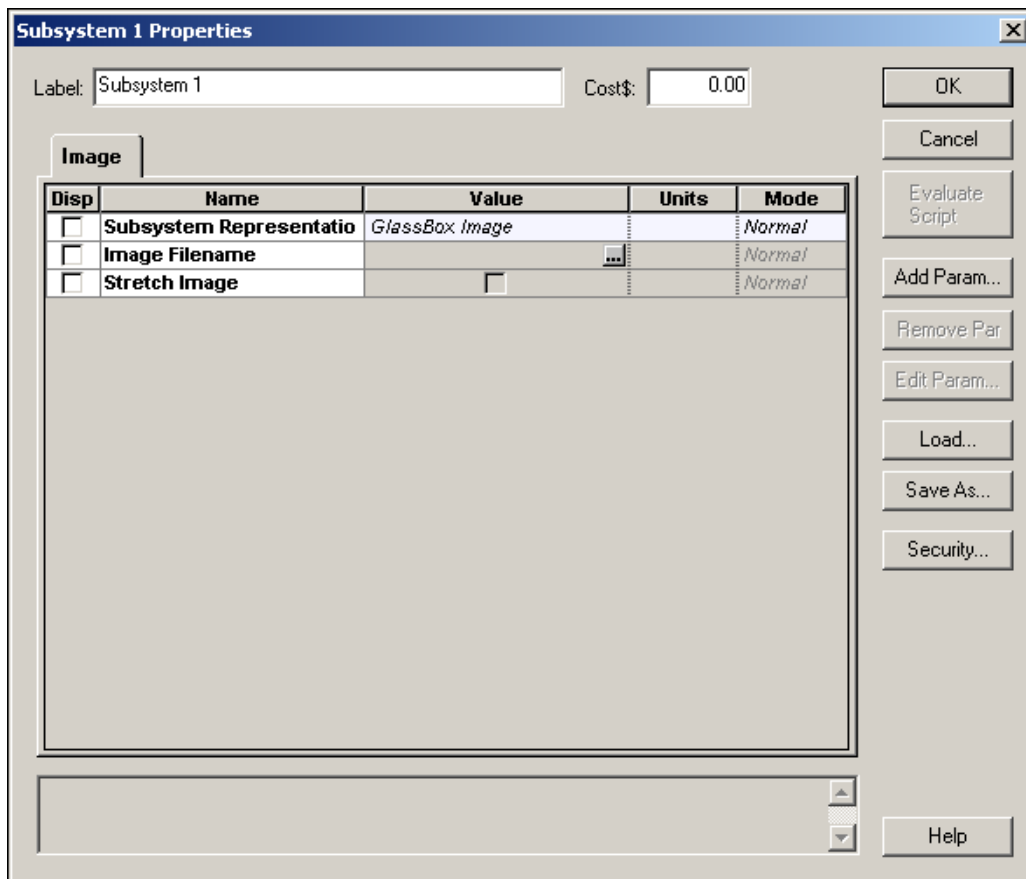


- 2 Select **Create Subsystem** from the menu.
*A glass box subsystem icon appears in the **Main layout**.*
- 3 Select the subsystem icon and right-click.
*The **Layout** context menu appears.*
- 4 Select **Look Inside**.
*The subsystem opens in the layout and the **Subsystem** tab appears.*

Or

- | Step | Action |
|------|---|
| 1 | Select Edit > Component > Create Subsystem .
<i>A glass box subsystem icon appears in the Main layout.</i> |
| 2 | Select the subsystem icon and right-click.
<i>The Layout context menu appears.</i> |
| 3 | Select Look Inside .
<i>The subsystem opens in the layout and the Subsystem tab appears.</i> |

Figure 57 Subsystem Properties dialog box



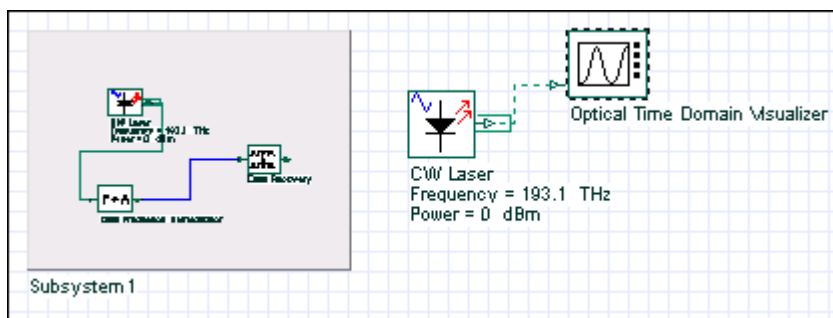
Label

Displays the name of the subsystem.

Image tab**Subsystem Representation**

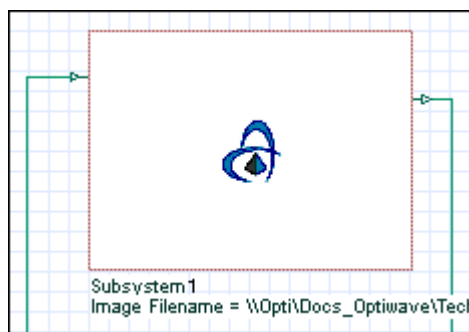
GlassBox Image: default setting (see [Figure 58](#)). Allows you to see the components that are in the subsystem and how they are connected.

Figure 58 Subsystem—GlassBox Image



User Image: allows you to select any image as your subsystem icon (see [Figure 59](#)). The **User Image** does not display the components or the connections in the subsystem.

Figure 59 Subsystem — User Image



To select a **User Image**, perform the following procedure.

Step Action

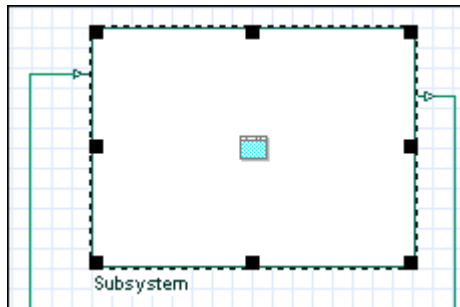
- 1 Double-click on the subsystem.
*The **Subsystem Properties** dialog box appears (see [Figure 57](#)).*
- 2 Click the **Value** cell beside **Subsystem Representation**.
A drop-down list appears.
- 3 Select **User Image**.
- 4 In the **Value** cell beside **Image Filename**, click 



- 5 Select the image that you want to use, and click **Open**.
*The name of the image you selected appears in the **Value** cell.*
- 6 Click **OK**.
The image you selected appears as the subsystem icon.

Default Icon: allows you to select the standard OptiSystem subsystem **Default Icon** (see [Figure 60](#)). The **Default Icon** does not display the components or the connections in the subsystem.

Figure 60 Subsystem — Default Icon



To select the **Default Icon**, perform the following procedure.

- | Step | Action |
|-------------|--|
| 1 | Double-click on the subsystem.
<i>The Subsystem Properties dialog box appears (see Figure 57).</i> |
| 2 | Click the Value cell beside Subsystem Representation .
<i>A drop-down list appears.</i> |
| 3 | Select Default Icon , and click OK .
<i>The Default Icon appears as the subsystem icon.</i> |

Image Filename

Displays the name of the file displayed as the subsystem icon.

Stretch Image

Allows you to stretch the subsystem image in the layout.

Opening a subsystem layout

After you create a subsystem in the project, you can open the subsystem to view and work with the components inside it. To open a subsystem layout, perform the following procedure.

Step Action

- 1 Select the subsystem in the **Main layout**.
The subsystem is highlighted.
- 2 Select **Edit > Component > Look Inside**.

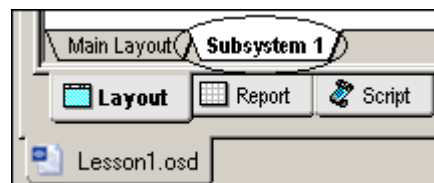
Or

Step Action

- 1 Select the subsystem in the **Main layout**.
The subsystem is highlighted.
- 2 Right-click on the subsystem.
*The **Layout** context menu appears.*
- 3 Select **Look Inside**.
The subsystem opens.

Once you open the subsystem, a **Subsystem** tab automatically appears beside the **Main layout** tab at the bottom of the window (see [Figure 61](#)). Each subsystem has its own tab.

Figure 61 Subsystem tab



Note: You must select the **Layout** tab before you can access the **Subsystem** tabs.

Closing a subsystem layout

You do not delete a subsystem when you close it. Closing a subsystem closes the subsystem work area and removes the **Subsystem** tab from beside the **Main layout** tab. The subsystem itself remains in the **Main layout** window.

To close a subsystem layout, perform the following procedure.

Step Action

- 1 Right-click in the subsystem work area.
*The **Layout** context menu appears.*
- 2 Select **Close Subsystem**.



Or

Step	Action
------	--------

- | | |
|---|---|
| 1 | Right-click in the subsystem work area.
<i>The Layout context menu appears.</i> |
| 2 | Select Edit > Component > Close Subsystem from the Menu toolbar. |

Placing components in subsystems

Once you create a subsystem, you can add components to it. Perform the following procedure to place a component in a subsystem.

Step	Action
------	--------

- | | |
|---|---|
| 1 | Select the subsystem tab in the Project Layout window.
<i>The subsystem work area opens.</i> |
| 2 | Select a component from the Component Library and drag the component to the Main layout window. |

Note: The **Subsystem** tab is only visible in the **Main layout** window if the subsystem is open.

Closing a subsystem window

To close a subsystem window (and therefore eliminate the tab at the bottom of the work area), perform the following procedure.

Step	Action
------	--------

- | | |
|---|--|
| 1 | Select the Subsystem tab. |
| 2 | Right click in an open section of the Subsystem layout work area.
<i>The Layout context menu appears.</i> |
| 3 | Select Close Subsystem .
<i>You return to the Main layout view.</i> |



Subsystem input and output port tools

When you work in the **Subsystem** window, two tools become active on the **Layout** toolbar—the **Input** and **Output Port** tools. These two draw tools allow you to insert input and output ports into subsystems.

Assigning an input or output port to a subsystem

To assign an input or output port to a subsystem, perform the following procedure.

Step	Action
1	Select the subsystem in the Main layout . <i>The subsystem is highlighted.</i>
2	Right click on the subsystem. <i>The Layout context menu appears.</i>
3	Select Look Inside . Note: If this option disables the menu, the subsystem is already open. Click on the Subsystem tab in the Main layout view if this is the case.
4	Click on either the Draw - Input Port Tool or Draw - Output Port Tool on the Layout Tools toolbar.
5	Move your cursor over to the edge of the subsystem work area. <i>The cursor changes to either the word "Out" or "In".</i>
6	Click to place the port. Note: A component inside of the subsystem must have an output port if you want the subsystem to have an output port. Likewise, a component inside the subsystem must have an input port if you want the subsystem itself to have an input port.

Figure 62 Subsystem Input and Output ports

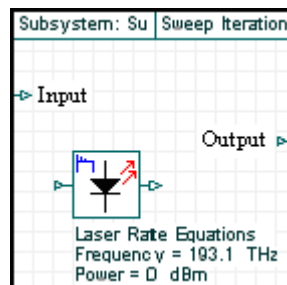
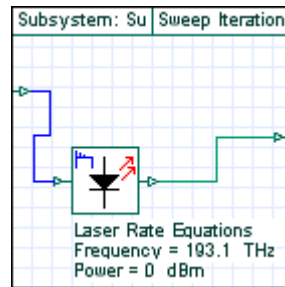


Figure 63 Subsystem Input and Output ports—created links



Subsystem port properties

Modifying subsystem port properties

Once a port has been added to a subsystem, you can change its properties. To change the subsystem port properties, perform one of the following procedures.

Action

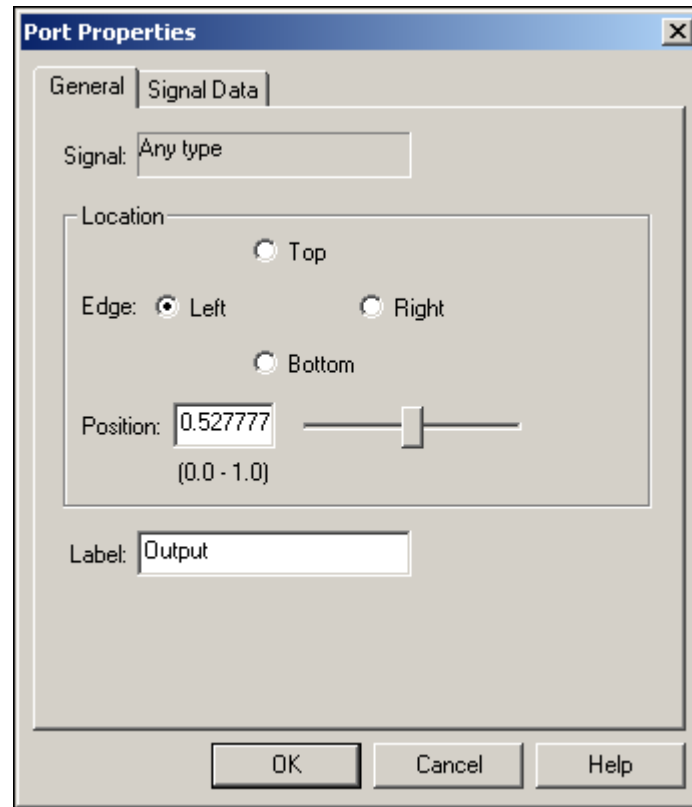
- Double-click on the subsystem port.
*The **Port Properties** dialog box appears.*

Or

Step Action

- 1 Right-click on the subsystem port.
*The **Layout** context menu appears.*
- 2 Select **Port Properties**.
*The **Port Properties** dialog box appears.*

Figure 64 Output Port Properties dialog box



Signal: displays the type of signal at the port.

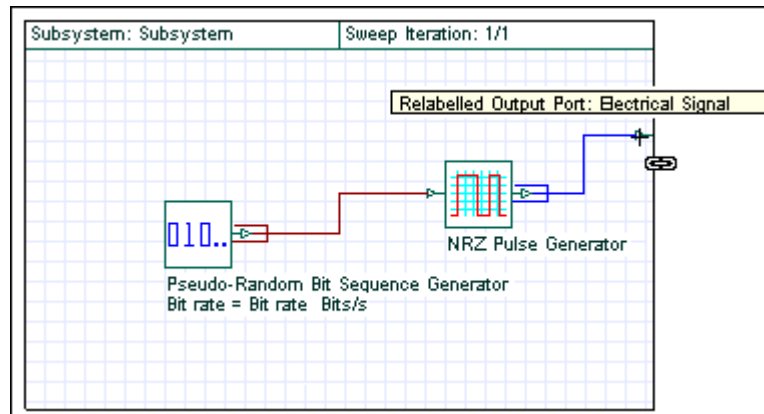
Edge allows you to set the port on either the top, bottom, left, or right edge of the subsystem icon.

Position allows you to set at what point on the chosen edge the port will be. 0.0 is one corner, 0.5 is the halfway point and 1.0 is the far corner.

Label: allows you to change the name of the port. The new name appears when you move the mouse over the port in the layout (see [Figure 65](#)).



Figure 65 Renamed port



In [Figure 65](#), the output port has been renamed **Relabelled Output Port**.

Subsystem properties

Subsystem properties are very similar to layout parameters and component properties.

Viewing subsystem properties

To view subsystem properties, perform the following procedure.

Action

- Double-click on the subsystem icon in the **Main layout**.
*The **Subsystem Properties** dialog box appears.*

Or

Step Action

- 1** Select the subsystem in the **Main layout**.
The subsystem is highlighted.
- 2** Right click on the subsystem.
*The **Layout** context menu appears.*
- 3** Select **Component Properties**.
*The **Subsystem Properties** dialog box appears.*

Or

Step Action

- 1** On the **Project Browser** docker, select the subsystem in the project layout list and right-click.
*The **Layout** context menu appears.*
- 2** Select **Component Properties**.
*The **Subsystem Properties** dialog box appears.*



Figure 66 Subsystem properties dialog box

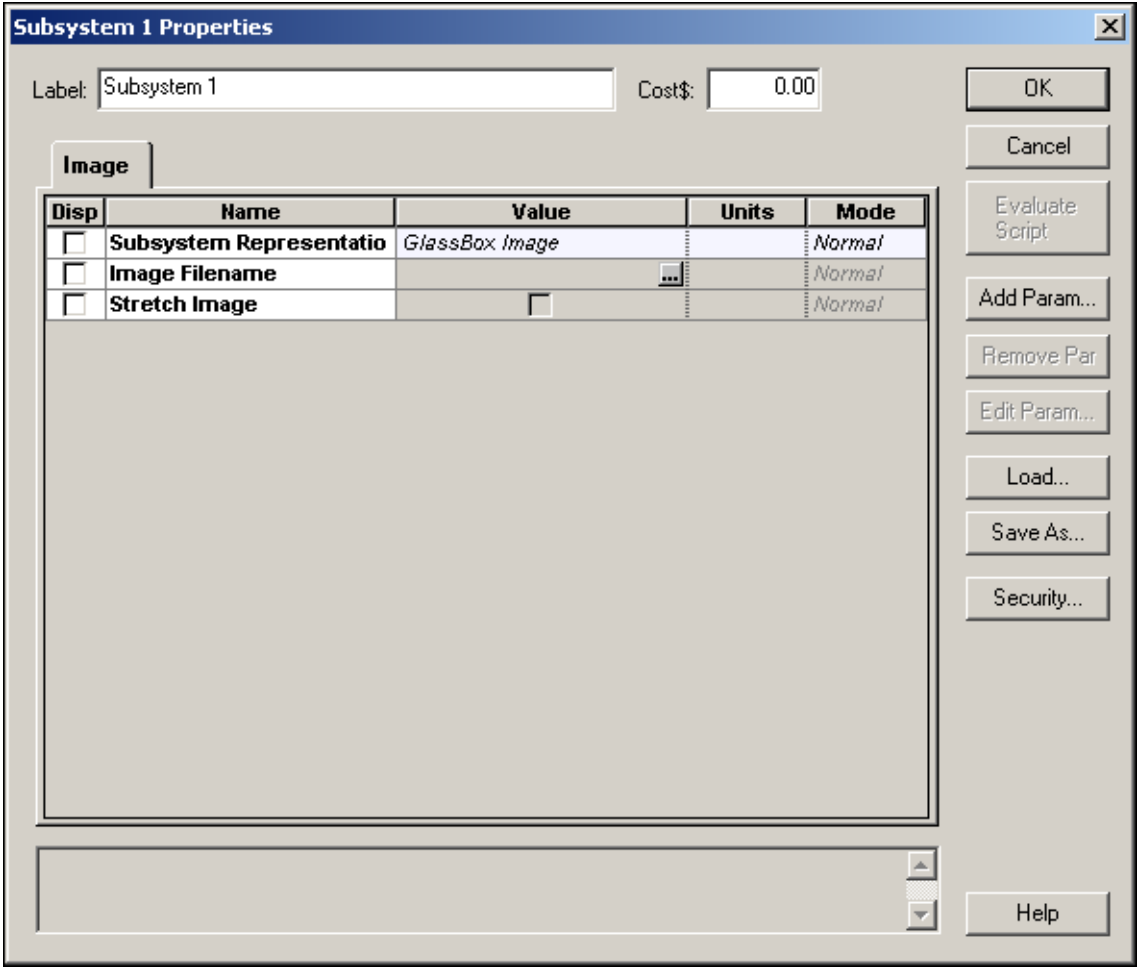


Table 3 shows describes the information in the **Subsystem Layout Properties** dialog box.

Table 3 Description of columns in the Subsystem Layout Properties dialog box

Column	Description
Disp	Checkbox that determines whether the value of a parameter is displayed in the layout.
Name	Displays the subsystem parameter names. Note: This is a read-only column and cannot be changed.
Value	Displays the value of the parameters. You can edit the value of the parameters from this column.
Units	Displays the units available for each parameter.



Column	Description
Mode	Indicates what mode the parameter is in. The Mode option is limited in the Layout Parameters window since these settings are created by the system. For this reason, you cannot change the Mode of the parameters. You can choose between Normal and Sweep when you create a new subsystem parameter.

Changing the value of a subsystem parameter

To change the value of a parameter, perform the following procedure.

Step	Action
-------------	---------------

- | | |
|----------|---|
| 1 | Click in the Value column beside the parameter you wish to change. |
| 2 | Enter the new value. |
| 3 | Click OK . |

Note: If the value that you enter is invalid, the **Value** column turns red when you click **OK**. In addition, the status box indicate that the entered value is invalid and displays the correct value range.

Changing the subsystem parameter unit

To change the unit for the parameter, perform the following procedure.

Step	Action
-------------	---------------

- | | |
|----------|---|
| 1 | Click in the Unit column beside the parameter you wish to change.
<i>If there are other units available, a drop-down menu appears to make a selection from.</i> |
| 2 | Press Enter .
<i>The number in the Value column automatically recalculates to show the appropriate value.</i> |

Note: The units available vary from parameter to parameter.

Adding new parameters to a subsystem

OptiSystem allows you to enter additional parameters into the **Subsystem Properties** window.

To add additional parameters to a subsystem, perform the following procedure.

Step	Action
-------------	---------------

- | | |
|----------|--|
| 1 | Click in the Value column beside the parameter you wish to change. |
| 2 | Select Add Param .
<i>The Add Parameter dialog box appears (see Figure 67).</i> |



Figure 67 Add Parameter window

The 'Add Parameter' window is a standard Windows-style dialog box. It features a title bar with the text 'Add Parameter' and a close button (X). The main area contains several labeled input fields and three buttons on the right. The 'Name' field contains 'Param1'. The 'Type' field is a dropdown menu currently showing 'floating-point'. The 'Category' field is a dropdown menu currently showing 'Image'. Below these are four more input fields: 'Minimum value' (0), 'Maximum value' (100), 'Current value' (0), and 'Units' (empty). At the bottom is a 'Choice list' field (empty). On the right side, there are three buttons: 'Add', 'Cancel', and 'Help'.

Table 4 Subsystem Layout Parameter categories

Category	Description
Name	The name of the parameter.
Type	You can select from the following parameter types. • floating (e.g. 3.21) • integer (e.g. 8) • boolean (e.g. ON/OFF) • string-filename (e.g. "c:\myfile.txt") • string-regular (e.g. "Hello") • choice
Category	Allows you to choose from Simulation , Signals and Noise .
Minimum value	The minimum value of the parameter.
Maximum value	The maximum value of the parameter. Note: OptiSystem will not allow you to set either the Minimum or Maximum values outside the valid range of the parameter.
Current value	The default value of the parameter. The Current value must fall between the Minimum and Maximum values.
Units	User-created parameters can only have one unit. OptiSystem does not allow changing between different units for user-created parameters. Note: OptiSystem does not allow you to edit the system parameters.
Choice list	Displays a list of subsystem parameter choices.

Removing a new subsystem layout parameter

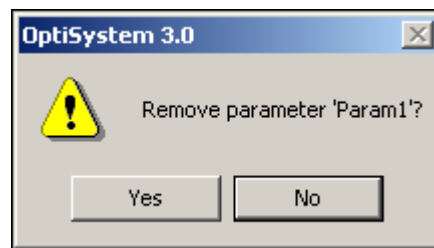
You can remove parameters that you have created in the **Subsystem Properties** dialog box.

To remove a new subsystem layout parameter, perform the following procedure.

Note: You cannot remove system parameters.

- | Step | Action |
|-------------|--|
| 1 | Click in the Value column beside the parameter you wish to change. |
| 2 | Select Remove Par.
<i>A dialog appears prompting you to respond (see Figure 68).</i> |

Figure 68 Delete parameter message



Editing new parameters in the subsystem

To edit the new parameters that you create in the **Subsystem Properties** window, perform the following procedure.

- | Step | Action |
|-------------|--|
| 1 | Click in the Value column beside the parameter you wish to change. |
| 2 | Select Edit Param
<i>The Edit Parameter dialog box appears.</i> |

Note: For more information about the parameter categories, see “Subsystem Layout Parameter categories” on page 82.



Figure 69 Edit parameter dialog box

The dialog box titled "Edit Parameter" contains the following fields and controls:

- Name:** Text box containing "NewLayoutParameter".
- Type:** Dropdown menu showing "floating-point".
- Category:** Dropdown menu showing "Noise".
- Minimum value:** Text box containing "0".
- Maximum value:** Text box containing "50".
- Current value:** Text box containing "0".
- Units:** Text box containing "dBm".
- Choice list:** Empty text box.
- Buttons:** "OK", "Cancel", and "Help" buttons are located on the right side.

Note: The OptiSystem system parameters cannot be edited. If you attempt to do so, the **Edit Parameter** dialog box will appear with all fields read-only (see [Figure 70](#)).

Figure 70 Edit system parameters dialog box

The dialog box titled "Edit Parameter" contains the following fields and controls:

- Name:** Text box containing "Subsystem Representation".
- Type:** Dropdown menu showing "choice".
- Category:** Dropdown menu showing "Image".
- Minimum value:** Empty text box.
- Maximum value:** Empty text box.
- Current value:** Text box containing "0".
- Units:** Empty text box.
- Choice list:** Text box containing "GlassBox Image, User Image,".
- Buttons:** "OK", "Cancel", and "Help" buttons are located on the right side.

Add-Ins

OptiSystem has incorporated **Add-Ins**, which extend the functionality of the system without rebuilding or restarting. They can be enabled or disabled while using OptiSystem.

There are two types of add-ins:

- **Background**: operate with OptiSystem and perform actions dependent on what is occurring within the program. These add-ins generate a toolbar on the main layout window when they are activated.
- **Command**: perform a single function, and are not interactive with OptiSystem. You cannot perform operations in OptiSystem while running a **Command** add-in.

OptiSystem add-ins are divided into categories. Each category can have both **Background** and **Command** add-ins.

Installing an Add-In

To install an **Add-In** feature, perform the following procedure.

- | Step | Action |
|------|--|
| 1 | Select Add-Ins > Add-In Manager .
<i>The Add-In Manager dialog box appears. (see Figure 71).</i> |
| 2 | Select the Background or Command tab. |
| 3 | Select Install .
<i>The Open file dialog box appears (see Figure 73).</i> |
| 4 | Select the Add-In from the list. |
| 5 | Click Open .
<i>The Add-In is activated in OptiSystem.</i> |

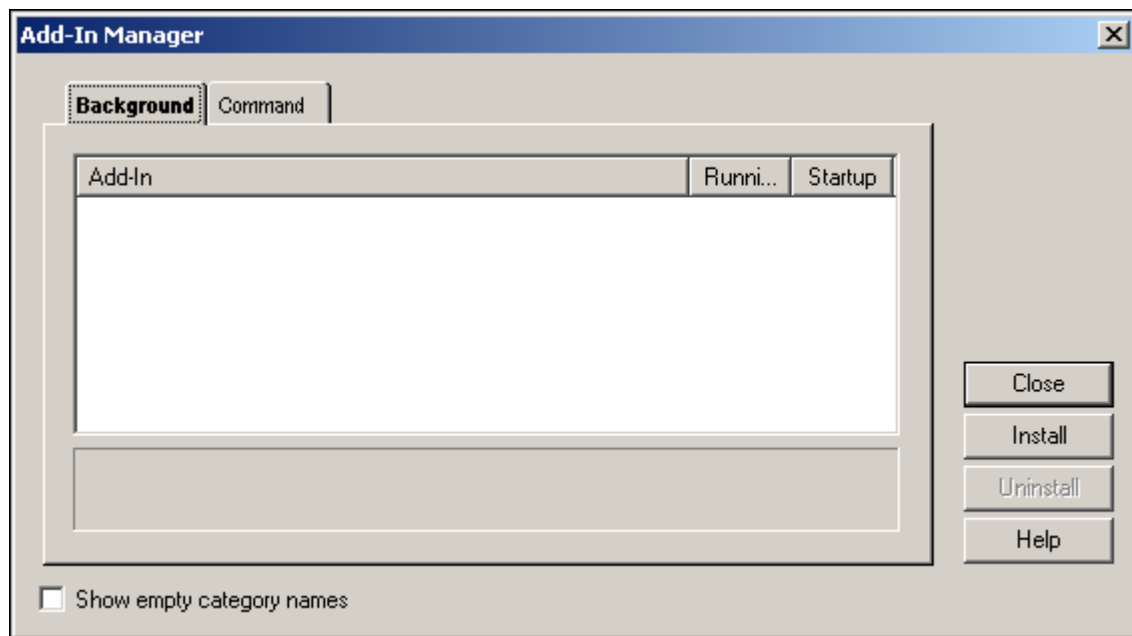


Uninstalling an Add-In

To uninstall an Add-In feature, perform the following procedure.

- | Step | Action |
|------|---|
| 1 | Select Add-Ins > Add-In Manager .
<i>The Add-In Manager dialog box appears (see Figure 71).</i> |
| 2 | Select the Background or Command tab. |
| 3 | Select the Add-In from the list. |
| 4 | Select Uninstall .
<i>The Add-In is uninstalled.</i> |

Figure 71 Add-In Manager dialog box— Background tab



Note: The **Background** add-ins include information about whether they are currently running in OptiSystem, and the startup time. If you select the **Show empty category names** box, categories without any add-ins will be displayed in the list.

Figure 72 Add-In Manager dialog box—Command tab

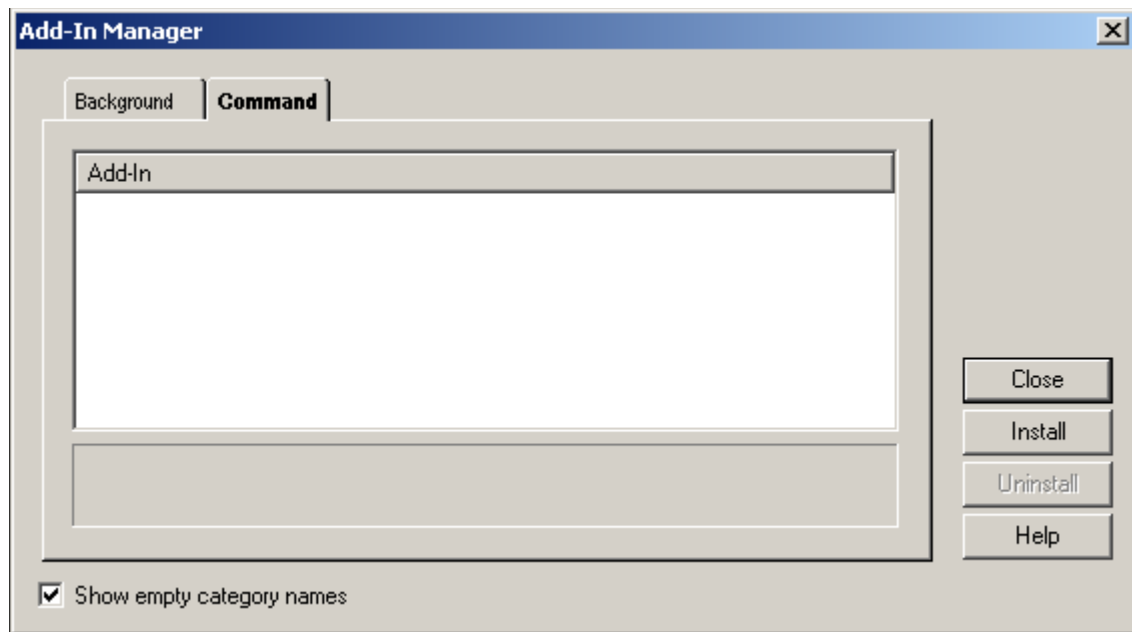
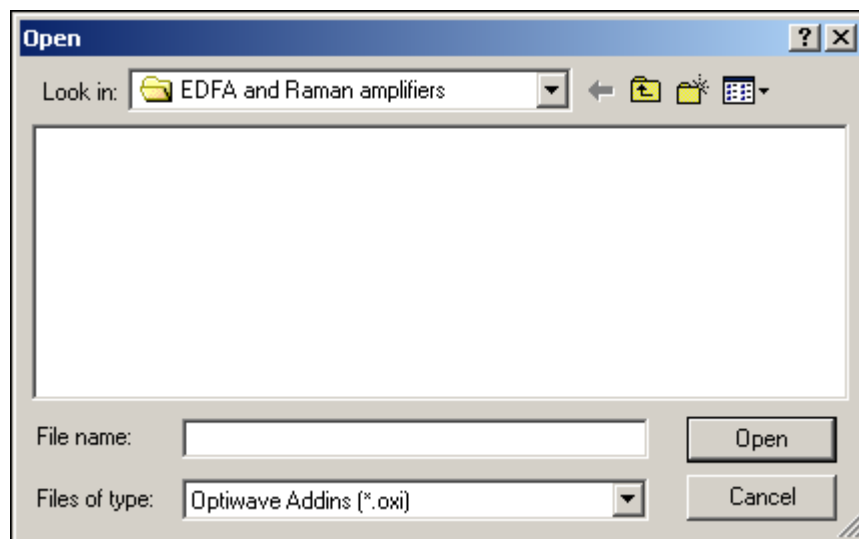


Figure 73 Open dialog box



ADD-INS

Notes:



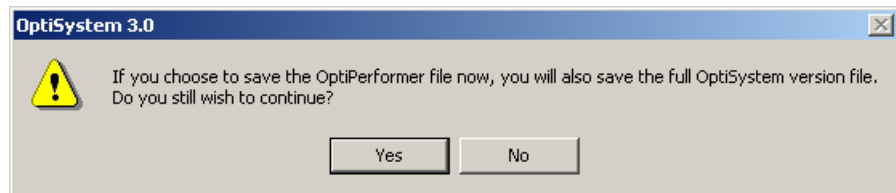
Exporting an OptiPerformer project file

After the project file is built in **OptiSystem**, it must be exported to **OptiPerformer**.

To export an OptiSystem project file to **OptiPerformer**, perform the following procedure (with the project file open in OptiSystem).

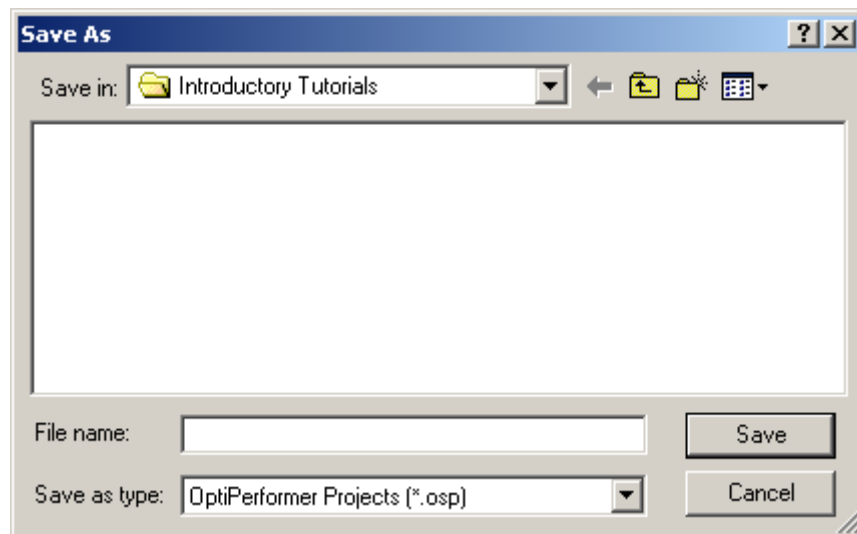
Step Action

- 1 From the **File** menu, select **Export > OptiPerformer > Export**.
A warning dialog appears.
- 2 If you wish to save the full OptiSystem file along with saving the OptiPerformer file, click **Yes**.



The **SaveAs** dialog box appears (see [Figure 2](#)).

Figure 1 SaveAs dialog box



- 3 Select the company logo image file, type business contact information, and provide any other pertinent project details in the **Info** tab fields (see [Figure 2](#)).
- 4 Click **Preview** to see a preview of the **OptiPerformer About** dialog box (see [Figure 3](#)).
- 5 Select global parameters to export with the **OptiPerformer** project file using the **Parameters** tab (see [Figure 4](#)).
- 6 Select files to attach to the **OptiPerformer** file using the **Attachments** tab.
- 7 Click **OK**.
*The **OptiPerformer Settings** dialog box closes.*



Info tab

Image

Load an image file to generate the company logo in the **About The Design** dialog box. Click **Browse** to navigate to the image file and import the path into the **Image** field.

