

Designer v6.1 User's Guide



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Table Of Contents

Welcome to Designer.....	1
Starting Designer	3
Back-Annotation.....	5
Starting a New Design	7
Opening An Existing Design.....	8
Opening Designs Created in Previous Versions	8
Opening Locked Files	8
Starting Other Applications from Designer (Pc Only)	9
About Your Installation	10
Directory Preferences.....	10
Updates	10
Proxy	11
File Association (Pc Only)	11
Setting Your Log Window Preferences.....	11
PDF Reader (UNIX Only)	12
Web Browser (UNIX only)	12
Device Selection Wizard	12
Setting Die, Package, Speed, And Voltage.....	12
Device Variations	12
Setting Operating Conditions	13
Changing Design Name and Family	14
Changing Device Information.....	14

Importing Source Files.....	15
Auditing Files	17
Importing Auxiliary Files	17
Keep Existing Timing Constraints in SDC Files	18
Keep Existing Physical Constraints	18
Compiling Your Design.....	19
Setting Compile Options	19
MX, SX, SX-A, eX Compile Options	19
Axcelerator Compile Options	20
ProASIC and ProASIC ^{PLUS} Compile Options.....	20
ProASIC3/E Compile Options	20
About Design Constraints	25
About Location and Region Assignments.....	25
About Physical Constraints and Attributes.....	25
Types of Physical Constraints	26
Timing Constraints	26
Running Layout	27
Axcelerator Layout Options.....	27
ProASIC3/E, ProASIC ^{PLUS} , and ProASIC Layout Options.....	28
ProASIC3/E, ProASIC ^{PLUS} , and ProASIC Layout Advanced Options	29
eX, SX, SX-A Layout Options.....	29
eX, SX, and SX-A Advanced Layout Options	30
ACT, MX, and DX Layout Options	30

ACT, MX, and DX Advanced Layout Options.....	31
Incremental Placement.....	31
Multiple Pass Layout.....	32
Analyzing Timing in Your Design	33
Analyzing Power Consumption in Your Design.....	33
Viewing Your Netlist.....	33
Back-Annotation.....	33
Available Report Types	35
Status Reports	35
Timing Reports	36
Pin Reports	36
Flip-Flop Reports.....	37
Power Reports	37
Timing Violations Reports	38
I/O Bank Reports.....	38
Exporting Files	41
Saving Your Design.....	43
Exiting Designer.....	43
About Tcl Commands.....	45
Tcl Documentation Conventions	47
backannotate.....	48
close_design	50
compile.....	51

export	56
extended_run_shell.....	56
get_defvar	58
get_design_filename.....	59
get_design_info	60
import_aux.....	62
import_source.....	63
is_design_loaded.....	66
is_design_modified.....	67
is_design_state_complete.....	67
layout	69
layout (Advanced Options for the SX family).....	70
layout (Advanced Options for ProASIC and ProASIC ^{PLUS}).....	71
layout (Advanced options for Axcelerator)	73
new_design	75
open_design	76
pin_assign	77
pin_commit	80
pin_fix	80
pin_fix_all	81
pin_unassign.....	82
pin_unassign_all.....	83
pin_unfix.....	83

report	84
save_design	84
set_design	85
set_device	86
set_defvar	88
smartpower_add_pin_in_domain	89
smartpower_commit	90
smartpower_create_domain	90
smartpower_remove_domain	91
smartpower_remove_pin_frequency	92
smartpower_remove_pin_of_domain	93
smartpower_restore	94
smartpower_set_domain_frequency	94
smartpower_set_pin_frequency	96
timer_add_clock_exception	96
timer_add_pass	97
timer_add_stop	98
timer_commit	99
timer_get_path	99
timer_get_clock_actuals	102
timer_get_clock_constraints	102
timer_get_maxdelay	103
timer_get_path_constraints	104

timer_remove_clock_exception.....	104
timer_remove_pass.....	105
timer_remove_stop.....	106
timer_restore	106
timer_setenv_clock_freq	107
timer_setenv_clock_period	108
timer_set_maxdelay	108
timer_remove_all_constraints.....	110
About Design Constraints	110
Designer Naming Conventions	111
Location and Region Assignment Constraints	111
I/O Assignment Constraints	112
Attributes.....	112
Overview - Entering Constraints.....	112
Assigning I/O Constraints.....	113
Assigning Location and Region Constraints.....	113
About Physical Design Constraint (PDC) Files	114
Importing PDC Files (ProASIC3E, ProASIC3, and Axcelerator Families Only)	115
Types of Constraints	116
ProASIC and ProASIC ^{PLUS} Timing Constraints	116
GCF to SDC Timing Constraints Conversion.....	117
GCF Syntax Conventions.....	117
Synopsys Design Constraints (SDC) Files	118

About DCF Files.....	119
DCF Syntax Rules.....	120
About PIN Files	122
I/O Standards Compatibility Matrix.....	122
I/O Standards And I/O Attributes Applicability.....	122
GCF Constraint Quick Reference.....	123
Priority Order for Global Promotion.....	124
dont_fix_globals	124
read	124
set_auto_global.....	125
set_auto_global_fanout	125
set_global.....	125
set_noglobal.....	125
use_global	125
Netlist Optimization Constraints.....	127
Netlist Optimization Constraint Syntax.....	128
dont_optimize	128
dont_touch.....	128
optimize	128
set_max_fanout.....	128
Placement Constraints	129
Macro.....	129
Package Pin and Pad Location.....	130

net_critical_ports.....	131
set_critical.....	131
set_critical_port.....	131
set_empty_io.....	131
set_empty_location.....	131
set_initial_io.....	132
set_initial_location.....	132
set_io.....	133
set_io_region.....	133
set_location.....	133
set_memory_region.....	134
set_net_region.....	134
create_clock.....	135
generate_paths.....	135
set_false_path.....	135
set_input_to_register_delay.....	136
set_max_path_delay.....	136
set_multicycle_path.....	136
set_register_to_output_delay.....	136
About Physical Design Constraint (PDC) Files.....	137
PDC Syntax Conventions.....	138
PDC Naming Conventions.....	140
assign_global_clock.....	141

assign_local_clock	142
assign_net_macros.....	142
assign_region	143
define_region (rectangular region).....	144
define_region (rectilinear region).....	145
delete_buffer_tree.....	146
dont_touch_buffer_tree	147
move_region	148
reset_floorplan.....	148
reset_io.....	149
reset_iobank.....	150
reset_net_critical	151
set_io.....	152
set_iobank.....	152
set_location.....	152
set_multitile_location (ProASIC3/E)	153
set_net_critical.....	156
set_vref.....	157
set_vref_defaults	158
unassign_global_clock.....	158
unassign_local_clock	159
unassign_macro_from_region.....	160
unassign_net_macro.....	161

undefine_region.....	161
Design Object Access Commands.....	162
get_clocks.....	162
get_pins.....	163
get_ports	163
all_inputs	163
all_outputs	164
create_clock (SDC clock constraint).....	164
set_false_path (SDC false path constraint).....	165
set_load (SDC load constraint).....	166
set_max_delay (SDC max path constraint).....	166
set_multicycle_path (SDC multiple cycle path constraint)	167
SDC Command Limitations	168
global_clocks.....	169
max_delays/min_delays	169
io_arrival_times	170
global_stops	171
pin_loads.....	171
I/O Attributes by Family	171
Bank Name	172
Hot Swappable	172
Input Delay.....	172
I/O Standard	173

I/O Threshold	176
Locked	176
Macro Cell	177
Output Drive	177
Output Load or Loading (pf)	178
Pin Number	178
Port Name	179
Power-Up State	179
Resistor Pull.....	179
Schmitt Trigger	180
Skew	181
Slew.....	181
Use Register	182
Actel Headquarters.....	185
Technical Support	186
Customer Service.....	186
Index	187

Welcome to Designer

The Designer interface offers both automated and manual flows, with the push-button flow achieving the optimal solution in the shortest cycle.

The basic steps to implement your design include:

[Starting a new design](#)*

Importing your [source](#) and [auxiliary](#) file(s)*

[Compiling](#) your design

Running [Layout](#) to place-and-route your design

[Back-Annotating](#) your design

Generating your programming file (Fuse or Bitstream)

Programming your device

Designer also includes the following User Tools that can be used to optimize your design:

PinEditor package level floorplanner and I/O attribute editor

ChipEditor chip level module placer

ChipPlanner floorplanning tool

NetlistViewer design schematic viewer

SmartPower power analysis tool

Timer static timing analysis and constraints editor

Timing driven place and route

ACTgen macro generator

These tools give you the flexibility to drive the place-and-route tools and meet your design requirements.

Starting Designer

To start standalone Designer:

On a PC

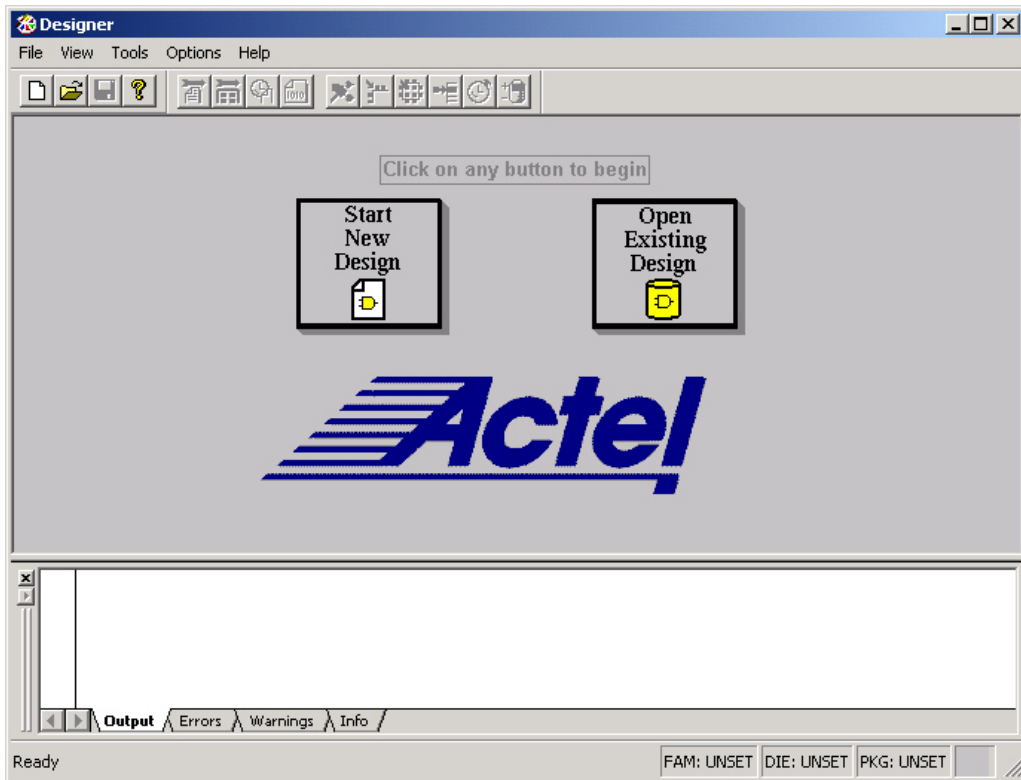
Click **Start**, point to the **Programs** menu and click **Designer**.

UNIX

Type the following command at the prompt:

```
<location of Actel software>/bin/designer
```

Designer opens and is ready for you to initiate your Designer Session.



Back-Annotation

The back-annotation functions are used to extract timing delays from your post layout data. These extracted delays are put into a file to be used by your CAE package's timing simulator. If you wish to perform pre-layout back-annotation, select Export and Timing Files from the File menu.

The Back-Annotation command creates the files necessary for back-annotation to the CAE file output type that you chose. Refer to Actel Interface Guides or the documentation included with your simulation tool for information about selecting the correct CAE output format and using the back-annotation files.

To back-annotate your design:

1. From the **Tools** menu, click **Back-Annotate**, or click the Back-Annotate button in the Design Flow window.
2. Make your selections in the Back-Annotate dialog box and click **OK**.

Extracted Files Directory: The file directory is your default working directory. If you wish to save the file elsewhere, click Browse and specify a different directory.

Extracted File Names: This name is used as the base-name of all files written out for back-annotation. Do not use directory names or file extensions in this field. The file extensions will be assigned based on your selection of which file formats to export. The default value of this field is <design>_ba.

Output Formats: Select the file format of the timing file. One of SDF or STF.

(STF is only supported for ACT1, ACT2, ACT3, DX, MX, SX).

Simulator Language: Select either Verilog or VHDL93.

Export Additional Files: Check Netlist or Pin to export these files at the same time. For Axcelerator, ProASIC3, and ProASIC3E, you must export and use the 'flattened' netlist (AFL-style) with the back-annotated timing file (SDF) in timing simulation.

Note: For Axcelerator, ProASIC3, and ProASIC3E, you cannot select SDF format using File -> Export Files -> Timing.

You have no choice regarding exporting the netlist from the back-annotate command for Axcelerator, ProASIC3, and ProASIC3E. This selection is hard-coded to be 'on'. For all other families, the export-netlist and back-annotate generates equivalent netlist files. So the back-annotate command does not enforce the writing out of the netlist during back-annotate.