Preview

Click to preview the **About The Design** dialog box with the loaded image.

Contact Info

Type company contact information into the fields within the **Contact Info** panel. Includes:

- Primary E-Mail
- Secondary E-Mail
- Web Address
- Phone Number
- Fax Number
- Address

Additional Info

Type any additional information regarding the company, business, and other relevant details.

Figure 2 OptiPerformer Settings dialog box—Info tab

OptiPerformer Export Settings

Info Parameters Attachments

Image
Company Logo (Windows Bitmap 256 Colors, Size: 461X258)
[Text Field] [Browse...] [Preview...]

Contact Info

Primary E-Mail	[sales@abccompany..com]	Address	ABC Company - Santa Triata 112001 Oakmead Village Drive Santa Clara CA 950d51-08d11
Secondary E-Mail	[tech@abccompany..com]		
Web Address	[http://www.abccompany.com/]		
Phone Number	[+1-613-555-5555]		
Fax Number	[+1-613-555-5555]		

Additional Info
[Text Area: ABC Company reserves the right to make any changes to this specification, and/or the design, performance, price, or terms of delivery of any product(s) without notice. ABC Company will assume no liability for infringements of patents or other rights held by third parties as a result of use or application of this product(s). No rights under any patent accompany the sale of any product(s) or information. ABC Company does not authorize or warrant any product(s) for use in life support]

OK Cancel Help



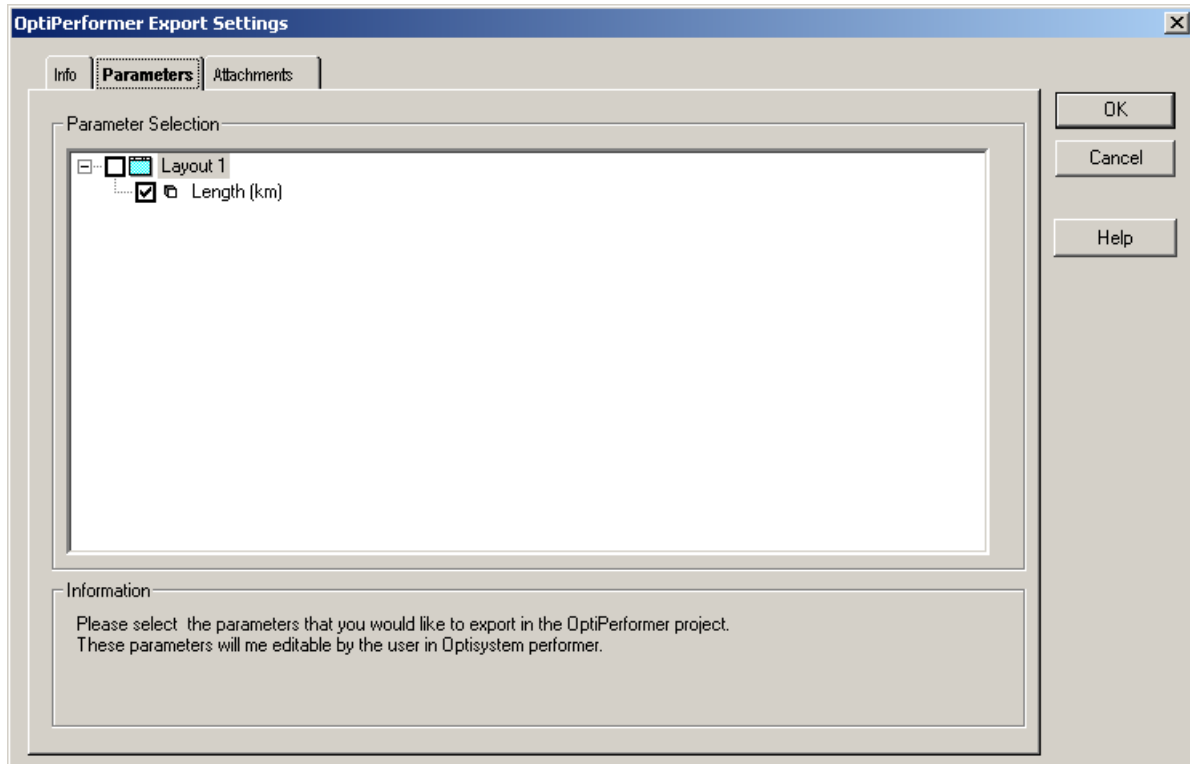
Figure 3 About The Design dialog box



Parameters tab

The global parameters created in **OptiSystem** can be exported into the **OptiPerformer** project file.

Figure 4 OptiPerformer Settings dialog box—Parameters tab



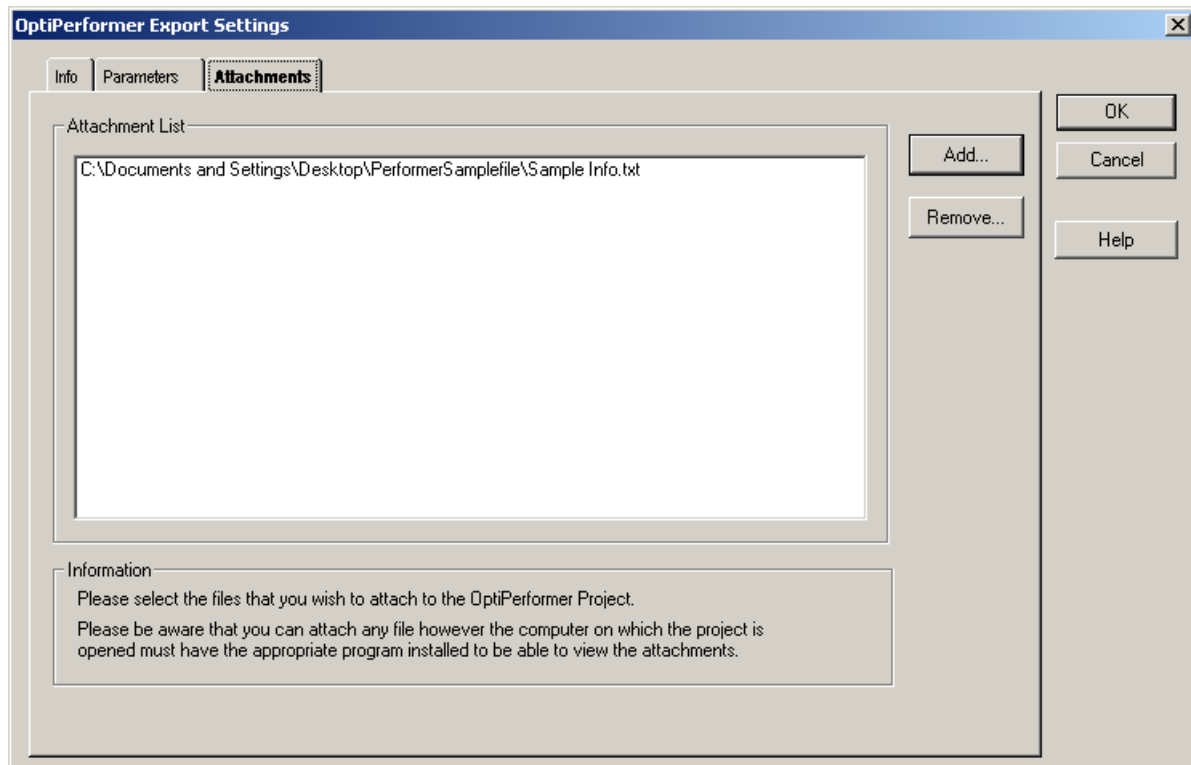
Select/deselect the global parameters to export in the **Parameter Selection** panel.

Attachments tab

You can attach relevant files to the **OptiPerformer** project file by adding them in the **Attachments** tab.

Note: You must have the necessary program installed to access any file you attach to the **OptiPerformer** project file.

Figure 5 OptiPerformer Settings dialog box—Attachments tab



To attach a file, click **Add**. The **Open** dialog box appears. Navigate to the file you want to attach and click **Open**. The file path appears in the **Attachment List**.

To remove an attachment, select the file in the **Attachment List**, and click **Remove**.



Library Management

A key feature of OptiSystem is management of the component library. The library management:

- allows you to enable/disable user-selected component libraries while using the software, thereby maximizing your memory resources
- allows you to install/uninstall libraries from your system, also maximizing your memory resources
- supplies an expanded view of the component library in the **Library Management** window.

Library Management tool

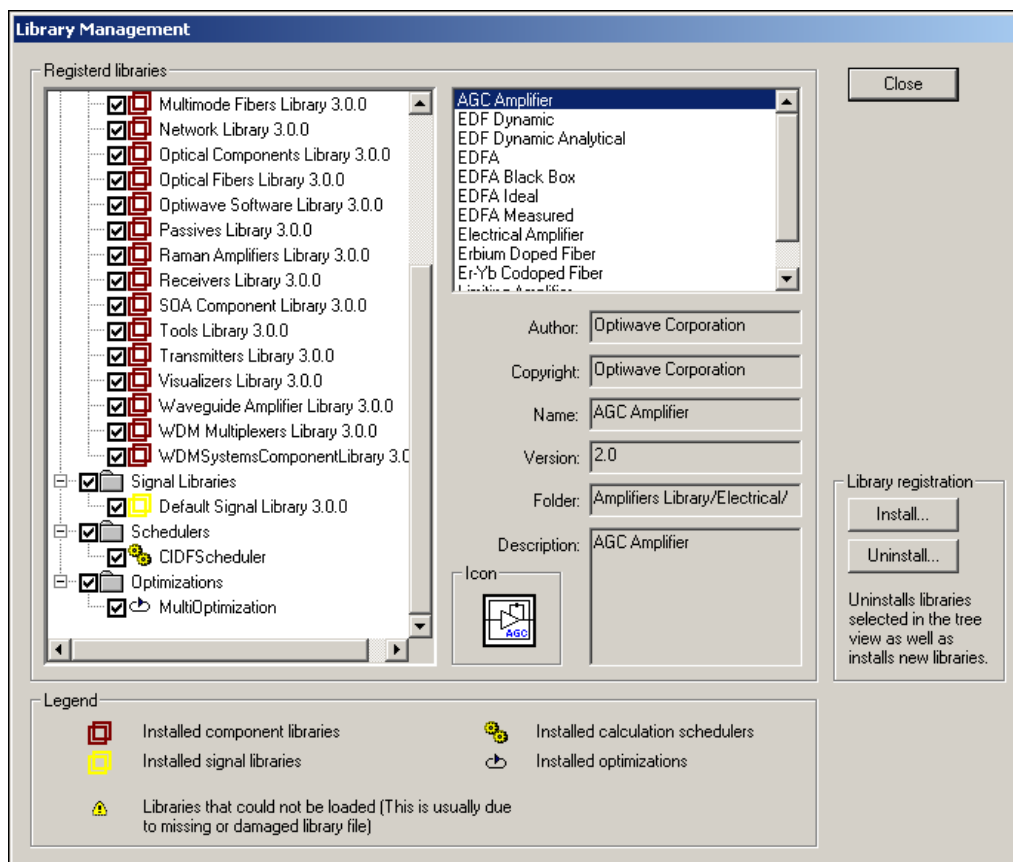
Using the Library Management tool

To access and use the **Library Management** tool, perform the following procedure:

Step Action

- 1 Select **Tools > Library Management**.
*The **Library Management** dialog box appears (see [Figure 6](#)).*

Figure 6 Library Management dialog



In the **Registered Libraries** window, a list of the Component and Signal libraries, Schedulers, and Optimizations is displayed.

Note: You can only access the **Library Management** tool when no projects are open.

Disabling libraries

To disable libraries in OptiSystem, perform the following action.

Action

- Clear the check box beside the library to be disabled.
A dialog box appears stating that the selected library is disabled.

Enabling libraries

To enable libraries in OptiSystem, perform the following action.

Action

- Select the check box beside the library to be enabled.
A dialog box appears stating that the selected library is enabled.

Installing libraries

To install libraries in OptiSystem, perform the following procedure.

Step Action

- 1** In the **Library Registration** window, click **Install**.
*The **Open** dialog appears (see [Figure 7](#)).*
Note: You can select signal, component, optimizer, or scheduler libraries.
- 2** Select the library you want to install.
The library is highlighted.
- 3** Click **Open**.
*The **Loaded Successfully** dialog appears (see [Figure 8](#)).*
- 4** Click **OK**.
*The library appears in the list of libraries in the **Library Management** dialog.*
- 5** Click **Close**.
*The system settings and dialog view are updated. The **Library Management** dialog box closes.*



Figure 7 Open dialog

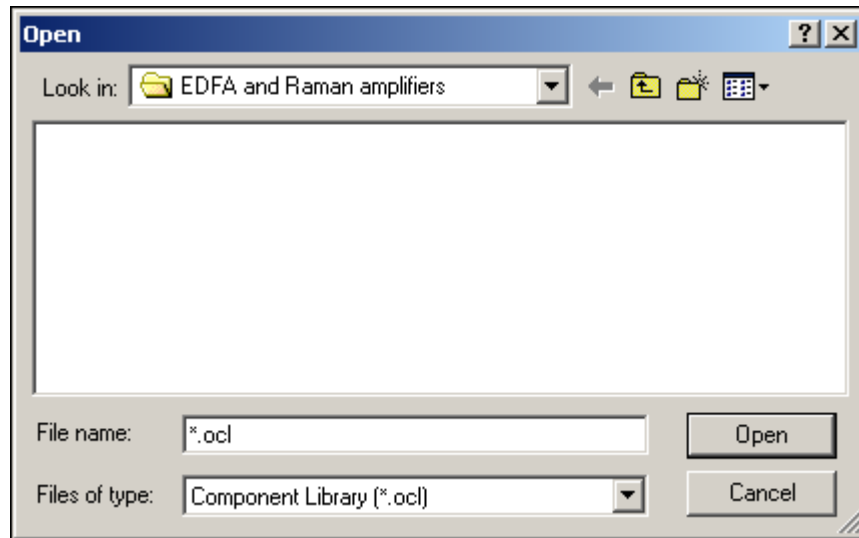
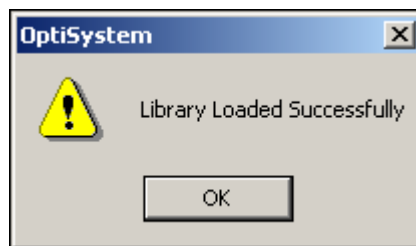


Figure 8 Library Loaded Successfully dialog box



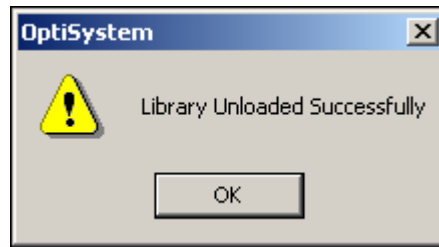
Uninstalling libraries

To uninstall libraries in OptiSystem, perform the following procedure.

- | Step | Action |
|------|---|
| 1 | Select the library you wish to uninstall.
<i>The library is highlighted.</i> |
| 2 | In the Library Registration window, click Uninstall .
<i>The Unloaded Successfully dialog appears (see Figure 9).</i> |
| 3 | Click OK .
<i>The library is removed from the list of libraries in the Library Management dialog.</i> |
| 4 | Click Close .
<i>The system settings and dialog view are updated. The Library Management dialog box closes.</i> |



Figure 9 Library Unloaded Successfully dialog box



Viewing component details

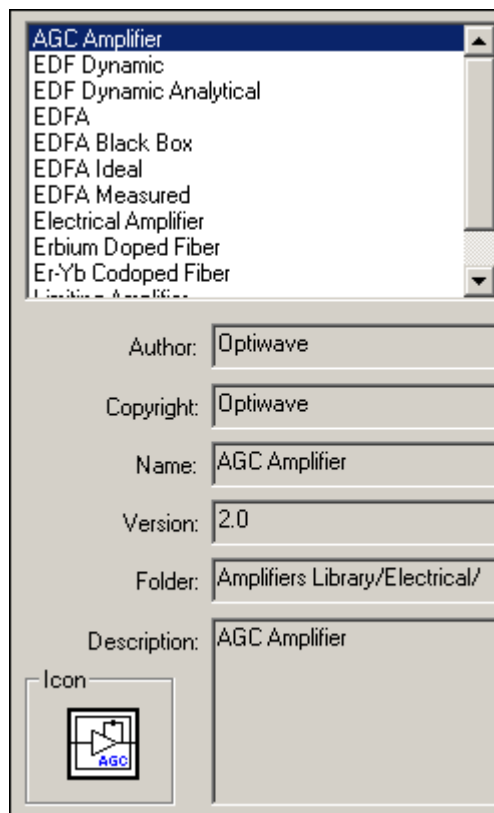
To view details about components in the libraries, perform the following procedure.

Step Action

- 1 Select the library that contains the component.
The library is highlighted.
- 2 Select the component from the list to the right of the list of libraries.
The component is highlighted.

Note: The detailed information about the selected component is found in the area below the component list. This information is read-only.

Figure 10 Component details in Library Management dialog box



Author: author of the component library.

Copyright: owner of the copyright for the component library.

Name: name of the component library.

Version: version number of the component library.

Folder: name of the folder that contains the component.

Description: description of the component.

Icon: component icon.

For more information about the **Library Management** dialog, look in the **Legend** window at the bottom of the dialog box.

Note: OptiSystem is updated automatically when you click **Close** to exit the **Library Management** dialog box.

Notes:

Dockers

There are three dockers available in OptiSystem. They are:

- [Component Library](#)
- [Project Browser](#)
- [Description](#)

Component Library

OptiSystem provides a component library with over 200 components available to build your projects. You can import single components or entire component libraries into OptiSystem, and use the search feature to look for components in the library.

There are several component library categories:

- **Default:** displays the default component libraries and components
- **Custom:** used to create and include user-defined custom components and libraries
- **Favorites:** used to include your most often used components for easy access
- **Recently Used:** displays the ten most recently used components.

There are two views available for the Component Library, one uses icons, and the other uses a list.

Using the Component Library

To use the **Component Library**, perform the following action:

Action

- Double-click on the **Default Library** icon (see [Figure 11](#)).
*The **Component Library** icons appear (see [Figure 12](#)).*

Or

- Click in the library description bar (found underneath the window title bar).
*The **Component Library** list appears (see [Figure 13](#)).*

Note: The library description bar is circled in the color of the folder, for example, red for the **Default** library (see [Figure 12](#)).



Figure 11 Component Library

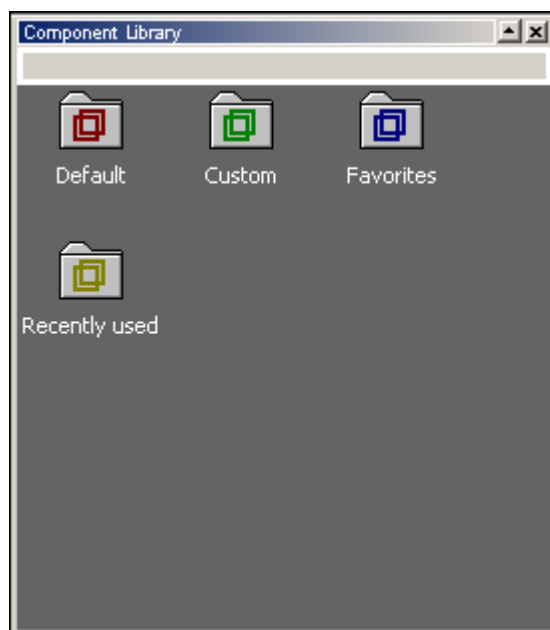


Figure 12 Component Library icons.

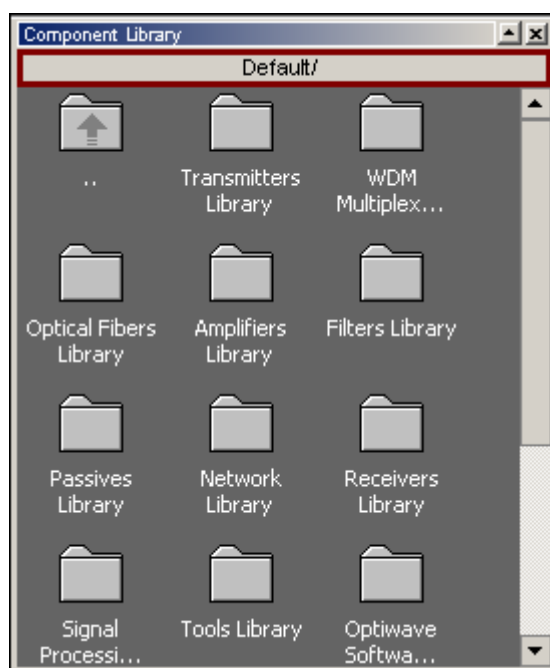
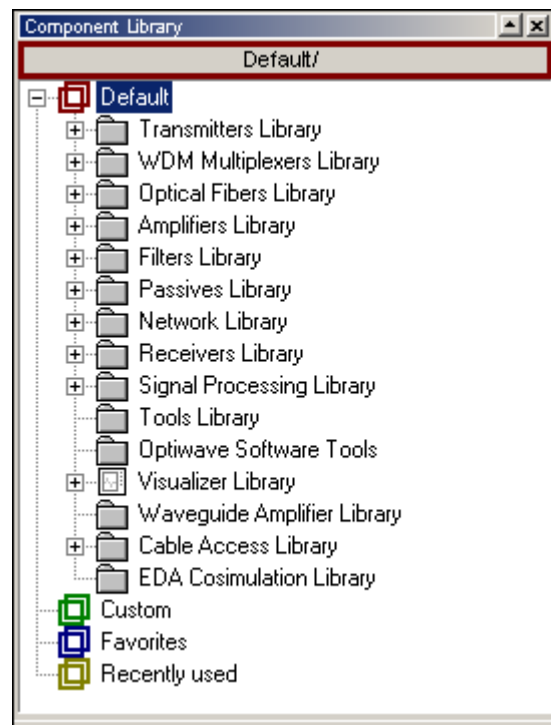


Figure 13 Component Library list

Moving (down) through the Component Library

Action

- Double-click the file folder icon until you reach the component you are searching for (see [Figure 12](#)).

Or

- Click the expansion icon until you reach the component you are searching for (see [Figure 13](#)).

Moving (up) through the Component Library

Action

- Double-click the up arrow file folder icon until you reach the level you are searching for (see [Figure 14](#)).

Figure 14 Component Library up arrow

Or

- Click the item in the component library list (see [Figure 13](#)).

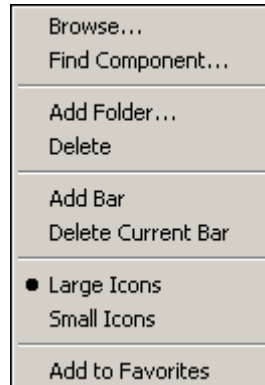


Component Library context menu

If you right-click in the **Component Library** docker, the context menu shown in [Figure 15](#) appears.

Note: You access the context menu when the component library is in icon mode (see [Figure 12](#)), not list mode (see [Figure 13](#)).

Figure 15 Component Library context menu



Browse: takes you to the component library in tree format to browse the available components.

Find Component: opens the component search dialog, and allows you to search for a specific component.

Add Folder: allows you to add a customized folder to the component library. To add a custom folder, double-click on the **Custom** library icon. The **New Folder** dialog appears and allows you to type the name of the folder (see [Figure 16](#)).

Note: This is only active when using the **Custom** category.

Delete: allows you to delete a customized folder. Select the folder, right-click to access the context menu, and select **Delete**.

Note: You cannot delete any folders other than user-created ones in the **Custom** library.

Add Bar: allows you to add a new bar to the component library docker, so you can access frequently used library locations without using the normal method to browse through the libraries. To create a bar, select the library/component and click **Add Bar**.

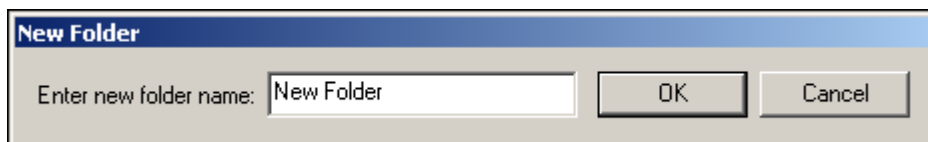
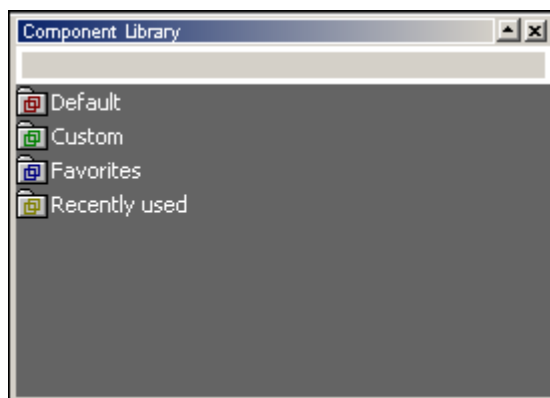
Delete Current Bar: allows you to delete a customized library bar from the **Component Library** docker.

Large Icons: displays large icons in the **Component Library** docker.

Small Icons: displays small icons in the **Component Library** docker (see [Figure 17](#)).

Add to Favorites: allows you to select a component and add it to your list of favorites. This makes it easier to access commonly used components.



Figure 16 New folder dialog**Figure 17 Component Library — small icons**

For information about managing the Component Library, see [“Exporting an OptiPerformer project file” on page 89](#).



Project Browser

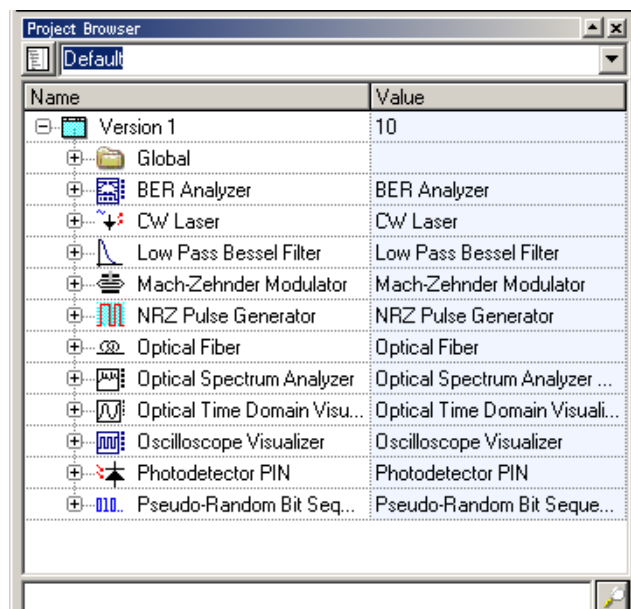
The **Project Browser** lists information about the project. Use the **Project Browser** to customize the view of the project, as it allows you to select what information is visible, calculated, used in reports, and plotted in graphs.

Figure 18 shows the **Project Browser** in **Default** view.

The components in the list are synchronized with the project layout window. When you click a component in the **Project Browser**, the component is highlighted in the layout. This also works in reverse, from the project layout to the **Project Browser**.

To expand the components, click the plus sign to the left of the component name. The ports, parameters, results, and graphs items related to the component appear in the list. To expand on any of these items, click the plus sign to the left of the name.

Figure 18 Project Browser—Default view



The following items are available in the default **Project Browser** view (see Figure 18):

Name column

Layout: displays all project layout names in the current project.

Component: displays the component names for each layout of the current project.

The component has four possible details items:

- **Ports:** displays a list of ports on the component.
- **Parameters:** displays a list of component parameters.
- **Results:** displays a list of the available numerical results of a calculation.
- **Graphs:** displays a list of available graphical results of a calculation.



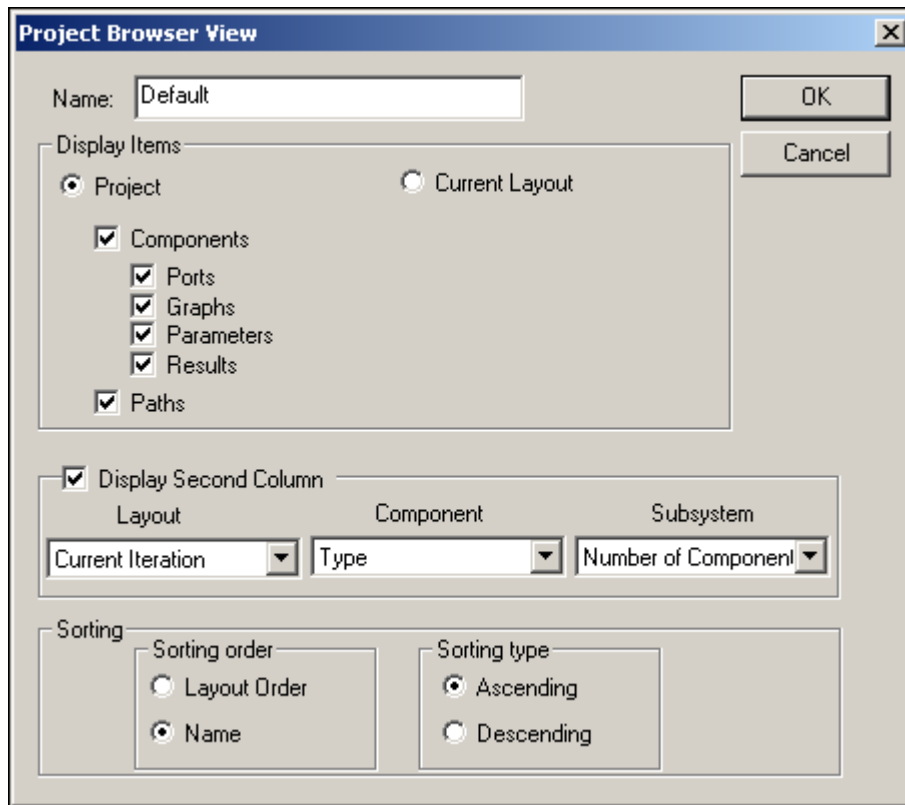
Value column

Layout: displays the current iteration number for each project layout listed.

Component: displays the component type for each component listed.

Subsystem: displays the number of components for each subsystem listed.

Figure 19 Project Browser View dialog box—Default view

**Name**

Displays the name of the current view in the **Project Browser**.

Display Items

Select/deselect items to view in the **Project Browser**. Includes:

Project: select to display all layouts in the current project.

Current Layout: select to display items for the current layout only.

Components: select/clear items for viewing. Includes **Ports**, **Graphs**, **Parameters**, and **Results**.

Paths: select to view paths in the current layout or project.



Display Second Column

Select to display the second column in the **Project Browser**.

Layout: select item to display in the second column about layout **Size**, **Current** (sweep) **Iteration**, **Number of Components** in the layout, or the **Total Cost** of the layout.

Component: select item to display in the second column about component **Cost** or **Type**.

Subsystem: select item to display in the second column about subsystem **Number of Components**, **Cost**, or **Size**.

Sorting

Determines how the items are sorted for display in the **Project Browser**.

Sorting Order: select to sort the items in the **Project Browser** by **Layout Order** or **Name**.

Sorting type: select to sort the items in the **Project Browser** in **Ascending** or **Descending** order.

Modifying the Project Browser view

In order to modify the available information in the **Project Browser**, use the **Project Browser View** dialog box.

To modify the **Project Browser** view, perform one of the following actions.

Action

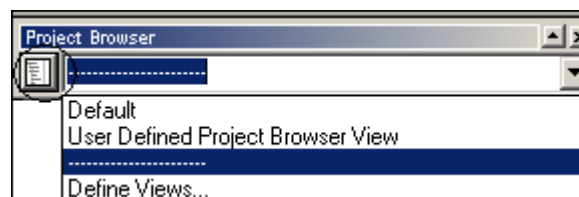
- In the **Project Browser**, click the menu button and select **Define Views** (see [Figure 20](#)).
The **Project Browser Views** dialog box appears (see [Figure 19](#)).

OR

Action

- In the **Project Browser**, click the **Project Browser** view button  (circled in [Figure 20](#)).
The **Project Browser Views** dialog box appears (see [Figure 19](#)).

Figure 20 Project Browser view menu



Graphs

The **Graphs** item in the **Project Browser** allows you to display graphical representations of calculated data. Graphs are generated by components, although not all components generate graphs.

Note: A graphic icon appears to the left of the graphs that can be viewed, with the style of icon indicating what type of graph is available:

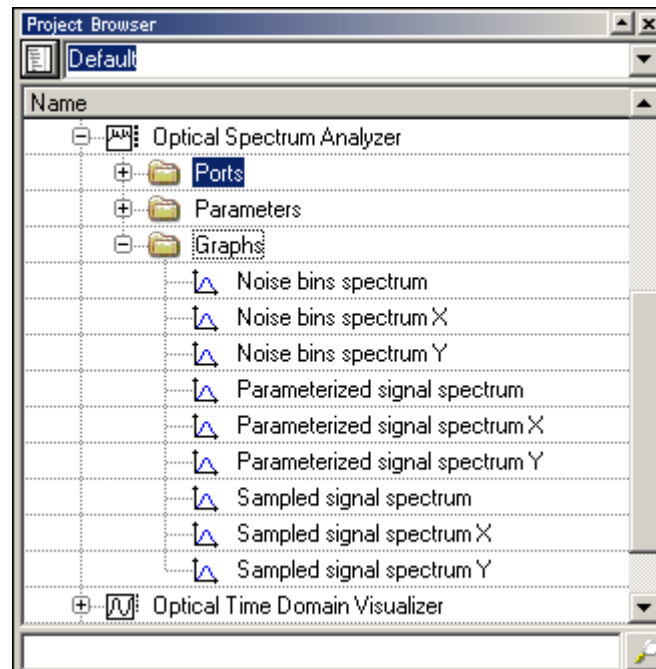


2D graph



3D graph

Figure 21 Project Browser — Expanded Graphs item



You can view a graph using two methods:

- [Quick View](#)
- [Report](#)



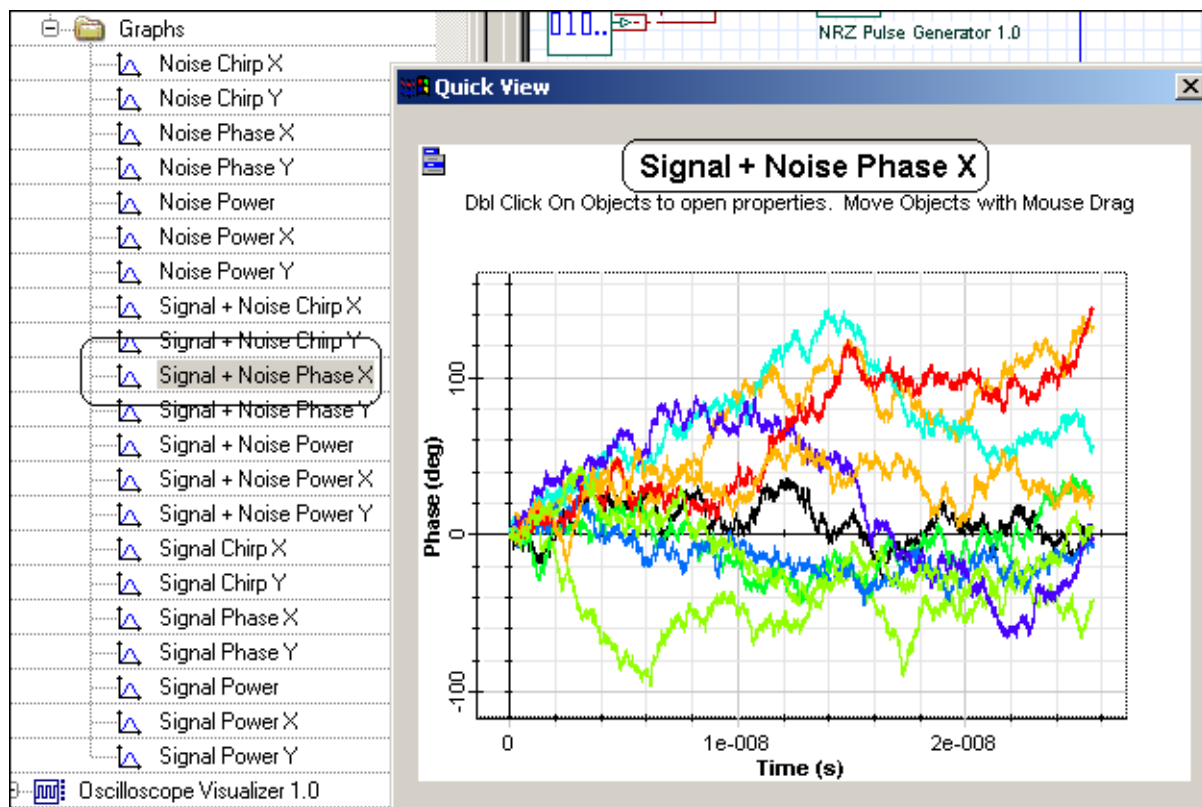
Quick View

Use to generate a temporary view of the graph results in a dialog box.

Placing graphs in Quick View

- | Step | Action |
|------|---|
| 1 | In the Project Browser , expand the Graph item under the component. |
| 2 | Select the graph name in the list, right-click, and select Quick View .
<i>The Quick View dialog box appears with the graph (see Figure 22).</i> |

Figure 22 Quick View graph



Report

Use to generate graph results and include them in a **Report**. You can combine graphs from same components, different components, or even different layouts.

Placing graphs in Report view

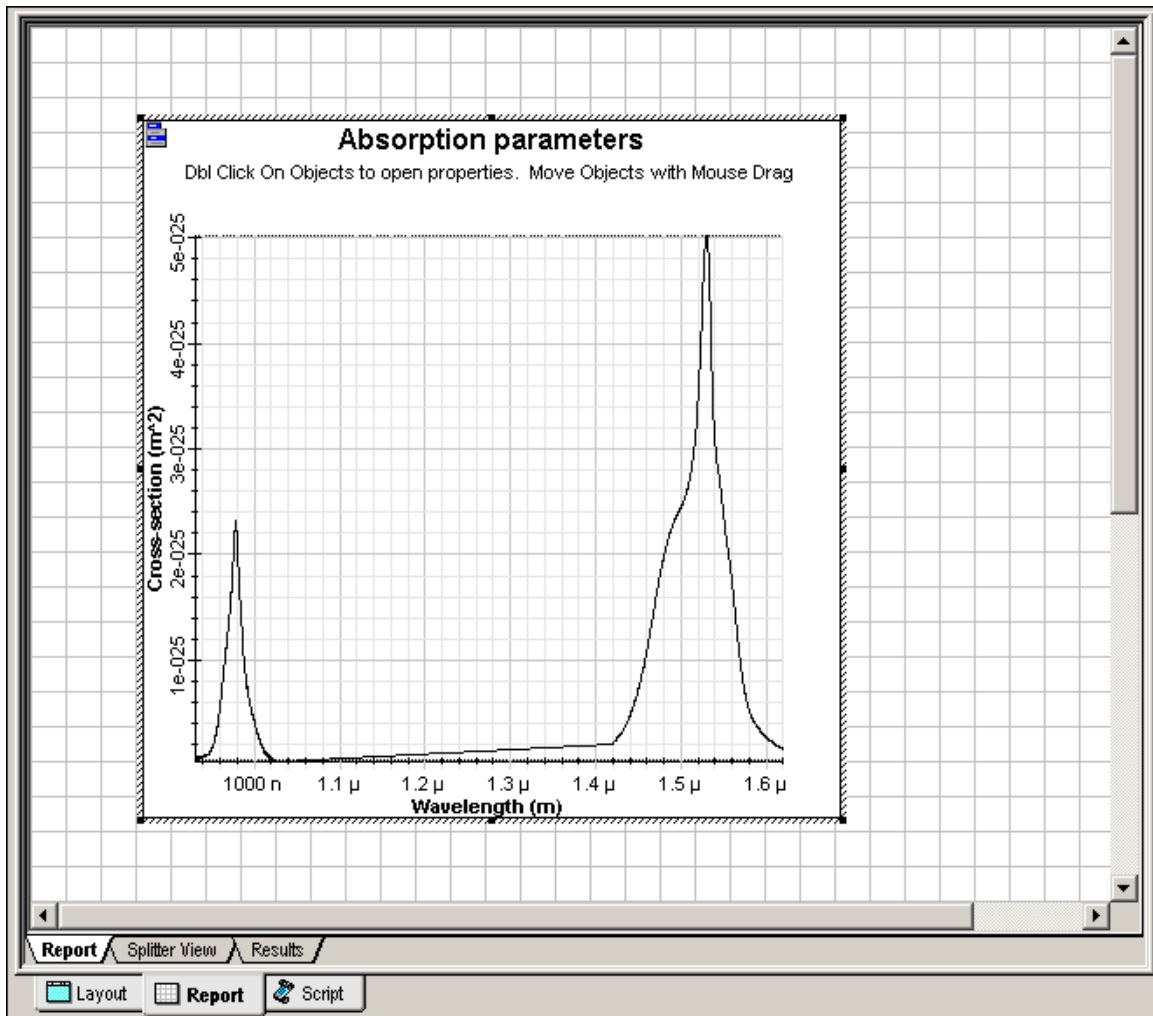
To place graphs in the **Report** view, perform the following procedure.

Step	Action
1	Click the Report tab in the main project layout view.
2	In the Project Browser , expand the Graph item under the component.
3	Select the graph name in the list, then click and drag the graph view into the report layout.

- Click the **Report** tab in the main project layout view.
- In the **Project Browser**, expand the **Graph** item under the component.
- Select the graph name in the list, then click and drag the graph view into the report layout.

The graph view appears in the report window.

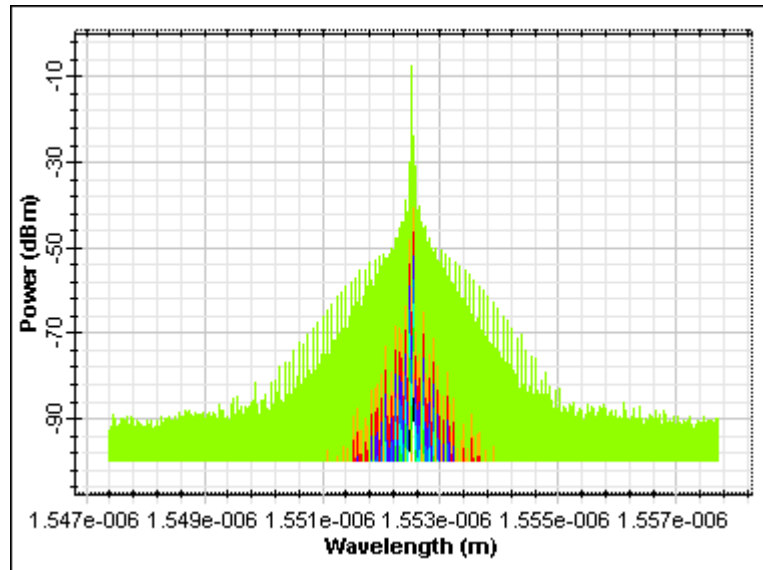
Figure 23 Graph in Report window



Multi-graph views

If you select a component that has more than one sweep iteration, the results are combined into the single graph view. Each view created has a different colour, indicating that the graph view includes several different graphs (see [Figure 24](#)).

Figure 24 Multi-Graph view

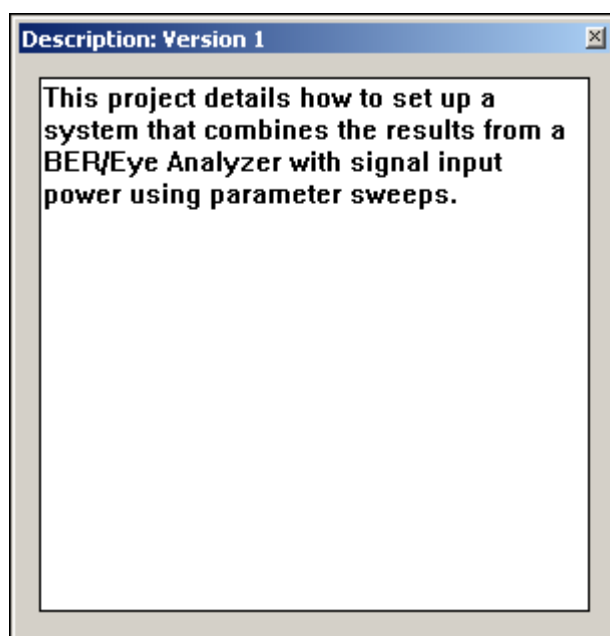


One view will always display as many curves per graph as there are sweep iterations.

Description

The **Description** docker allows you to develop a detailed description of the project and components, including detailed technical information, for others to see when they open the project file and use OptiSystem.

Figure 25 Description docker



DOCKERS

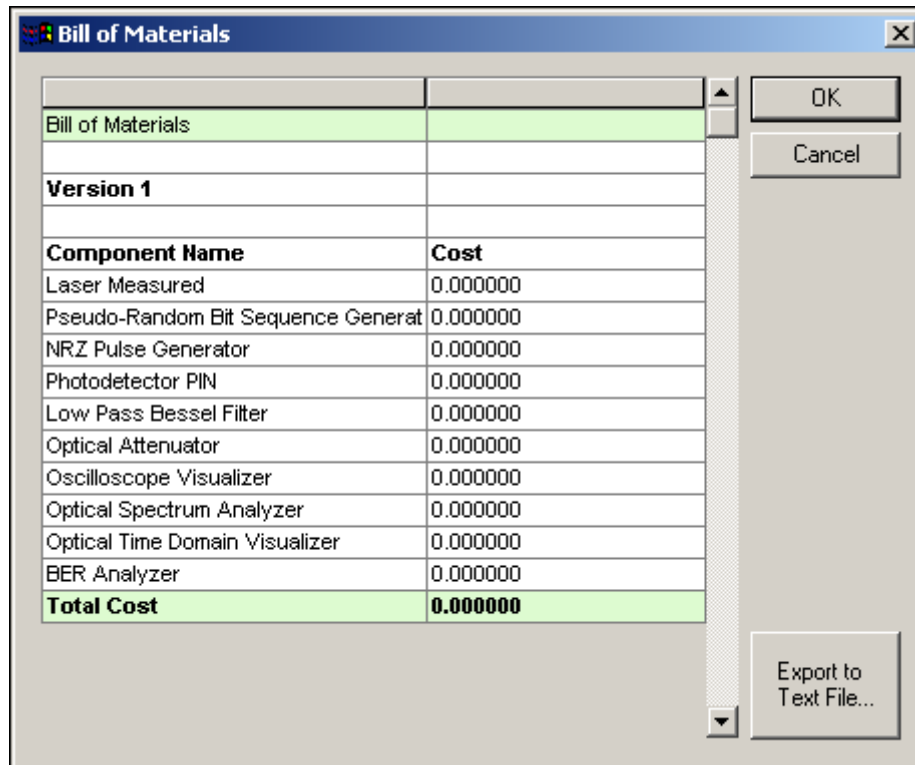
Notes:

Bill of Materials

The **Bill of Materials** dialog box lists all components and layouts in an active project, their associated costs, and the total cost of the project (see [Figure 26](#)).

You can export the **Bill of Materials** to a text file, and use it as a spreadsheet.

Figure 26 Bill of Materials dialog box

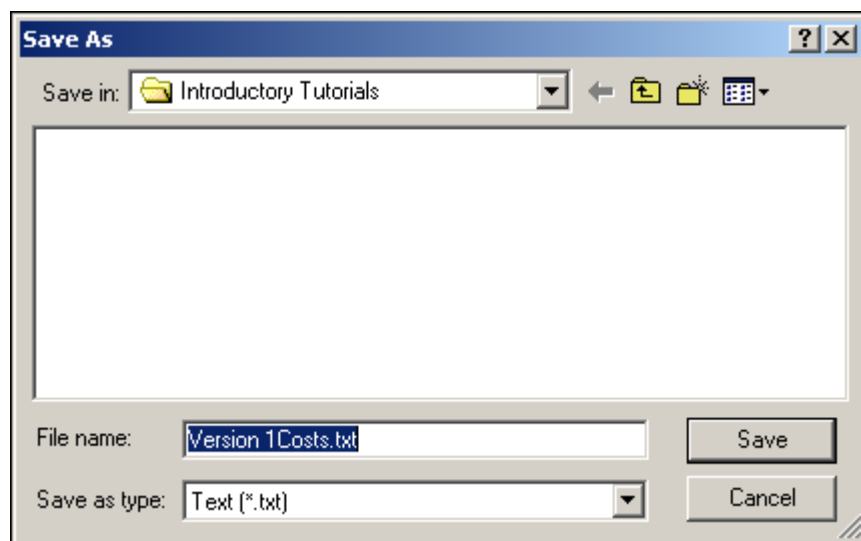


Export to Text File

Opens the **Save As** dialog box and allows you to export the **Bill of Materials** to a text file (see [Figure 27](#)) for external cost spreadsheet creation.



Figure 27 Bill of Materials—Save As dialog box



Report

The **Report** toolbar contains the buttons to perform all typical windows application actions, in addition to report generation options.

Figure 28 Report toolbar

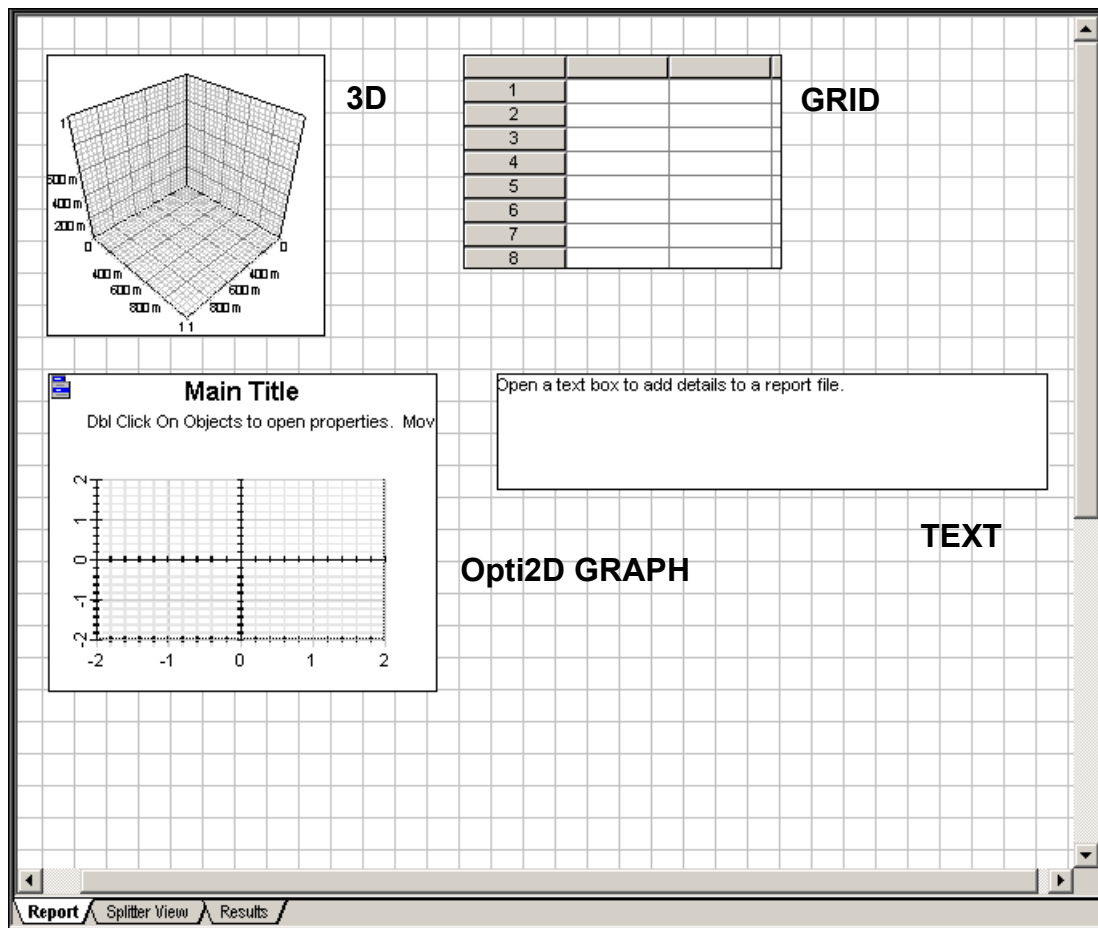


Menu item	Toolbar button	Description
Open Layout (Ctrl L)		Open an existing report layout file. Select the report layout file from the Open dialog box.
Save Layout (Ctrl S)		Save the active (current) report layout under the current name in the default location.
Open Report Layout Template		Open an existing report layout template. Select the report layout template from the Open dialog box.
Save Report Layout Template		Save the active (current) report layout template under the current name in the default location.
Print		Print the active (current) report layout.
Print Preview		See a preview of the active (current) report layout.
Report Properties		Opens the Report properties dialog box.
Cut (Ctrl+X)		Remove all selected objects and place them on the clipboard.
Copy (Ctrl+C)		Copy selected objects to the clipboard. The selected objects remain in the active report layout.
Paste (Ctrl+V)		Copy objects from the clipboard and paste them in a user-defined location—the same report layout or a new report layout.
Delete		Allows you to delete selected objects in the active (current) report layout.
Zoom Percent		Select the zoom percentage: 10, 50, 75, 100, 150, 200, 400, or 800.
Zoom In		Zoom in on the active (current) report layout.
Zoom Out		Zoom out on the active (current) report layout.
Scroll document		Scroll through active (current) report page.



Menu item	Toolbar button	Description
Select		Save a selected component in a separate component library file that can be used in another project/application.
3D Graph		Inserts a 3D graph template in the Report window with data plotted for the selected report item.
Grid		Inserts a grid in the Report window that contains data for the selected report item.
Opti2D Graph		Inserts a 3D graph template in the Report window with data plotted for the selected report item.
Text		Inserts a text box to add details to the active (current) report.

Figure 29 Report options



Report options

To access report options, you use the **Report options** dialog box.

Report options dialog box

To open the **Report options** dialog box, perform the following procedure.

- | Step | Action |
|------|---|
| 1 | Select the Report tab in the Project layout window.
<i>The Report window appears (see Figure 30).</i> |
| 2 | Right-click in the Report window.
<i>The Report options dialog box appears (see Figure 31).</i> |

Figure 30 Report window

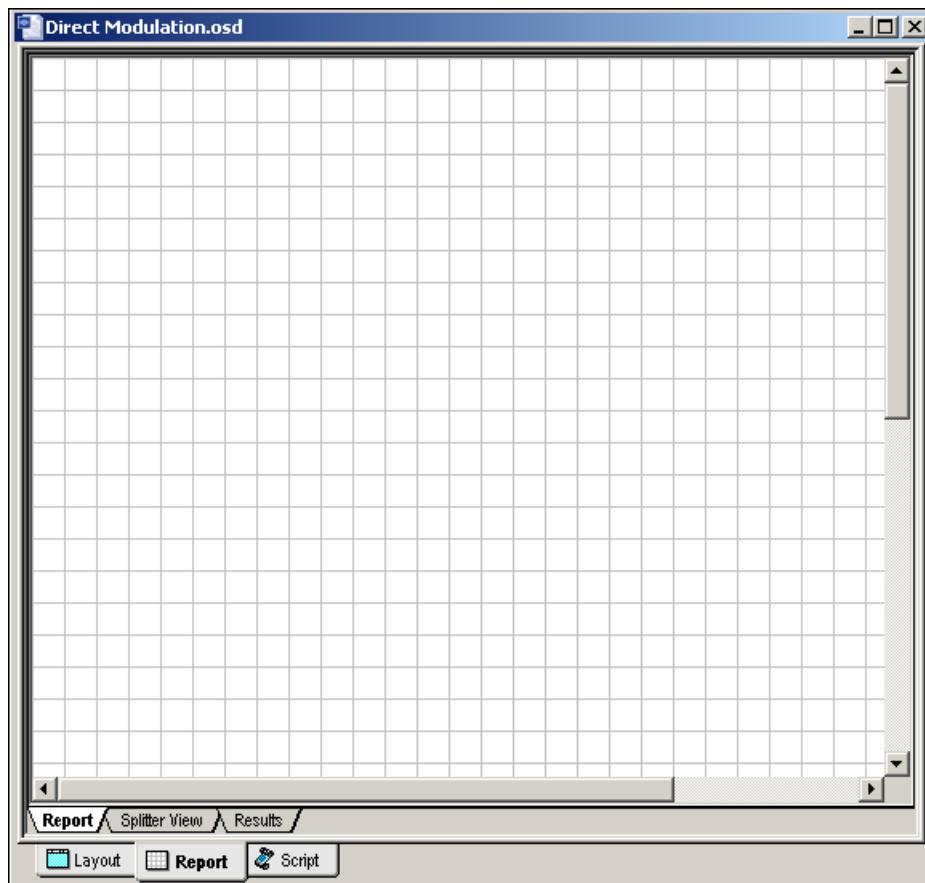
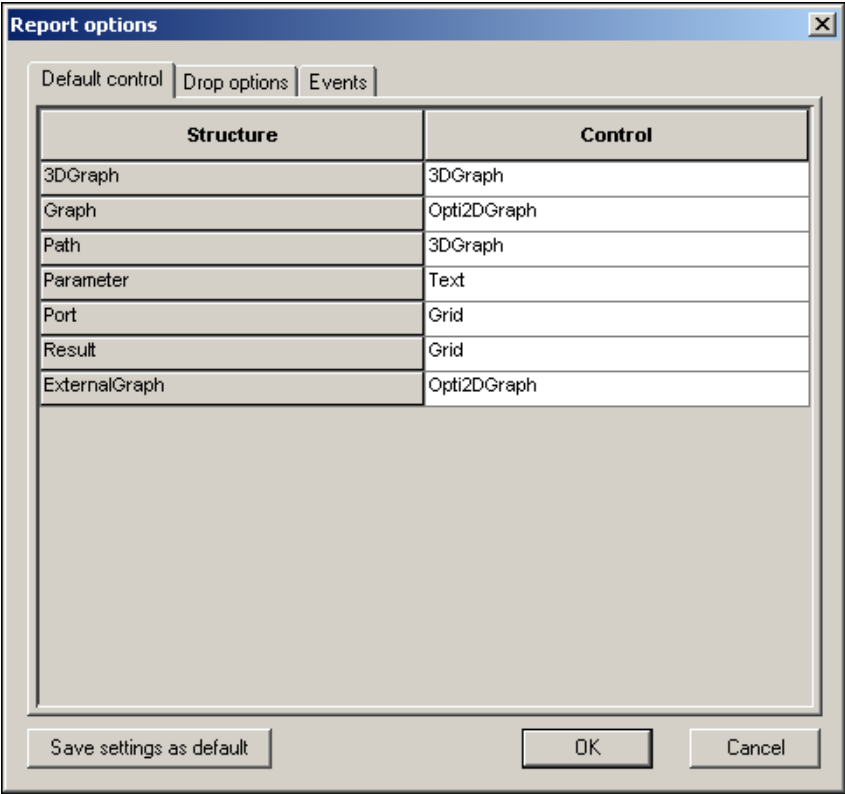


Figure 31 Report options dialog box



Default control tab

The **Structure** list contains all possible types of information that can be incorporated into a report. In the **Control** column, a drop-down menu lists all possible display control options for each structure.

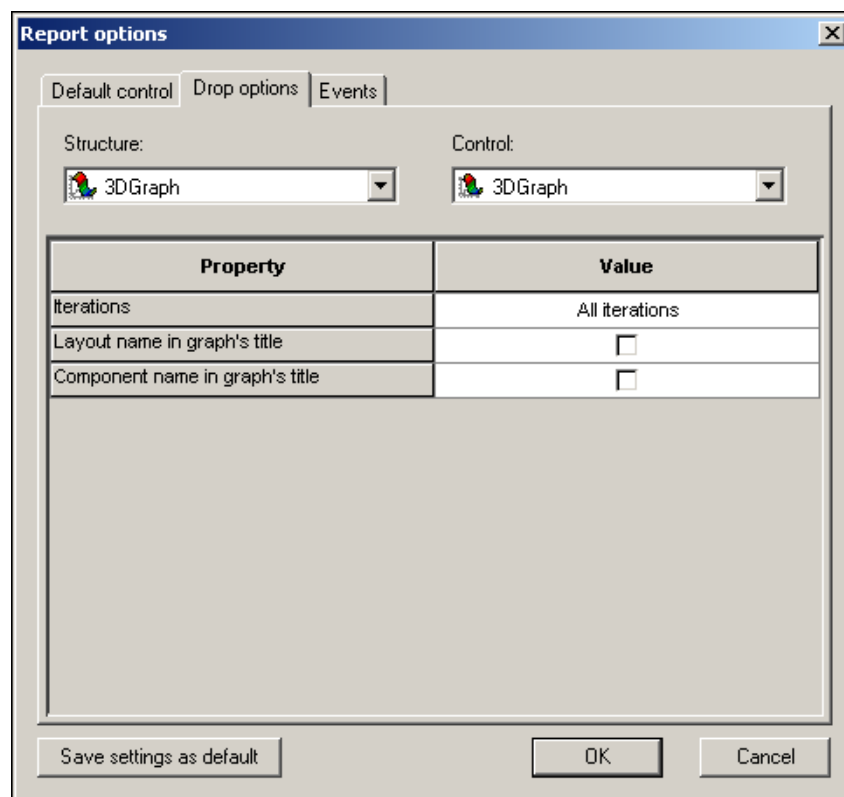
Name of Structure	Control options
3DGraph	3DGraph Grid Text
Graph	3DGraph Grid Opti2DGraph Text
Path	3DGraph Opti2DGraph Text
Parameter	Grid Opti2DGraph Text

Name of Structure	Control options
Port	Grid Opti2DGraph Text
Result	Grid Opti2DGraph Text
ExternalGraph	Opti2DGraph

Drop options tab

The **Structure** list contains all possible types of information that can be incorporated into a report. In the **Control** column, a drop-down menu lists all possible display control options for each structure. The **Property** list view is dependent on the selected **Structure**. The **Value** list view is dependent on the selected **Control**.

Figure 32 Report options—Drop options tab



Structure	Control	Property	Values
3DGraph	3DGraph	Iterations	All iterations, Current iteration, 1
	Grid	Iterations	See above
		X values	Display/Hide
		Y values	Display/Hide
		Z values	Display/Hide
		Layout name in header	Display/Hide
		Component name in header	Display/Hide
	Opti2DGraph	n/a	n/a
	Text	Layout name	Display/Hide
		Component name	Display/Hide
		Graph's name	Display/Hide
		Axis labels	Display/Hide
Graph	3DGraph	Layout name in graph's title	Display/Hide
		Component name in graph's title	Display/Hide
	Grid	Iterations	All iterations/Current iteration, 1
		X coordinate	Display/Hide
		Y coordinate	Display/Hide
		Layout name in header	Display/Hide
	Opti2DGraph	Component name in header	Display/Hide
		Iterations	See above
		Layout name in graph's title	Display/Hide
		Component name in graph's title	Display/Hide
	Text	Layout name	Display/Hide
		Component name	Display/Hide
		Graph's name	Display/Hide
		Axis labels	Display/Hide
Path	3DGraph	Z axis	Power/Noise/OSNR
		Type	Discrete/Distance
		Layout name in graph title	Display/Hide
	Grid	n/a	n/a
	Opti2DGraph	Iterations	All iterations/Current iteration, 1
		Power	Display/Hide
		Noise	Display/Hide
		OSNR	Display/Hide
		Type	Discrete/Distance
		Layout name in graph's title	Display/Hide
	Text	Layout name	Display/Hide
		Path name	Display/Hide



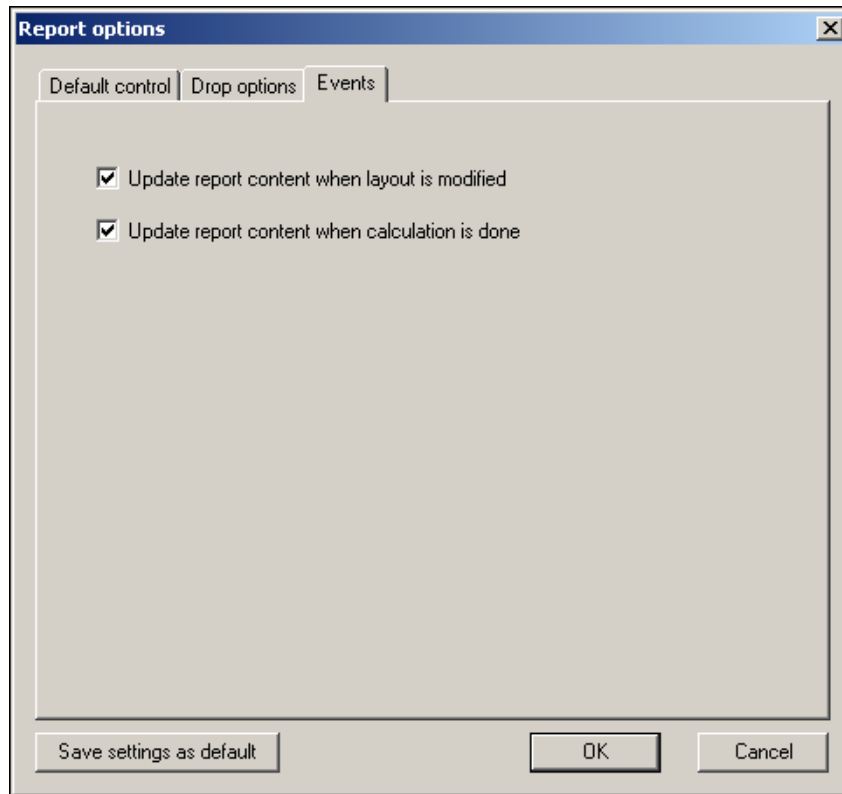
Structure	Control	Property	Values
Parameter	3DGraph Grid	n/a	n/a
		Iterations	All iterations/Current iteration, 1
		Layout name in header	Display/Hide
	Opti2DGraph Text	Component name in header	Display/Hide
		n/a	n/a
		Layout name	Display/Hide
Port	3DGraph Grid	Path name	Display/Hide
		n/a	n/a
		Iterations	All iterations/Current iteration, 1
	Opti2DGraph	Layout name in header	Display/Hide
		Component name in header	Display/Hide
		Power	Display/Hide
		Noise	Display/Hide
		OSNR	Display/Hide
		Layout name in graph's title	Display/Hide
		Component name in graph's title	Display/Hide
	Text	Layout name	Display/Hide
		Component name	Display/Hide
		Port name	Display/Hide
		Lite monitor data	Display/Hide
Result	3DGraph Grid	n/a	n/a
		Iterations	All iterations/Current iteration, 1
		Layout name in header	Display/Hide
	Opti2DGraph Text	Component name in header	Display/Hide
		n/a	n/a
		Layout name	Display/Hide
		Component name	Display/Hide
		Result name	Display/Hide
		Result value	Display/Hide
ExternalGraph	3DGraph Grid	n/a	n/a
		n/a	n/a
	Opti2DGraph	Layout name in graph's title	Display/Hide
		Component name in graph's title	Display/Hide
	Text	n/a	n/a

Save settings as default

Select to use active report settings as the default report view.



Figure 33 Report options—Events tab

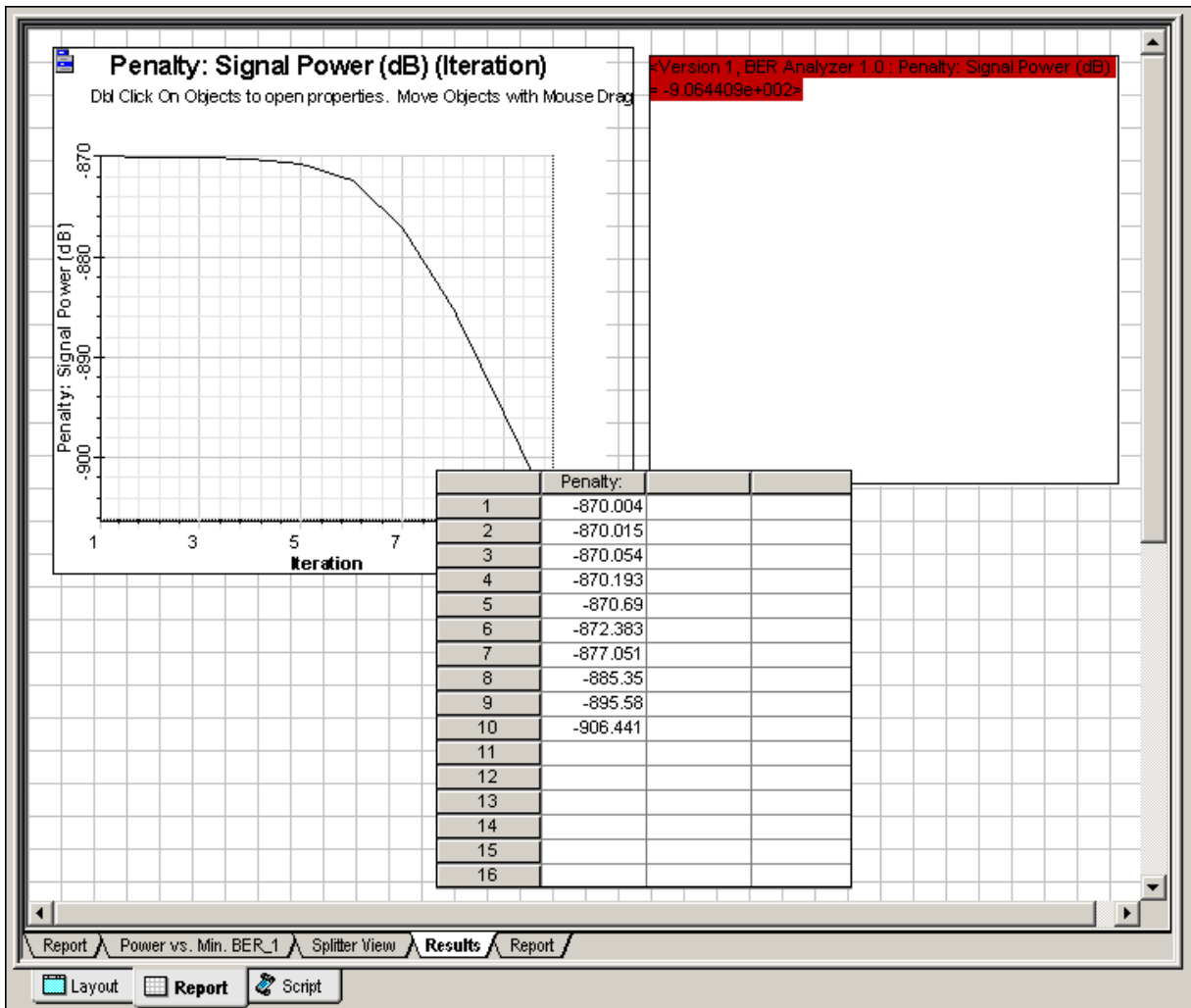
**Update report content when layout is modified**

Select to update the content of the report when modifications are made to the project layout.

Update report content when calculation is done

Select to update the content of the report when project calculations are made.

Figure 34 Report options—Results in three formats



Plotting parameters vs results

When a project includes sweep iterations, you can plot parameters on results graphs.