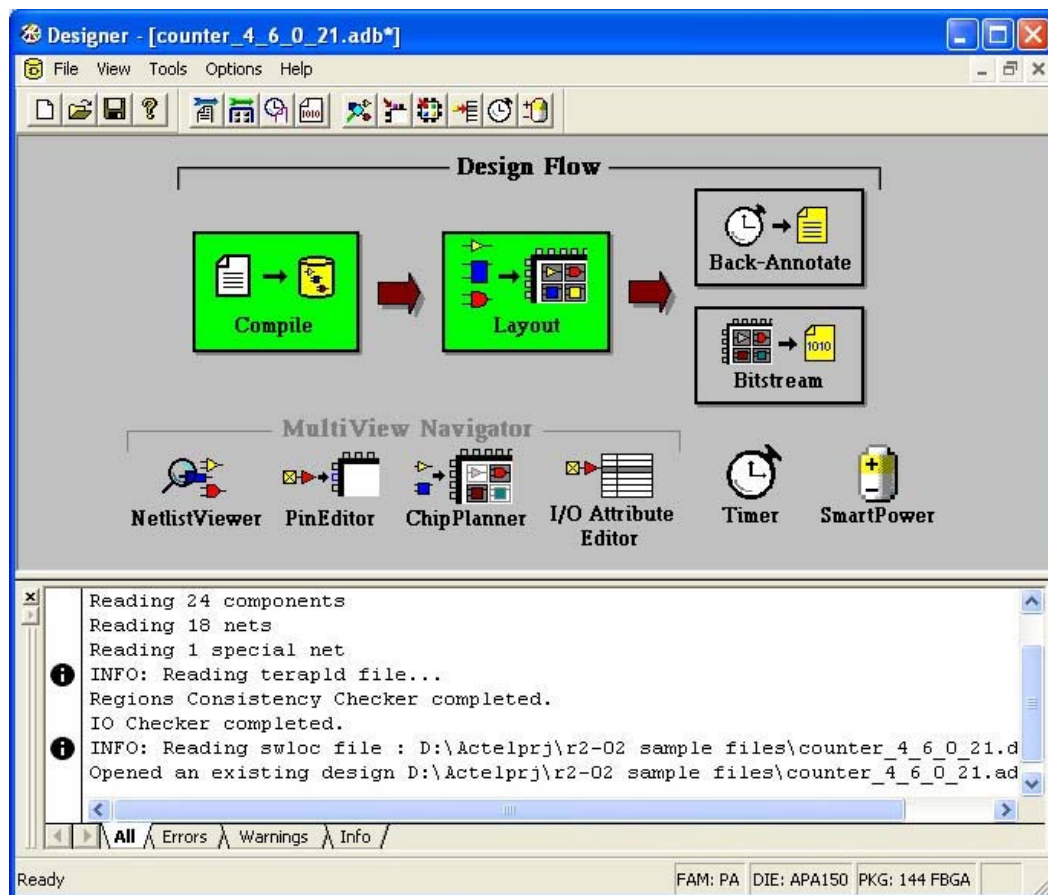
Starting a New Design

To begin a new design session, you must start a new design or open an existing design.

Starting a new design creates an Actel ADB file. ADB files are proprietary Actel project files.

To start a new design:

1. Click **Start New Design** in the Designer main window, or in the **File** menu, click **New**. This displays the Setup Design dialog box.
2. Setup Design:
Enter a **Design Name**. The design name is used in reports and as the default name when saving or exporting files.
Select an **Actel Family** from the drop down menu list.
Specify a **working directory**. Click Browse to locate a directory.
3. Click **OK**. The Designer custom design flow window appears. All tools and commands are activated.



Designer:New Design

Opening An Existing Design

To open an existing design:

1. Click **Open Existing Design** or in the **File** menu, click **Open**. This displays the Open dialog box.
2. Select File. Type the full path name of the .adb file in the File Name box, or select the file from the list.
3. Click Open. Designer's custom design flow window appears and all tools and commands are activated. When you open an existing design, Designer checks to see if you have modified your netlist since the last time you imported the netlist into this design. If you have, Designer prompts you to re-import your netlist.

Opening Designs Created in Previous Versions

Designer can directly open designs created with previous versions of the Designer software.

If your design was created in version 3.1 or earlier, contact Applications or go to <http://www.actel.com/support> for information on converting your design.

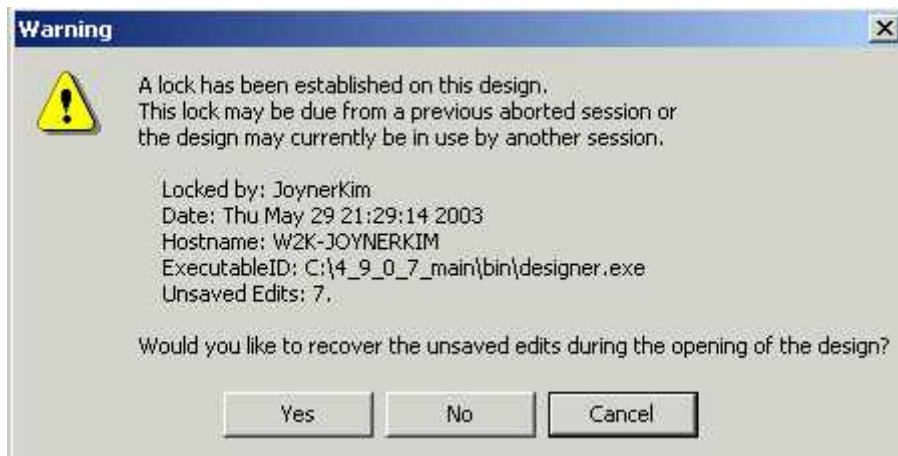
All existing die, package, pin assignments, and place-and-route information is read and maintained. Designs created in previous versions of software may need library conversions when loaded into the Designer environment. If your design requires this conversion, Designer prompts you to allow the software to update the design to the new library before you attempt to start any of the Designer features.

Opening Locked Files

Designer notifies you if a lock has been established on your file. You might get a warning or an error message when opening a design with a lock.

Warning

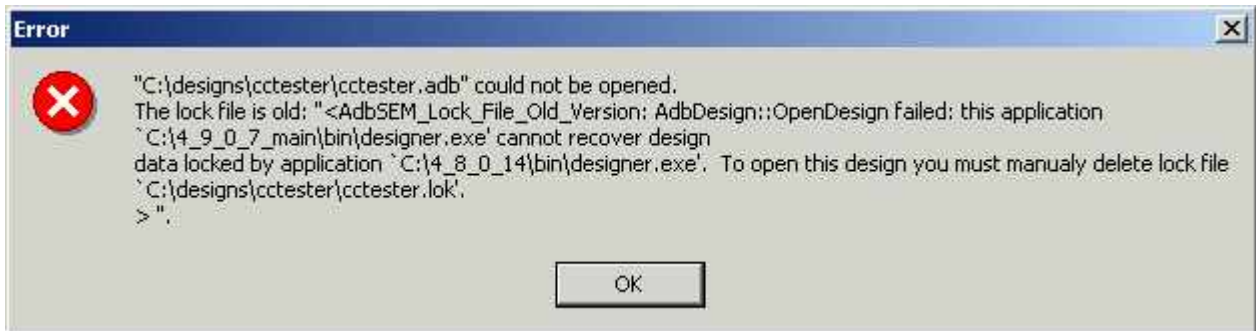
Designer warns you when opening a design that was not closed properly or may be open somewhere else. You can choose to recover the unsaved edits.



Warning: Locked File

Error

When opening a design, an error might notify you that the file can't be opened because the lock file is old. You can't recover any unsaved edits.



Error: Locked File

To open a design with an old lock file:

1. Go to the design directory.
2. Locate the design .adb file and corresponding .lok file.
3. Delete the .lok file.
4. Return to Designer and open the design.

Name	Size	Type	Modified
ada01928.4	87 KB	4 File	2/7/2003 10:24 PM
cctester.adb	87 KB	Actel Designer Desi...	12/11/2001 10:39 AM
cctester.lock	1 KB	LOK File	2/7/2003 10:24 PM

Starting Other Applications from Designer (Pc Only)

You can start any application from Designer that you have added to the Tools menu.

To add an application to the Tools menu:

1. From the Tools menu, click Customize.
2. Enter the application name in the Menu Text area. This text will appear in the Tools command menu.
3. Enter the command to execute, or click the Browse button to select an executable filename. If the location of the command to execute is not in your path, you must include the absolute path when specifying the command.
4. In the Arguments text box, enter the command-line arguments that will be passed to the command when executing.
5. In the Initial Directory field, type the absolute path of the directory in which the application will initially be executed.
6. Click Add.
7. When you are finished adding tools, click **OK**. The application name you added appears in the Tools menu.

To remove an application from the Tools menu:

1. From the Tools menu, click Customize.
2. Select the application to remove and click Remove.

3. When you are finished removing applications, click OK.

To order applications in the Tools menu:

1. From the **Tools** menu, click Customize.
2. Reorder the tools by selecting one at a time and clicking the Move Up or Move Down buttons.
3. Click OK when you are finished. The tools will appear in the Tools menu in the same order as they do in the Menu Contents list box.

About Your Installation

To display information about your license:

From the Start menu, click Programs, and then click the Actel software folder and select About Your Installation. The software displays your complete license configuration, all Actel-installed software and versions, as well as your HostID and disk volume serial number.

You can also select License Details from the Help menu in Designer to view your license information.

Directory Preferences

When executing a command or function such as Open or Save, Designer uses the directory you specify as the start-up directory.

To specify your directory preferences:

1. From the **File** menu, click **Preferences**.
2. Click the **Directory** tab.
3. Specify your Startup directory.
4. Select your working directory options:
5. **To design file's directory when opening design:** Select to automatically change directories when opening a design.
6. **To design file's directory when saving design:** Select to automatically change directories when saving a design.
7. **To script file's directory when executing script:** Select to automatically change directories when executing a script.
8. **Add design name to working directory when creating design:** Select to enable a design name folder to be automatically created in the working directory when creating a new design.
9. Click **OK**.

Updates

The Updates tab in the Preferences dialog box allows you to set your automatic software update preferences.

To set your automatic software update preferences:

1. From the File menu, click Preferences and Updates.
2. Choose one of the following options and click OK.
3. Automatically check for updates at startup: Select to be notified of updates when you start Designer.
4. Remind me to check for updates at startup: Select to be asked if you want to check for a software update when you start Designer.

- Do not check for updates or remind me at startup: Select if you do not want to check for software updates at startup.

To manually check for software updates, from the **Help** menu, click **Check for Software Updates**.

Note: This feature requires an internet connection.

Proxy

A Proxy improves access to the Actel server.

To enable the proxy:

- Select I use a proxy.
- Type the proxy name in the text field.
- Click **OK**.

File Association (Pc Only)

Several programs, including Designer, create files with the .adb extension.

Use the File Association tab in the Preferences dialog box to specify Designer as the default program for files with the .adb extension. Doing so starts Designer whenever a file with the .adb extension is double clicked.

To associated .adb files with the Designer application:

- From the **File** menu, click **Preferences**.
- Select Check the default file association (.adb) at startup to Check the box to associate .adb files with the Designer application. Un-check the box if you do not want Designer to start when clicking a file with the .adb extension.
- Click **OK**.

Setting Your Log Window Preferences

Errors, Warnings, and Informational messages are color coded in the log window. You can change the default colors by using the log Window tab in the Preferences dialog box.

To change colors in the log window:

- From the **File** menu, choose **Preferences**.
- Click the **Log Window** tab in the Preferences Dialog Box.
- Select your new default colors and click **OK**.

The default color settings for the log window are:

Message Type	Colors
Errors	Red
Warnings	Light Blue
Informational	Black
Linked	Dark Blue

The default preference is to Clear log window automatically. This clears the Designer log window each time you close or open a new design in Designer. Uncheck the box if you want Designer to leave the log information after you close a design.

PDF Reader (UNIX Only)

Use the PDF Reader tab to bring up the Designer online manuals. Enter the default reader's name with the full path or click browse.

Web Browser (UNIX only)

Specify the default web browser you wish to use on the UNIX platform. The web browser displays the online help for Designer.

Device Selection Wizard

After you import your source files, the Device Selection Wizard helps you specify the device, package, and other operating conditions. You must complete these steps before your netlist can be compiled.

The wizard steps include:

[Selecting die, package, speed, and voltage](#)

[Selecting variations \(reserve pins and I/O attributes\)](#)

[Setting operating conditions](#)

Setting Die, Package, Speed, And Voltage

The first screen in the [Device Selection Wizard](#) allows you to set die, package, speed, and voltage.

1. In the **Tools** menu, click **Device Selection** to start the Device Selection Wizard.
2. Select **Die** and **Package**. Select a die from the Die list. Available packages are listed for each die.
3. Specify **Speed**.
4. Select **Die Voltage**. Select from the available settings in Die Voltage drop-down menu. Two numbers separated by a “/” are shown if mixed voltages are supported. If two voltages are shown, the first number is the I/O voltage and the second number is the core (array) voltage.
5. Click **Next** to set reserve pins and I/O Attributes.