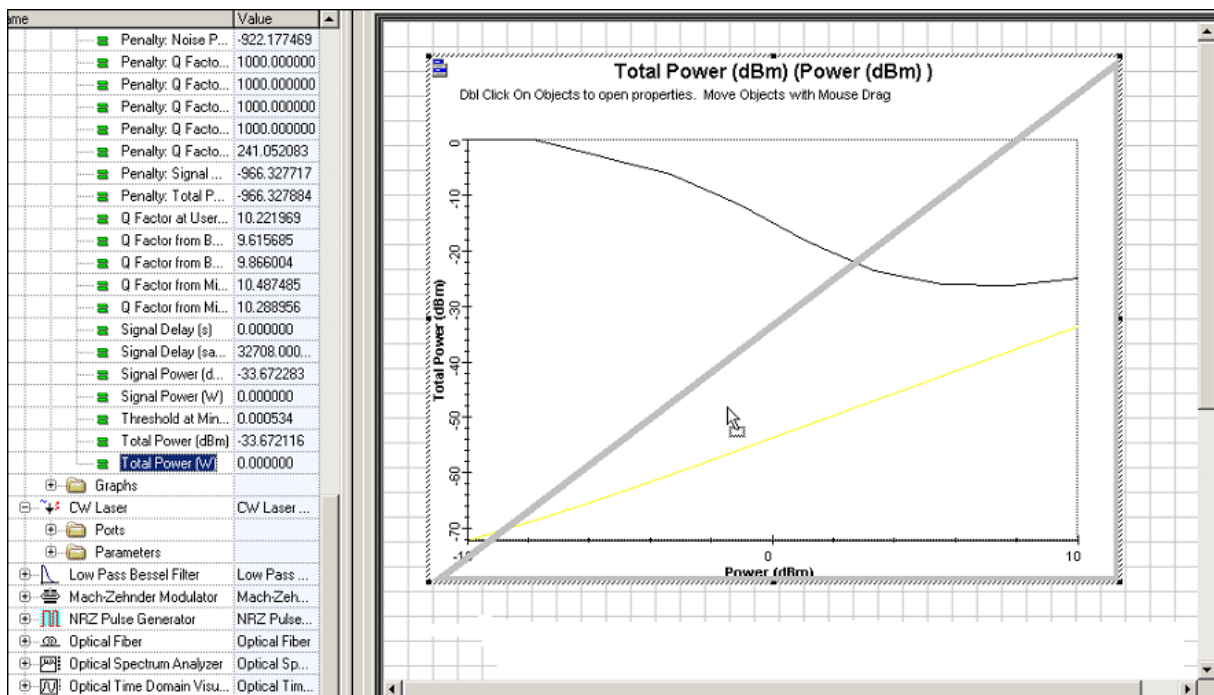
To plot parameters with results, perform the following procedure.

Step Action

- 1 Run the simulation.
- 2 Select the **Report** tab in the **Project layout** window.
*The **Report** window appears*
- 3 Click the **2D Graph** button on the **Report** toolbar.
*The 2D graph appears in the **Report** window.*
- 4 Select the parameter you wish to plot in the **Project Browser**, and drag it to the **Report** window.
*The graph appears in the **Report** window.*
- 5 Select the result you wish to plot in the **Project Browser**, and drag it into the graph.
The result is plotted in the graph (see [Figure 35](#)).

Note: When you drag the result into the graph, a grey triangle appears (see [Figure 35](#)). This indicates the axis that the result is plotted on. You can plot the result on the X-axis or the Y-axis. Move the cursor until the grey triangle is positioned on the axis you want to plot the result on.

Figure 35 Parameter plotted with Results



Script

The script function allows you to view or change global, layout, and component parameter values of the current project.

Note: In order to **Run** a script, you must **Generate** the script first.

Generating scripts

To generate the script, perform one of the following actions in the current project.

Step Action

- 1 Select **Script > Generate** on the **Menu** bar.
A warning dialog appears (see [Figure 36](#)).
- 2 Click **OK**.
*The **Script** window appears in the **Project layout** window (**Script** tab is selected) with the generated script (see [Figure 37](#)).*

OR

Step Action

- 1 Click the **Generate Script** button on the **Script** toolbar.
A warning dialog appears (see [Figure 36](#)).
- 2 Click **OK**.
*The **Script** window appears in the **Project layout** window (**Script** tab is selected) with the generated script (see [Figure 37](#)).*

Figure 36 Generate Script warning dialog box

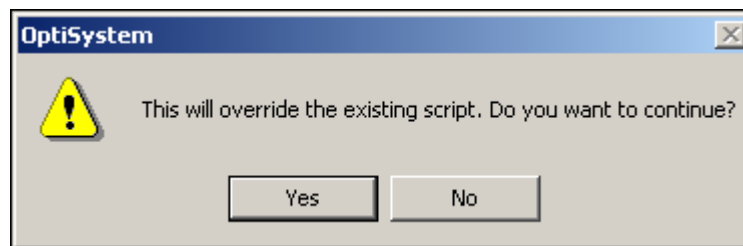
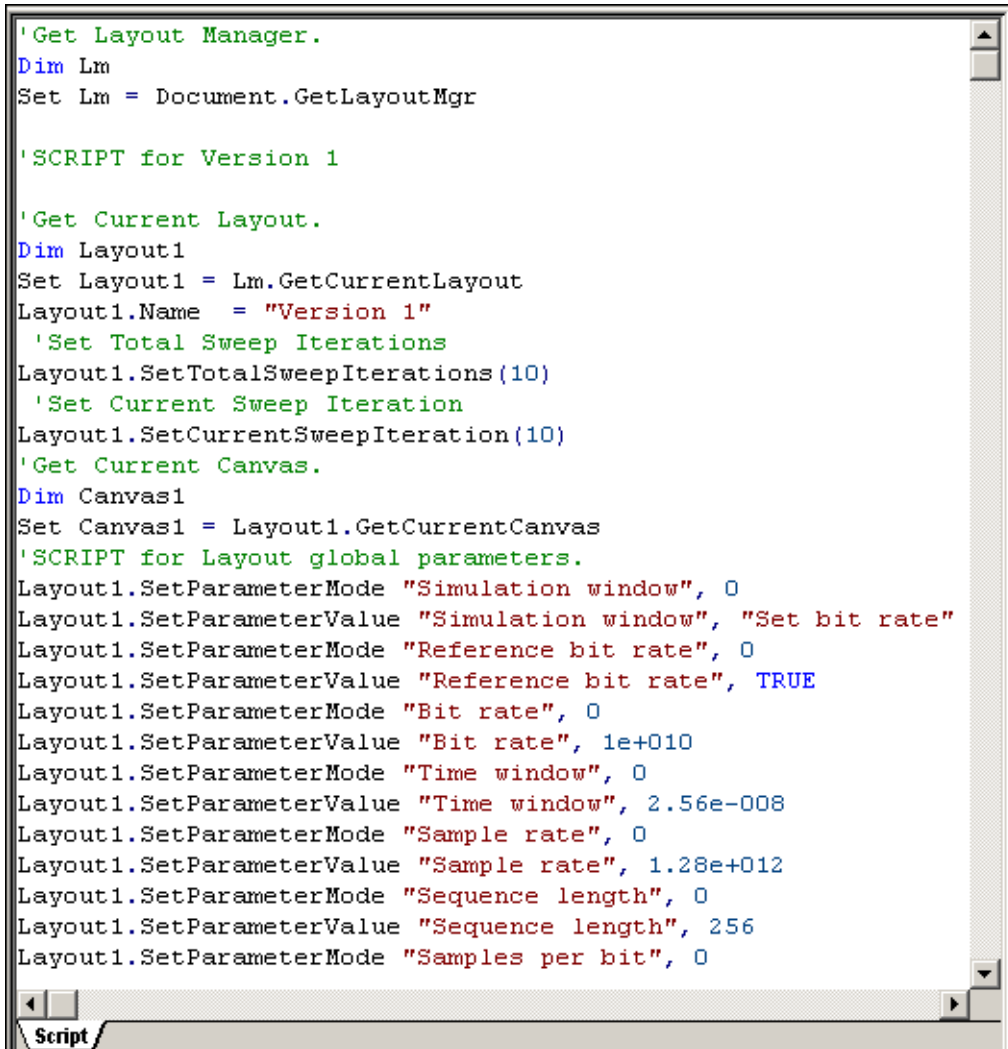


Figure 37 Script window



```

'Get Layout Manager.
Dim Lm
Set Lm = Document.GetLayoutMgr

'SCRIPT for Version 1

'Get Current Layout.
Dim Layout1
Set Layout1 = Lm.GetCurrentLayout
Layout1.Name = "Version 1"
'Set Total Sweep Iterations
Layout1.SetTotalSweepIterations(10)
'Set Current Sweep Iteration
Layout1.SetCurrentSweepIteration(10)
'Get Current Canvas.
Dim Canvas1
Set Canvas1 = Layout1.GetCurrentCanvas
'SCRIPT for Layout global parameters.
Layout1.SetParameterMode "Simulation window", 0
Layout1.SetParameterValue "Simulation window", "Set bit rate"
Layout1.SetParameterMode "Reference bit rate", 0
Layout1.SetParameterValue "Reference bit rate", TRUE
Layout1.SetParameterMode "Bit rate", 0
Layout1.SetParameterValue "Bit rate", 1e+010
Layout1.SetParameterMode "Time window", 0
Layout1.SetParameterValue "Time window", 2.56e-008
Layout1.SetParameterMode "Sample rate", 0
Layout1.SetParameterValue "Sample rate", 1.28e+012
Layout1.SetParameterMode "Sequence length", 0
Layout1.SetParameterValue "Sequence length", 256
Layout1.SetParameterMode "Samples per bit", 0

```

After the script is generated, you have several choices:

Run: run the generated script

Save: save the generated script in a text file for future use

Load: load a script text file from an external source

Script tab

Use the **Script** tab in the **Project layout** window to view or change a script.

To view or change a script, perform the following procedure.

- | | |
|-------------|---|
| Step | Action |
| 1 | Select the Script tab in the Project layout window.
<i>The Script window appears.</i> |
| 2 | Right-click in the Script window.
<i>A context menu appears (see Figure 38).</i> |

Figure 38 Script tab context menu

Undo	Ctrl+Z
Cut	Ctrl+X
Copy	Ctrl+C
Paste	Ctrl+V
Delete	Del
Select All	
Load...	
Save As...	

Undo

Reverses an action taken in the **Script** window (cut, paste, delete).

Cut

Cuts selected script in the **Script** window.

Copy

Copies selected script in the **Script** window.

Paste

Pastes text into **Script** window from **Clipboard**.

Delete

Deletes selected script in the **Script** window.

Select All

Selects all text in the **Script** window.

Load

Opens the **Open** dialog box to load a **.txt** file into the **Script** window.

Save As

Opens the SaveAs dialog box to save the script in the Script window as a **.txt** file.



SCRIPT

Notes:



Data Monitor

In OptiSystem, the data that passes through the ports are arrays with very large amounts of data. It would be impractical for a program to store data for every port, because of the excessive memory requirements.

Instead, OptiSystem incorporates a flexible way of viewing data in which you select the ports you want to view calculated data for, connect visualizers to the ports, and view the calculation results using a monitor. A monitor is a module placed on the port of a component that records the data that passes through a port during calculations.

The OptiSystem **Signal Tracer** stores signal data after projects are calculated. You can view the calculated port signal data of the project temporarily, or as a global parameter on the project layout.

The **Signal Tracer** can be enabled and disabled using the global parameter dialog box. When the **Signal Tracer** is disabled, signal data calculation results are not stored.

Displaying signal data on the layout

To display the calculation results on the layout, perform one of the following procedures.

Step Action

- 1 Select **View > Display Properties > View Signal Data**.
- 2 Calculate the project.
The port signal data appears on the layout when the calculations are complete (see [Figure 39](#)).

OR

Step Action

- 1 On the **Layout Operations** toolbar, select the **View Port Signal Data** tool.
*The **View Port Signal Data** tool is enabled.*
- 2 Calculate the project.
The port signal data appears on the layout when the calculations are complete (see [Figure 39](#)).

Disabling signal data on the layout

To disable the signal data on the layout, perform one of the following procedures.

Step Action

- 1 On the **Layout Operations** toolbar, disable the **View Port Signal Data** tool.
- 2 Calculate the project.
The port signal data does not display on the layout.



OR

Step Action

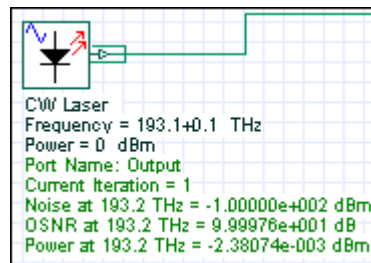
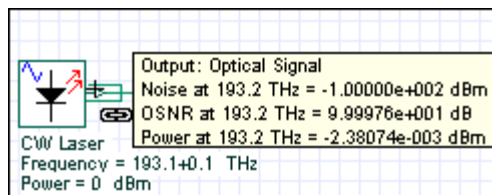
- 1 Select **View > Display Properties**.
- 2 Click on **View Signal Data** if it is selected.
- 3 Calculate the project.
The port signal data does not display on the layout.

Viewing signal port data when not displayed in the layout

To view signal port data when it is not displayed in the layout, perform the following procedure.

Step Action

- 1 Calculate the project.
- 2 Move the cursor over an output port.
The list of signal port data appears temporarily until you move the cursor away from the port (see [Figure 40](#)).

Figure 39 Port signal data layout display with View Port Signal Data enabled**Figure 40 Port signal data layout display with View Port Signal Data disabled****Selecting port information for display**

To select the signal port data for display in the project layout, perform the following procedure.

Step Action

- 1 Double-click on the port in the active (current) project layout.
*The **Port Properties** dialog box appears.*
- 2 Select the **Signal Data** tab (see [Figure 41](#)).



- 3 Select the **Disp** check box for each port parameter to display.
- 4 Click **OK**.
The selected port parameters will display in the project layout (see Figure 42).

Figure 41 Port Property dialog box—Signal Data tab

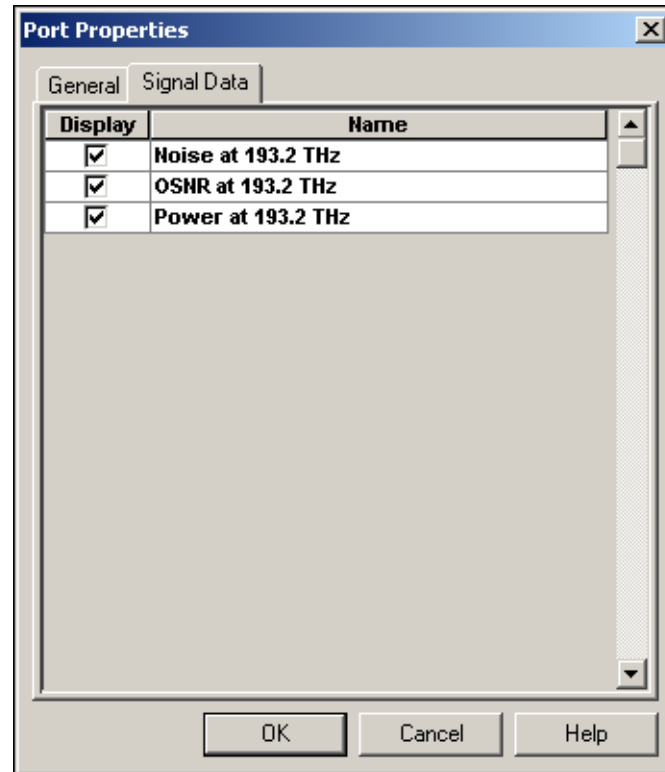
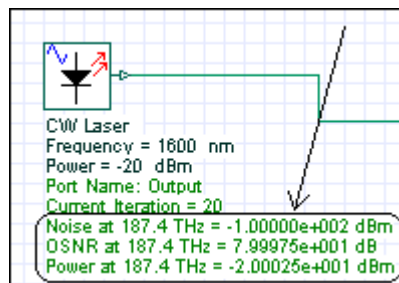


Figure 42 Port properties displayed in project layout

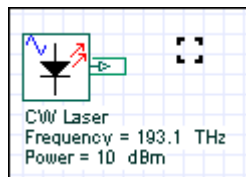


Adding a monitor to a port

To add a monitor to a port, perform the following procedure.

Step	Action
1	Select the Monitor tool on the Layout Tools toolbar. <i>The cursor changes to a square. If the square is placed directly over the port, the frame changes from a solid black square to an empty white square. This indicates that the monitor tool is ready.</i>
2	Click on the port. <i>The monitor is created over the port (see Figure 43).</i>

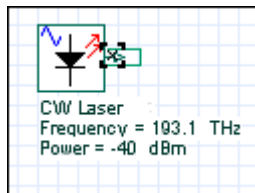
Figure 43 Port with monitor



To indicate that there is a monitor in the port, a small box appears around the port.

If you move the monitor tool over ports that already have a monitor, the cursor will change to a box with an X inside (see [Figure 44](#)).

Figure 44 Port with monitor — cursor change



Removing a monitor from a port

Action

- Click on the port that has a monitor.
The monitor is removed from the port.

Enabling the Signal Tracer

To enable the **Signal Tracer**, perform the following procedure.

- | Step | Action |
|------|---|
| 1 | Double-click in the Main layout .
<i>The parameter dialog box for the layout appears.</i> |
| 2 | Click the Signal tracing tab (see Figure 45). |
| 3 | Select the Calculate signal tracing check box. |

Disabling the Signal Tracer

To disable the **Signal Tracer**, perform the following procedure.

- | Step | Action |
|------|---|
| 1 | Double-click in the Main layout .
<i>The parameter dialog box for the layout appears (see Figure 45).</i> |
| 2 | Click the Signal tracing tab. |
| 3 | Clear the Calculate signal tracing check box. |

Figure 45 Calculate signal tracing parameter

The screenshot shows the 'Amplifier Noise Parameters' dialog box with the 'Signal tracing' tab selected. The 'Label' field contains 'Amplifier Noise'. The 'Signal tracing' tab is active, showing a table of parameters. The 'Calculate signal tracing' checkbox is checked. Other parameters include Power unit (dBm), Frequency unit (THz), Decimal places (4), Sensitivity (-100 dBm), Resolution (0.1 nm), Calculate noise floor (unchecked), and Interpolation offset (0.5 nm). Buttons for OK, Cancel, Add Param..., Remove Par, and Edit Param... are visible on the right.

Name	Value	Units	Mode
Calculate signal tracing	☒		Normal
Power unit	dBm		Normal
Frequency unit	THz		Normal
Decimal places	4		Normal
Sensitivity	-100	dBm	Normal
Resolution	0.1	nm	Normal
Calculate noise floor	☐		Normal
Interpolation offset	0.5	nm	Normal



Notes:



Path Tool

OptiSystem allows you to trace paths within your project. You can access the **Path Tool** using the main toolbar, or through the **Trace Paths** tool.

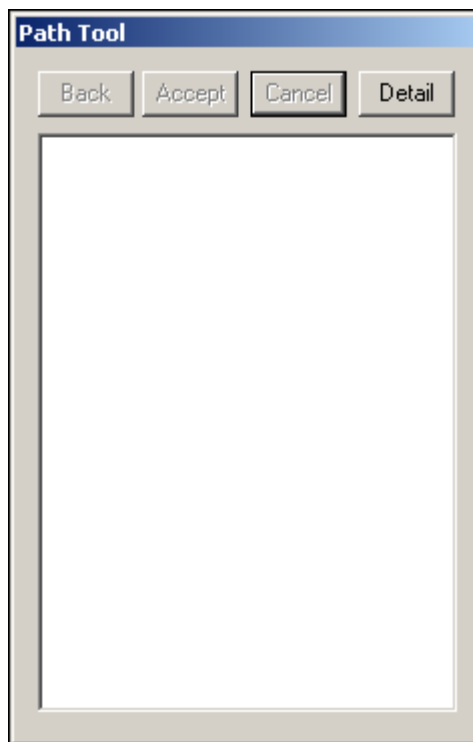
Using the Path Tool

To use the **Path Tool**, perform the following procedure.

Step Action

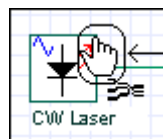
- 1 On the **Tools** toolbar, select the **Draw Path** tool.
*The **Path Tool** dialog box appears (see [Figure 46](#)).*

Figure 46 Path Tool dialog



- 2 Move the cursor to the start component in your path on the layout.
The cursor changes to a hand (see [Figure 47](#)).

Figure 47 Path Manager selection cursor



- 3 Click on the component to select it.



- 4 Move the cursor to the next component in the path.
- 5 Click on the component to select it.
The path between the two selected components is highlighted (see [Figure 48](#)).

Note: If you select the **Detail** button in the **Path Tool** dialog, each selected component in the path is listed (see [Figure 49](#)).

- 6 If you wish to add another component to the path, move the cursor to the component in the path.
- 7 Click on the component to select it.

Figure 48 Selected path between components

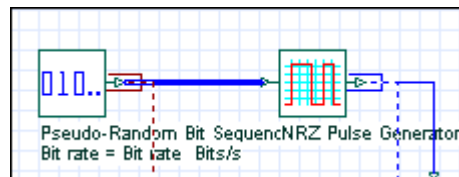
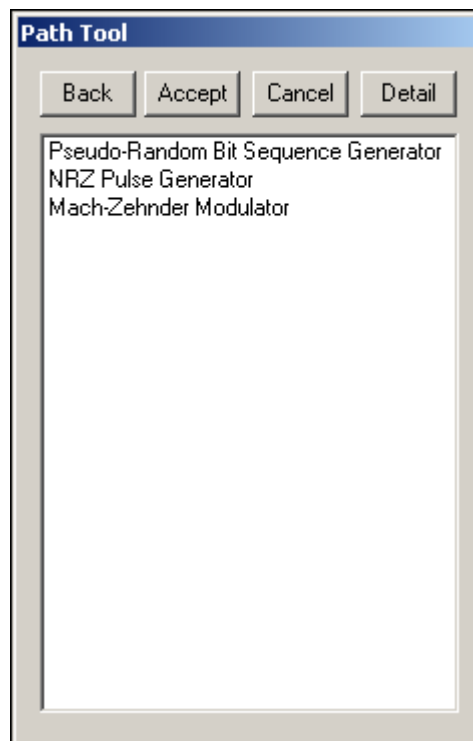
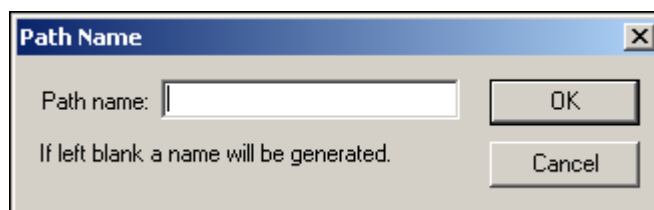


Figure 49 Path Tool dialog



- 8 When you have selected all components in the path, click **Accept** in the **Path Tool** dialog box (see [Figure 49](#)).
*The **Path Name** dialog box appears (see [Figure 50](#)).*

Figure 50 Path Name dialog



- 9 Enter the name of the path in the **Path Name** dialog and click **OK**.
 The **Path Tool** dialog box closes. The path is listed in the **Project Browser** (see [Figure 51](#)).

Note: If you click **OK** without entering a path name, the system creates a default name, for example, **Path 1**.

Note: If there are multiple paths that follow the same route, one of the paths increases in thickness, to allow you to see that there is more than one path through the components (see [Figure 52](#)).

Figure 51 Project Browser with listed Path

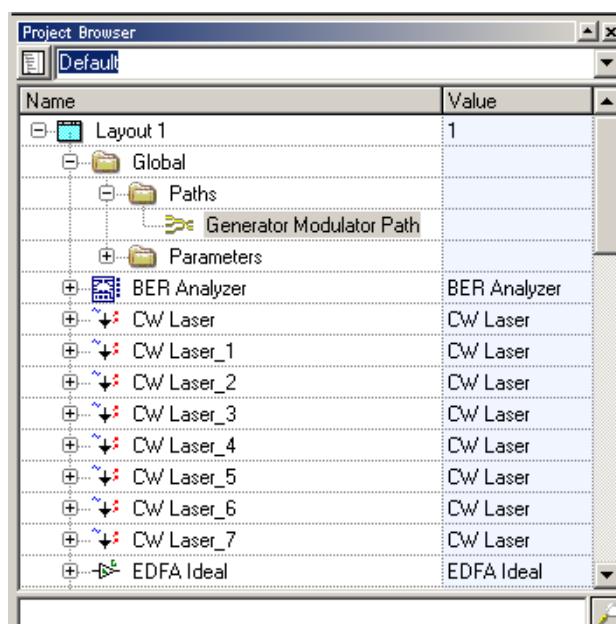
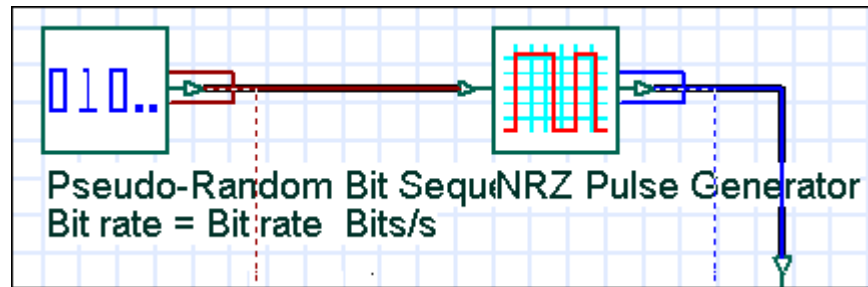


Figure 52 Thick paths connecting components



Trace Paths tool

You use the **Trace Paths** tool to trace signals through paths to see how their values change over the path.

Note: The path must have been created using the **Path Tool**.

You can view two different types of path information:

- **Distance:** displays information about the signals over distances in the path.
- **Discrete:** displays information about the signals between ports.

Tracing a path

In order to have signal values to trace, the layout has to be calculated. To trace a path, perform the following procedure.

Step	Action
1	Select the path in the Project Browser .
2	Right-click on the path and select Preview . <i>The Trace Docker dialog box appears.</i>
3	Select Distance or Discrete . <i>The Trace Display axes values change according to the choice.</i>
4	Select the check box of the signal values you want to display in the Trace Display . <i>Each selected signal value displays in the Trace Display. For Distance Trace Display, see Figure 53, and for Discrete Trace Display, see Figure 54. The color of the display corresponds to the color of the path.</i>

Note: In order to display more than one path in the **Trace Docker** window, press and hold **Ctrl** and select the paths in the **Project Browser** that you want to display (the path names are highlighted). To place the selected paths in the window, right-click and select **Preview**.



Figure 53 Trace Docker — Distance

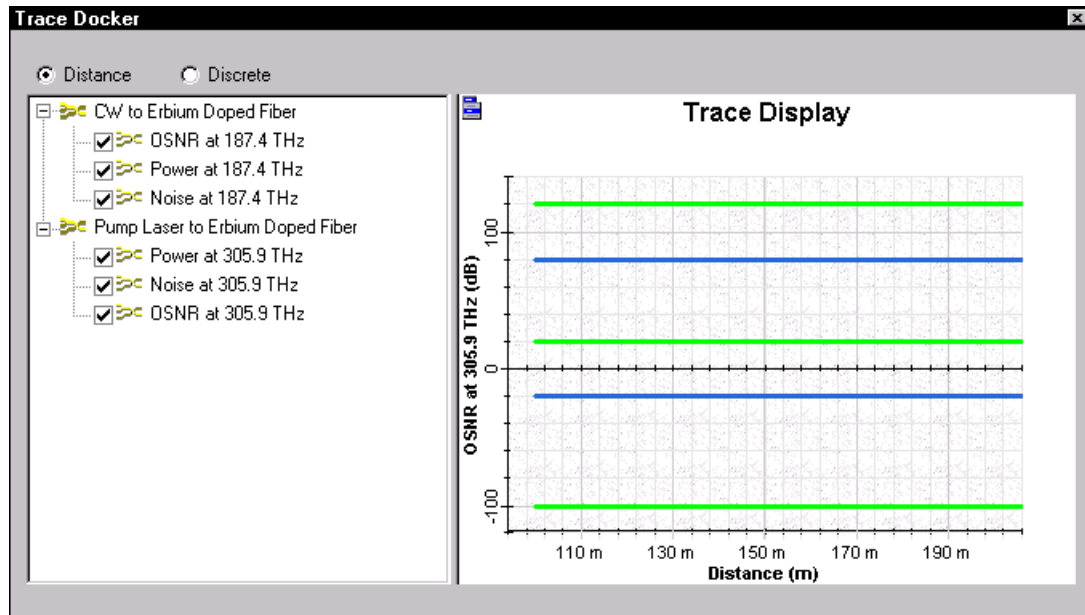
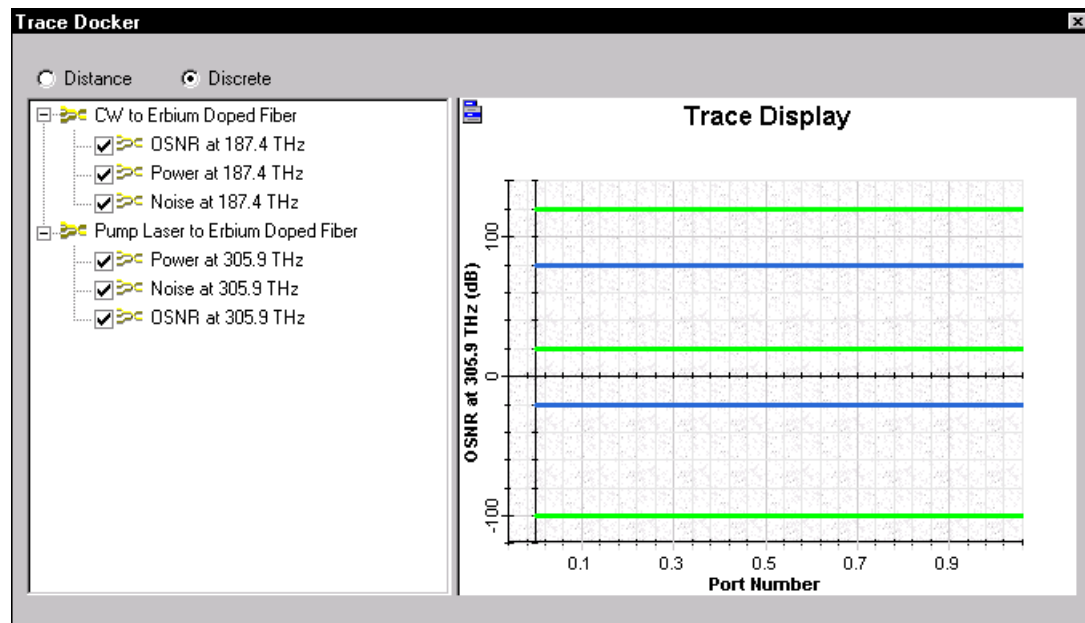


Figure 54 Trace Docker — Discrete



Parameter Sweeps

When a parameter is in sweep mode, the value of the parameter changes through sweep iterations. You can select the parameter sweep version for display in the project layout.

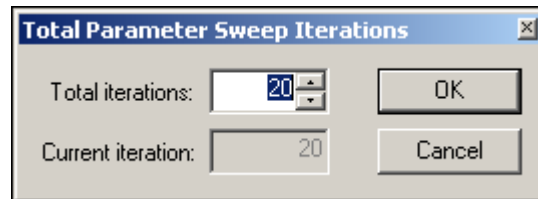
In order to change a parameter value across sweep iterations, you need to define the number of sweep iterations, and define the parameter value.

Setting/Changing the Total Parameter Sweep Iterations

To set the total number of sweep iterations, perform the following procedure:

- | Step | Action |
|------|--|
| 1 | Click the Set Total Sweep Iterations button on the Layout toolbar.
<i>The Total Parameter Sweep Iterations dialog appears displaying the current values (see Figure 55).</i> |
| 2 | Enter the total number of sweep iterations. |
| 3 | Click OK . |

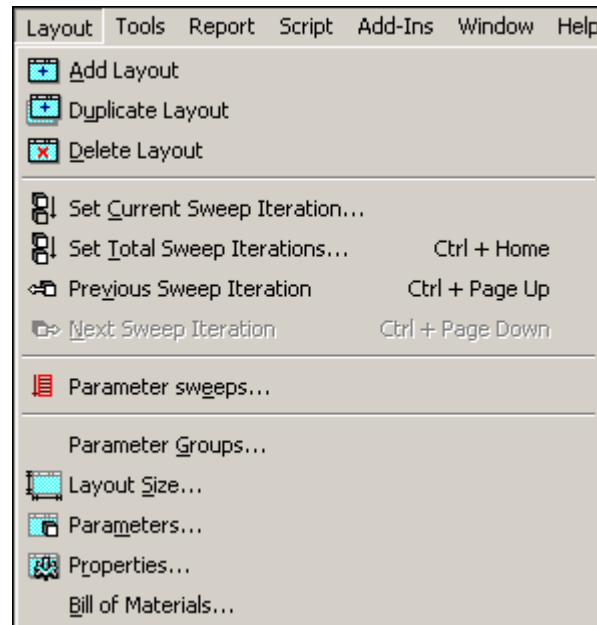
Figure 55 Total Parameter Iterations dialog



Or

- | Step | Action |
|------|---|
| 1 | Select Layout > Set Total Sweeps Iteration on the Menu toolbar (see Figure 56).
<i>The Total Parameter Sweep Iterations dialog appears displaying the current values (See Figure 55).</i> |
| 2 | Enter the total number of sweep iterations. |
| 3 | Click OK . |



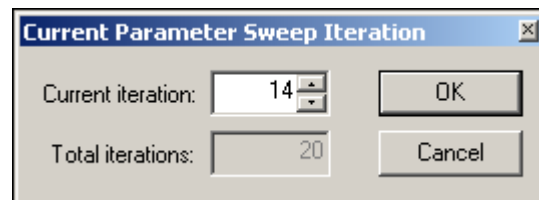
Figure 56 Layout access - Set Total Sweep Iterations

Setting the current sweep iteration

To change the sweep iteration displayed in the layout (after calculations), perform the following procedure.

Step Action

- 1 Select **Layout > Set Current Sweep Iteration** on the **Menu** toolbar.
*The **Set Current Sweep Iteration** dialog box appears (see [Figure 57](#)).*
- 2 Enter the number of the sweep iteration you want to display in the layout.
- 3 Click **OK**.
The displayed parameter values change to reflect the selected parameter sweep iteration.

Figure 57 Current Parameter Sweep Iteration dialog box

Or

Action

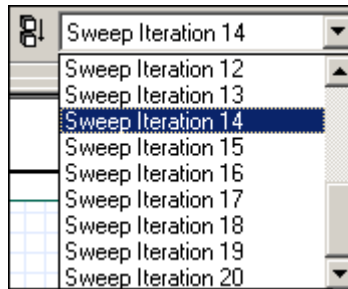
- Use the **Previous Sweep Iteration** or **Next Sweep Iteration** buttons on the **Layout** toolbar.

Or

Action

- Select the sweep iteration from the **Set Current Iteration** drop-down box (see [Figure 58](#)).

Figure 58 Set Current Iteration drop-down box



Changing the Parameter values

After you select the number of parameter sweep iterations, you can enter the parameter values to sweep. The parameter must be changed to **Sweep** mode.

Selecting the Sweep mode

To select the **Sweep** mode for a component parameter, perform the following procedure.

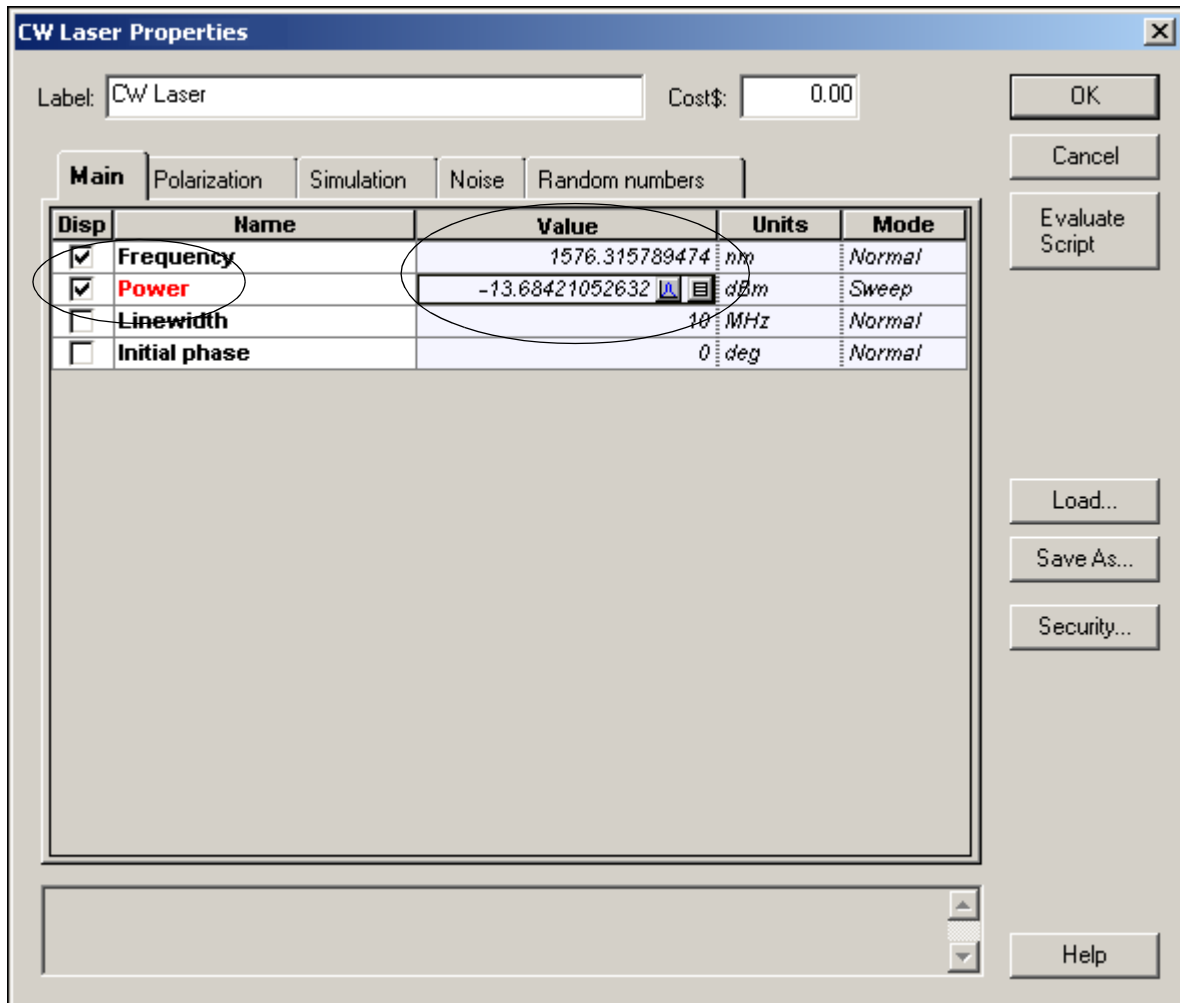
Note: In the following procedures, we use the **CW Laser** component as an example.

Step	Action
1	Select Layout > Parameter Sweeps on the Menu toolbar. <i>The component parameter dialog box appears (see Figure 60).</i>
2	In the Mode column, select the Sweep mode (see Figure 59). <i>The color of the parameter becomes RED. This indicates that the parameter is in sweep mode.</i> <i>The Parameter 2D graph and the Parameter Sweeps dialog buttons appear in the Value column of the parameter in sweep mode (see Figure 60).</i>

Figure 59 Sweep mode



Figure 60 Component properties — Parameter Sweep mode



- 3 Click on the **Parameter Sweep** button in the **Value** column of **Power**.
The **Parameter Sweeps** dialog box appears (see [Figure 61](#)).

Figure 61 Component Parameter Sweep Values

CW Laser	
Sweeps	Power [dBm]
1	0
2	-1.052631578947
3	-2.105263157895
4	-3.157894736842
5	-4.210526315789
6	-5.263157894737
7	-6.315789473684
8	-7.368421052632
9	-8.421052631579
10	-9.473684210526
11	-10.52631578947
12	-11.57894736842
13	-12.63157894737
14	-13.68421052632
15	-14.73684210526
16	-15.78947368421
17	-16.84210526316
18	-17.89473684211
19	-18.94736842105
20	-20

The twenty values in the **Power (dBm)** column represent the power parameters of the **CW Laser** across the twenty sweep iterations.

Editing the parameter sweep iteration values

To edit the parameter sweep iteration values, perform the following procedure.

Step Action

- 1** Select **Layout > Parameter Sweeps** on the **Menu** toolbar.
The component parameter dialog box appears.
- 2** Click on the **Parameter Sweep** button in the **Value** column of the parameter.
*The **Parameter Sweeps** dialog box appears.*
- 3** Enter data into each field manually, or use the **Spread Tools** to calculate the values.

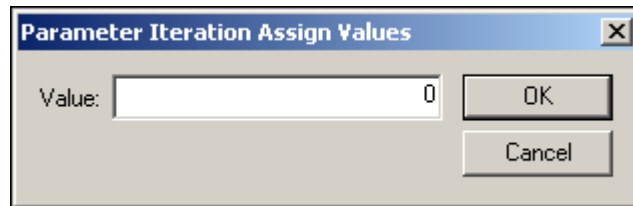


Assigning sweep iteration values

To assign parameter sweep iteration values, perform the following procedure.

- | Step | Action |
|------|---|
| 1 | Select Layout > Parameter Sweeps .
<i>The Parameter Sweeps dialog appears.</i> |
| 2 | Click in the Power value cell (see). |
| 3 | Click Assign Values .
<i>The Parameter Iteration Assign Values dialog box appears (see Figure 62).</i> |
| 4 | Type the number in Value and click OK .
<i>The Parameter Iteration Assign Values dialog box closes and the assigned value appears in the Power column.</i> |

Figure 62 Parameter Iteration Assign Values dialog box

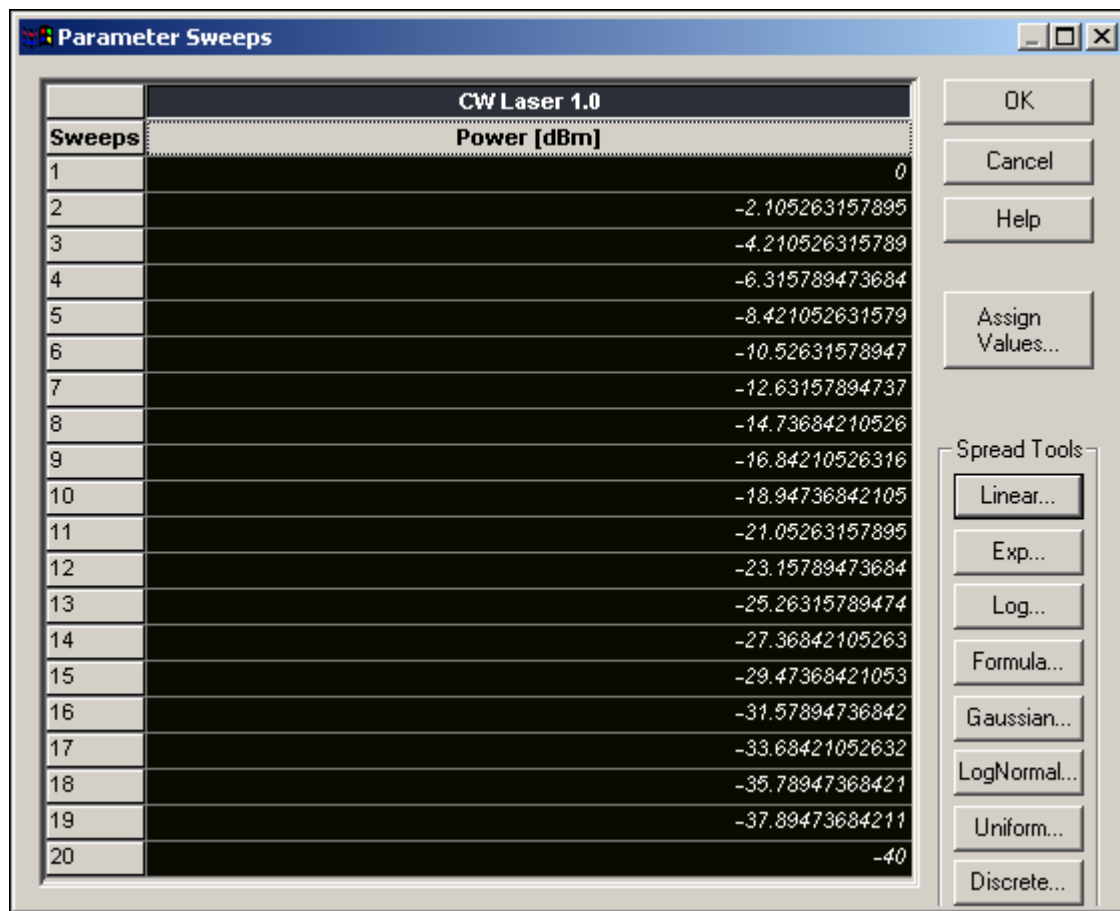


Generating sweep iteration values

To generate sweep iteration values, perform the following procedure.

- | Step | Action |
|------|--|
| 1 | Select the Power column (highlights all twenty parameter sweeps). |
| 2 | Click the Linear button in the Spread Tools window.
<i>The Parameter Iteration Spread dialog box appears.</i> |
| 3 | Enter 0 in Start Value and -40 in End Value . |
| 4 | Click OK .
<i>The values in the Power column change to reflect the Linear sweep values you entered (see Figure 63).</i> |

Figure 63 Parameter Sweeps— Generating Linear values



Note: More than one parameter can be set to perform sweep iterations.

Spread tools

There are several methods available to generate sweep iteration values.

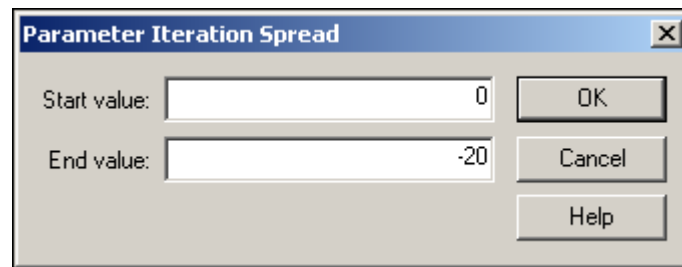
Table 5 Spread Tools

Tool Name	Description
Linear	Generates a linear spread of values based on the start and end values entered in the Parameter Iteration Spread dialog box.
Exp	Generates an exponential spread of values based on the start and end values entered in the Parameter Iteration Spread dialog box.
Log	Generates a logarithmic spread of values based on the start and end values entered in the Parameter Iteration Spread dialog box.
Formula	Generates a spread of values based on the values and script entered in the Parameter Sweep Script Editor dialog box.



Tool Name	Description
Gaussian	Generates a Gaussian spread of values based on the values entered in the Gaussian sweep iteration dialog box.
LogNormal	Generates a logarithmic spread of values based on the values entered in the LogNormal sweep iteration dialog box.
Uniform	Generates a uniform spread of values based on the values entered in the Uniform sweep iteration dialog box.
Discrete	Generates a spread of values based on the values entered in the Discrete sweep iteration dialog box.

Figure 64 Parameter Iteration Spread dialog box

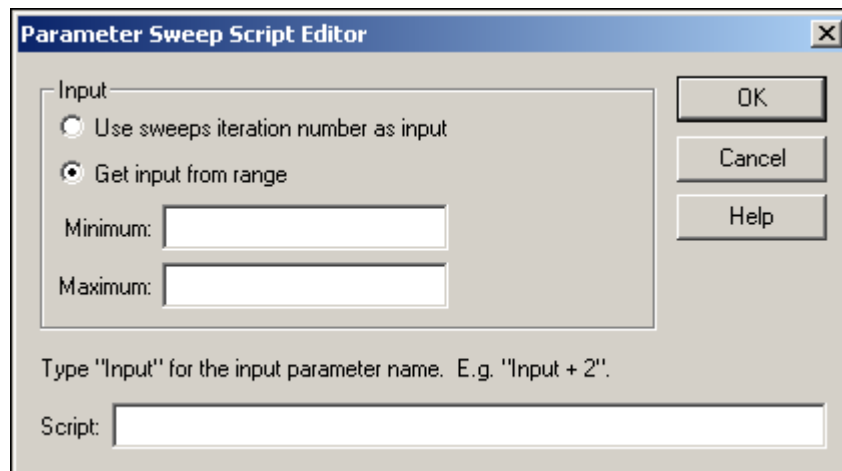


The dialog box titled "Parameter Iteration Spread" contains two input fields: "Start value:" with a value of 0 and "End value:" with a value of -20. To the right of these fields are three buttons: "OK", "Cancel", and "Help".

Start value: displays the first value for the iteration spread calculation.

End value: displays the last value for the iteration spread calculation.

Figure 65 Parameter Sweep Script Editor dialog box



The dialog box titled "Parameter Sweep Script Editor" has an "Input" section with two radio buttons: "Use sweeps iteration number as input" (unselected) and "Get input from range" (selected). Below these are "Minimum:" and "Maximum:" input fields. To the right are "OK", "Cancel", and "Help" buttons. At the bottom, there is a text instruction: "Type 'Input' for the input parameter name. E.g. 'Input + 2'." followed by a "Script:" input field.

Input

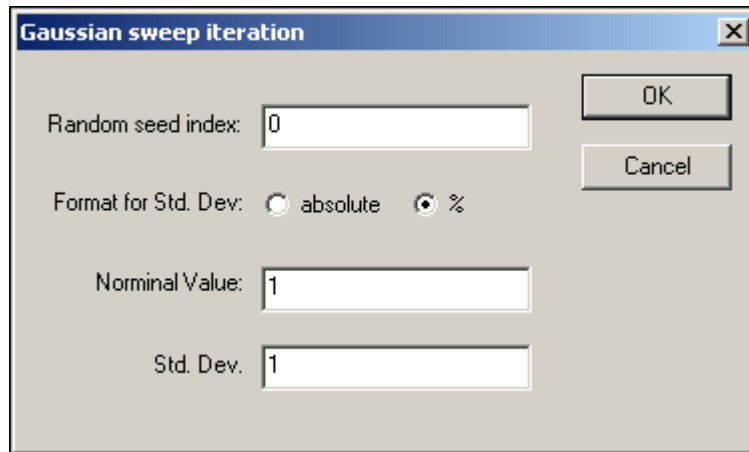
Use sweeps iteration number as input: determines if the value in the selected iteration number is used as input for sweep calculations.

Get input from range: determines if the values for the sweep calculations are set by the range specified by **Minimum** and **Maximum**.

Note: **Minimum** and **Maximum** only become active if **Get input from range** is selected.

Script: displays the script for the sweep calculations. Includes **Input** variable.

Figure 66 Gaussian sweep iteration dialog box

The image shows a dialog box titled "Gaussian sweep iteration" with a standard Windows-style title bar (blue with a close button). The dialog has a light gray background. It contains four input fields: "Random seed index:" with a text box containing "0", "Format for Std. Dev:" with two radio buttons labeled "absolute" and "%", "Nominal Value:" with a text box containing "1", and "Std. Dev.:" with a text box containing "1". To the right of these fields are two buttons: "OK" and "Cancel". The "Format for Std. Dev:" section has the "%" radio button selected.

Random seed index

Displays the random seed index value for use in the sweep calculations.

Format for Std. Dev

Determines whether the absolute value or a percentage value is used in the sweep calculations.

Nominal Value

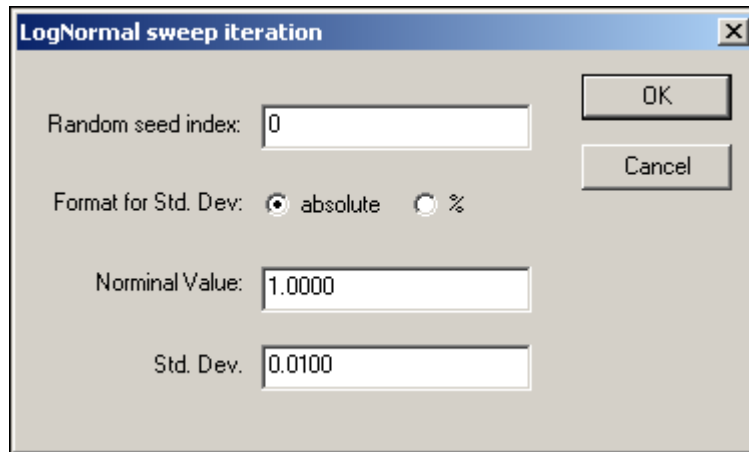
Displays the nominal value for use in the sweep calculations.

Std. Dev.

Displays the standard development value for use in the sweep calculations.



Figure 67 LogNormal sweep iteration dialog box



The dialog box is titled "LogNormal sweep iteration" and contains the following fields and controls:

- Random seed index:** A text input field containing the value "0".
- Format for Std. Dev:** Two radio buttons. The first is labeled "absolute" and is selected. The second is labeled "%".
- Nominal Value:** A text input field containing the value "1.0000".
- Std. Dev.:** A text input field containing the value "0.0100".
- Buttons:** "OK" and "Cancel" buttons are located on the right side of the dialog.

Random seed index

Displays the random seed index value for use in the sweep calculations.

Format for Std. Dev

Determines whether the absolute value or a percentage value is used in the sweep calculations.

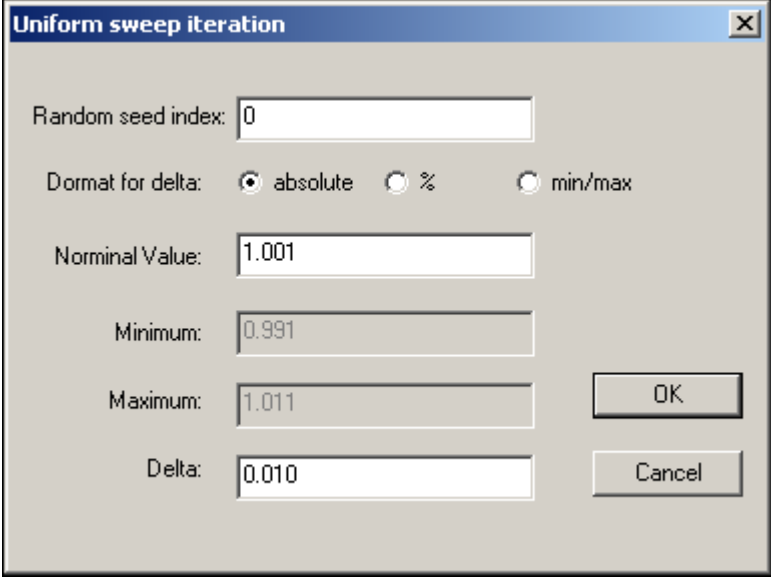
Nominal Value

Displays the nominal value for use in the sweep calculations.

Std. Dev.

Displays the standard development value for use in the sweep calculations.

Figure 68 Uniform sweep iteration dialog box

The image shows a software dialog box titled "Uniform sweep iteration". It contains several input fields and a set of radio buttons. The "Random seed index" field is set to 0. The "Format for delta" section has three radio buttons: "absolute" (selected), "%", and "min/max". The "Nominal Value" field is set to 1.001. The "Minimum" field is set to 0.991 and the "Maximum" field is set to 1.011. The "Delta" field is set to 0.010. There are "OK" and "Cancel" buttons on the right side of the dialog box.

Uniform sweep iteration

Random seed index: 0

Format for delta: ☒ absolute ☐ % ☐ min/max

Nominal Value: 1.001

Minimum: 0.991

Maximum: 1.011

Delta: 0.010

OK

Cancel

Random seed index

Displays the random seed index value for use in the sweep calculations.

Format for delta

Determines whether the absolute value, a percentage value, or a range of values is used in the sweep calculations.

Note: **Minimum** and **Maximum** become active when you select **min/max**.

Nominal Value

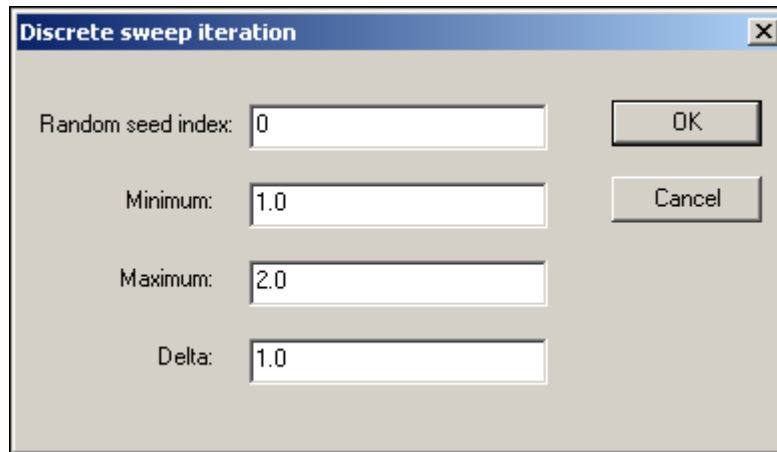
Displays the nominal value for use in the sweep calculations.

Delta

Displays the delta value for use in the sweep calculations.



Figure 69 Discrete sweep iteration dialog box

A screenshot of a software dialog box titled "Discrete sweep iteration". The dialog box has a blue title bar with a close button (X) in the top right corner. The main area is light gray and contains four input fields, each with a label to its left: "Random seed index:" with the value "0", "Minimum:" with the value "1.0", "Maximum:" with the value "2.0", and "Delta:" with the value "1.0". To the right of the input fields are two buttons: "OK" and "Cancel".

Random seed index:	0	OK
Minimum:	1.0	Cancel
Maximum:	2.0	
Delta:	1.0	

Random seed index

Displays the random seed index value for use in the sweep calculations.

Minimum

Displays the minimum value for use in the sweep calculations.

Maximum

Displays the maximum value for use in the sweep calculations.

Delta

Displays the delta value for use in the sweep calculations.

Calculations

Performing calculations

To perform calculations, perform one of the following actions.

Action

- Click the **Calculate** button.
The project calculation dialog box appears (see [Figure 70](#)).

OR

Action

- From the **Menu bar**, select **File > Calculate**.
The project calculation dialog box appears (see [Figure 70](#)).

In the project calculations dialog box, you can:

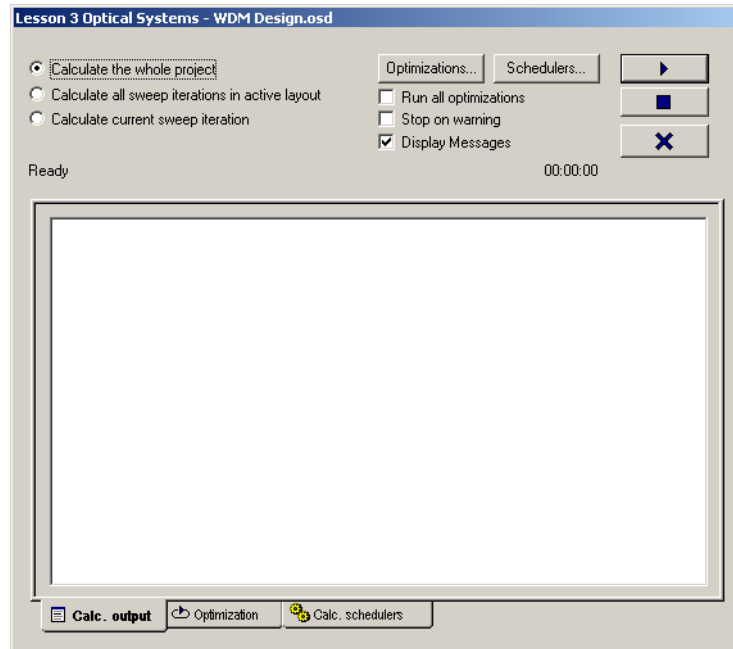
- calculate the whole project
- calculate all sweep iterations in the active layout
- calculate the current sweep iteration



Calculations dialog box

Calc. output tab

Figure 70 Project calculations dialog box—Calc. output tab



Calculate the whole project: calculates all the layouts and all the sweep iterations within each layout.

Calculate all sweep iterations in the active layout: calculates all the sweep iterations within the current active layout only.

Calculate current iteration: calculates only the selected sweep iteration in the current layout.

Optimizations

Opens the **Optimizations** dialog box.

Schedulers

Opens the **Schedulers** dialog box.

Run all optimizations

If selected, all optimizations are run during the project calculations.

Stop on warning

If OptiSystem encounters a calculation error, (e.g. an invalid signal type entered in the components) the calculations are stopped, and a warning message appears in the



Calc. Output window. If this option is not selected, the system continues the calculations regardless of the reported error.

Display Messages

Displays calculation output messages.

Calculations dialog box buttons

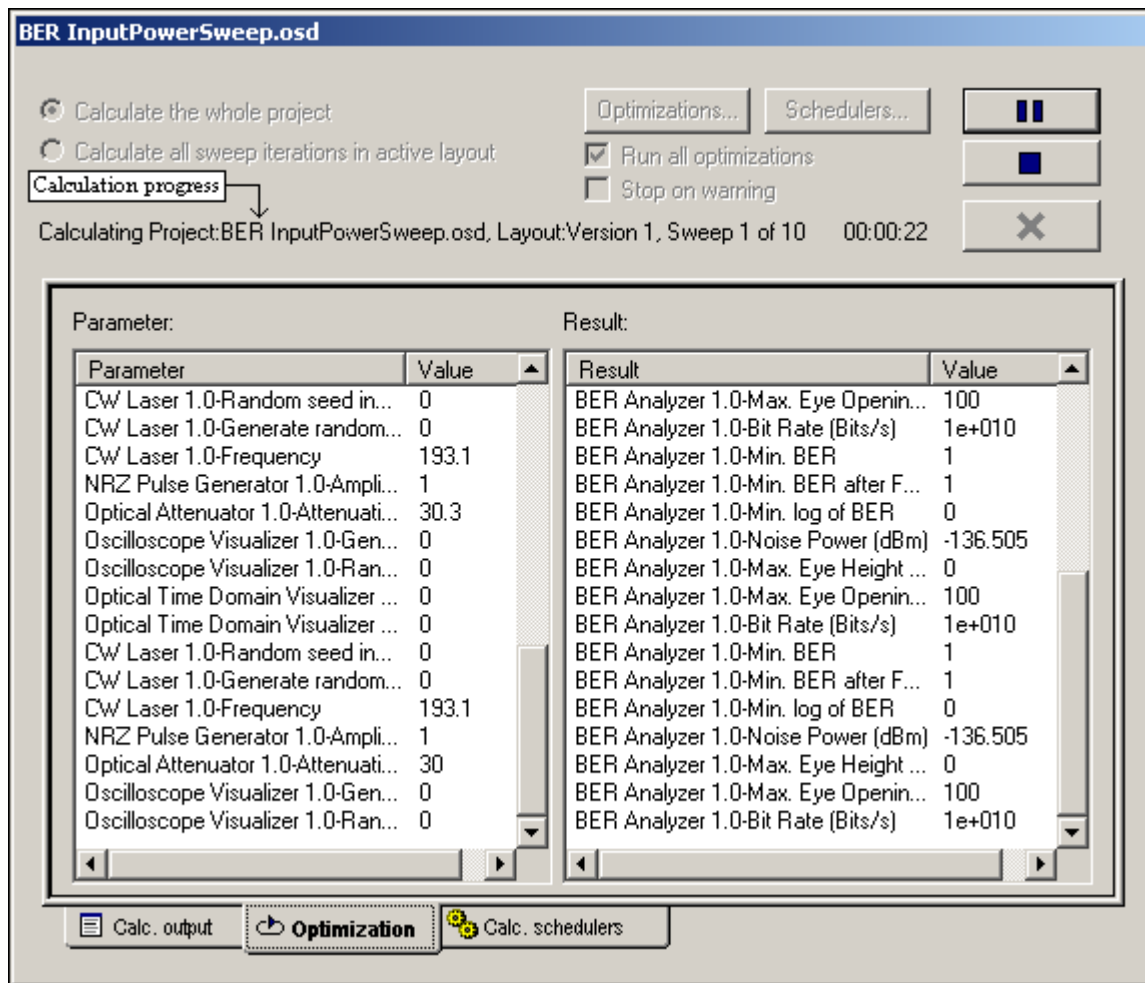
Calculation function	Calculation button	Description
Run		Click to run the calculation (button changes to Pause). When calculation is running, click again to pause the calculation (button changes to Resume).
Pause		Click to pause the calculation (button changes to Resume). When calculation is paused, click again to resume.
Cancel		Cancels the calculations, but does not close Calculations dialog box.
Resume		Resumes paused calculations.
Stop		Stops the calculations and closes the Calculations dialog box.



Optimization tab

While a calculation is in progress, if there are any selected optimizations, the results are displayed on the **Optimization** tab.

Figure 71 Project calculations dialog box—Optimization tab



Information regarding the progress of the calculation appears above the optimization details window in the **Calculations** dialog box.

The optimization details window contains two lists:

Parameter

The **Parameter** list displays each parameter and the corresponding value as the optimization is calculated.

Result

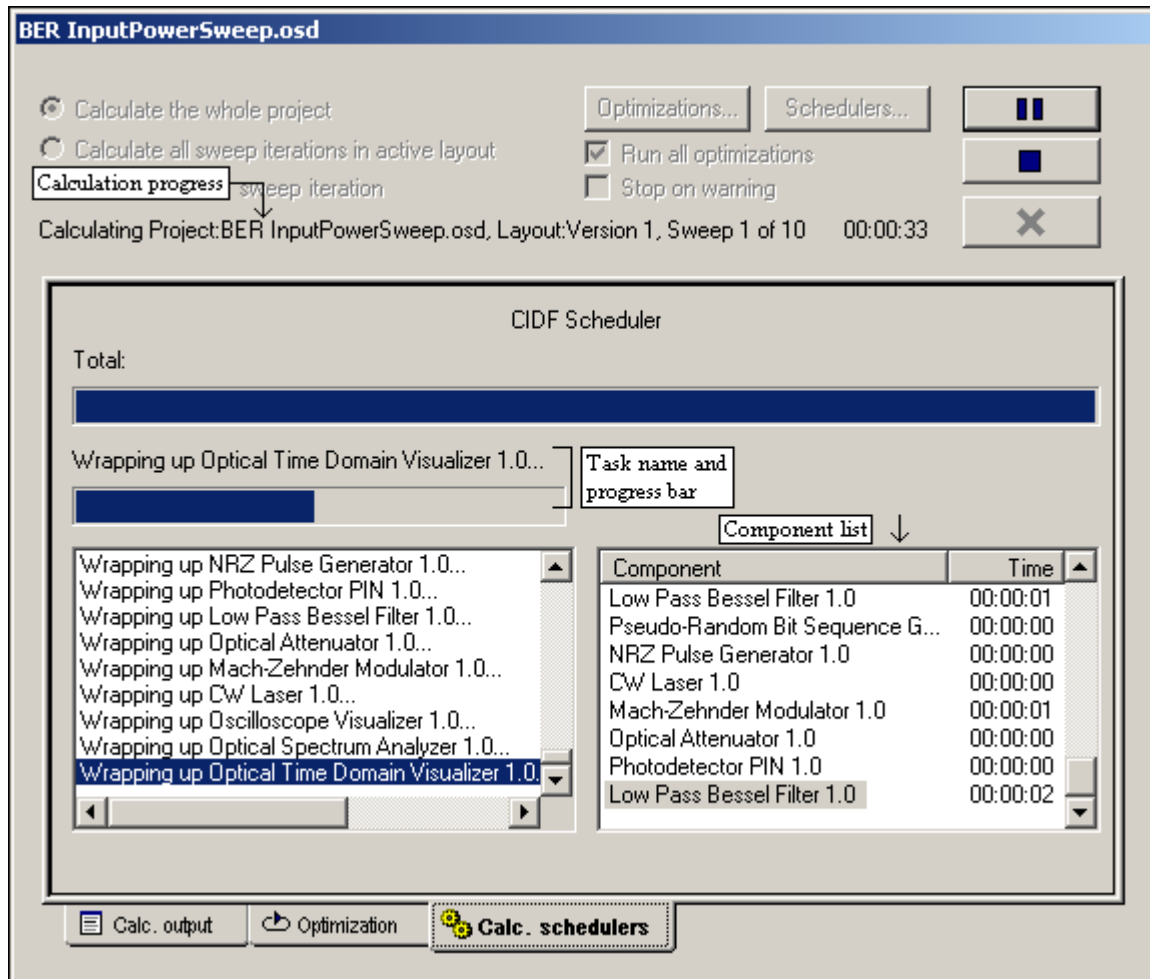
The **Result** list displays the name of each result and the corresponding value as the optimization is calculated.



Calc. schedulers tab

While a calculation is in progress, if there are any active calculation **Schedulers**, the results are displayed on the **Calc. schedulers** tab.

Figure 72 Project calculations dialog box—Calc. schedulers tab



Information regarding the progress of the calculation appears above the scheduler details window in the **Calculations** dialog box.

The calculation scheduler details window contains the following:

Scheduler name

Displays the name of the scheduler.

Total:

Displays a progress bar showing the current scheduler progress.



Task progress bar

Displays a progress bar that shows the progress of the current task in the progress list.

Progress list

Displays a list of each calculation item activated in the scheduler.

Component list

Displays a list of each component as it is utilized by the scheduler during the calculations.

Cancelling calculations

To cancel calculations before they are started, perform the following action.

Action

- Click the **Close** button.
*The **OptiSystem** calculation dialog box closes. No calculations are performed.*

Optimizations

Optimizations allows for the modification of parameters in a layout in order to achieve a desired goal.

OptiSystem provides a flexible method of defining optimizations in a project.

Setting optimizations

To access the **Optimizations** dialog box and set optimizations, perform one of the following actions.

Action

- Select the **Optimizations** button in the project calculation dialog box (see [Figure 70](#)).
*The **Optimizations** dialog box appears (see [Figure 73](#)).*

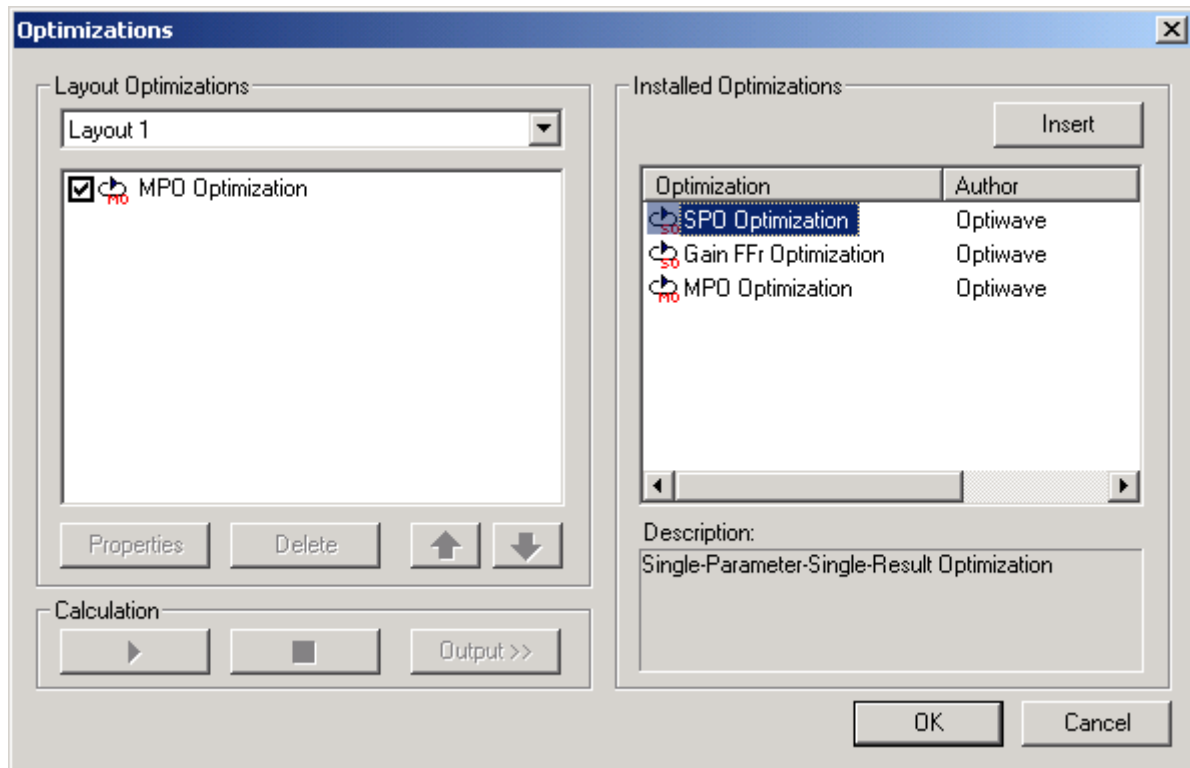
OR

Action

- Select **Tools > Optimizations** from the menu.
*The **Optimizations** dialog box appears (see [Figure 73](#)).*



Figure 73 Optimizations dialog box



Layout Optimizations

Displays the list of optimizations active in the current project layout. Use the dropdown list to select the active layout.