Device Variations

The second screen in the [Device Selection Wizard](#) enables you to set reserve JTAG and probe pins and the default I/O standard.

To select reserve pins and default I/O standard:

1. Select your reserve pins:
2. Check the Reserve JTAG box to reserve the JTAG pins “TDI,” “TMS,” “TCK,” and “TDO” during layout.
3. Check the Reserve JTAG Reset box to reserve the JTAG reset Pin “TRST” during layout.
4. Check the Reserve Probe box to reserve the Probe pins “PRA,” “PRB,” “SDI,” and “DCLK” during layout.

Reserve Pins are not selectable for the Axcelerator, ProASIC, and ProASIC Plus families.

5. Select an I/O attribute. The I/O Attributes section notifies you if your device supports the programming of I/O attributes on a per-pin basis. For the Axcelerator family, the I/O Attribute section allows you to set the default I/O standard for the I/O banks.

- Click Next to set operating conditions.

Setting Operating Conditions

Operating Conditions, step 3 of the [Device Selection Wizard](#), enables you to define the voltage and temperature ranges a device encounters in a working system. The operating condition range entered here is used by Timer, the timing report, and the back-annotation function. These tools enable you to analyze worst, typical, and best case timing.

Junction Temperature

Select a junction temperature. Supported ranges include:

- Commercial (COM)
- Industrial (IND)
- Military (MIL)
- Automotive
- Custom

Consult the Actel Data Sheet, available at <http://www.actel.com/techdocs/ds/index.html> to find out which temperature range you should use.

If you select Custom, edit the Best, Typical, and Worst fields. Modify the range to the desired value (real) such that Best < Typical < Worst.

You can calculate junction temperature from values in the Actel Data Sheet, available at <http://www.actel.com/techdocs/ds/index.html>.

The temperature range represents the junction temperature of the device. For commercial and industrial devices, the junction temperature is a function of ambient temperature, air flow, and power consumption.

For military devices, the junction temperature is a function of the case temperature, air flow, and power consumption. Because Actel devices are CMOS, power consumption must be calculated for each design. For most low power applications (e.g. 250mW), the default conditions should be adequate.

Performance decreases approximately 2.5% for every 10 degrees C that the temperature values increase. Refer to the SmartPower online help for more information about power consumption.

Voltage

Select a voltage:

- Commercial (COM)
- Industrial (IND)
- Military (MIL)
- Automotive
- Custom

If you select Custom, you may choose from Best > Typical > Worst in the drop-down menu.

Radiation Derating

Conservative post radiation performance estimates are available for some radiation tolerant devices based upon the number of KRads the device is expected to be subjected to. Radiation effects vary by device lot and may not be completely representative of the lot you are using. Post radiation timing numbers are only meant to be a guide and are not a guarantee of performance. Customers must consult the specific radiation performance report for the specific lot used. Post radiation exposure estimates currently only affect timing numbers. The SmartPower power analysis tool is not affected by changing the radiation exposure value.

RTSX-S and RTAX-S ONLY - Radiation Derating

This option is only available for RTSX-S and RTAX-S devices. The valid range is integer values from 0 to 300, and the units are in KRads. Modifying this selection impacts the timing derating in Timer and back-annotating SDF files, so when you modify this value, you must extract a new SDF file from Designer and re-evaluate the timing of your design. It does not affect the device configuration.

Changing Design Name and Family

Design name and family are set when you create a new design. However, you can change this information for existing designs. If you change the family, you must re-import the netlist. Use the following procedure to change the name of a design and the targeted Actel family for the design.

To change the design name or family:

1. In the **Tools** menu, click **Setup Design**. This displays the Setup Design dialog box.
2. Specify the design name and family.
3. Click **OK**. Refer to the Actel datasheet for your device for family specifications.

You may wish to migrate your SX device to an SX-A device. The SX to SX-A compatible family change option is available in the Device Selection wizard.

To migrate your SX design to SX-A:

1. Open your SX design.
2. From the **Tools** menu, select **Device Selection**.
3. Select "SXA" from the **Change to** drop down menu, and proceed in the [Device Selection Wizard](#) to complete the migration. You must re-compile and layout your design to run the Designer User Tools.

Changing Device Information

Device and package information, device variations, and operating conditions are set when you import a netlist and compile a new design. However, you can change this information for existing designs.

To change device information for existing designs:

1. In the **Tools** menu, click **Device Selection**. The Device Selection Wizard appears.
2. Select Die, Package, and Speed Grade and click **Next**. (You must select die and package to continue.)
3. Select Device Variations and click **Next**.
4. Select Operating Conditions and click **Finish**.

Refer to the Actel FPGA Data Book or call your local Actel Sales Representative for information about device, package, speed grade, variations, and operating conditions.

Compatible Die Change

When you change the device, some design information can be preserved depending on the type of change.

Changing Die Revisions

If you change the die from one technology to another, all information except timing is preserved. An example is changing an A1020A (1.2um) to an A1020B (1.0um) while keeping the package the same.

Device Change Only

Constraint and pin information is preserved, when possible. An example is changing an A1240A in a PL84 package to an A1280A in a PL84 package.

Repackager Function (Non-Axcelerator families only)

When the package is changed (for the same device), the Repackager automatically attempts to preserve the existing pin and Layout information by mapping external pin names based on the physical bonding diagrams. This always works when changing from a smaller package to a larger package (or one of the same size). When changing to a smaller package, the Repackager determines if any of the currently assigned I/Os are mapped differently on the smaller package. If any of the I/Os are mapped differently, then the layout is invalidated and the unassigned pins identified.

Importing Source Files

Source files include your netlist and constraint files.

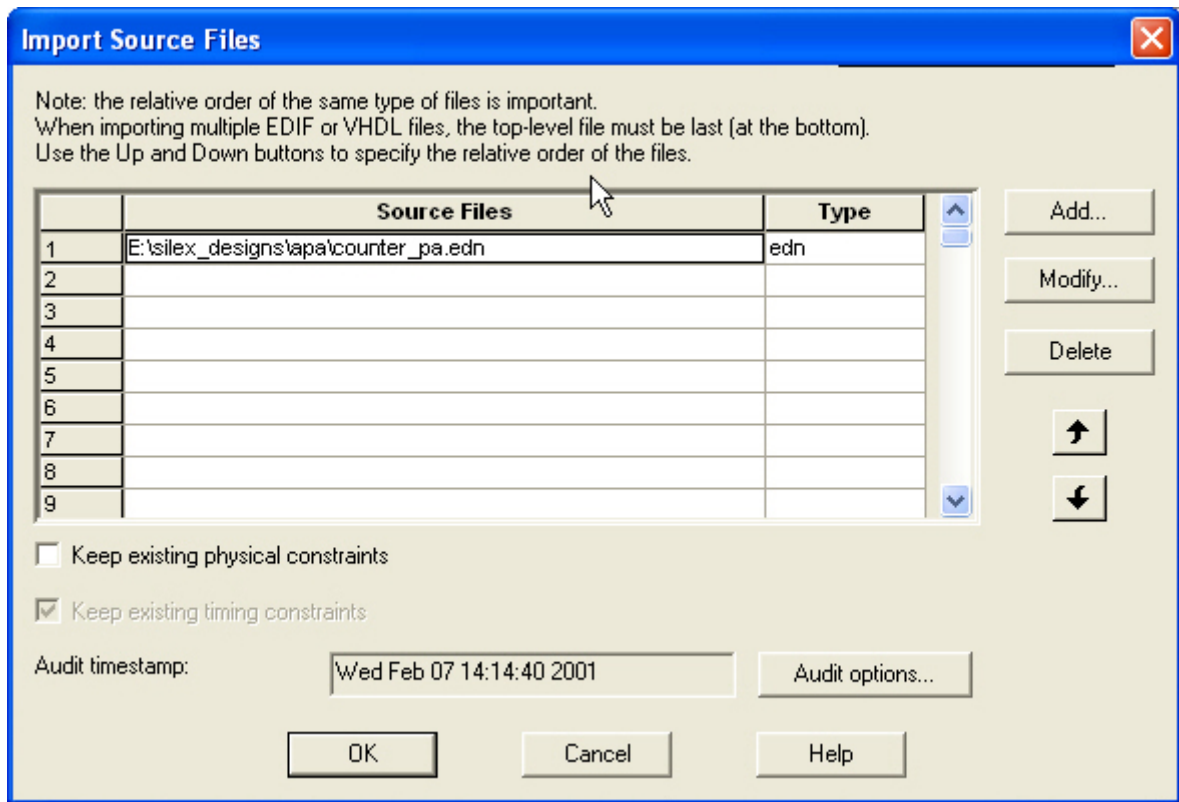
Source files are files created by outside tools that will be tracked (audited) to better coordinate the design changes. If you wish, you may import some files as [auxiliary files](#). Auxiliary files are not audited, but you do not have to re-compile your design after you import them.

Source Files	File Type Extension
EDIF	*.ed*
Verilog	*.v
VHDL	*.vhd
Actel ADL Netlist	*.adl
Criticality	*.crt
ProASIC Constraint File (ProASIC ^{PLUS} , ProASIC)	*.gcf
Physical Design Constraint File (ProASIC3/E, Axcelerator)	*.pdc
SDC	*.sdc

The choice of source files is family dependent. Only supported source files are displayed in the Import Source dialog box. If you are working on a new design or if you have changed your netlist, then you must re-import your netlist into Designer.

To import a source file:

1. From the **File** menu, choose **Import Source Files**. This displays the Import Source Files dialog box, as shown in the figure below.



Import Source Files Dialog Box

2. Click **Add**. The Add Source Files dialog appears.
3. Select the file you want to import and click Import. The File is added to the Import Source Files dialog box.
4. Add more source files to the list. All files added to the Import Source Files dialog box are imported at the same time. To modify a file, select the file and click Modify. To delete a file, select the file and click Delete.
5. Specifying a priority is useful if you are importing multiple netlist files, GCF files, or PDC, or SDC files. When importing multiple EDIF or structural HDL files, the top-level file must appear last in the list (at the bottom). Drag your files to specify the import order.
6. (Axcelerator, ProASIC, ProASIC PLUS, ProASIC3/E designs only) Select Keep existing physical constraints to preserve all existing physical constraints that you have made using ChipPlanner, PinEditor, or the I/O Attribute Editor.
7. (SX-A, eX, Axcelerator, ProASIC^{PLUS}, ProASIC3/E) Select Keep existing timing constraints to preserve all the existing timing constraints already in your design, whether coming from the Timer tool or previously imported file. If you import an SDC file and select this option, Designer merges the existing constraints and the constraints contained in the SDC file. In case of a conflict, the new constraint has priority over the existing constraint.
8. To set the audit options for these source files, click Audit options and follow the directions in the Audit Options dialog box.
9. When you are done adding all your source files, click **OK**. Your source files are imported. Any errors appear in the Designer log window.

Note: Designer may not import file names or paths with spaces. Rename the file or path to remove the spaces, and re-import.

Importing SDC and GCF Files Simultaneously

If you specify SDC and GCF files in the Import source file dialog, GCF files are imported before SDC files regardless of the order you specify. This means that any timing constraints in GCF are converted before the SDC constraints are applied. For a cleaner flow, Actel recommends that you do not use both SDC and GCF timing constraints. SDC is the recommended format.

Auditing Files

Designer audits your source files to ensure that your imported source files are current. All imported source files are date and time stamped. Designer notifies you if the file is changed. When notified, select the appropriate action and click **OK**.

To change your audit settings:

1. From the **File** menu, click **Audit Settings**. The Audit Settings dialog box appears. Audit Timestamp reflects the last time and day that the import source or audit update was successfully done.
2. Select the audit check box next to the file to enable auditing.
3. Click **Change Location** to open the "Modify File Location" dialog. The Modify File Location dialog box enables you to specify the correct path so that the design can find the source file(s)..
4. Click **Reset to Current Date Time** to associate the file with the current day and time.

Importing Auxiliary Files

Auxiliary files are not audited and are treated more as one-time data-entry or data-change events, similar to entering data using one of the interactive editors (e.g. PinEditor or Timer).

Some timing constraints (such as multi_cycle) are not supported in the Timer GUI and must be implemented by importing the SDC file. If you import the SDC file as an auxiliary, you do not have to re-compile your design. However, auditing is disabled when you import auxiliary files, and Designer cannot detect the changes to your SDC file(s) if you import them as auxiliary files.

Auxiliary Files	File Type Extension	Family
Criticality	*.crt	ACT1, ACT2, ACT3, MX, XL, DX
PIN	*.pin	ACT1, ACT2, ACT3, MX, XL, DX, SX, SX-A, eX
SDC	*.sdc	ProASIC3/E, SX-A, eX, Axcelerator, ProASIC ^{PLUS}
Physical Design Constraint	*.pdc	ProASIC3/E and Axcelerator
Value Change Dump	*.vcd	ProASIC3/E, Axcelerator, ProASIC, ProASIC ^{PLUS}
Switching Activity Intermediate File/Format	*.saif	ProASIC3/E, Axcelerator, ProASIC, ProASIC ^{PLUS}
Design Constraint File	*.dcf	Axcelerator, ACT1, ACT2, ACT3, MX, XL, DX, SX, SX-A, eX

To import an auxiliary file:

1. From the **File** menu, select **Import Auxiliary Files**. The Import Auxiliary Files dialog appears.
2. Click the **Add** button. The Add Auxiliary Files dialog box appears.
3. Select your file and click **Import**. The file is added to the Import Auxiliary Files dialog box. Continue to add more auxiliary files to the list. Some formats (like DCF and SDC) are not allowed to be imported in multiple auxiliary files.