Properties: opens the **Optimizations** dialog box for the optimization selected in the displayed list.

Delete: deletes the selected optimization.

Up/Down arrows: selects optimizations up or down the displayed list.

Calculation

Run button: starts the calculations.

Stop button: stops the calculations.

Output button: displays the results of the selected optimization output at the bottom of the **Optimizations** dialog box.

Installed Optimizations

Displays the list of optimizations installed in OptiSystem.



Insert button: inserts the selected optimization into the list of active optimizations in the selected project layout.

Description

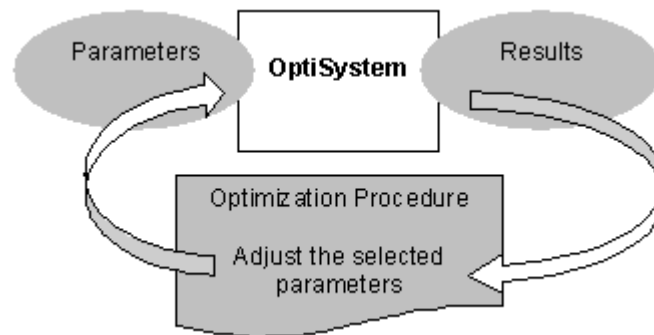
Displays a full description of the selected optimization.



Multi-parameter multi-target optimizations (MPO)

To enhance the capacity of an optical system, the optimization of the signal parameters and system components is a critical task. In a real system, there are many parameters that can be adjusted to achieve the desired performance levels, however, this requires implementation of time-consuming procedures. For example, optimizing the pump powers of a Raman fiber amplifier for a target gain and best gain flatness requires a large number of iterations which cannot be implemented manually. Being familiar with the component or system behavior would decrease the number of iterations, but it is not always easy to estimate the optimum parameters. A flexible and powerful optimization tool would automate the optimization process and result in the best system performance.

Figure 1 Schematic of optimization



OptiSystem provides a powerful multi-parameter multi-target optimization tool. [Figure 1](#) is a schematic of the tool. The optimization is performed by simulating the optical system or sub-system within OptiSystem. In general, the optimization tool adjusts one or more signal or component parameters before each run, based on previous results obtained using several optimization algorithms depending on the type of the optimization selected. Optimization procedures are based on a customized version of Matlab's* widely accepted and well-proven optimization technology. It can also force several user-defined constraints on selected parameters. This is specially important when for example a selected parameter or summation/subtraction of several parameters is needed to be kept between certain values, or when certain result is required to be below a defined value while minimizing/maximizing another result. In this version, a limited number of constraint types are provided. These

include limiting summation/subtraction of parameters and limiting the results. Currently, numbers of constraints are limited with the number of parameters.

Five type of optimizations are currently available, namely Minimization, Maximization, Goal Attainment, LSQ (Nonlinear Least Square), and Gain Flattening. Minimization and Maximization procedures minimize/maximize a single result by varying multiple parameters whereas Goal Attainment tries to attain multiple result goals by changing multiple parameters defined by the user. LSQ procedure minimizes sum of squares of multiple result by altering multiple parameters. Gain Flattening is used to optimize the parameters of amplifiers, filters, pumps, etc. for the best gain flatness. The current optimization tool also allows setting up multiple multi-parameter optimizations and running them in sequence.

If proper parameters are selected optimization procedure can find the optimum parameters after reasonable number of iterations. Number of iterations depends on number of parameters selected, number of target values, number of constraints, degree of sensitivity, starting values of parameters, complexity of the system, etc. For example optimizing length of DCF to maximize the Q factor may take a couple of iteration, while flattening the gain of a multi-pumped Raman amplifier may require more than fifty iterations. However, as all optimization procedures, the selected procedure may give a local minima or maxima instead of a global one. In that respect, you may get two different results depending on your initial parameter values. Fortunately, this is not a problem most of the times, since the parameter range is well known. Furthermore, you can give good starting values to optimizer since you already have an idea about the behavior of the component or system.

Technical details of the optimization types are given in the following sections.

Minimization

This type of optimization minimizes a user-defined result by varying one or more parameters within the user defined range starting from an initial guess.

A trust region method based on interior-reflective Newton method [1], [2] is used when optimization is Large-Scale. If it is Medium-Scale, a Sequential Quadratic Programming (SQP) method [3], [4] is used.

Only one result can be minimized. However you can force constraints on some extra results. You can also define constraints on parameters.

Maximization

This type of optimization maximizes a user-defined result by varying one or more parameters within the user defined range starting from an initial guess.

A trust region method based on interior-reflective Newton method [1], [2] is used when optimization is Large-Scale. If it is Medium-Scale, a Sequential Quadratic Programming (SQP) method [3], [4] is used.

Only one result can be minimized. However you can force constraints on some extra results. You can also define constraints on parameters.



Internally, result you want to maximize is reversed and the minimization procedure is applied to get the maximum.

Goal Attaining

This type of optimization tries to attain multi-objective goals by varying one or more parameters within the user defined range starting from an initial guess. A weight to each result can be given. Greater, less, or exact achievement can be selected. If greater option is selected, optimization procedure tries to reach the goals (tries to make the selected results greater than the goals). If less option is selected, it tries to minimize the results less than the goals. If exact option is selected, it treats the goals like hard constraints rather than as goal constraint.

This type of optimization uses Sequential Quadratic Programming (SQP) method [5].

If you select Constrained option in Main Tab, you can force constraints on some extra results. You can also define constraints on parameters.

Goal Attainment type of optimization with exact option selected can also be used for parameter extraction. One example to this is extracting the thermal noise of a PIN to obtain a given receiver sensitivity.

Nonlinear Least Square (LSQ) Optimization

This type of optimization minimizes the sum of squares of the results by varying one or more parameters within the user defined range starting from an initial guess. This procedure is schematically shown in [Figure 3](#). Measuring device can be any type of visualizer as well as any result calculated by any component.

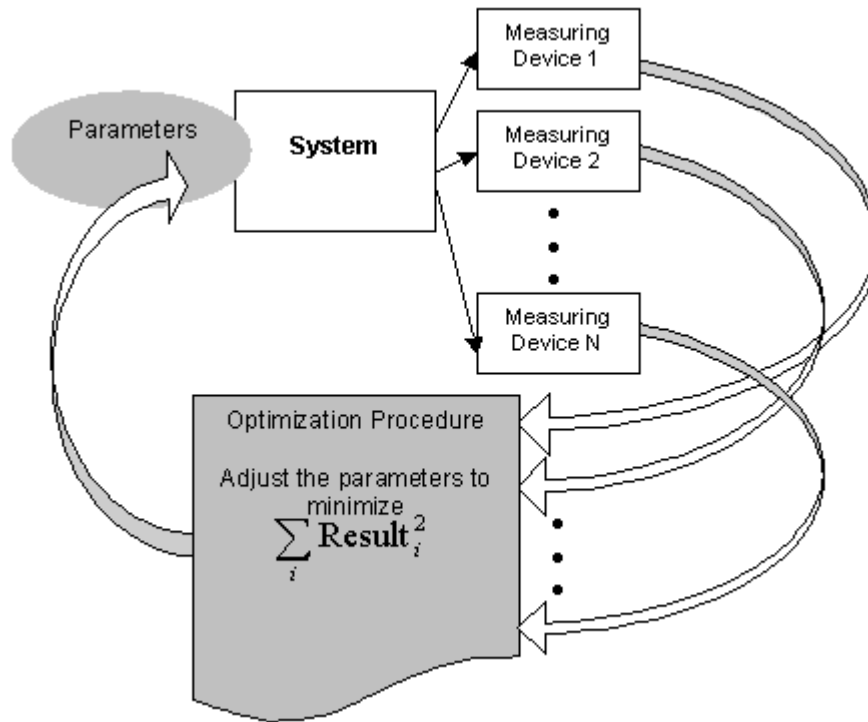
A trust region method based on interior-reflective Newton method [1], [2] is used, if optimization is Large-Scale. Medium-Scale Optimization uses the Levenberg-Marquardt method with line-search [6].

Large-Scale Optimization requires that the number of results be at least as great as the number of parameters. If this condition is not satisfied, the medium-scale algorithm is selected automatically.

Medium scale algorithm does not handle bound constraints on parameters, i.e. the parameters are not forced to remain within defined minimum and maximum values. A Gauss-Newton method [7] with line-search can also be selected from Advanced Tab.

Even though you cannot force any additional constraints on parameters or results in this type of optimization, you can force the parameters to be within a defined region if Large-Scale Optimization is selected internally.

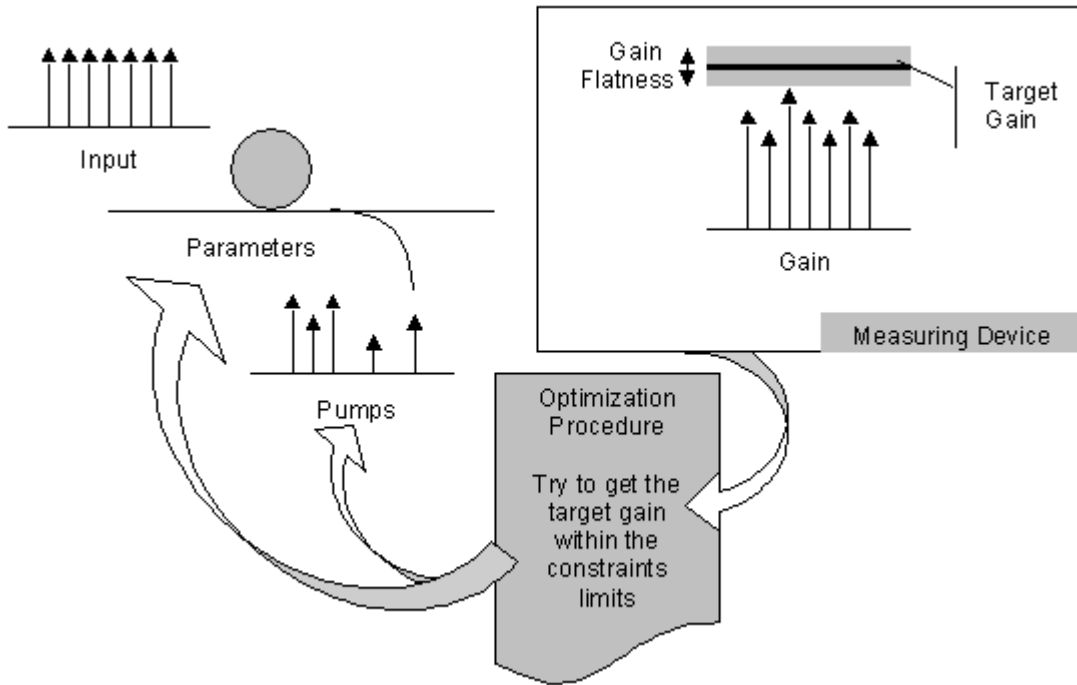


Figure 2 Schematic of LSQ type of optimization

Gain Flattening

This type of optimization uses the Goal Attainment procedure described above. In this case, exact achievement option is automatically selected.

A schematic of gain flattening is shown in [Figure 3](#). It tries to get a gain for each channel as close as to the target gain and at the same time tries to keep the gain flatness under a given value. This is done by optimization procedure, depending on your parameter selection, either adjusting the amplifier parameters or pump parameters. You can also select parameters of some other component in the layout to optimize. For example, for a gain flattening filter design, parameters of a series of gratings can be optimized. Depending on your design, you can select as much parameters as you wish. You can also select output signal power of each channel and ask optimizer to target specified output channel powers. Measuring device can be, for example, Dual Port WDM Analyzer, or the internal analyzer of a Raman amplifier.

Figure 3 Schematic of a standard gain flattening procedure

Gain flatness is implemented as a constraint in optimization tool and you need to select it in the Constraints Tab as the first constraint. You can also add some other constraints to the optimization if you like.

If you want to optimize a Raman amplifier by using multi-pump configuration, you need to consider that the required pump power for a certain Raman gain is affected by several factors, such as Raman gain coefficient, polarization effect, fiber length, fiber loss at pump wavelength, pump depletion and so on. In the case of a multi-wavelength pumping scheme, the wavelength dependence of these factors is one of principal parameters to determine the pump power allocation. For example, the Raman gain coefficient at shorter wavelength is larger than at longer, while fiber loss is generally larger at shorter wavelength due to Rayleigh scattering. Another important effect is pump-to-pump Raman interaction. It increases the required pumping power at shorter wavelength, because a longer wavelength pump absorbs the energy of shorter one.

This requires a self-consistent solution, which seriously complicates the design problem. From the numerical standpoint, the problem is further complicated by the fact that there are a very large number of channels in the system, and interaction between every pair of these channels should be taken into account. Therefore it is very important to give good estimated initial values, especially for pump wavelengths, to the optimizer. For example, a general guideline to estimate the pump channel locations is given in [6]. It is based on the fact that the gain profile of a multi-wavelength pumped Raman amplifier can be expressed as a logarithmic superposition of the gain profiles caused by respective pumping wavelengths with the assumption that magnitude of Raman gain is only determined by the corresponding pump power and wavelength. Even though, this is not correct, it will give a rough



estimate for the pump channel locations. The predicted gain profile is sure to be realized by an appropriate pump power level unless it is beyond the limit. When a good estimation is provided, the optimization procedure can find the optimum pump powers and wavelengths by adjusting the pump powers and refining the pump wavelengths. Most of the times you may even do not need to select the pump wavelengths as parameters to be optimized. Only optimizing the pump powers may give sufficient gain flatness. For this reason, for a better optimizer performance, you need to place the pump powers at the top of the list in Parameters Tab of the optimization tool. Optimization procedure gives priority to the parameters and results on the top of the list. It might be also useful to provide an extra constraint to optimizer. For example putting min/max constraint to total pump power will make sure that the gain is as close as required gain. Otherwise, the optimization may end up with a set of optimum parameters that gives a good enough flatness but a lower average gain.

Parameters in each tab are described in the following tables. They also give a summary of the meaning of each parameter with value ranges and default values.

Note: The parameter and result names and result values in *italics* are the first parameter and result from the Selected Parameters and Selected Results tables.

Main

Name/Description	Default value	Value range
Optimization Name User defines the name, or OptiSystem generates name.	Minimize Optimize <i>Power</i> for minimum <i>Q factor</i> Maximize Optimize <i>Power</i> for maximum <i>Q factor</i> LSQ Optimize <i>Power</i> for LSQ of <i>Q factor</i> Goal Attaining Optimize <i>Power</i> to attain <i>Q factor</i> of 6 Gain Flattening Optimize <i>Power</i> to flatten the gain	
Optimization Type	Goal Attaining	Minimize, Maximize, Goal Attaining, LSQ, Gain Flattening
Goal Attainment If Greater , optimization attempts to make results higher than goals (under attainment). If Less , optimization attempts to make results less than goals (over attainment). If Exact , optimization treats goals as hard constraints rather than goal constraints.	Exact	Greater, Less, Exact
Maximum number of passes	100	[1, INF]
Result Tolerance for Exact Goal Attainment (%)	10	[0, 100]



Name/Description	Default value	Value range
Constrained Defines if there are constraints to be applied on parameters or results.	FALSE	True, False

Parameters

Name/Description	Default value	Value range
Minimum Parameter Value Lower limit of selected parameter. Acts as constraint on parameter.	Current value in layout	[-INF, INF]
Maximum Parameter Value Upper limit of selected parameter. Acts as constraint on parameter.	Current value in layout	[-INF, INF]
Initial Parameter Value User selected value. A close guess gives faster results.	Current value in layout	[-INF, INF]

Result

Name/Description	Default value	Value range
Target Value Valid only for Goal Attainment and Gain Flattening optimizations.	0	[-INF, INF]
Weight (%) Weighting to control relative under- or over-attainment of active objectives. When all goals are non-zero, to guarantee the same percentage of under- or over-attainment of objectives, set all weights to 100. If any weight or target value is set to 0, the optimizer treats goals like hard constraints. If exact goal achievement is selected, Weight (%) has no effect on optimizations.	100	]0, 100]
Number of Goals to Achieve Exactly Defines the number of goals to "just" achieve (not over- or under-achieve). To achieve target result, set this parameter to number of results and put the results to the top of the selected results list.	Number of Goals	[0, Number of Goals]

Parameters

Name/Description	Default value	Value range
Constraint Termination Tolerance Maximum termination tolerance on the constraint violation. Provides a tolerance based on the minimum possible constraint.	0.1	]0, INF]



MULTI-PARAMETER MULTI-TARGET OPTIMIZATIONS (MPO)

Name/Description	Default value	Value range
Result Termination Tolerance Calculation termination tolerance on results. Provides a tolerance based on minimum possible result.	0.1	]0, INF]
Parameter Termination Tolerance Calculation termination tolerance on parameters. Provides a tolerance based on minimum parameter value.	0.1	]0, INF]
Internally Normalize Parameters If TRUE , " <i>Parameter Termination Tolerance</i> " option is blocked, and " <i>Parameter Termination Tolerance (%)</i> " is activated. Note: If your parameter values are very small, it is strongly suggested that you select this option.	FALSE	TRUE, FALSE
Parameter Termination Tolerance (%) Calculation termination tolerance on parameters as a percentage.	10	]0, 100]
Internally Normalize Results If TRUE , " <i>Result Termination Tolerance</i> " option is blocked, and " <i>Result Termination Tolerance (%)</i> " is activated.	FALSE	TRUE, FALSE
Result Termination Tolerance (%) Calculation termination tolerance on results as percentage.	10	]0, 100]
Chose Levenberg-Marquardt over Gauss-Newton Algorithm Defines whether Levenberg_Marquardt or Gauss-Newton algorithm is used. For LSQ optimizations. Valid only for medium-scale optimizations.	ON	ON, OFF
Line Search Algorithm Used for Minimization, Maximization, LSQ. Valid for medium-scale optimizations. As default, a medium-scale optimization uses Gauss-Newton method. To use Levenberg-Marquardt, set Levenberg_Marquardt to ON .	quadcubic	quadcubic, cubicpoly Note: Quadcubic is a safeguarded, mixed quadratic and cubic polynomial interpolation and extrapolation method. Cubicpoly is a safeguarded cubic polynomial method.



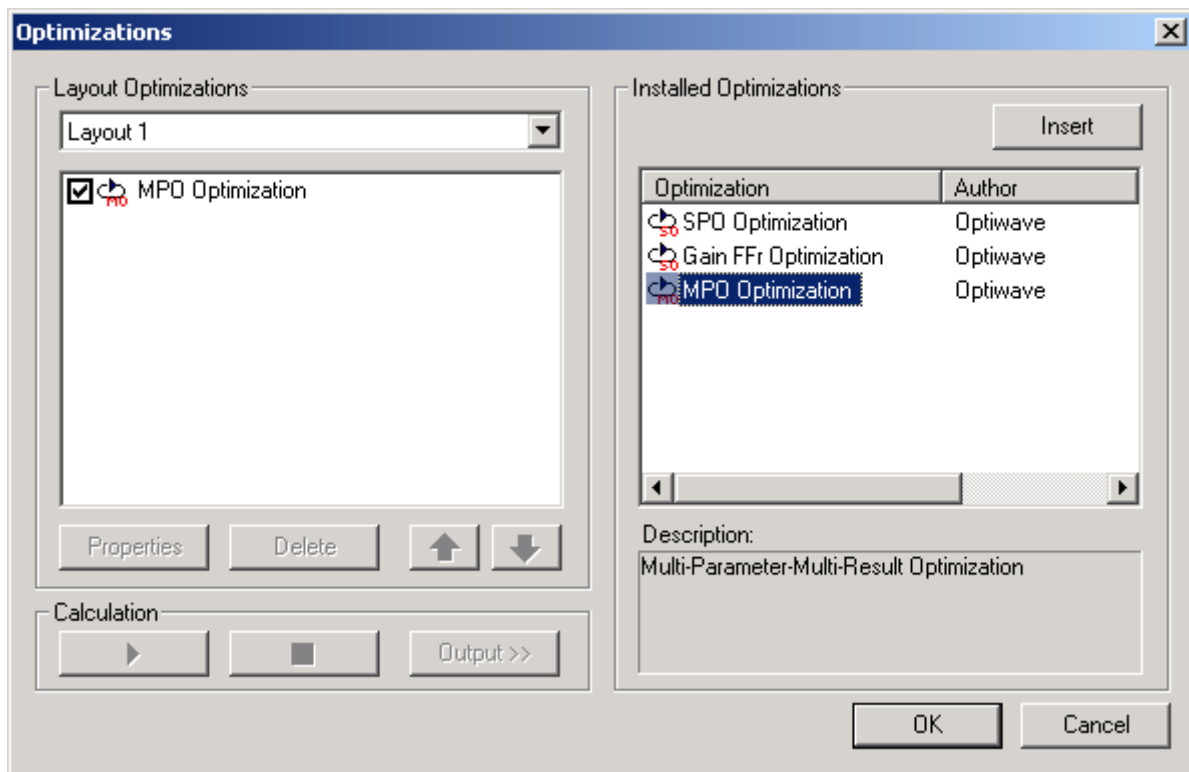
If "*Internally Normalize Parameter*" is selected, parameters are normalized with respect to "*Initial Parameter Values*". Selecting this option is important, especially when a parameter has very small value (such as $1\text{E-}20$), or when you try to optimize more than two parameters that have very disparate values (such as one in the order of $1\text{E-}20$ and the other in the order of 100).

"*Internally Normalize Result*" operates in the same way. This option is only valid for **Goal Attainment** and **Gain Flattening** types of optimizations. When you select this option, results are internally normalized with respect to goal values. You need to select this option when your goal values are very different (such as $1\text{E-}9$ and 6).

Setting up the optimization

The main optimization window is shown in [Figure 4](#). You can add as many multi-parameter, multi-result optimizations from the table as you like. You can activate or deactivate them one by one or altogether.

Figure 4 Optimizations dialog box



Adding a new optimization

To add a new optimization to your project, perform the following procedures.

Adding general information

Step	Action
1	Selecting Tools > Optimizations from the Main menu.
2	Select the optimization you want to add from the list in the Installed Optimizations window and click Insert .
3	To change the optimization options or parameters/results, click Properties . <i>The Optimization Setup dialog box appears (see Figure 5).</i>

You can either type a name for the optimization, or click **Generate** to have the name generated automatically. The name is generated based on the **Optimization Type** as follows:

- If **Minimize** is selected:

Optimize *Power*, ... for minimum *Q Factor*

- If **Maximize** is selected:

Optimize *Power*, ... for maximum *Q Factor*

- If **LSQ** is selected:

Optimize *Power*, ... for LSQ of *Q Factor*, ...

- If **Goal Attain** is selected:

Optimize *Power*, ... to attain *Q Factor* of 6, ...

- If **Gain Flattening** is selected:

Optimize *Power*, ... to flatten the gain

The parameter and result names and result values in italics are the first parameters and results from the **Selected** parameters and **Selected** results tables.

- 4 Select the **Optimization Type**.

Note: If you selected **Goal Attain** type of optimization, you will also need to select **Goal Attainment Type**. If you selected **Gain Flatten** as optimization type, **Goal Attainment Type** will be automatically set to **Exact**.

- 5 If you want to set a maximum number of passes, modify the **Maximum Number of Passes** parameter.

Note: If you select **Exact Goal Attainment**, you can change the **Result Tolerance for Exact Goal Attainment (%)** parameter.

- 6 If you require any constraints, select **Constrained** in the **Optimization** window.



Figure 5 MPO Setup dialog box—Main tab

Setup

Optimization Name: MPO Optimization Generate

Main Parameters Results Advanced

Optimization

Optimization Type: Goal Attaining

Goal Attainment: Exact

Maximum number of passes: 50

Result Tolerance for Exact Goal Attainment (%): 10

☐ Constrained

General Info

Author: Optiwave

Version: 1.0

Copyright: Optiwave

Description: Multi-Parameter-Multi-Result Optimization

OK Cancel

Modifying parameter information

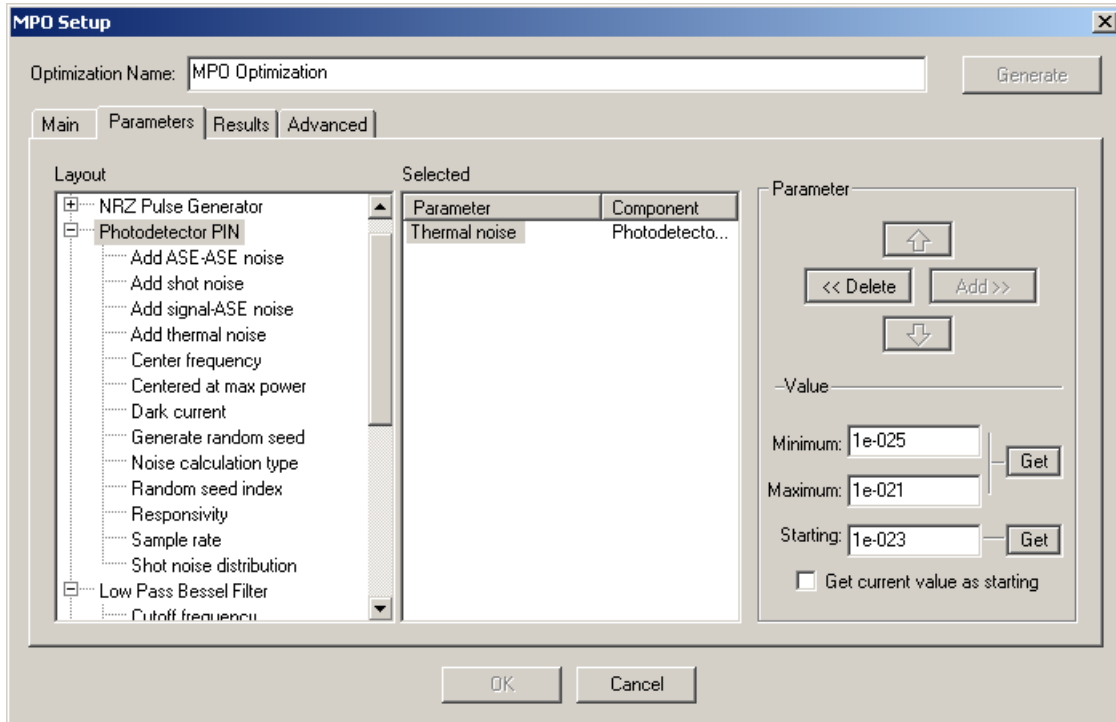
- | Step | Action |
|-------------|--|
| 1 | Select the Parameters tab. |
| 2 | To optimize parameters, move the parameters into the Selected parameters list by following these steps: <ol style="list-style-type: none"> a. Select the parameter to be optimized in the Layout list. b. Click Add to insert the parameter in the Selected list. c. Modify the Minimum, Maximum, and Starting parameter values, if required. d. Click Get to retrieve the values from the active (current) design layout. |

Repeat this for all parameters to be optimized.

Note: You can change the order of parameters in the **Selected** parameters list by selecting the parameter and using the up and down arrow buttons.



Figure 6 MPO Setup dialog box—Parameters tab



Modifying result information

- | Step | Action |
|------|---|
| 1 | Select the Results tab. |
| 2 | To include results in the optimization, move the results into the Selected results table by following these steps: <ol style="list-style-type: none"> Select the result in the Layout list. Click Add to insert the result in the Selected list. Modify the Target Value, Weight (%), and Number of Goals to Achieve Exactly values, if required. Click Get to retrieve the values from the active (current) design layout. |

Repeat this procedure for all results to be included.

Note: You can change the order of results in the **Selected** results list by selecting the result and using the up and down arrow buttons.

Note: For **Minimize** and **Maximize**, only one result is allowed.

When any target value or weight of any result is zero, the **Exact Goal Attainment** type is automatically selected.

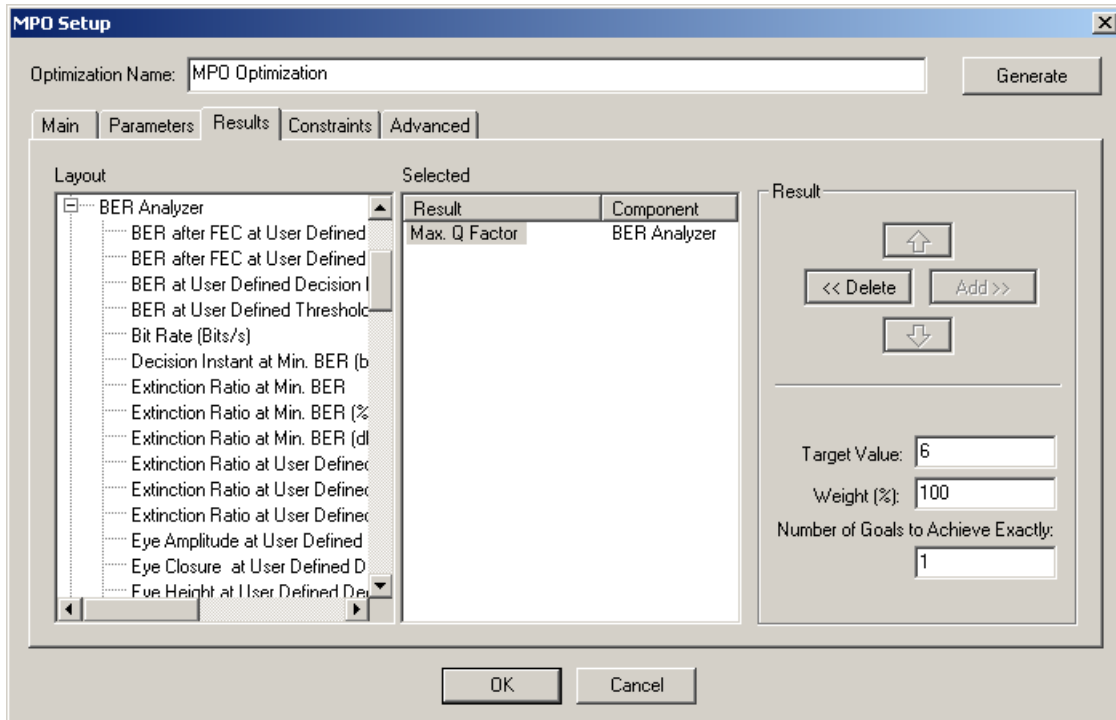
The **Number of Goals to Achieve Exactly** parameter increases as you add new results to the **Selected** list. This parameter is only valid for **Goal Attain** and **Gain Flatten** type of optimizations. You modify this parameter after adding all the results



you require to the **Selected** list. This parameter defines the number of goals to "just" achieve—do not try to over- or under-achieve. To make a set of results as near as possible to the target value, set this parameter to the minimum number of results, and put these results at the top of the **Selected** results list.

If you selected a **Gain Flatten** type of optimization, add the gain of each channel you are interested in into the **Selected** results list.

Figure 7 MPO Setup dialog box—Results tab



Adding optimization constraints

If you selected the **Constrained** option in the **Main** tab, you can add constraints to your optimization using the **Constraints** tab. If the **Constrained** option on the **Main** tab is not selected, this tab will not be available.

There are two types of constraints functions: **Bind Sum** and **Bind Result**.

If **Bind Sum** is selected, you can select parameters from the **Selected** Parameters list and apply summation or subtraction to them. The optimizer will try to bind the final result within user-defined limits.

If **Bind Result** is selected, you can select any result from any component and add them to the **Constraints** list. The optimizer will try to bind the selected results within user-defined limits.

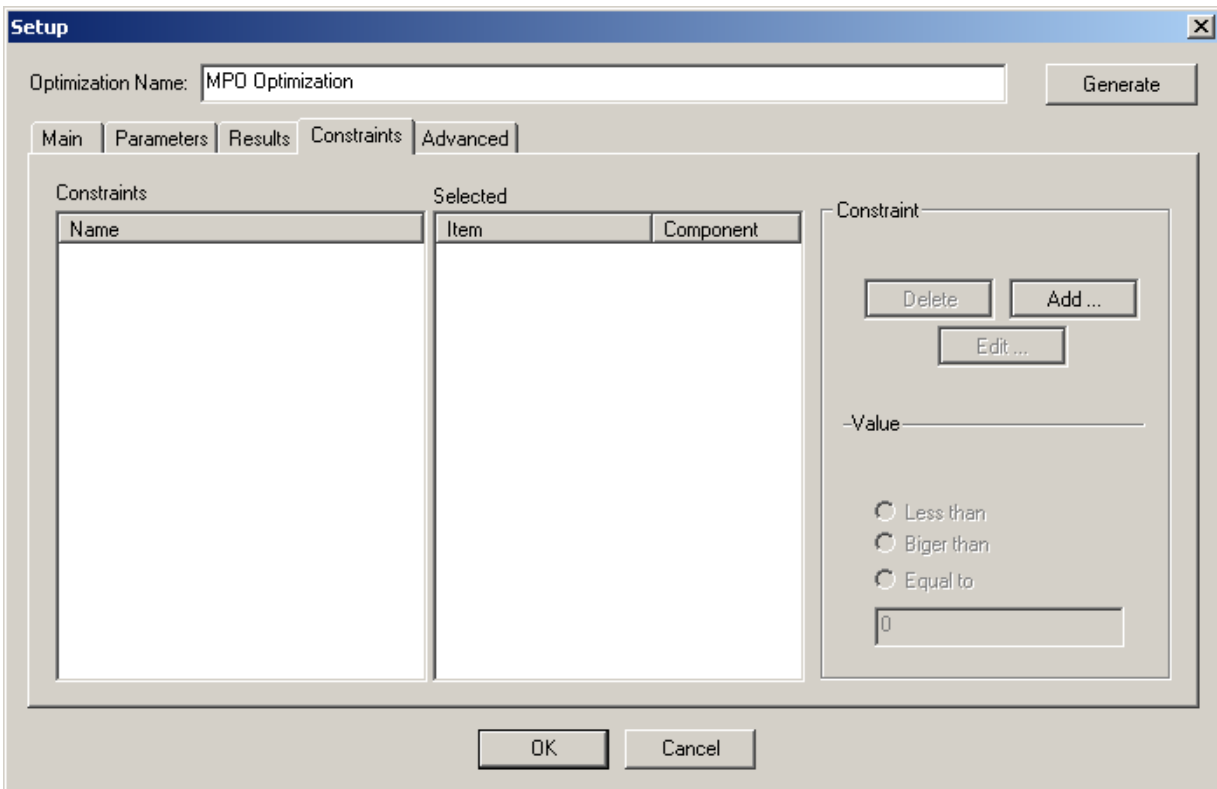
Note: You must give a name to each constraint.

The total number of constraints cannot be more than the number of parameters.



If the optimization type is **Gain Flatten**, in **Value**, the **Less than** and **Bind Result** options are selected automatically. Furthermore, **Name** will be set to **Gain Flatness**. In this case you need to add **Gain Flatness** to the constraints list as the first constraint. You can then add more constraints, such as **Limiting Total Pump Power**, to the constraints list.

Figure 8 MPO Setup dialog box—Constraints tab



If you select a **Bind Sum** type of constraint, a new window appears when you click **Add** (see Figure 9).