Modifying: If you need to modify a selection, select the file row and click **Modify**

Deleting: If you need to delete a file, select the file row and click **Delete**.

Ordering: Ordering your auxiliary files. Select and drag your files to specify the import order. Specifying a priority is useful if you are importing multiple PDC files.

4. After you are done adding all your Auxiliary files, click **OK**. Your auxiliary files are imported. Any errors appear in Designer's Log Window.

.vcd and .saif are used by SmartPower for power analysis.

.crt for backwards compatibility with existing designs only.

File names or paths with spaces may not import into Designer. Rename the file or path, removing the spaces, and re-import.

Keep Existing Timing Constraints in SDC Files

The Keep Existing Constraints check box is designed to support an additional “merge or replace” functionality when you import SDC files.

Select **Keep existing timing constraints** to preserve all existing timing constraints that you have made using the Timer GUI or previously imported file. If you import a SDC file and you have this box selected, Designer merges the existing constraints and the constraints existing in the SDC file. In case of a conflict, the new constraint has priority over the existing constraint.

The Keep Existing Constraints option is **On** by default. With this option **On**, your timing constraints from the imported SDC files are merged with the existing constraints. When this option is **Off**, all the existing timing constraints are replaced by the constraints in the newly imported SDC files.

Keep Existing Physical Constraints

The Keep Existing Physical Constraints option in the Import Source Files dialog box enables you to merge or replace existing constraints when you import new or modified GCF or PDC files.

Select **Keep existing physical constraints** to preserve all existing physical constraints that you have entered either using one of the MVN tools (ChipPlanner, PinEditor, or the I/O Attribute Editor) or a previous GCF or PDC file. The software will resolve any conflicts between new and existing physical constraints and display the appropriate message.

The Keep Existing Constraints option is **Off** by default. When this option is **Off**, all the physical constraints in the newly imported GCF or PDC files are used. All pre-existing constraints are lost. When this option is **On**, the physical constraints from the newly imported GCF or PDC files are merged with the existing constraints.

Compiling Your Design

After you import your netlist files and select your device, you must compile your design. Compile contains a variety of functions that perform legality checking and basic netlist optimization. Compile checks for netlist errors (bad connections and fan-out problems), removes unused logic (gobbling), and combines functions to reduce logic count and improve performance. Compile also verifies that the design fits into the selected device.

There are three ways to select the compile command:

In the Tools menu, select **Compile**.

Click the **Compile** button in the Design Flow.

Click the **Compile** icon in the toolbar.

If you have not already done so, Designer's [Device Selection Wizard](#) prompts you to set the device and package.

During compile, the message window in the Main window displays information about your design, including warnings and errors. Designer issues warnings when your design violates recommended Actel design rules. Actel recommends that you address all warnings, if possible, by modifying your design before you continue.

If the design fails to compile due to errors in your input files (netlist, constraints, etc.), you must modify the design to remove the errors. You must then re-import and re-compile the files.

After you compile the design, you can run Layout to place-and-route the design or use the User Tools (PinEditor, ChipEditor, ChipPlanner, Timer, SmartPower, or NetlistViewer) to perform additional optimization prior to place-and-route.

Setting Compile Options

To set compile options

1. From the **Options** menu, click **Compile**. The Compile Options dialog box opens. The Options available are family specific.
2. Select your options, and click **OK**.

Note: ProASIC3/E Compile options appear by default each time you compile the design. If you have disabled this feature, you can click the Options menu and choose Compile to review/change/reset your Compile options.

Compile options vary according to family:

[MX, SX, SX-A, eX](#)

[Axcelerator](#)

[ProASIC, ProASIC^{PLUS}](#)

[ProASIC3/E](#)

MX, SX, SX-A, eX Compile Options

Netlist Pin Properties Overwrite Existing Properties

During the Compile process, Designer checks the netlist properties. If the netlist file specifies a pin assignment for a pin that was also assigned in PinEditor session, there is a conflict. How this conflict is resolved is determined by your selection in this box.

If this option is off, or unchecked, then Designer uses the assignment made in PinEditor, and the assignment in the netlist file for the conflicting pin is ignored. If this option is on, or checked, then Designer uses the assignment in the netlist file for that pin, and the PinEditor assignment is ignored. If you edit pin assignments in PinEditor, this option is automatically set to "off."

Fanout Messages

Use the control slider in the Messages area to control the warning level. Use the control slider to specify the fanout limit that the Compile step checks against. Setting the control slider to '0' informs the system to use the system defaults. Any non-zero value replaces the system default value for the fanout limit with the user-specified value. Typically, this value range is 1 to 24.

This does not adjust the fanout of the design and it has no effect on the netlist. This only adjusts the warning level, by controlling what level of fanout checking you want to be warned about during Compile. Changing this fanout limit option does not invalidate the Compile design state.

Axcelerator Compile Options

Combine Registers into I/Os Where Possible

The Axcelerator, ProASIC3, and ProASIC3E families includes an optional register on the input path, an optional register on the output path, and an optional register on the 3-state control pin. Select the option Combine Registers into I/Os where possible to take advantage of these registers.

Abort on PDC Error

Setting Abort on PDC Error aborts the PDC import when an error is encountered. When this box is checked, the PDC file is either imported fully or the design is left untouched.

ProASIC and ProASIC^{PLUS} Compile Options

Include RAM and I/O in Spine and Net Regions

This option affects the behavior of the following:

- The use_global constraint
- The set_net_region constraint
- The creation of spines in the MultiView Navigator

Selecting "Include RAM and I/O in Spine and Net Regions" enables you to assign memory and I/O to spine (LocalClock) and net regions.

When this option is checked, Designer will apply the use_global and set_net_region constraints to core cells, memory, and I/O. When unchecked, Designer will apply the use_global and set_net_region constraints to core cells only. For new designs, this box is automatically checked. For designs created with v5.1 or earlier, this option is unchecked by default. If you change this default setting, you must recompile your design.

This option also determines whether memory and I/O are included in a LocalClock region that you create with the ChipPlanner tool. If checked, memory and I/O are included. If not checked, they are excluded.

ProASIC3/E Compile Options

This interface lets you do the following:

Verify [Physical Design Constraints](#)

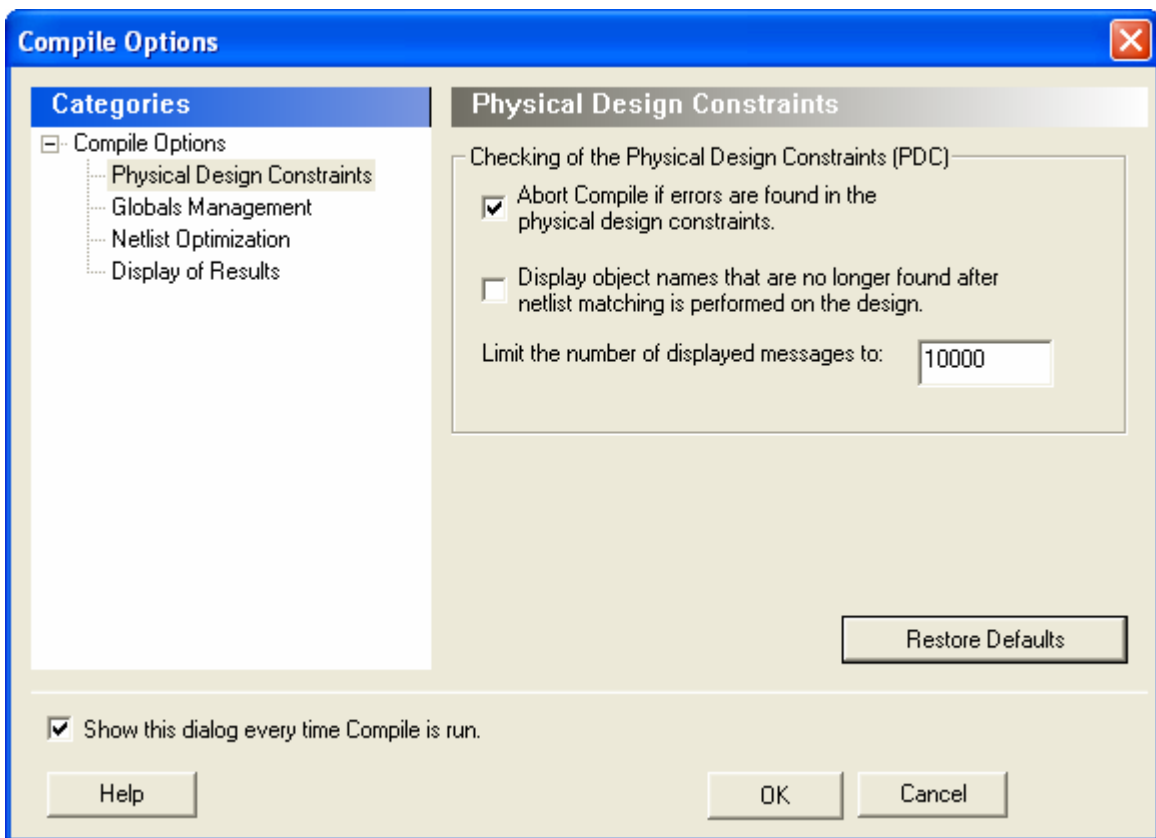
Perform [Globals Management](#)

[Netlist Optimization](#)

Generate [Compile report](#)

Physical Design Constraints

This interface enables you to verify the Physical Design Constraints (PDC) file.



Checking the Physical Design Constraint (PDC)

Abort Compile if errors are found in the physical design constraints: Changes the “Abort on PDC error” behavior. Select this option to stop the flow if any error is reported in reading your PDC file. If you deselect this option, the tool skips errors in reading your PDC file and just reports them as warnings. The default is ON.

Note: The flow always stops even if this option is deselected in the following two cases:

If there is a Tcl error (For example, the command does not exist or the syntax of the command is incorrect)

The assign_local_clock command for assigning nets to LocalClocks fails. This may happen if any floor planning DRC check fails, such as, region resource check, fix macro check (one of the load on the net is outside the local clock region). If such an error occurs, then the Compile command fails. Correct your PDC file to proceed.

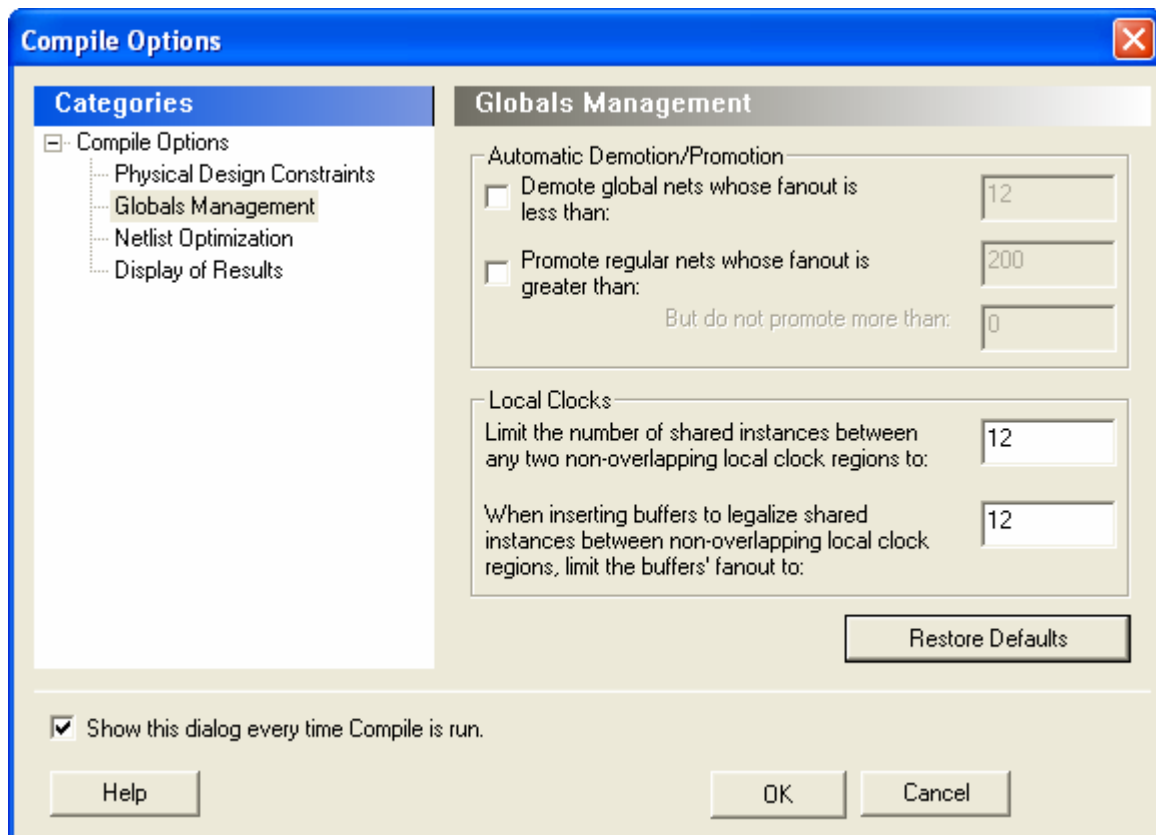
Note: Every time you invoke this dialog box, this option is reset to its default value ON. This is to ensure that you have a correct PDC file.

Display object names that are no longer found after netlist matching is performed on the design: Displays netlist objects in the PDC that are not found in the imported netlist during the Compile ECO mode. Select this option to report netlist objects not found in the current netlist when reading the internal ECO PDC constraints. The default is OFF.

Limit the number of displayed messages to: Defines the maximum number of errors/warnings to be displayed in the case of reading ECO constraints. The default is 10000 messages.

Globals Management

The interface provides a global control to the Compile component of the design flow.



Automatic Demotion/Promotion

Demote global nets whose fanout is less than: Enables the global clock demotion of global nets to regular nets. By default, this option is OFF. The maximum fanout of a demoted net is 12.

Note: A global net is not automatically demoted (assuming the option is selected) if the resulting fanout of the demoted net is greater than the max fanout value. Actel recommends that the automatic global demotion only act on small fanout nets. Actel recommends that you drive high fanout nets with a clock network in the design to improve timing and routability.

Promote regular nets whose fanout is greater than: Enables global clock promotion of nets to global clock network. By default, this option is OFF. The minimum fanout of a promoted net is 200.

But do not promote more than: Defines the maximum number of nets to be automatically promoted to global. The default value is 0. This is not the total number as nets need to satisfy the minimum fanout constraint to be promoted. The `promote_globals_max_limit` value does not include globals that may have come from either the netlist or PDC file (quadrant clock assignment or global promotion)

Note: Demotion of globals through PDC or Compile is done before automatic global promotion is done.

You may exceed the number of globals present in the device if you have nets already assigned to globals or quadrants from the netlist or by using a PDC file. The automatic global promotion adds globals on what already exists in the design.

Local clocks

Limit the number of shared instances between any two non-overlapping local clock regions to: Defines the maximum number of shared instances allowed to perform the legalization. It is also for quadrant clocks.

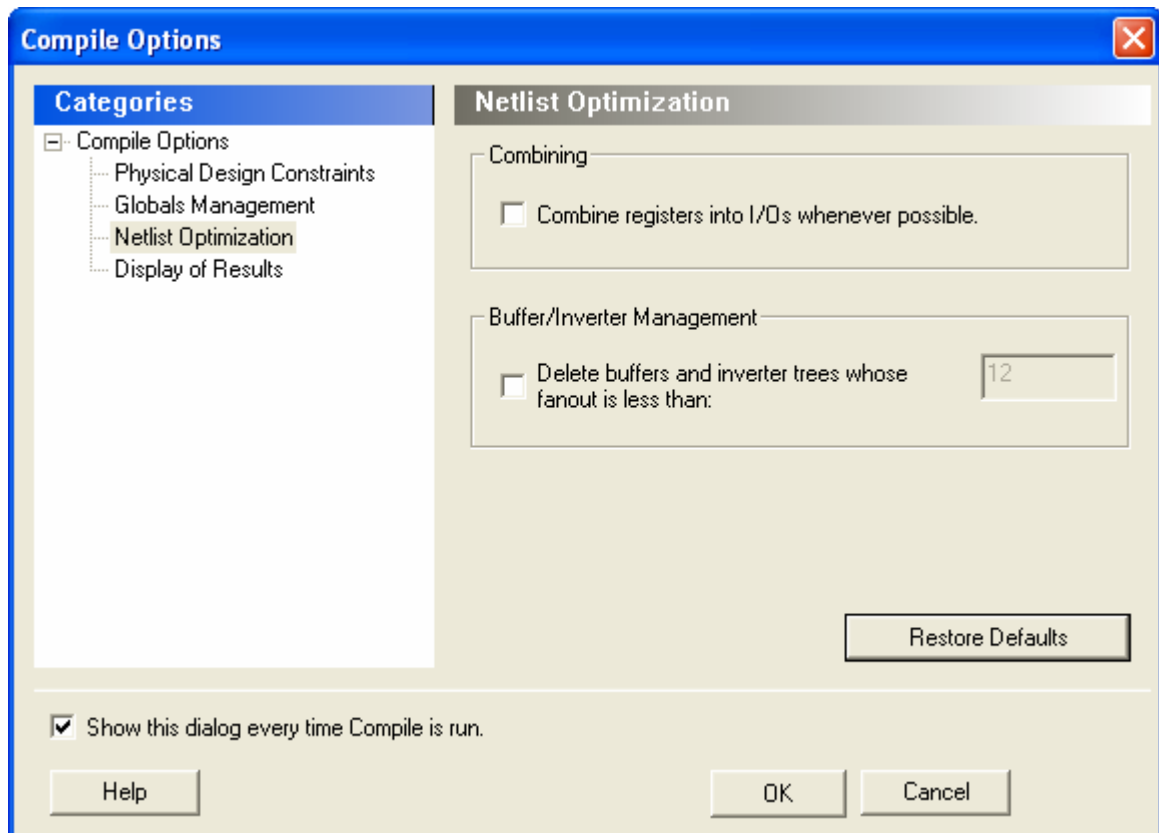
The maximum number of instances allowed to be shared by 2 local clock nets assigned to disjoint regions to perform the legalization (default is 12, range is 0-1000). If the number of shared instances is set to 0, no legalization is performed.

When inserting buffers to legalize shared instances between non-overlapping local clock regions, limit the buffers' fanout to: Defines the maximum fanout value used during buffer insertion for clock legalization. Set the value to 0 to disable this option and prevent legalization (default value is 12, range is 0-1000). If the value is set to 0, no buffer insertion is performed. If the value is set to 1, there will be one buffer inserted per pin.

Note: If you assign quadrant clock to nets using MultiView Navigator, no legalization is performed.

Netlist Optimization

This interface allows you to perform netlist optimization.



Combining

Combine registers into I/O wherever possible: Combines registers at the I/O into I/O-Registers. Select this option for optimization to take effect. By default, this option is OFF.

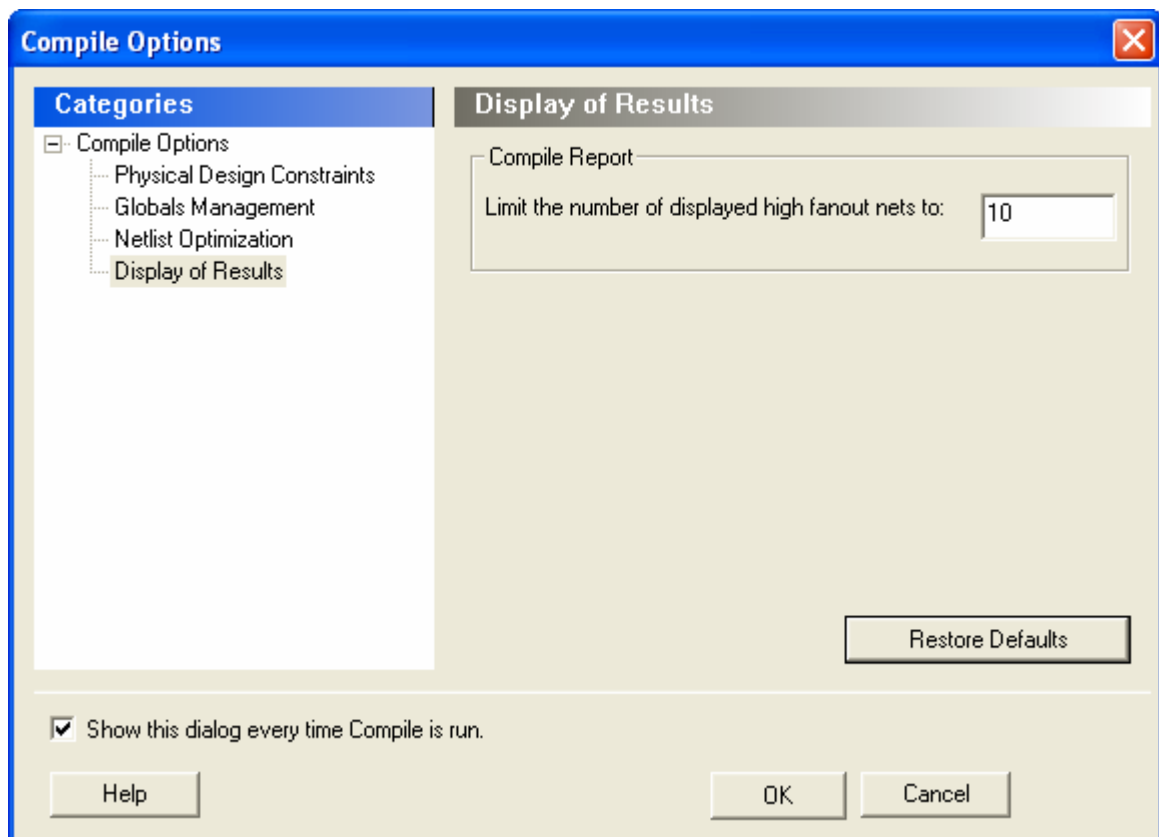
Buffer/Inverter Management

Delete buffers and inverter trees whose fanout is less than: Enables buffer tree deletion on the global signals from the netlist. The buffer and inverter are deleted. By default, this option is OFF. The maximum fanout of a net after buffer tree deletion is 12.

Note: A net does not automatically remove its buffer tree (assuming the option is on) if the resulting fanout of the net (if the buffer tree was removed) is greater than the max fanout value. It is recommended that the automatic buffer tree deletion should only act on small fanout nets. From a routability and timing point of view, it is not recommended to have high fanout nets not driven by a clock network in the design.

Display of Results

This interface lets you generate a Compile report.



Compile Report

Limit the number of displayed high fanout nets to: Enables flip-flop net sections in the compile report and defines the number of nets to be displayed in the high fanout. The default value is 10

About Design Constraints

Design constraints are specifications for placing, implementing, naming, and timing considerations of physical and logical assignments. They are usually either restrictions or properties in your design. There are several types of constraints: routing, timing, area, mapping, and placement constraints.

Timing constraints

Location and region assignment constraints Location and region assignment constraints (placing and routing)

I/O assignment constraints (pin location and I/O attributes)

Attributes

You use constraints to ensure that a design meets timing performance and required pin assignments.

Designer supports both physical and timing constraints. You can set constraints by either using Actel's interactive tools or by importing constraint files directly into Designer.

About Location and Region Assignments

You can set constraints for locations and regions using the ChipPlanner or ChipEditor tool as well as via constraint files.

The tool you use depends on which product family you are designing for:

For ProASIC3E, ProASIC3, ProASIC ^{PLUS}, Axcelerator, and ProASIC devices, use ChipPlanner.

For other design families, use ChipEditor.

If you choose to use constraint files to set your location and region assignments, the exact constraint file you use depends on your device family. See Types of physical constraints for more information.

When you open your design (.adb) file, Designer automatically presents you with the appropriate tools in the Design Flow window.

About Physical Constraints and Attributes

Physical Constraints

Physical constraints are the placement and routing constraints that apply to a specific architecture and device. You can either import a constraint file or enter them in your design using one of several tools.

If you are designing for the ProASIC3E, ProASIC3, ProASIC ^{PLUS}, Axcelerator, and ProASIC families, you will use the tools available from within the MultiView Navigator. These tools are:

ChipPlanner - Sets location and region assignments

PinEditor in MVN - Sets the pin location constraints

I/O Attribute Editor - Sets I/O attributes

For all other families, you will use the standalone versions of the following tools:

ChipEditor - Sets location and region assignments

PinEditor - Sets I/O attributes and pin location constraints

Physical constraints may also be specified in three types of files. The supported file types depend on the family. See Types of physical constraints for more information.

Attributes

Attributes are the characteristics of logic macros or nets in your design. They indicate placement, implementation, naming, directionality, and other characteristics. This information is used by the design implementation software during placement and routing of a design.

Input and output attributes are described in the documentation for the I/O Attribute Editor. Attributes applicable to a specific tool are described in the documentation for that tool.

Types of Physical Constraints

Designer supports three types of physical constraints:

- I/O assignments
- Location and region assignments
- Clock assignments

I/O Assignments

Use PinEditor to manually place and configure your I/Os. Or, assign I/O locations automatically by importing one of the following constraint files into Designer:

- GCF (ProASIC^{PLUS} and ProASIC families)
- PDC (ProASIC3E, ProASIC3, and Axcelerator families)
- PIN (all families except ProASIC3E, ProASIC3, ProASIC^{PLUS}, Axcelerator, and ProASIC)

Location and Region Assignments

Use ChipPlanner to view the placement and routing for ProASIC3E, ProASIC3, Axcelerator, ProASIC, and ProASIC^{PLUS} designs. Use ChipEditor to view and manually change location assignments for other design families.