Figure 9 New Constraint dialog box

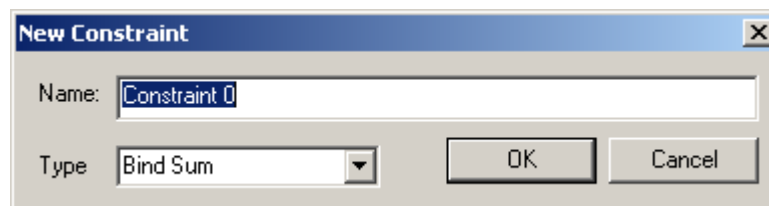
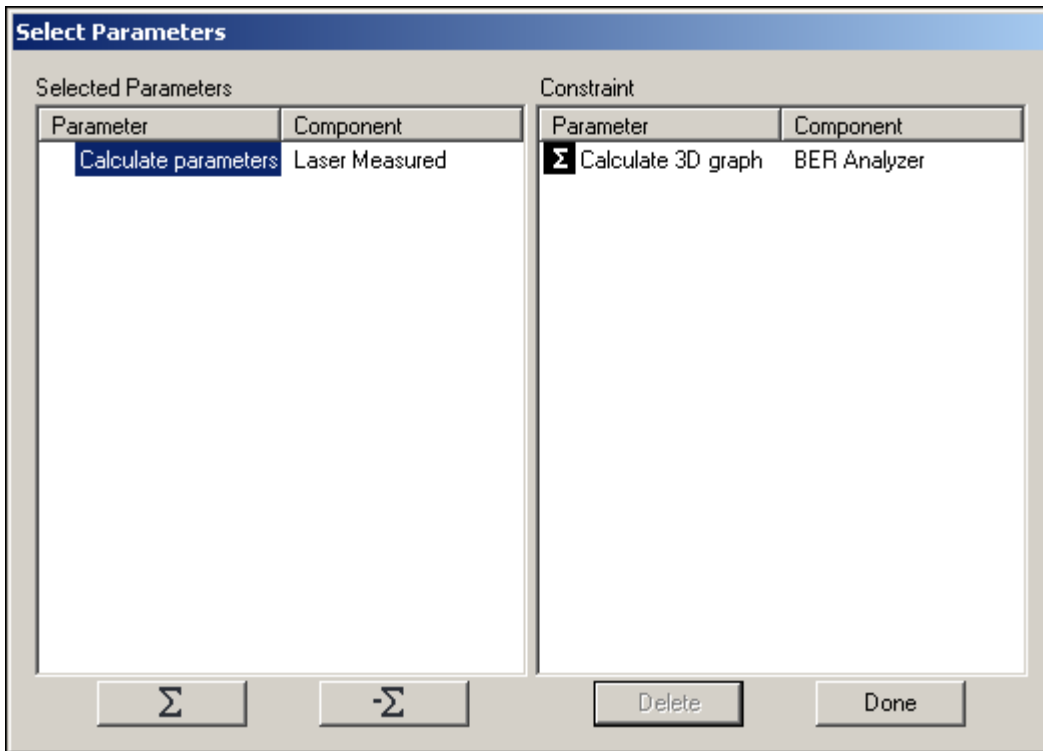


Figure 10 Select Parameters dialog box



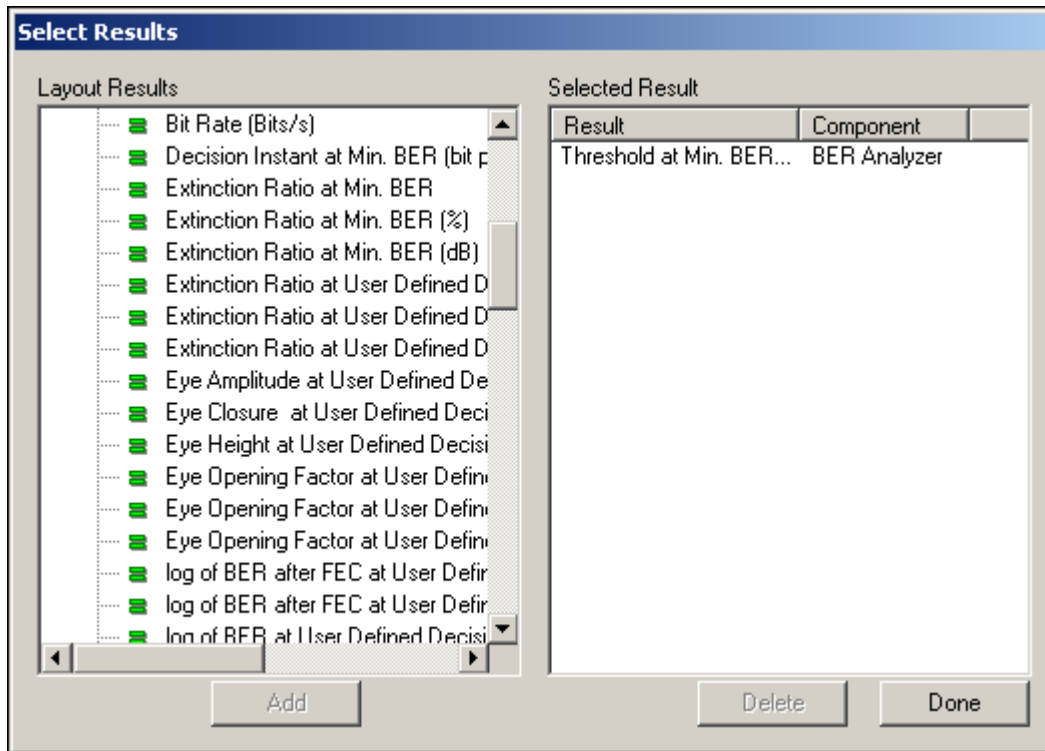
To add a result to bind to the optimization, perform the following procedure.

Step Action

- 1 Click **Add**.
*The **Select Results** dialog box appears.*
- 2 Select the parameter from the **Layout Results** list.
- 3 Click **Add**.
*The result is added to the **Selected Result** list (see [Figure 11](#)).*
- 4 Repeat this procedure until you have added all required results, and click **Done**.
*The **Select Results** dialog box closes.*



Figure 11 Select Results dialog box



You can change the optimization parameters in the **Advanced** tab. Details of these parameters are found in “Parameters” on page 169.

Running the optimization

To run the optimization, perform one of the following procedures.

Step Action

- 1 From the **File** menu, select **Calculate**.
*The **OptiSystem Calculations** dialog box appears.*
- 2 Select **Run all optimizations**, and click the **Run** button.
The simulation runs.

Step Action

- 1 Select **Tools > Optimizations**.
*The **Optimizations** dialog box appears.*
- 2 Select the optimization you want to run from the **Layout Optimizations** list.
- 3 If you want to see the optimization progress, click **Output** in the Calculation window.
*The **Output** window appears.*
- 4 Click the **Run** button in the **Calculation** window.
The simulation runs.



References:

- [1] Coleman, T.F. and Y. Li, SIAM Journal on Optimization, Vol. 6, pp.418-445, 1996.
- [2] Coleman, T.F. and Y. Li, Mathematical Programming, Vol. 67, Number 2, pp. 189-224, 1994.
- [3] Gill, P.E. et al., ACM Trans. Math. Software, Vol. 10, pp.282-298, 1984.
- [4] Gill, P.E. et al., Numerical Linear Algebra and Optimization, Vol. 1, Addison Wesley, 1991.
- [5] Fletcher, R., *Practical Methods of Optimization*, John Wiley and Sons, 1980.
- [6] Emori, Y. et al., "Broadband flat-gain and low-noise Raman amplifiers pumped by wavelength-multiplexed high power laser diodes", Opt. Fib. Tech. 8, 107 (2002).



Notes:

Single-parameter optimization (SPO)

Single-parameter optimization is a simplified version of MPO (Multiple-parameter optimization). It runs faster than MPO and it is easier to setup. However, the user is limited to optimize one parameter and one result.

Technical details of the optimization types are given in the following sections.

Minimization

This type of optimization minimizes a user-defined result by varying one parameter within the user defined range starting from an initial guess.

Only one result can be minimized.

Maximization

This type of optimization maximizes a user-defined result by varying one or more parameters within the user defined range starting from an initial guess.

Only one result can be minimized.

Internally, result you want to maximize is reversed and the minimization procedure is applied to get the maximum.

Goal Attaining

This type of optimization tries to attain an objective goal by varying one parameter within the user defined range starting from an initial guess.

This type of optimization uses section search method.

Goal Attainment type of optimization is typically used for parameter extraction. One example to this is extracting the thermal noise of a PIN to obtain a given receiver sensitivity.

Parameters

Parameters in each tab are described in the following tables. They also give a summary of the meaning of each parameter with value ranges and default values.



Note: The parameter and result names and result values in *italics* are the first parameter and result from the Parameters and Results tables.

Main

Name/Description	Default value	Value range
Optimization Name User defines the name, or OptiSystem generates name.	Minimize Optimize <i>Power</i> for minimum <i>Q factor</i> Maximize Optimize <i>Power</i> for maximum <i>Q factor</i> Goal Attaining Optimize <i>Power</i> to attain <i>Q factor</i> of 6	
Optimization Type	Goal Attaining	Minimize, Maximize, Goal Attaining
Maximum number of passes	50	[1, INF]
Result Tolerance	0.5	[-INF, +INF]

Parameters

Name/Description	Default value	Value range
Minimum Parameter Value Lower limit of selected parameter. Acts as constraint on parameter.	Current value in layout	[-INF, INF]
Maximum Parameter Value Upper limit of selected parameter. Acts as constraint on parameter.	Current value in layout	[-INF, INF]

Result

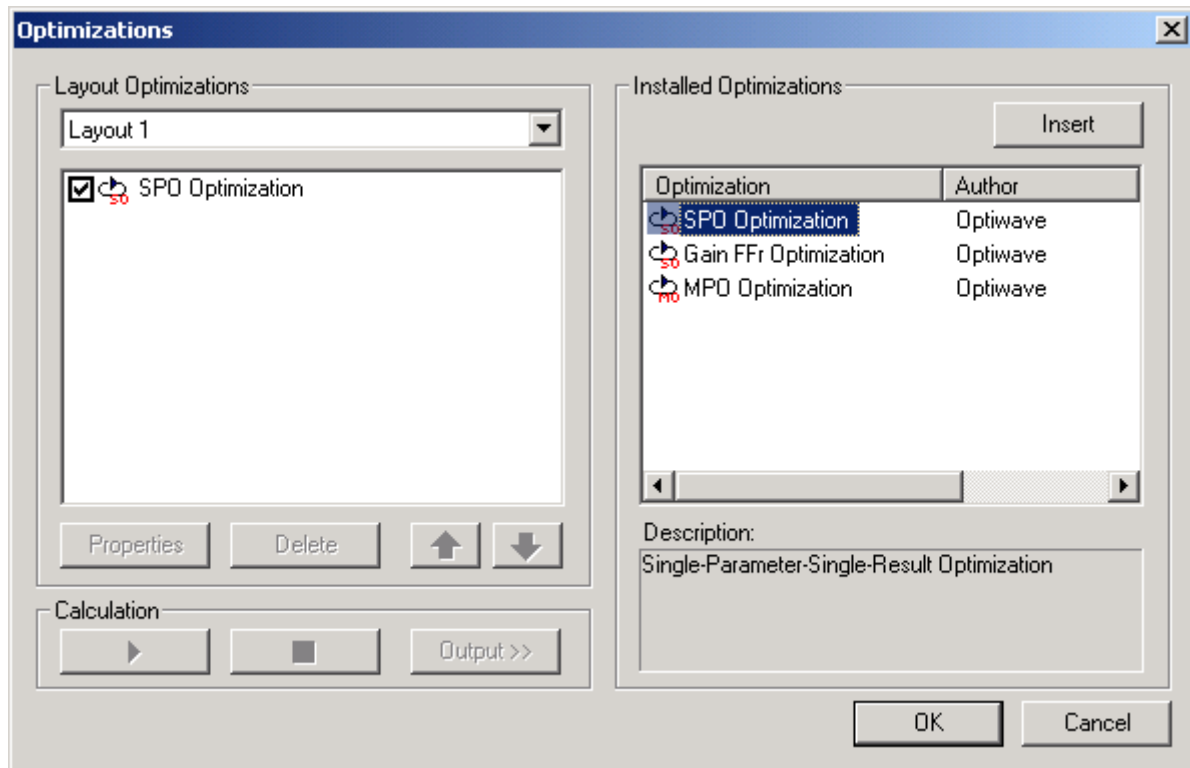
Name/Description	Default value	Value range
Target Value Valid only for Goal Attainment .	0	[-INF, INF]

Setting up the optimization

The main optimization window is shown in [Figure 12](#). You can add as many single-parameter optimizations from the table as you like. You can activate or deactivate them one by one or altogether.



Figure 12 Optimizations dialog box



Adding a new optimization

To add a new optimization to your project, perform the following procedures.

Adding general information

Step	Action
1	Selecting Tools > Optimizations from the Main menu.
2	Select the optimization you want to add from the list in the Installed Optimizations window and click Insert .
3	To change the optimization options or parameters/results, click Properties . <i>The Optimization Setup dialog box appears (see Figure 13).</i>

You can either type a name for the optimization, or click **Generate** to have the name generated automatically. The name is generated based on the **Optimization Type** as follows:

- If **Minimize** is selected:

Optimize Power, ... for minimum Q Factor

- If **Maximize** is selected:

Optimize Power, ... for maximum Q Factor

- If **Goal Attain** is selected:

Optimize Power, ... to attain Q Factor of 6, ...

The parameter and result names and result values in italics are the first parameters and results from the parameters and results tables.

- | | |
|---|---------------------------------------|
| 4 | Select the Optimization Type . |
|---|---------------------------------------|

Note: If you selected **Goal Attain** type of optimization, you will also need to select **Target Value** (Result tab).

- | | |
|---|---|
| 5 | If you want to change the maximum number of passes, modify the Maximum Number of Passes parameter. |
|---|---|



Figure 13 SPO Setup dialog box—Main tab

SPO Setup

Optimization Name:

Main | Parameter | Result

Optimization

Optimization Type:

Maximum number of passes:

Result Tolerance:

General Info

Author:

Version:

Copyright:

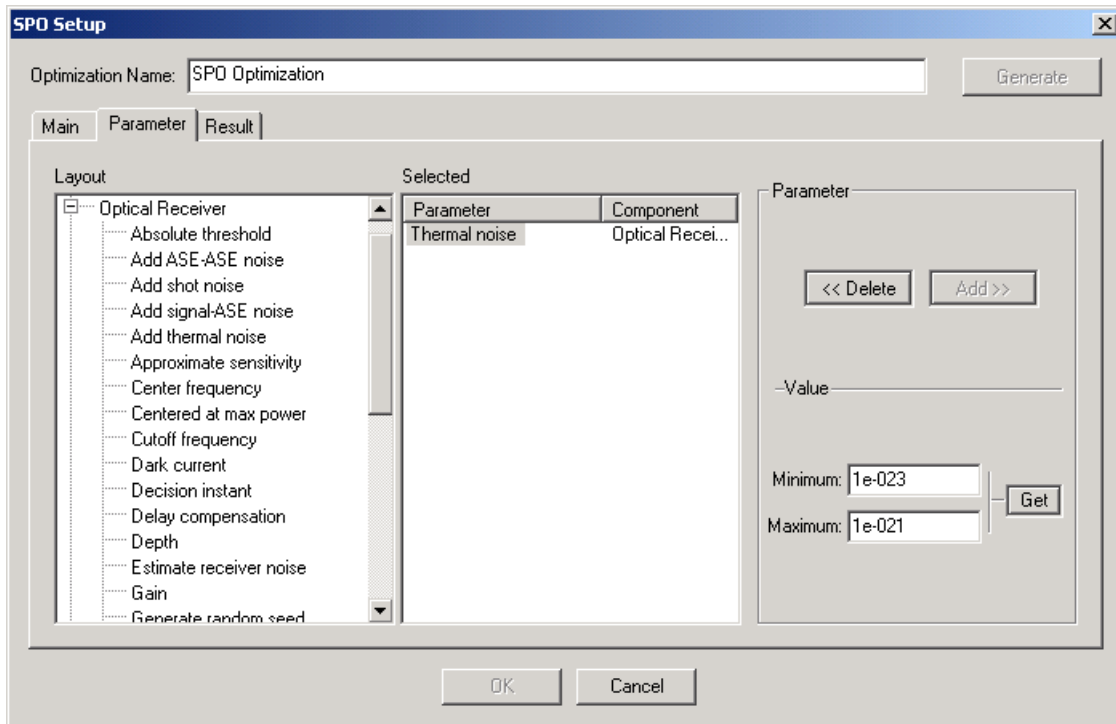
Description:

Modifying parameter information

- | Step | Action |
|-------------|--|
| 1 | Select the Parameters tab. |
| 2 | To optimize parameters, move the parameters into the parameter list by following these steps: <ol style="list-style-type: none"> a. Select the parameter to be optimized in the Layout list. b. Click Add to insert the parameter in the list. c. Modify the Minimum and Maximum parameter values. d. Click Get if you want to retrieve the values from the active (current) design layout. |



Figure 14 SPO Setup dialog box—Parameters tab



Modifying result information

- | Step | Action |
|------|---|
| 1 | Select the Results tab. |
| 2 | To include results in the optimization, move the results into the result table by following these steps: <ol style="list-style-type: none"> Select the result in the Layout list. Click Add to insert the result in the list. Modify the Target Value, if required. Click Get if you want to retrieve the values from the active (current) design layout. |

Figure 15 SPO Setup dialog box—Results tab

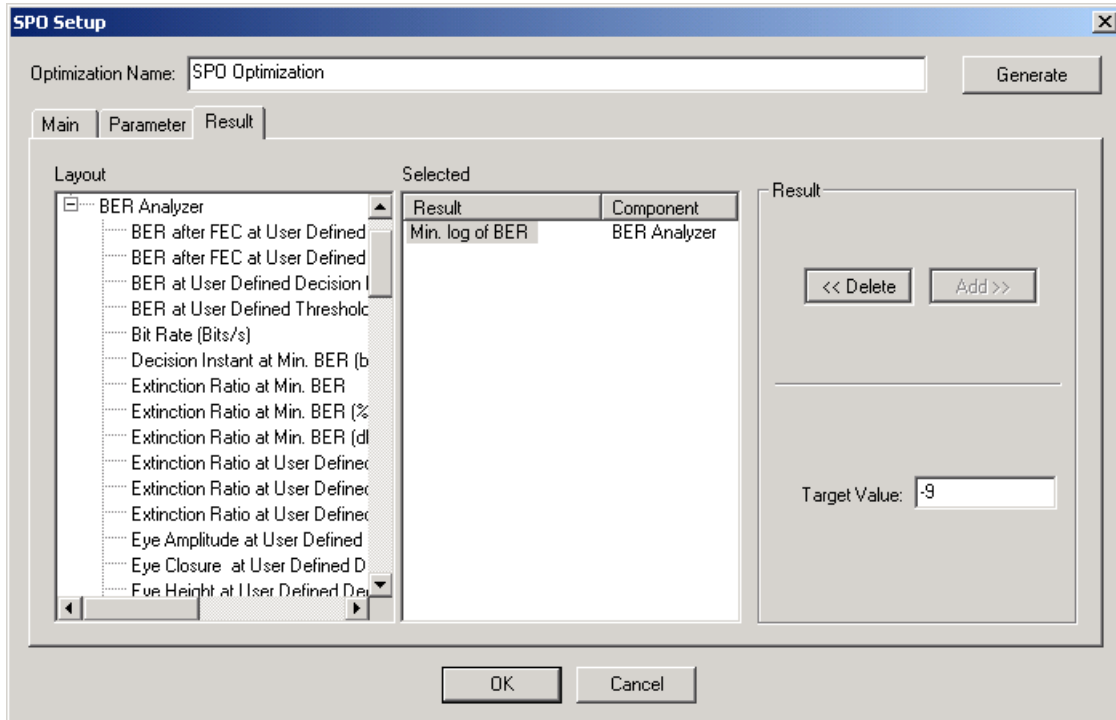


Figure 16

Running the optimization

To run the optimization, perform one of the following procedures.

Step Action

- 1 From the **File** menu, select **Calculate**.
*The **OptiSystem Calculations** dialog box appears.*
- 2 Select **Run all optimizations**, and click the **Run** button.
The simulation runs.

Step Action

- 1 Select **Tools > Optimizations**.
*The **Optimizations** dialog box appears.*
- 2 Select the optimization you want to run from the **Layout Optimizations** list.
- 3 If you want to see the optimization progress, click **Output** in the Calculation window.
*The **Output** window appears.*
- 4 Click the **Run** button in the **Calculation** window.
The simulation runs.



Note

Gain flattening filter optimization (Gain FFr)

This optimization is an advanced optimization tool that can estimate the transmission values of a gain flattening filter. EDFAs have a wavelength-dependent gain; i.e., some wavelengths are amplified more than others. A gain-flattening filter restores all wavelengths to approximately the same intensity. OptiSystem use optimization capabilities to design a gain-flattening filter which will flatten (or equalize) the output of the EDFA so that it is flat with a user defined tolerance or ripple.

There optimization requires a **Gain Flattening Filter** component and a **Dual Port WDM Analyzer**.

Parameters

Parameters in each tab are described in the following tables. They also give a summary of the meaning of each parameter with value ranges and default values.

Main

Name/Description	Default value	Value range
Optimization Name User defines the name, or OptiSystem generates name.	Optimize <i>Gain Flattening Filter</i> based on <i>Dual Port WDM Analyzer</i>	
Maximum number of steps Number of times OptiSystem will calculate the current layout until the tolerance is attained.	10	[1, INF]
Minimum transmission value The minimum value allowed for the filter transmission	-40	[-INF, 0]
Maximum transmission value The maximum value allowed for the filter transmission. It is also the value outside the wavelength range	-0.1	[-INF, 0]
Wavelength from The lower wavelength limit for the optimization	1500	[100, 2000]

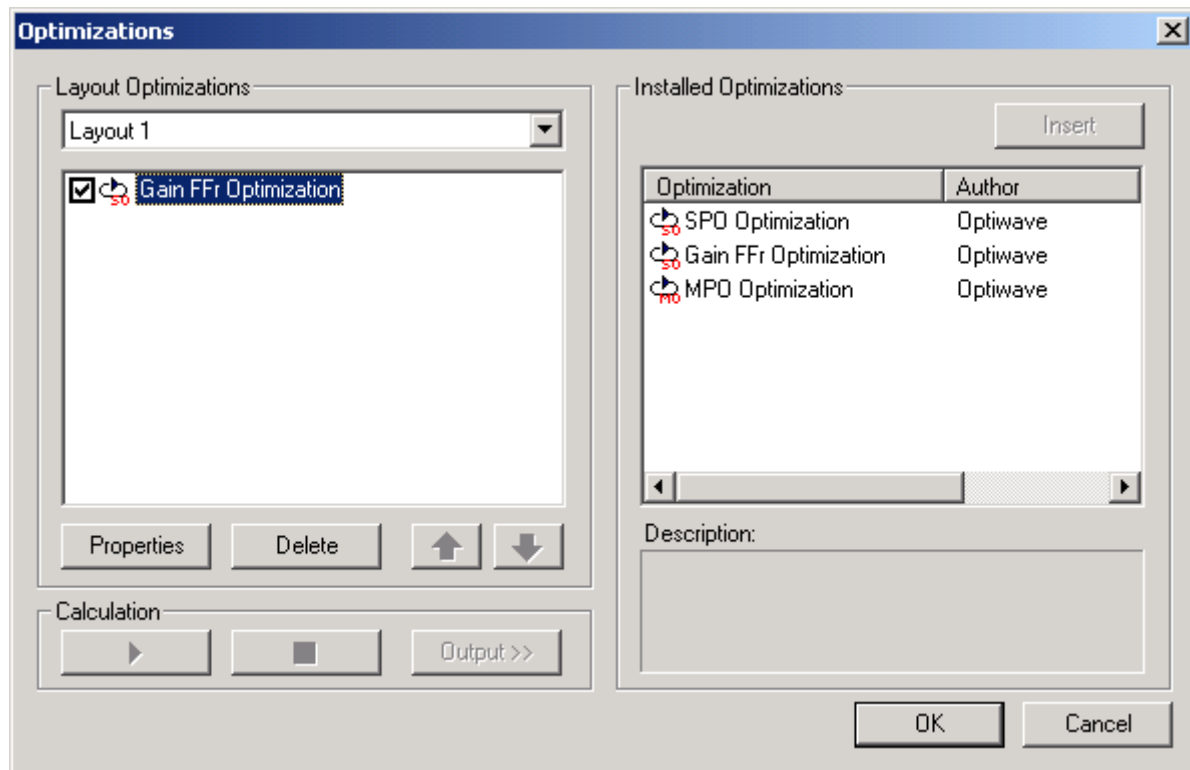


Name/Description	Default value	Value range
Wavelength to	1600	[100, 2000]
The upper wavelength limit for the optimization		
Tolerance	0.1	[0,+INF]
The maximum filter ripple		

Setting up the optimization

The main optimization window is shown in [Figure 17](#). You can add as many single-parameter optimizations from the table as you like. You can activate or deactivate them one by one or altogether.

Figure 17 Optimizations dialog box



Adding a new optimization

To add a new optimization to your project, perform the following procedures.

Adding general information

Step	Action
1	Selecting Tools > Optimizations from the Main menu.
2	Select the optimization you want to add from the list in the Installed Optimizations window and click Insert .
3	To change the optimization options or parameters/results, click Properties . <i>The Optimization Setup dialog box appears (see Figure 18).</i>

You can either type a name for the optimization, or click **Generate** to have the name generated automatically. The name is generated based on the **Optimization Type** as follows:

Optimize *Gain Flattening Filter* based on *Dual Port WDM Analyzer*.

4	If you want to change the maximum number of steps, modify the Maximum number of steps parameter.
5	Set the Minimum and Maximum transmission value parameters
6	Set the Wavelength range for the optimization.
7	Set the Tolerance , or the gain ripple for the optimized filter.



Figure 18 Gain FFr Setup dialog box—Main tab

GFFrO Setup

Optimization Name: Generate

Main Components Visualizers

Optimization

Maximum number of steps:

Minimum transmission value: (dB)

Maximum transmission value: (dB)

Wavelength from: (nm)

Wavelength to: (nm)

Tolerance: (dB)

General Info

Author:

Version:

Copyright:

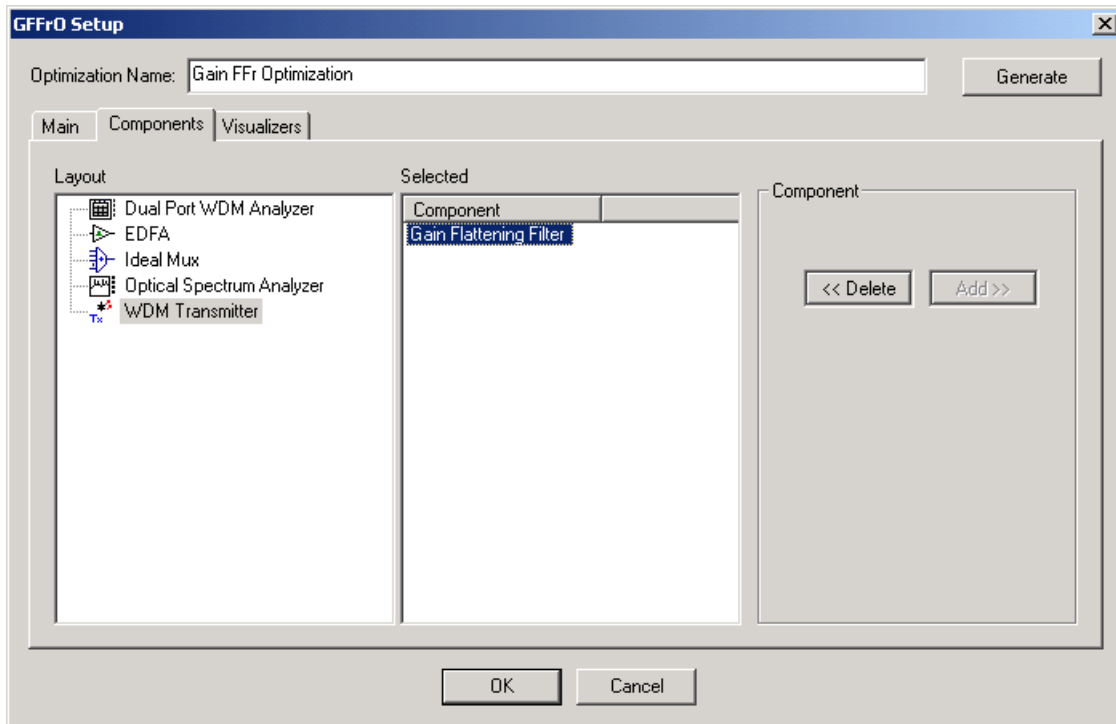
Description:

OK Cancel

Modifying parameter information

Step	Action
1	Select the Components tab.
2	To optimize a filter, move the filter into the component list by following these steps:
Note: You must select one Gain Flattening Filter component from the list. - Select the filter to be optimized in the Layout list. - Click Add to insert the component in the list.	

Figure 19 SPO Setup dialog box—Parameters tab



Modifying result information

- | Step | Action |
|------|---|
| 1 | Select the Visualizers tab. |
| 2 | To include Visualizers in the optimization, move the visualizer into the visualizer table by following these steps: <div style="margin-left: 20px;"> <p>Note: You must select one Dual Port Dual Port WDM Analyzer visualizer from the list</p> <ol style="list-style-type: none"> a. Select the visualizer in the Layout list. b. Click Add to insert the visualizer in the list. </div> |



Figure 20 SPO Setup dialog box—Results tab

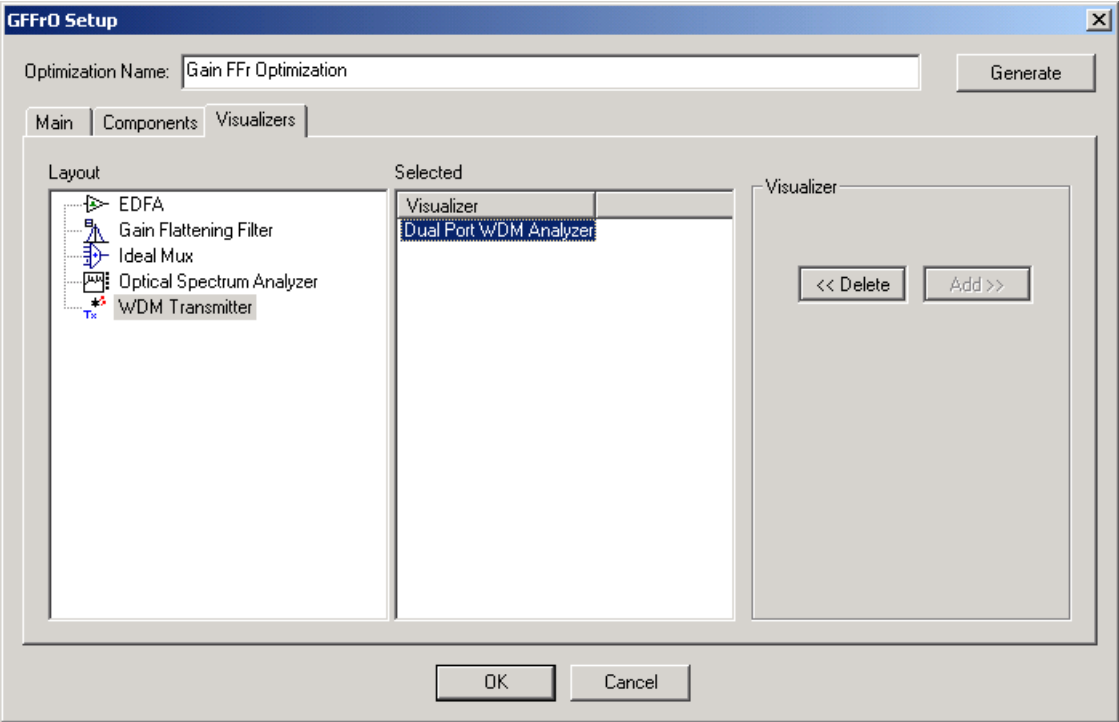


Figure 21

Running the optimization

To run the optimization, perform one of the following procedures.

Step Action

- 1 From the **File** menu, select **Calculate**.
 *The **OptiSystem Calculations** dialog box appears.*
- 2 Select **Run all optimizations**, and click the **Run** button.
 The simulation runs.

Step Action

- 1 Select **Tools > Optimizations**.
 *The **Optimizations** dialog box appears.*
- 2 Select the optimization you want to run from the **Layout Optimizations** list.
- 3 If you want to see the optimization progress, click **Output** in the Calculation window.
 *The **Output** window appears.*
- 4 Click the **Run** button in the **Calculation** window.
 The simulation runs.



Note

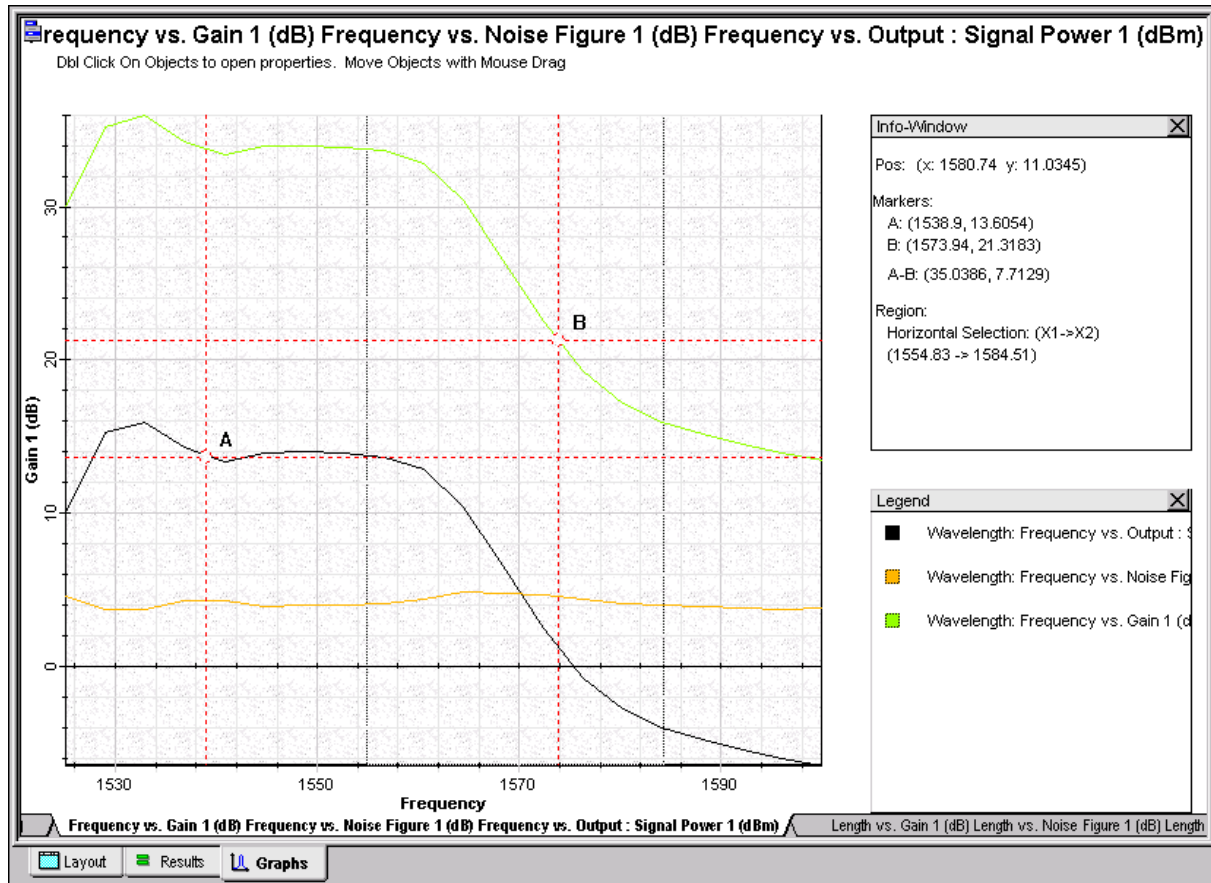




Appendix A—Opti2D Graph Control

The Graph control is a versatile and powerful tool for observing data. It is also quite simple to use. The following section of this document gives a brief description of some of the features and an explanation of how to use them.

Figure 22 Opti2D Graph Control



User interface features

Feature	Description
Large data handling capabilities	Opti2D Graph Control is capable of handling millions of points.
Optimized drawing	Even with a large number of data points, Opti2D Graph Control is optimized to allow for smooth tracing and panning of graphs.
Moveable information windows	Moveable information windows allows for placement of the windows in the most convenient location in the graph window.
Graph toolbox	The popup Graph toolbox allows easier access to the viewing/organizing/editing capabilities of the Opti2D Graph tool.
Graph menu button	The Graph menu button allows you to access a full list of functionality associated with the graphs and their data.