You can also assign location constraints and enter region constraints by importing one of the following constraint files into Designer:

- GCF (ProASIC and ProASIC^{PLUS} families)
- PDC (ProASIC3E, ProASIC3, and Axcelerator families)

Clock Assignments

Use ChipPlanner to assign nets to local clocks in ProASIC and ProASIC^{PLUS}.

You can also assign nets to local clocks and global clocks (with the exception noted below) by importing the following constraint files into Designer:

- GCF (ProASIC and ProASIC^{PLUS} families)
- PDC (ProASIC3/E and Axcelerator families)

Note: You cannot assign global clocks for Axcelerator.

Timing Constraints

Timing constraints can be entered using the interactive Timer tool or by importing a constraint file.

Constraint File Type	Supported Families
SDC	Axcelerator, ProASIC ^{PLUS} , ProASIC3/E, SX-A, and eX
DCF	SX, SX-A, MX, eX, ACT1, ACT2, and ACT3
GCF	ProASIC ONLY

To understand the complexity of a design and its performance, perform place-and-route with no constraints to see if routing can complete without constraints. If routing completes successfully, you can open Timer to see if the physical design meets timing requirements.

ProASIC only: If you are using a synthesis tool such as Synopsys Design Compiler, Actel recommends that you use it to generate a forward SDF file containing path constraints only.

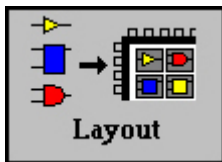
Over constraining a design may result in increased place-and-route run times, while not improving design performance.

Running Layout

Use Layout to place and route your design.

To run Layout:

1. Click the **Layout** button in the Design Flow Window.



2. **Layout Options.** Select your Layout options and Click **OK**. Layout options are family specific.

Axcelerator Layout Options

When [running Layout](#), use the Layout Options dialog box to set your Layout options.

Timing-driven

Select this option to run timing-driven Layout. The primary goal of timing-driven layout is to meet [timing constraints](#), with a secondary goal of producing high performance for the rest of the design. Timing-driven Layout is more precise and typically results in higher performance.

Standard layout is selected when the Timing-driven checkbox is unchecked. Standard layout maximizes the average performance for all paths. Each part of a design is treated equally for performance optimization. Standard layout uses net weighting (or criticality) to influence the results. Delay constraints that have been set for a design during place-and-route are not considered, however a delay report based on delay constraints entered in Timer can still be generated for the design. This is helpful to determine if timing-driven Layout is required.

Run Place

Select this option to run the placer during Layout. If you have not run Layout before, Run Place is checked by default. If your design has already been placed but not routed, this box is not checked. You can also select the following [incremental placement](#) options.

Incrementally: Select to use previous placement data as the initial placement for the next placement run.

Lock Existing Placement (fix): Select to use and lock previous placement data for the next incremental placement run.

Effort Level

Use the Effort Level slider to increase the effort Layout uses to place and route your design. The range is 1 to 5 with a default of 3. A higher level of effort generally improves the quality of results, but runs longer.

Run Route

Select to run the router during Layout. By default, it reflects the current Layout state. If you have not run Layout before, Run Route is checked. Run Route is also checked if your previous Layout run completed with routing failures. If your design has been routed successfully, this box is checked.

Incremental routing is available for Axcelerator devices. When activated, the option sets the previous routing information as the initial starting point. To use the incremental routing option in the script mode, see the [Advanced Tcl Layout options for Axcelerator](#) (in the Tcl Scripting section).

Use Multiple Passes

Select to run layout multiple times with different placement seeds. Multiple Pass Layout attempts to improve layout quality by selecting from a greater number of layout results. Click **Configure** to set your [Multiple Pass Configuration](#).

Note: To run Multiple Passes, you must check both Run Place and Run Route.

ProASIC3/E, ProASIC^{PLUS}, and ProASIC Layout Options

When [running layout](#), use the Layout Options dialog box to set your layout options.

Timing-Driven

Select this option to run timing-driven Layout. The primary goal of timing-driven layout is to meet [timing constraints](#), with a secondary goal of producing high performance for the rest of the design. Timing-driven Layout is more precise and typically results in higher performance.

When not checked, standard layout runs. Standard layout maximizes the average performance for all paths. Each part of a design is treated equally for performance optimization. Standard layout uses net weighting (or criticality) to influence the results. Delay constraints that have been set for a design during place-and-route are not considered, however a delay report based on delay constraints entered in Timer can still be generated for the design. This is helpful to determine if timing-driven Layout is required.

Run Place

Select this option to run the placer during Layout. By default, it reflects the current Layout state. If you have not run Layout before, Run Place is checked by default. If your design has already been placed but not routed, this box is not checked by default. You can also select the following [incremental placement](#) options.

Incrementally: Select to use previous placement data as the initial placement for the next place run.

Lock Existing Placement (fix): Select to preserve previous placement data during the next incremental placement run.

Run Route

Select to run the router during Layout. By default, it reflects the current Layout state. If you have not run Layout before, Run Route is checked. Run Route is also checked if your previous Layout run completed with routing failures. If your design has been routed successfully, this box is checked.

Incrementally: Select to fully route a design when some nets failed to route during a previous run. You can also use it when the incoming netlist has undergone an E.C.O. (Engineering Change Order). Incremental routing should only be used if a low number of nets fail to route (less than 50 open nets or shorted segments). A high number of failures usually indicates a less than optimal placement (if using manual placement through macros, for example) or a design that is highly connected and does not fit in the device. If a high number of nets fail, relax constraints, remove tight placement constraints, or select a bigger device and rerun routing.

Use Multiple Passes

Select to run layout multiple times with different seeds. Multiple Pass Layout attempts to improve layout quality by selecting from a greater number of layout results. Click **Configure** to set your [Multiple Pass Configuration](#).

Click the [Advanced](#) button to set Timing-Driven options.

ProASIC3/E, ProASIC^{PLUS}, and ProASIC Layout Advanced Options

To set these advanced options during [Layout](#), click the Advanced button in the Layout dialog box.

Placer Timing Weight

Setting this option to values within a recommended range of 1-4 changes the weight of the timing objective function, thus influencing the results of timing-driven place-and-route in favor of either routability or performance. This option is available only when timing constraints have been defined.

Note: If you change the Timing Weight you must re-run the placer to complete routing. Changing the Timing weight has no effect if you do not re-run the placer.

Restore Defaults

Click **Restore Defaults** to run the factory default settings for advanced options.

eX, SX, SX-A Layout Options

When [running layout](#), use the Layout dialog box to set your layout options.

Timing-Driven

Select to run Timing-Driven Layout. The primary goal of Timing-Driven layout is to meet [timing constraints](#), while still producing high performance for the rest of the design. Timing-Driven Layout is more precise and typically results in higher performance. This option is available only when timing constraints have been defined.

When not checked, standard layout runs. Standard layout maximizes the average performance for all paths. Each part of a design is treated equally for performance optimization. Standard layout uses net weighting (or criticality) to influence the results. Delay constraints that have been set for a design during place-and-route are not considered, however a delay report based on delay constraints entered in Timer can still be generated for the design. This is helpful to determine if Timing-Driven Layout is required.

Place Incrementally

Select to use previous placement data as the initial placement for the next place run.

Lock Existing Placement: Select to preserve previous placement data during the next incremental placement run.

Use Multiple Passes (eX and SX-A only)

Select to run layout multiple times with different seeds. Multiple Pass Layout attempts to improve layout quality by selecting from a greater number of layout results. Click **Configure** to set your [Multiple Pass Configuration](#).

Advanced

Click the [Advanced](#) button to set Extended Run and Timing-Driven options.

eX, SX, and SX-A Advanced Layout Options

To set these advanced options during [Layout](#), click the Advanced button in the Layout dialog box.

Extended Run

Select this to run a greater number of iterations during optimization within a single layout pass. An extended run layout can take up to 5 times as long as a normal layout.

Effort Level

This setting specifies the duration of the timing-driven phase of optimization during timing-driven Layout. Its value specifies the duration of this phase as a percentage of the default duration. This option is available only when timing constraints have been defined

The default value is 100 and the selectable range is within 25 - 500. Reducing the effort level also reduces the run time of timing-driven place-and-route (TDPR). With an effort level of 25, TDPR is almost four times faster. With fewer iterations, however, performance may suffer. Routability may or may not be affected. With an effort level of 200, TDPR is almost two times slower. This variable does not have much effect on timing.

Timing Weight

Setting this option to values within a recommended range of 10-150 changes the weight of the timing objective function, thus influencing the results of timing-driven place-and-route in favor of either routability or performance. This option is available only when timing constraints have been defined

The timing weight value specifies this weight as a percentage of the default weight (i.e. a value of 100 has no effect). If you use a value less than 100, more emphasis is placed on routability and less on performance. Such a setting would be appropriate for a design that fails to route with TDPR. In case more emphasis on performance is desired, set this variable to a value higher than 100. In this case, routing failure is more likely. A very high timing value weight could also distort the optimization process and degrade performance. A value greater than 150 is not recommended.

Restore Defaults

Click **Restore Defaults** to run the factory default settings for advanced options.

ACT, MX, and DX Layout Options

Timing-Driven

Select this option to run Timing-Driven Layout. The primary goal of timing-driven layout is to meet [timing constraints](#), with a secondary goal of producing high performance for the rest of the design. timing-driven Layout is more precise and typically results in higher performance. This option is available only when timing constraints have been defined.

When not checked, standard layout runs. Standard layout maximizes the average performance for all paths. Each part of a design is treated equally for performance optimization. Standard layout uses net weighting (or criticality) to influence the results. Delay constraints that have been set for a design during place-and-route are not considered, however a delay report based on delay constraints entered in Timer can still be generated for the design. This is helpful to determine if Timing-Drive Layout is required.

Place Incrementally

Select to use previous placement data as the initial placement for the next place run.

Lock Existing Placement:Select to preserve previous placement data during the next incremental placement run.

Advanced

Click [Advanced](#) to set Extended Run options.

ACT, MX, and DX Advanced Layout Options

To set these advanced options during [Layout](#), click the Advanced button in the Layout dialog box.

Extended Run

Select this to run a greater number of iterations during optimization. An extended run layout can take up to 5 times as long as a normal layout.

Restore Default

Click **Restore Defaults** to run the factory default settings for advanced options.

Incremental Placement

In either standard or timing-driven mode, use incremental placement to preserve the timing of a design after a successful place-and-route, even if you change part of the netlist. Incremental placement has no effect the first time you run layout. During design iteration, incremental placement attempts to preserve the placement information for any unchanged macros in a modified netlist.

As a result, the timing relationships for unchanged macros approximate their initial values, decreasing the execution time to perform Layout. By forcing Designer to retain the placement information for a portion of the design, some flexibility for optimal design layout may be lost. Therefore, do not use incremental placement to place your design in pieces. You should only use it if you have successfully run Layout and you have minor changes to your design.

Incremental placement requires prior completion of place. Do not use incremental placement if the previous Layout failed to meet performance goals.

Locking Existing Placement (Fix)

When the **Lock Existing Placement** option is selected in the Layout dialog box, all unchanged macros are treated as locked (fixed) placements during an incremental placement. This is the strongest level of control, but it may be too restrictive for the new placement to successfully complete. The default ON setting treats unchanged macro locations as placement hints, but alters their locations as needed to successfully complete placement. Refer to ChipEditor for details on locking macros.

ProASIC and ProASIC^{PLUS} Placement Constraint File (GCF)

For ProASIC and ProASIC^{PLUS} designs, you can export a GCF constraint file to get all of the constraint information. From the **File** menu, choose **Export>Constraint Files**, type a file name and click **Save**, and then select **All GCF constraints** in the **Export GCF File** dialog box. Blocks with locked placement constraints generate locked placement constraints, while the others generate initial placement constraints. You can edit a GCF file to remove existing constraints or add new constraints. You must then import the modified GCF file as well as the netlist back into Designer. See [Importing Source Files](#) for more information about importing files.

Multiple Pass Layout

Multiple Pass Layout attempts to improve layout quality by selecting from a greater number of Layout results. This is done by running individual place and route multiple times with varying placement seeds and measuring the best results with a specified criteria.

Before running Multiple Pass Layout, you need to save your design.

Multiple Pass Layout is supported in the following families: ProASIC3/E, Axcelerator, ProASIC^{PLUS}, ProASIC, SX-A, and eX.

Multiple Pass Layout saves your design file with the pass that has the best layout results. A corresponding timing report file for the best result, named design-name_timing.rpt is also saved to disk. If you want to preserve your existing design state, you should save your design file with a different name before proceeding. To do this, from the File menu, click Save As.

A timing report for each pass will be written out to the working directory to assist you in later analysis. The report files will be named design-name_timing.rpt.pass-number. Look at the design-name_iteration_summary.rpt for details of the saved files.

To configure your multiple pass options:

1. When running Layout, select **Use Multiple Passes** in the Layout Options dialog box.
2. Click **Configure**. The Multi-Pass Configuration dialog box appears.
3. Set the options and click **OK**.

Maximum Number of Passes: Set the number of passes (iterations) using the slider. 3 is the minimum and 25 is the maximum. The recommended number of passes is 5.

Measurement: Select the measurement criteria you want Layout to meet. If Slowest Clock or Specific Clock is selected as your criterion, then the Layout runs all passes. If Timing Violations is selected as your criterion, Layout stops once the timing constraints are met. If the constraints are not met, then all of the Layout passes run.

Slowest Clock	Select to use the slowest clock in the design in a given pass as the performance reference for the layout pass.
Specific Clock	Select to use a specific clock as the performance reference for all Layout passes.
Timing Violations	Select to use the pass that best meets the slack or timing-violations constraints. NOTE: You must enter your own timing constraints through the Timer or SDC. The 'best' case is calculated by determining the total negative slack for all constraints.

Save Results from All Passes: Select to save the design file (.adb) for each pass. By default, only the best result is saved to your design. With this option, for every pass, the individual .adb is stored as filename_pass-number.adb in the name. The 'best' pass design will still also be written back to the original .adb filename. Saving all results does take more disk space, but allows you to later analyze the result of each pass in more detail. Look at the design-name_iteration_summary.rpt for details of the saved files.

The [extended_run_shell](#) Tcl script enables you to run the multiple pass layout in batch mode from a command line. See the extended_run_shell script for more information.

Analyzing Timing in Your Design

Use the Timer tool to analyze the timing in your design. Using Timer, you can:

- Determine your clock frequency (a common yardstick for measuring the timing of your design)
- Calculate delays in paths
- Analyze and modify critical paths
- Set timing constraints to meet your timing requirements
- Incorporate the ChipPlanner/ChipEditor tools

Analyzing Power Consumption in Your Design

Use the SmartPower tool to analyze your designs power consumption. Use the SmartPower tool to:

- Define clock domains
- Specify individual pin frequencies
- View detailed hierarchical analysis of your design
- View global power consumption at the design level

If you wish, you may also view the equations that SmartPower uses to calculate your power consumption.

Viewing Your Netlist

The NetlistViewer tool displays the contents of the design as a schematic, making it easier for you to debug your design. With NetlistViewer, you can view nets, ports, and instances in the schematic view. You can also isolate specific sections of your netlist to simplify your analysis and cross probe with other tools.

There are two versions of the NetlistViewer tool: NetlistViewer in MultiView Navigator (MVN) and NetlistViewer Standalone. Which version you use depends on which family you are designing for.

NetlistViewer in MultiView Navigator supports ProASIC3E, ProASIC3, ProASIC ^{PLUS}, Axcelerator, and ProASIC families.

NetlistViewer Standalone supports MX, SX-A, eX, RTSX, and RTSX-S families.

Used with PinEditor in MultiView Navigator, ChipPlanner, or Timer, NetlistViewer in MultiView Navigator assists you in meeting area and timing goals by helping you with critical path identification. NetlistViewer Standalone can also be used alone or with PinEditor Standalone, ChipEditor, or Timer.

When you open your design (.adb) file, Designer will automatically present you with the appropriate tools in the Design Flow window. You must compile your design before you can open it in NetlistViewer.

Back-Annotation

The back-annotation functions are used to extract timing delays from your post layout data. These extracted delays are put into a file to be used by your CAE package's timing simulator. If you wish to perform pre-layout back-annotation, select Export and Timing Files from the File menu.

The Back-Annotation command creates the files necessary for back-annotation to the CAE file output type that you chose. Refer to Actel Interface Guides or the documentation included with your simulation tool for information about selecting the correct CAE output format and using the back-annotation files.

To back-annotate your design:

4. From the **Tools** menu, click **Back-Annotate**, or click the Back-Annotate button in the Design Flow window.
5. Make your selections in the Back-Annotate dialog box and click **OK**.

Extracted Files Directory: The file directory is your default working directory. If you wish to save the file elsewhere, click Browse and specify a different directory.

Extracted File Names: This name is used as the base-name of all files written out for back-annotation. Do not use directory names or file extensions in this field. The file extensions will be assigned based on your selection of which file formats to export. The default value of this field is <design>_ba.

Output Formats: Select the file format of the timing file. One of SDF or STF.

(STF is only supported for ACT1, ACT2, ACT3, DX, MX, SX).

Simulator Language: Select either Verilog or VHDL93.

Export Additional Files: Check Netlist or Pin to export these files at the same time. For Axcelerator, ProASIC3, and ProASIC3E, you must export and use the 'flattened' netlist (AFL-style) with the back-annotated timing file (SDF) in timing simulation.

Note: For Axcelerator, ProASIC3, and ProASIC3E, you cannot select SDF format using File -> Export Files -> Timing.

You have no choice regarding exporting the netlist from the back-annotate command for Axcelerator, ProASIC3, and ProASIC3E. This selection is hard-coded to be 'on'. For all other families, the export-netlist and back-annotate generates equivalent netlist files. So the back-annotate command does not enforce the writing out of the netlist during back-annotate.

Available Report Types

Select from Report Type & Options on the dialog box when invoking a report.

Report Type	Supported Families	Report Contents
Status Report	All	Provides information about Designer, Device Data, and variable settings for the design.
Timer Report	All	Displays summarized timing delays for paths.
Pin Report	All	Allows you to create a text list of the I/O signal locations on a device. You can generate a pin report sorted by I/O signal names or by package number.
FlipFlop Report	All	Creates a report that lists the number and type of flip-flops (sequential or CC, which are flip-flops made of 2 combinatorial macros) used in a design. The flip-flop report can be of two types: Summary or Extended. Both types of reports include the Flip-Flop type, sequential (Seq) or combinatorial (CC), the Library name, and the Total number of Seq and CC Flip-Flops in the design. The Summary Report also includes the Number of instances of each unique type. The Extended Report provides the Macro name. All Reports are output to an editable window for viewing, modifying, saving, and printing.
Power Report	ProASIC ^{PLUS} , Axcelerator, ProASIC and ProASIC3/E	Enables you to quickly determine if any power consumption problems exist in your design. The power report lists the following information: <ul style="list-style-type: none"> - Global device information and SmartPower Preferences selection information - Design level static power summary - Dynamic power summary - Hierarchical detailed power report (including gates, blocks, and nets), with a block by block, gate by gate, and net by net power summary SmartPower results
Timing Violations Report	All	Enables you to obtain constraint results sorted by slack. You can now view Max Delay violations as well as Min Delay violations in the report.
I/O Bank Report	Axcelerator and ProASIC3/E	Provides information on the I/O functionality, I/O technologies, I/O banks and I/O voltages.

Status Reports

The status report enables you to create a report containing device and design information, such as die, package, percentage of the logic and I/O modules used, etc.

To generate a status report:

1. In the **Tools** menu, choose **Reports**.
2. Select **Status** from the drop-down list in the **Report Types** dialog box. The status report opens in a separate window. You can save or print the report.

Timing Reports

The timing report enables you to quickly determine if any timing problems exist in your design. The timing report lists the following information about your design:

- maximum delay from input I/O to output I/O
- maximum delay from input I/O to internal registers
- maximum delay from internal registers to output I/O
- maximum delays for each clock network
- maximum delays for interactions between clock networks

To generate a timing report:

1. In the **Tools** menu, click **Reports**.
2. Choose **Timing** from the Report Type drop-down list. This displays the Timing Report dialog box.
3. Specify the Slack Threshold. If you select “Slack” as the sort method, you can limit the number of delays displayed based upon a slack threshold. For example, if you only want to see delays that have a slack less than 5ns, enter 5 in the Slack Threshold box.
4. Setup-hold Timing Check. Selection of this box enables you to configure the timing report to calculate external setup and hold information for device inputs in addition to the standard information.
5. Expand Failed Paths. If a path does not meet your timing specifications, and you would like to see the incremental delay of each macro within that path, select the Expand Failed Paths box.
6. Options. Clicking Options brings up the Timing Preferences dialog box, where you can set additional display and report options.

Sort by Actual Delay

Sort by Slack Delay

Path Selection

Break Path at Register

7. Click **OK**. This displays a timing report based upon your timing and display preferences. The format and content of the report is determined by the family

Pin Reports

The pin report allows you to create a text list of the I/O signal locations on a device. You can generate a pin report sorted by I/O signal names or by package number.

To generate a pin report:

1. In the **Tools** menu, click **Reports**.
2. Choose **Pin** from the drop-down list in the Report Type dialog box. This displays the Pin Report dialog box.
3. Specify the type of report to generate. Select Number or Name from the List By pull-down menu, then click **OK**. This displays a pin report.

Flip-Flop Reports

The flip-flop report enables you to create a report that lists the number and type of flip-flops (sequential or CC, which are flip-flops made of 2 combinatorial macros) used in a design.

There are two types of reports you can generate, Summary or Extended:

A Summary report displays whether the flip-flop is a sequential, I/O sequential, or CC flip-flop, the macro implementation of the flip-flop, and the number of times the implementation of the flip-flop is used in the design.

An Extended report individually lists the names of the macros in the design.

To generate a flip-flop report:

1. In the **Tools** menu, click **Reports**. This displays the Reports dialog box.
2. Select Flip-Flop from the drop-down menu. The Flip-Flop Report dialog box appears.
3. Specify the type of report to generate. Select Summary or Extended from the Type pull-down menu, then click **OK**. This displays the report in a separate window.

Power Reports

The power report enables you to quickly determine if any power consumption problems exist in your design. The power report lists the following information:

Global device information and SmartPower Preferences selection information

Design level static power summary

Dynamic power summary

Hierarchical detailed power report (including gates, blocks, and nets), with a block by block, gate by gate, and net by net power summary SmartPower results

To create a power report:

1. In the **Tools** menu, click **Reports**. This displays the Reports dialog box.
2. Choose **Power** in the Report list and click **OK**. The Power Report dialog appears.
3. Choose from the following options:

Static Power: Returns static power information

Dynamic Power: Returns dynamic power information

Report Style: Specifies report style

Select analysis preferences:

Units: Sets units preferences for power and frequency

Operating Conditions: Sets preferences for operating conditions

Block Expansion Control: Filters reported power values returned in the report. This box does not control which values are included, rather it specifies which blocks are detailed/expanded. You may specify which blocks are expanded using a minimum power value, a minimum power ratio (with regards to the total power of the design) and a maximum hierarchical depth; a filtered value is not include in displayed lists, but still counted for upper hierarchical levels.

4. Once you are satisfied with your selections, click **OK** in the Preferences dialog box and then click **OK** in the Power Report dialog box. SmartPower displays the report in a separate window.

Timing Violations Reports

For families that use the pin-to-pin timing model, the Violations report enables you to obtain constraint results sorted by slack. You can now view Max Delay violations as well as Min Delay violations in the report.

To generate a timing violations report:

1. From **Tools** menu, click **Reports**.
2. In the Report Types dialog box, select **Timing Violations**.
3. Click **OK**.

I/O Bank Reports

The I/O Bank report provides information about the I/O functionality, I/O technologies, I/O banks and I/O voltages.

The following section shows an excerpt from the I/O Bank report:

I/O Function:

Type	w/o register	w/ register	w/ DDR register
Input I/O	20	0	0
Output I/O	17	0	0
Bidirectional I/O	1	0	0
Differential Input I/O Pairs	0	0	0
Differential Output I/O Pairs	0	0	0

I/O Technology:

I/O Standard(s)	Voltages		I/Os		
	Vcci	Vref	Input	Output	Bidirectional
LVTTL	3.30v	N/A	20	17	1

I/O Bank Resource Usage:

	Voltages		Single I/Os		Diff I/O Pairs		Vref I/Os		
	Vcci	Vref	Used	Total	Used	Total	Used	Total	Vref Pins
Bank0	3.30v	N/A	0	25	0	12	N/A	N/A	N/A
Bank1	3.30v	N/A	0	15	0	7	N/A	N/A	N/A
Bank2	3.30v	N/A	0	17	0	6	N/A	N/A	N/A
Bank3	3.30v	N/A	0	16	0	7	N/A	N/A	N/A
Bank4	3.30v	N/A	0	15	0	7	N/A	N/A	N/A
Bank5	3.30v	N/A	0	22	0	10	N/A	N/A	N/A
Bank6	3.30v	N/A	0	19	0	9	N/A	N/A	N/A
Bank7	3.30v	N/A	0	18	0	7	N/A	N/A	N/A

I/O Voltage Usage:

Voltages		I/Os	
Vcci	Vref	Used	Total
3.30v	N/A	38	147

I/O Functionality

This section of the report indicates the total number of regular input, output, and bidirectional signals. This also shows the differential input and output in the design. The I/O categories are: regular I/Os, registered I/Os or DDR I/Os in the current design.

I/O Technologies

This section of the report specifies the VCCI and VREF voltage requirements for each I/O standard and the number of user I/Os per I/O standards used in the current design.

Note: For voltage referenced I/O standards, input and bidirectional I/Os require both a VCCI and a VREF power supply whereas output I/Os only require a VCCI power supply. This is why these two categories are shown separately in this section.

I/O Banks

This section of the report specifies the following I/O bank characteristics:

VCCI and VREF voltages assigned for each bank.