Information windows

There are two main windows visible on the main display:

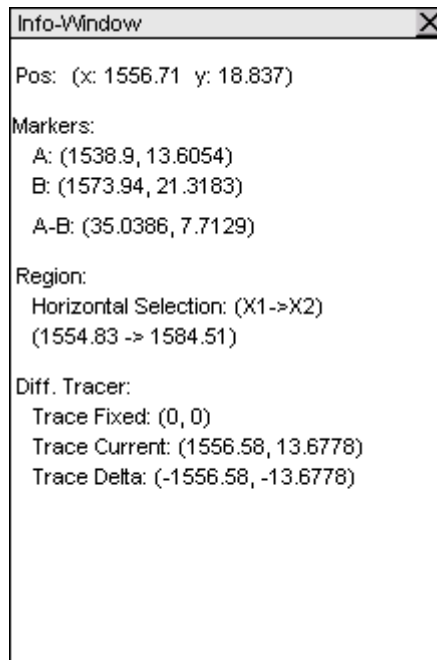
- [Info-window](#)
- [Legend](#)

Both can be launched using the [Graph menu](#) or [Graph tools](#).



Info-window

Figure 23 Info-window

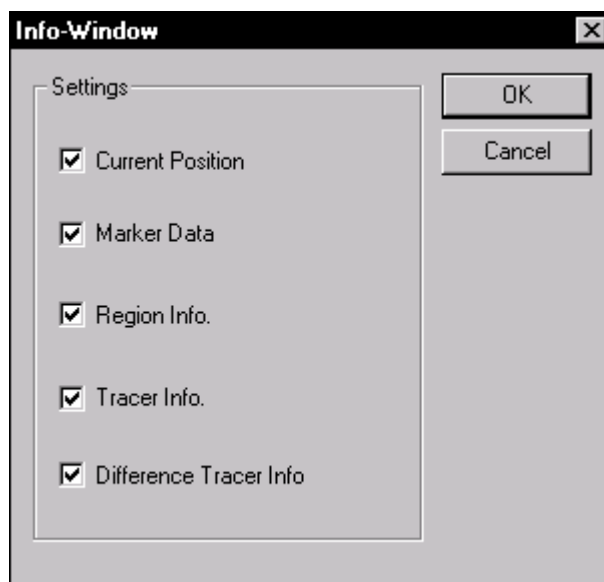


When you access the **Info-Window**, it displays in the work area of the graph view. By default, it displays the current position (in data-based coordinates) of the cursor. When you add marker, tracers, and regions, the Info-Window expands to show the details of these components.

When you use the **Select** tool, if you double click in the window, the **Info-Window** properties dialog displays (see [Figure 23](#)).



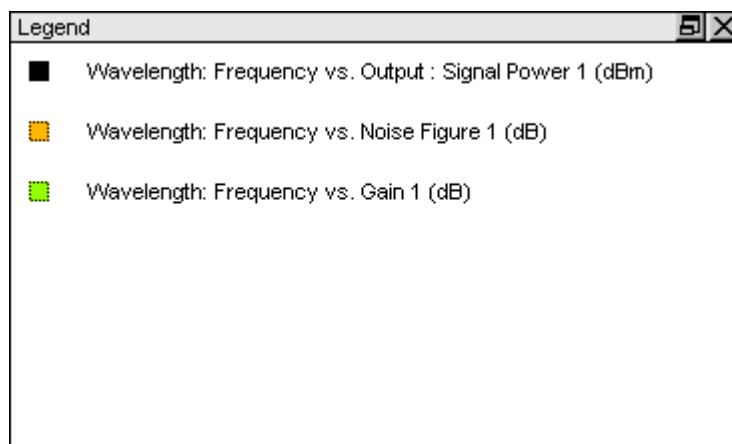
Figure 24 Info-Window settings dialog



Legend

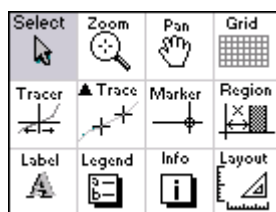
You can switch the **Legend** on and off using the Legend tool in the **Graph toolbox**, or the **Graph** menu. The **Legend** displays a list of all the curves displayed in the graph with the corresponding line color that is used to display those curves. See [Figure 25](#). Use the **Minimize/Maximize** button to change the display of the **Legend**, or close the **Legend** by using the **Close** button.

Figure 25 Legend



Graph toolbox

Figure 26 Popup Graph toolbox



To access the **Graph toolbox**, right-click in the graph view. Most graph editing/viewing/organizing capabilities are accessible using the toolbox.

Graph tools



Select

Allows you to manipulate and move most of the objects on the graph.

Note: To edit the properties of an object, double click on the object in the graph view.



Zoom

Zoom in: You can select a rectangular region, or click in the graph view for proportional zoom

in.

Extra features:

- **Zoom out:** Hold **Ctrl** and click to perform a zoom out.
- **Reset Zoom Level:** Double-click in the graph view to return to the default Zoom level.



Pan

Allows you to pan from side to side in the graph display to see parts of the graph that may not be visible at the existing Zoom level or resolution.

To pan, click to grab the display, and move the cursor from side to side.

Extra features:

- If you press **Ctrl** while panning the graph display, accelerated pan is engaged, which makes the pan much faster. This feature is useful when you work under a high zoom factor.



Grid

Allows you to turn the grid lines on/off. Click on the **Grid** tool to toggle the grid lines.



**Tracer**

Allows you to select a curve and trace over it while viewing the exact positional values on the curve in the **Info-Window**. To select a different curve, double click in the graph view.

Extra features:

- You can freeze the tracer by pressing **Ctrl**. Click to place a marker on the curve at that position.
- Press **Shift** and drag the cursor to put the tracer into a high-resolution trace that iterates through each element in the source data array. This allows for a very detailed scan of the data and to find peaks that the standard trace may omit.

**Trace**

Allows you to select a curve and trace over it while viewing the exact positional values on the curve in the **Info-Window**.

Note: The **Difference Tracer** differs from the **Tracer** tool because it allows you to create a second tracer to compare values on either the same curve or on different curves. To select the next curve, double-click on the curve in the graph view.

Extra features:

- By pressing **Ctrl**, the tracer will freeze in its present position. Then, by pressing the left mouse button a marker will be placed on that position on the curve.
- By pressing **Shift** and dragging the mouse, the tracer jumps into a high-resolution trace that iterates through each element in the source data array. This allows for a very detailed scan of the data and to find peaks that the standard trace may omit.

**Marker**

Allows you to place markers in the active graph view. The markers can be horizontal, vertical or both.

The position of the markers is displayed in the **Info-Window**.

**Region**

Allows you to select a horizontal, vertical or rectangular region in the active graph view.

The coordinates of the selection are displayed in the **Info-Window**.

**Label**

Allows you to place customized labels in the active graph view.

**Legend**

Allows you to toggle the **Legend** on and off within the active graph view.

**Info**

Allows you to toggle the **Info-Window** on and off within the active graph view.





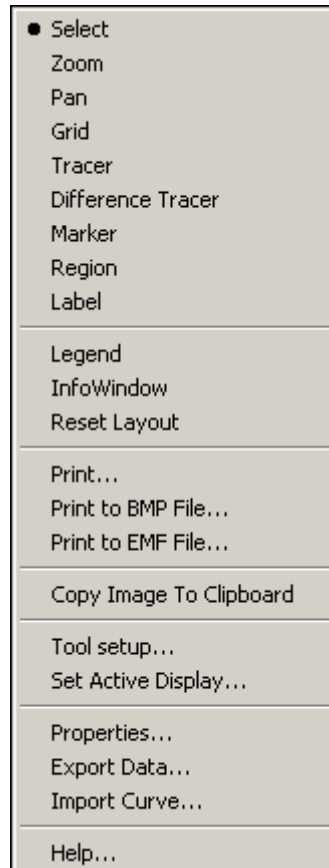
Layout

Allows you to reset the layout and place all windows in their default positions.

Graph menu

You launch the **Graph menu** by clicking on the blue icon in the top left corner of the **Graph** view.

Figure 27 Graph menu



Graph Menu button

The **Graph Menu** button is in the top left corner of the graph view.



Tools

The tools available from the Graph menu include:

- [Select](#)
- [Zoom](#)
- [Pan](#)
- [Grid](#)
- [Tracer](#)
- Difference [Tracer](#)
- [Marker](#)
- [Region](#)
- [Label](#)

Windows

The information windows available in the Graph Menu include:

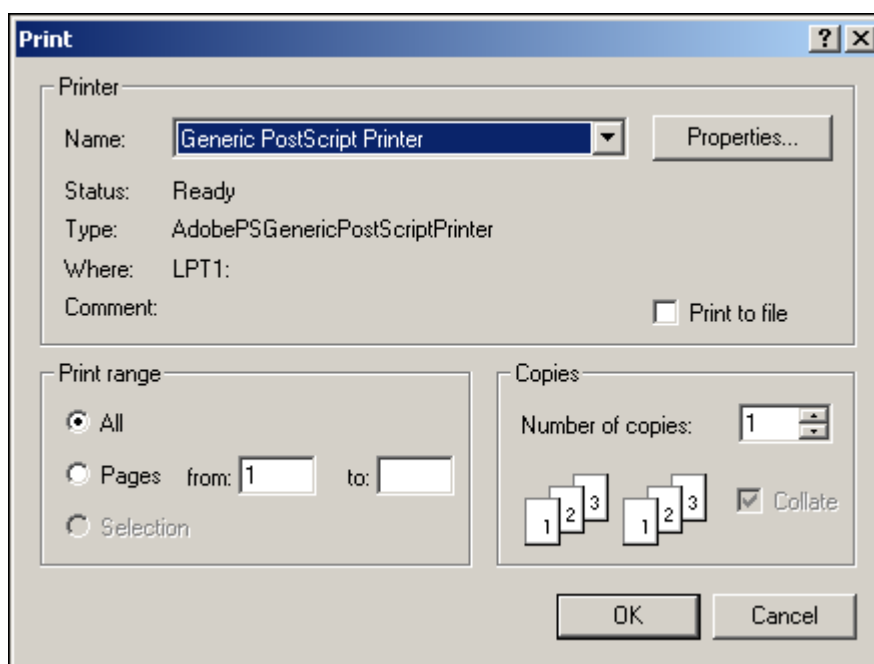
- [Legend](#)
- [Info Window](#)
- Reset [Layout](#)

Printing and exporting files

Print

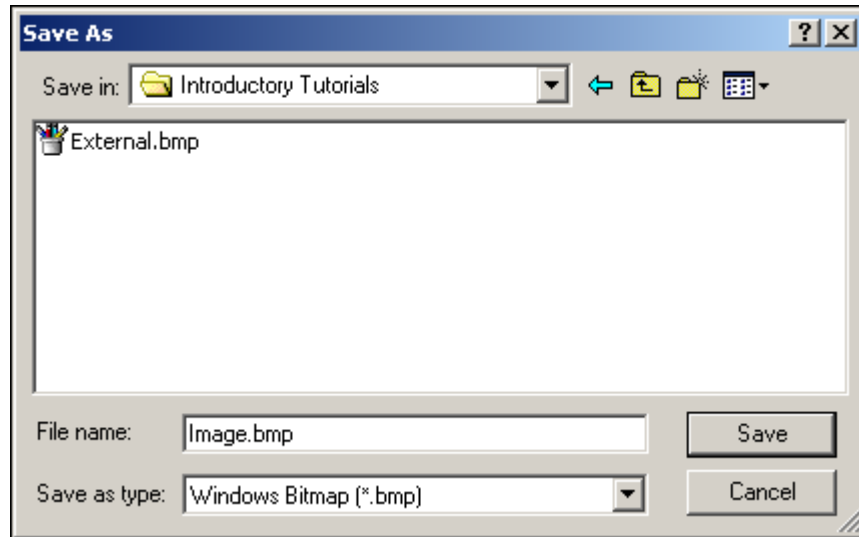
Launches a print dialog and allows you to print an image of the active graph view.

Figure 28 Print dialog

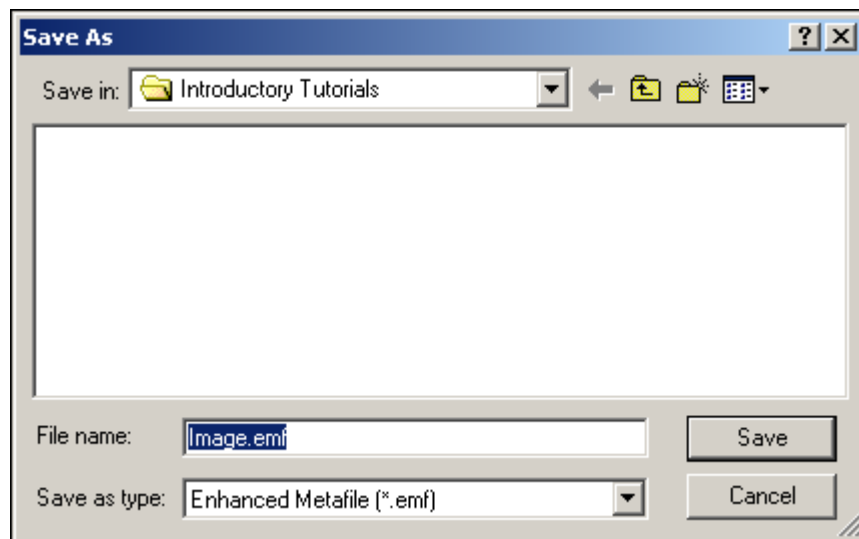


Print to BMP file

Exports an image of the active graph view to a file in .bmp format using the Save As dialog.

Figure 29 Print to BMP file**Print to EMF file**

Exports an image of the active graph view to a file in .emf format using the Save As dialog.

Figure 30 Print to EMF file**Copy image to clipboard**

Copies an image of the active graph view to the clipboard.



Utilities

Tool setup

Allows you to modify the properties of some of the tools.

Note: The tool property dialog only launches if the active tool allows settings to be changed.

Set Active Display

Allows you to select the active display. For more information see [“Displays” on page 208](#).

Properties

Allows you to launch the graph **Properties** dialog. For more information see [“Graph Properties dialog” on page 209](#).

Export Data

Launches the **Data Export** dialog box that displays a list of all the curves on the graph control and displays the data coordinates of those curves. It also allows you to export the data points to a text file (**Export Display** or **Export Curve**). The format of the data is either **Single Pair** or **Table** (see [Figure 31](#)).

The file is in the format below.

X1 (tab) Y1 (**Single Pair**)

or

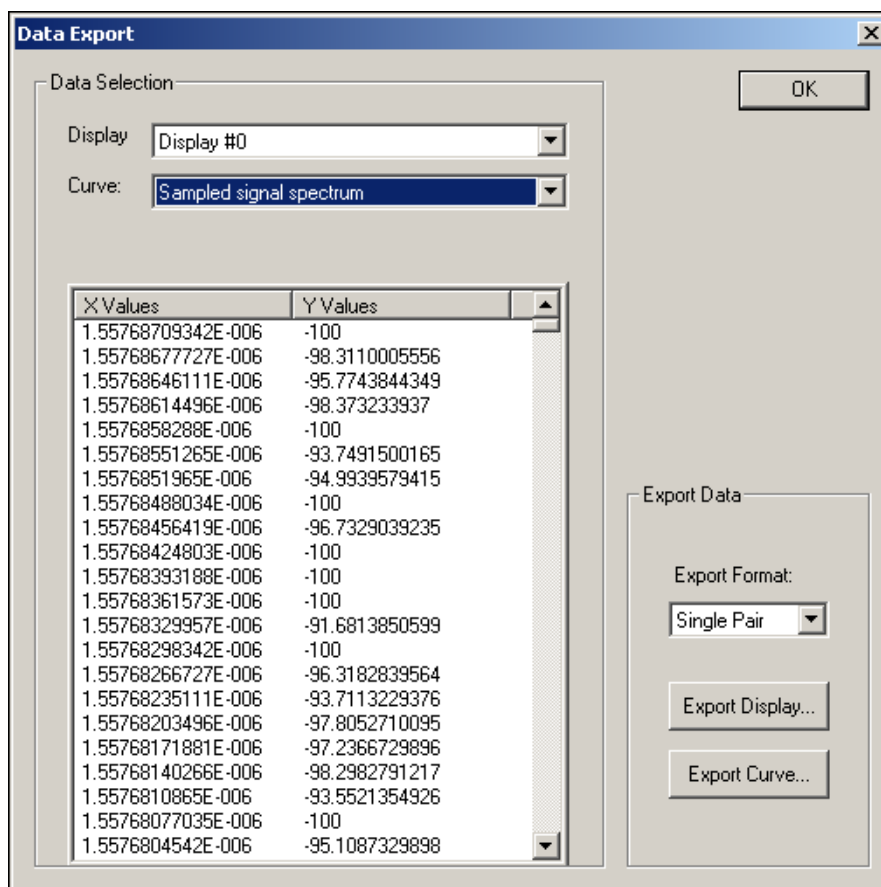
X1 (tab) Y1

X2 (tab) Y2

Etc... (**Table**)



Figure 31 Data Export dialog



Import Curve

Allows you to import a curve from a text file. The file must be in the format below.

X1 (tab) Y1

X2 (tab) Y2

Etc...

Ex:

// (Beginning of file) (this line should not be in the file)

123.23 123.45

123.24 124.55

123.25 555.5

123.26 222.22

//(End of file) (this line should not be in the file)



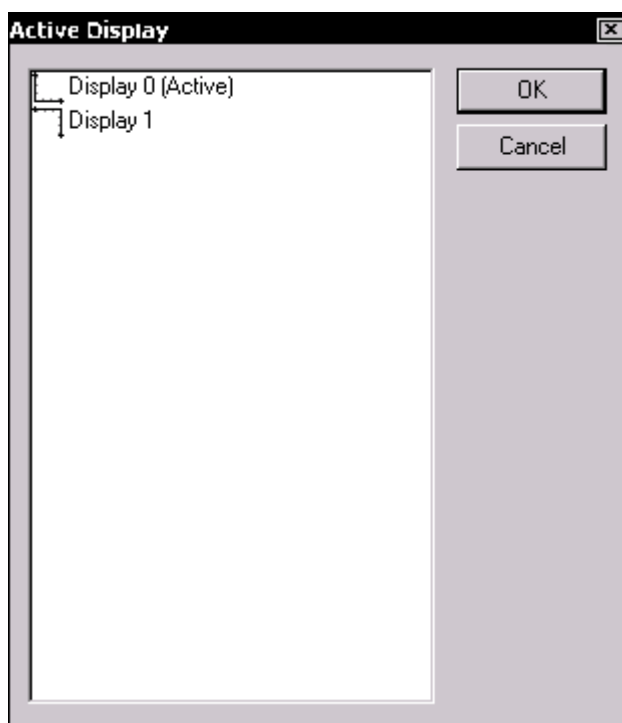
Help

Launches a help dialog box specifically related to the Opti2D Graph Control.

Displays

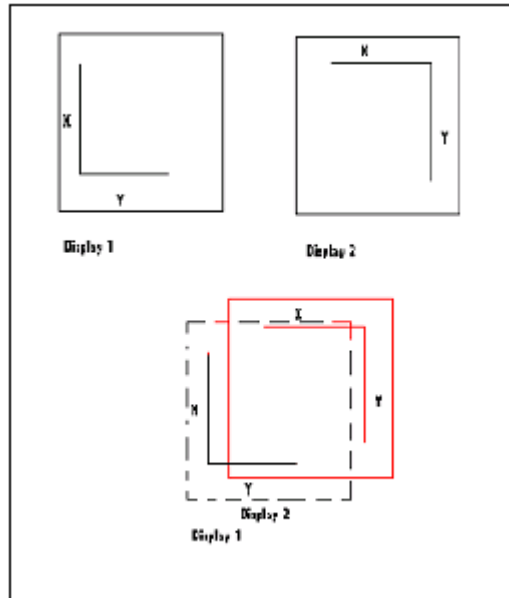
The graph is made up of layered displays. Each display has a pair of axes. By default, the control contains one display with **Axis X** on the bottom of the display and **Axis Y** on the left. In the case of complex graphs that require more than one pair of axes, more than one display exists. See [Figure 32](#).

Figure 32 Active Display dialog box



Any objects that you place on the graph (such as markers) are placed on the active graph view. Therefore, if you place a marker on the graph and Display 1 is active, the new marker is based on the coordinate system of Display 1. If you want to add a marker on Display 2, you must select the main menu in the **Graph menu**. This launches the **Graph Display** dialog, which permits you to select a different display. In complex graphs, the displays are layered one on top of the other.

Figure 33 Graph displays



Graph Properties dialog

The graph **Properties** dialog allows you to manage properties of the graph.

The graph **Properties** dialog tabs include:

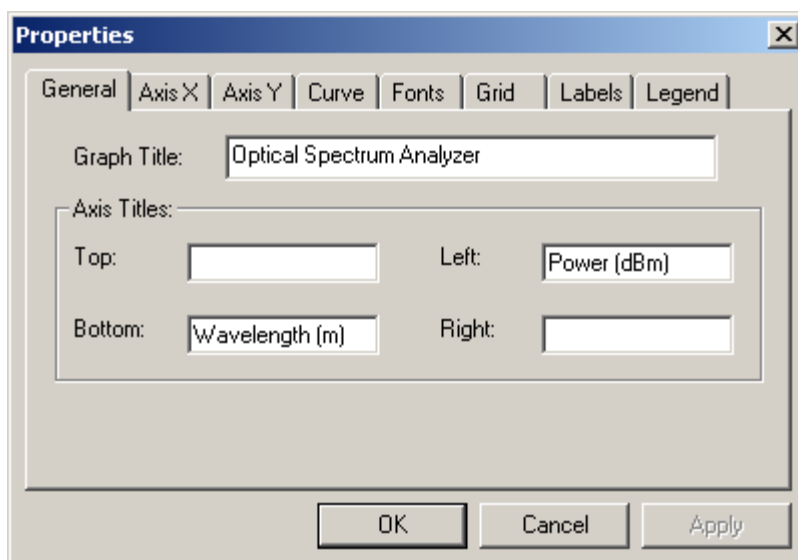
- [General](#)
- [Axis X](#)
- [Axis Y](#)
- [Curve](#)
- [Fonts](#)
- [Grid](#)
- [Legend](#)
- [Labels](#)



General

Allows you to change the titles of the graph, and the titles of the axes (see [Figure 34](#)).

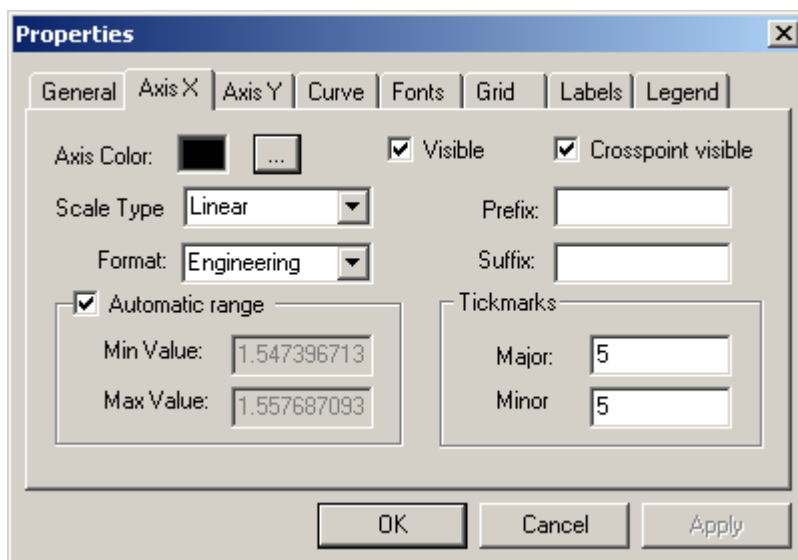
Figure 34 General tab



Axis X

Allows you to set properties of the X-axis (see [Figure 35](#)).

Figure 35 Axis-X tab



Axis Color:

Select a color for the X-axis, and select whether the axis is **Visible** and the **Crosspoint** is visible.

The values in **Scale Type** can be:

- Linear
- Logarithmic
- DB

The values in **Format** can be:

- Decimal: simple decimal values (1000.0, 2000.0, 3000.0)
- Exponential: exponential notation (1.0-e3, 2.0-e3, 3.0-e3)
- Engineering: engineering notation (1k, 2k, 3k)
- Scientific: scientific notation (1.0×10^3 , 2.0×10^3 , 3.0×10^3)

Prefix: You can place a prefix string before each of the scale values.

Suffix: You can place a suffix string after each of the scale values (e.g. 1000.0 nm)

Automatic Range, Min Value, Max Value: You can check **Automatic Range**, which sets the range according to the curves in the displays, or force the axis range to certain values.

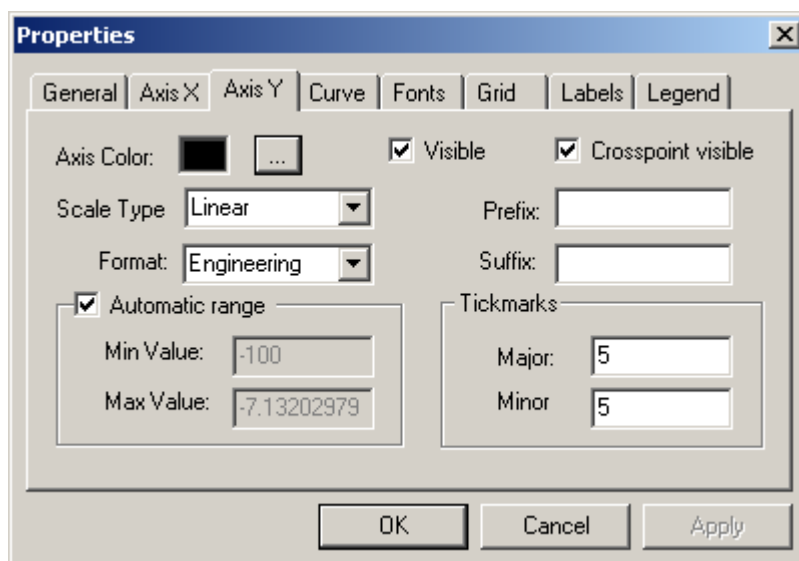
Tickmarks: You can set the number of major and minor tick marks on the Axis.

Axis Y

Allows you to set properties of the Y-axis (see [Figure 36](#)).

To see descriptions of the **Axis Y** dialog fields, see [“Axis X” on page 210](#).

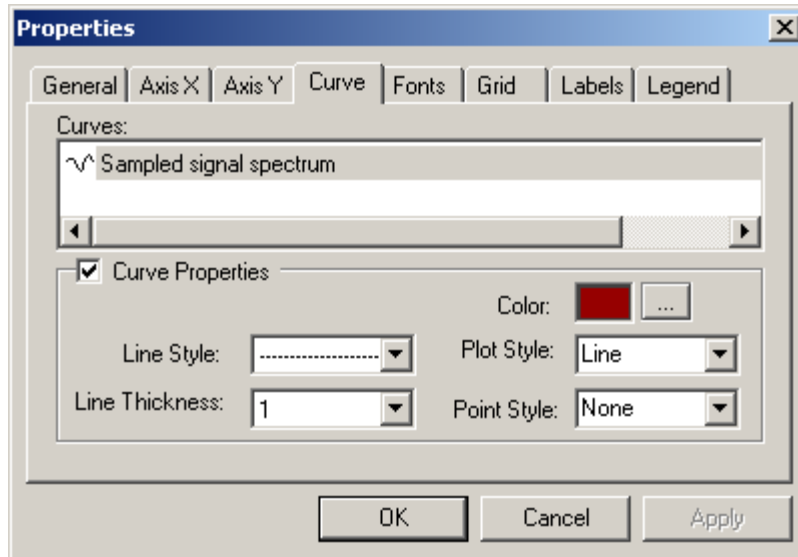
Figure 36 Axis Y tab



Curve

Allows you to set various properties of the curves that are added to the control (see [Figure 37](#)).

Figure 37 Curves tab



Curve List: Displays all of the curves on the active display.

Curve Properties

Color: Allows you to choose the color of the selected curve.

Line Style: Allows you to select the line style of the selected curve.

Plot Style: Allows you to select the plot style.

The values in **Plot Style** can be:

- Point
- Line
- Segment Left
- Segment Right
- Segment Center
- Step Left
- Step Right
- Drop Line

Line Thickness: Allows you to select the thickness of the currently plotted curve line. Values range from 1 to 8.



Point Style: Allows you to select the style in which each point on the curve will be drawn.

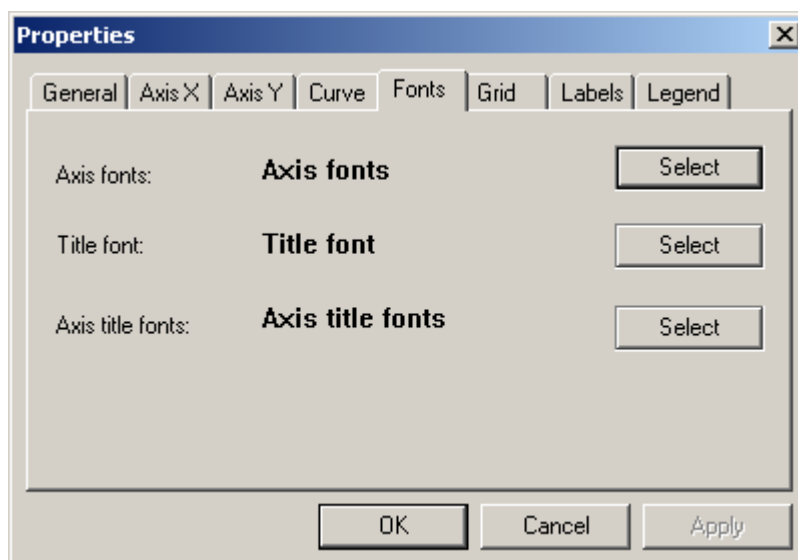
The values in **Point Style** can be:

- None
- Circle
- Square
- Diamond
- Cross

Fonts

Allows you to select the fonts used for displaying titles and axis values (see [Figure 38](#)).

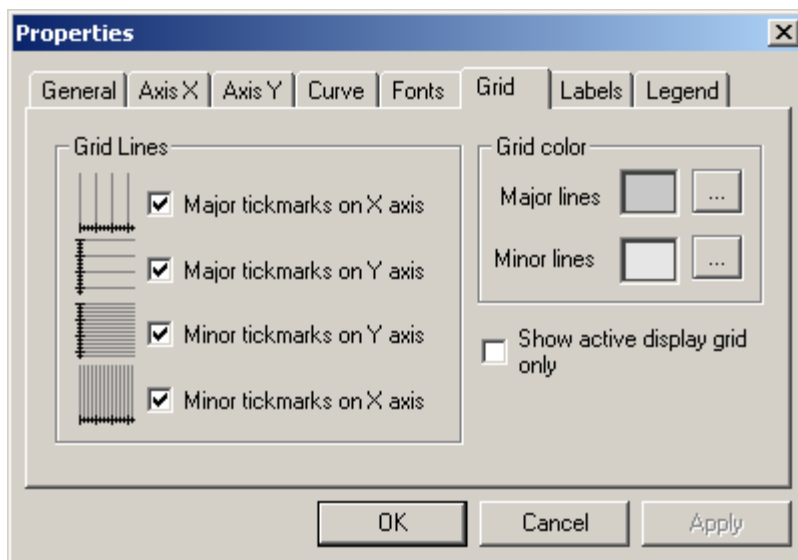
Figure 38 Fonts tab dialog



Grid

Allows you to select which of the grid lines on the display are visible, and what color they are to be displayed in (see [Figure 39](#)), and whether you only show the active display grid (**Show active display grid only**).

Figure 39 Grid tab



Labels

The **Labels** tab allows you to remove and edit labels on the graph (see [Figure 40](#)). To add a label, you use the **Label** tool in the **Graph toolbox** (see [Graph tools](#)).

Note: For removing a large number of labels or labels that may have been positioned at coordinates that are not in the viewable area, it is easier to remove or edit them using the **Labels** tab, because of the multiple selection feature.

Use the **Label Properties** dialog to edit the name or coordinates of the selected label, or delete the label (see [Figure 41](#)).

Figure 40 Labels tab

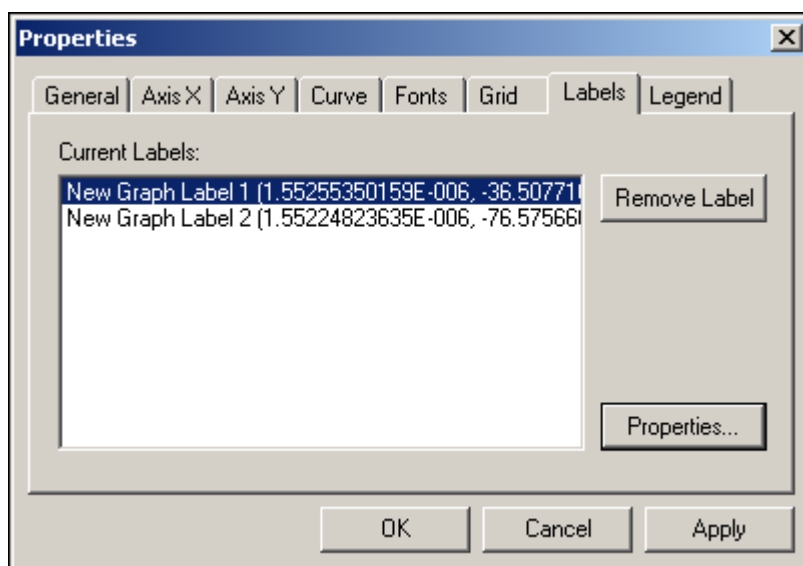
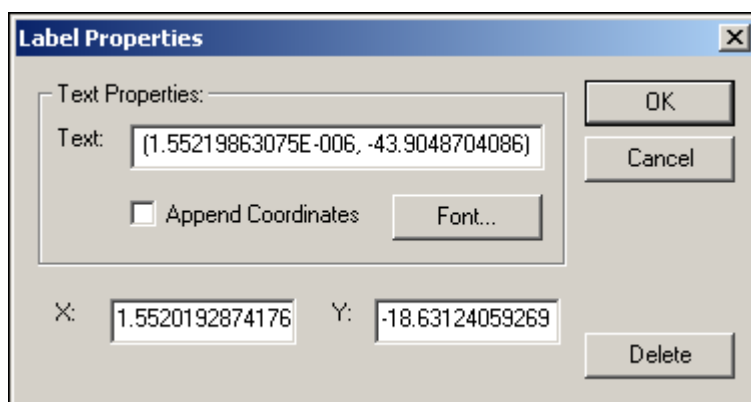


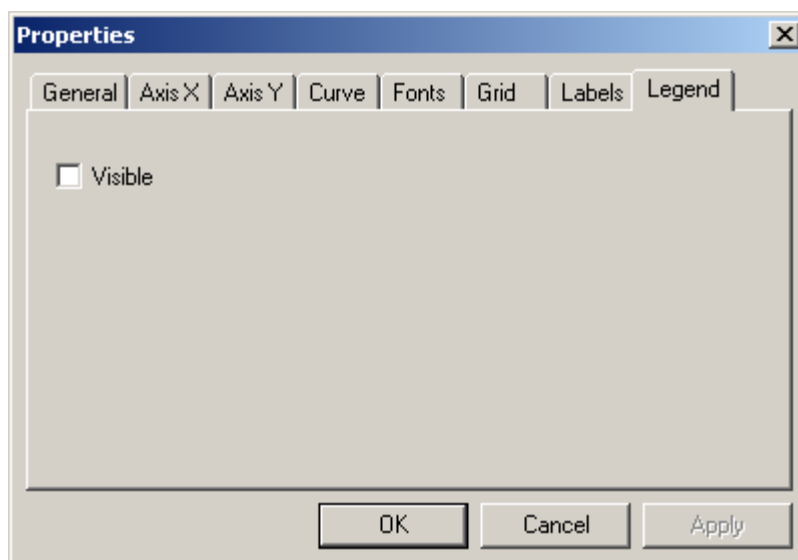
Figure 41 Labels tab—Label Properties dialog



Legend

Allows you to toggle the graph legend to be **Visible** or invisible.

Figure 42 Legend tab dialog





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