Total number of single-ended I/Os available and used for each bank.

Total number of differential I/O pairs available and used for each bank.

Total number of VREF pins assigned for each bank. This information is only relevant if a bank has been assigned a VREF voltage.

Total number of voltage referenced I/Os available and used for each bank. Voltage referenced I/Os are available only if VREF pins have been assigned.

I/O Voltages

This section of the report indicates the current design voltage requirements.

For each VCCI and VCCI/VREF user I/O demand in the current design, this table reports the total number of bonded I/Os available on the device that satisfy this demand.

Note: For an I/O bank assignment (VCCI and VREF assignment) to be valid for the current design, the I/O voltage table must show no violation. Violations are indicated with an asterix ("*") when the number of user I/Os that need a given VCCI or VCCI/VREF assignment is less than the total number of bonded I/Os that can satisfy this demand.

To generate IO bank report:

1. In the **Tools** menu, choose **Reports**. This displays the **Report Types** dialog box.
2. Select **IOBank** in the **Report types** and click **OK**. The IOBank report opens in a separate window. You can save or print the report.

Exporting Files

Designer supports different types of files to export.

[Supported file types](#)

[How to export a file?](#)

[Export a GCF file](#)

[Export a PDC file](#)

Supported File Types

The following table shows a complete list of files that you can export along with the supported family.

Note: Designer does not support exporting VHDL 87 format.

Files	File Extension	Family
Actel Flattened Netlist	.afl	All
Actel Internal Netlist	.adl	All
Standard Delay Format	.sdf	All
STAMP	.mod, .data	SX-A, eX, Axcelerator, ProASIC3/E, ProASIC, ProASIC ^{PLUS}
Tcl script file	.tcl	All
Verilog Netlist	.v	All
VHDL Netlist	.vhd	All
EDIF Netlist file	.edn	All
Log File	.log	All
STAPL	.stp	ProASIC3/E, ProASIC, ProASIC ^{PLUS}
Bitstream	.bit	ProASIC3/E, ProASIC, ProASIC ^{PLUS}
Programming file (legacy)	.fus	ACT1, ACT2, ACT3, MX, XL, DX
Actel programming file	.afm	ACT1, ACT2, ACT3, MX, XL, DX, SX, SX-A, eX, Axcelerator
Routing Segmentation file	.seg	ACT1, ACT2, ACT3, MX, XL, DX, SX, SX-A, eX
Silicon Explorer Probe file	.prb	ACT1, ACT2, ACT3, MX, XL, DX, SX, SX-A, eX, Axcelerator
Placement Location file	.loc	ProASIC3/E, ACT1, ACT2, ACT3, MX, XL, DX, SX, SX-A, eX
ProASIC Constraints file	.GCF	ProASIC
ProASIC ^{PLUS} Constraints file	.GCF	ProASIC ^{PLUS} There is no timing constraint information when you export a GCF file in ProASIC ^{PLUS} ; constraints are moved to an SDC file. The SDC file is not automatically exported when the GCF is exported; you must explicitly export the SDC file.
Combiner Info	.cob	ACT1, ACT2, ACT3, MX, XL, DX, SX, SX-A, eX, Axcelerator, ProASIC3/E
BSDL file	.bsd	DX, 42MX, SX, SX-A, eX, Axcelerator, ProASIC3/E,

		ProASIC, ProASIC ^{PLUS}
Criticality	*.crt	ACT1, ACT2, ACT3, MX, XL, DX
PIN	*.pin	ACT1, ACT2, ACT3, MX, XL, DX, SX, SX-A, eX
SDC	*.sdc	SX-A, eX, Axcelerator, ProASIC ^{PLUS} , ProASIC3/E
Physical Design Constraint	*.pdc	Axcelerator and ProASIC3/E
Value Change Dump	*.vcd	Axcelerator, ProASIC3/E, ProASIC, ProASIC ^{PLUS}
Switching Activity Intermediate File/Format	*.saif	Axcelerator, ProASIC3/E, ProASIC, ProASIC ^{PLUS}
Design Constraint file	*.dcf	ACT1, ACT2, ACT3, MX, XL, DX, SX, SX-A, eX

How to Export a File

To export a file:

1. From the **File** menu, select **Export** and then select the type of file you wish to export.
2. Specify file name and file type and click **OK**.

Note: You must compile your design before you export an SDC file.

To export a GCF file:

1. From the File menu, select Export > Constraint Files.
2. Enter the file name and click **OK**.
3. Choose the type of information you want to export:
4. **Pin locations:** Select to export the I/O placement and region constraints related to the I/Os only.
5. **Placement constraints:** Select to export all placement constraints, including I/O and core constraints.
6. **All GCF constraints:** Select to export all constraint information.
7. Click **OK**.

To export a PDC file:

1. From the File menu, select Export > Constraint Files.
2. Type a file name and choose a directory for it. Click **Save**. The Export Physical Design Constraints (PDC) dialog box appears.
3. Choose the type of information you want to export:
 - Pin locations and attributes:** Select to export information about the pin locations and attributes only.
 - Placement constraints:** Select to export all user-defined constraints.
 - Complete placement information:** Select to export all the information about the I/O locations, I/O attributes, and logic placement.
4. Click **OK**.

A message appears in the Log window telling you if the Export command succeeded.

Note: The content of the exported PDC file depends on the state of your design.

Pre-Compile: The exported PDC file will contain constraints that are stored in the database from the last valid compile state. Export may fail if you did not run Compile at least once before running Export.

Post-Compile: The exported PDC file will contain constraints that are currently stored in the database.

Saving Your Design

Once you have imported a netlist and compiled a design, you can save the design as an ADB file.

To save your design as an ADB file:

1. In the **File** menu, click **Save** or click the save icon in the toolbar.
2. Enter the File name and click **Save**. The default file name is the name you previously entered in the setup dialog box. The default format is adb. Make sure your save in the “.adb” format.

Once you have saved your compiled design as an ADB file, during any future Designer sessions, you can open the ADB file, skipping the compile step, and perform optimization on the design, including updating netlist and auxiliary file information.

Exiting Designer

To end a Designer session, from the **File** menu, click **Exit**.

If the information has not been saved to disk, you are asked if you want to save the design before exiting. If you choose YES, the “<design_name>.adb” file is updated with information entered the current session. If you choose NO, the information is not saved and the “<design_name>.adb” file remains unchanged.

About Tcl Commands

A Tcl (Tool Command Language) file contains scripts for simple or complex tasks. You can run scripts from either the Windows or UNIX command line or store and run a series of Tcl commands in a “.tcl” batch file. You can also run scripts from within Designer.

Designer supports the following Tcl scripting commands:

Command	Action
backannotate	Extracts timing delays from your post layout data
close_design	Closes the current design
compile	Performs design rule check and optimizes the input netlist before translating the source code into machine code
export	Converts a file from its current format into the specified file format, usually for use in another program
extended_run_shell	Runs multiple iterations of layout through Designer
get_defvar	Returns the value of the Designer internal variable you specify
get_design_filename	Returns the fully qualified path of the specified design file
get_design_info	Returns detailed information about your design, depending on which arguments you specify
import_aux	Imports the specified file as an auxiliary file, which are not audited and do not require you to re-compile the design
import_source	Imports the specified file as a source file, which include your netlist and design constraints
is_design_loaded	Returns True if the design is loaded into Designer; otherwise, returns False
is_design_modified	Returns True if the design has been modified since it was last compiled; otherwise, returns False
is_design_state_complete	Returns True if the specified design state is complete (for example, you can inquire as to whether a die and package has been selected for the design); otherwise, returns False
layout	Place-and-route your design
layout (advanced options for the SX family)	Sets advanced place-and-route features for SX family designs
layout (advanced options for ProASIC)	Sets advanced place-and-route features for ProASIC family designs
new_design	Creates a new design (.adb) file in a specific location for a particular design family such as Axcelerator or ProASIC3
open_design	Opens an existing design in the Designer software
pin_assign	Assigns the named pin to the specified port but does not lock its assignment.
pin_commit	Saves the pin assignments to the design (.adb) file.
pin_fix	Locks the pin assignment for the specified port, so the pin cannot be moved during place-and-route.
pin_fix_all	Locks all the assigned pins on the device so they cannot be moved during place-and-route.
pin_unassign	Unassigns a specific pin from a specific port. The unassigned pin location is then available for other ports.
pin_unassign_all	Unassigns all pins from a specific port.
pin_unfix	Unlocks the specified pin from its port.
report	Generates the type of report you specify: Status, Timing, Timer Violations, Flip-flop, Power, Pin, or I/O Bank

save_design	Writes the design to the specified filename
set_defvar	Sets the value of the Designer internal variable you specify
set_design	Specifies the design name, family and path in which Designer will process the design
set_device	Specifies the type of device and its parameters
smartpower_add_pin_in_domain	Adds a pin to either a Clock or Set domain
smartpower_commit	Saves the changes made in SmartPower to the design file (.adb) in Designer
smartpower_create_domain	Creates a new clock or set domain
smartpower_remove_domain	Removes an existing domain
smartpower_remove_pin_frequency	Removes the frequency of an existing pin
smartpower_remove_pin_of_domain	Removes a clock pin or a data pin from a Clock or Set domain, respectively.
smartpower_restore	Restores previously committed constraints
smartpower_set_domain_frequency	Sets the frequency of a domain
smartpower_set_pin_frequency	Sets the frequency of an existing pin
timer_add_clock_exception	Adds an exception to or from a pin with respect to a specified clock
timer_add_pass	Adds the pin to the list of pins for which the path must be shown passing through in the timer
timer_add_stop	Adds the specified pin to the list of pins through which the paths will not be displayed in the timer
timer_commit	Saves the changes made to constraints in Timer into the Designer database.
timer_get_path	Displays the Timer path information in the Log window
timer_get_clock_actuals	Displays the actual clock frequency in the Log window
timer_get_clock_constraints	Displays the clock constraints (period/frequency and dutycycle) in the Log window
timer_get_maxdelay	Displays the maximum delay constraint between two pins of a path in the Log window
timer_get_path_constraints	Displays the path constraints set for maxdelay in the Timer in the Log window
timer_remove_clock_exception	Removes the previously set clock constraint
timer_remove_pass	Removes the previously entered path pass constraint
timer_remove_stop	Removes the path stop constraint on the specified pin
timer_restore	Restores previously committed constraints
timer_setenv_clock_freq	Sets a required clock frequency, in MHz, for the specified clock
timer_setenv_clock_period	Sets the clock period constraint for the specified clock
timer_set_maxdelay	Adds a maximum delay constraint for the path
timer_remove_all_constraints	Removes all the timing constraints previously entered in the Designer system

Note: Tcl commands are case sensitive. However, their arguments are not.

See Also

[Tcl documentation conventions](#)

Introduction to Tcl scripting
 Basic syntax
 Variables
 Command substitution
 Quotes and braces
 Control structures
 Lists and arrays
 Print statement and Return values
 Types of Tcl commands
 Running Tcl scripts from the command line
 Running Tcl scripts from within Designer
 Exporting Tcl scripts
 Sample Tcl scripts

Tcl Documentation Conventions

The following table shows the typographical conventions used for the Tcl command syntax.

Syntax Notation	Description
command -argument	Commands and arguments appear in Courier New typeface.
<i>variable</i>	Variables appear in blue, italic Courier New typeface. You must substitute an appropriate value for the variable.
[-argument <i>value</i>] [<i>variable</i>]+	Optional arguments begin and end with a square bracket with one exception: if the square bracket is followed by a plus sign (+), then users must specify at least one argument. The plus sign (+) indicates that items within the square brackets can be repeated. Do not enter the plus sign character.

Note: All Tcl commands are case sensitive. However, their arguments are not.

Examples

Syntax for the `get_defvar` command followed by a sample command:

```
get_defvar variable
```

```
get_defvar "DESIGN"
```

Syntax for the `backannotate` command followed by a sample command:

```
backannotate [-dir directory_name] -name filename -format format_type -language  
language [-netlist] [-pin]
```

```
backannotate -dir \  
  {..\design} -name "fanouttest_ba.sdf" -format "SDF" -language "VERILOG" \  
-netlist
```

Wildcard Characters

You can use the following wildcard characters in names used in Tcl commands:

Wildcard	What it does
\	Interprets the next character literally
?	Matches any single character
*	Matches any string
[]	Matches any single character among those listed between brackets (that is, [A-Z] matches any single character in the A-to-Z range)

Note: The matching function requires that you add a slash (\) before each slash in the port, instance, or net name when using wildcards in a PDC command and when using wildcards in the Find feature of the MultiView Navigator. For example, if you have an instance named “A/B12” in the netlist, and you enter that name as “A\\B*” in a PDC command, you will not be able to find it. In this case, you must specify the name as A\\B*.

Special Characters ([], { }, and \)

Sometimes square brackets ([]) are part of the command syntax. In these cases, you must either enclose the open and closed square brackets characters with curly brackets ({}) or precede the open and closed square brackets ([]) characters with a backslash (\). If you do not, you will get an error message.

For example:

```
pin_assign -port {LFSR_OUT[0]} -pin 15
or
pin_assign -port LFSR_OUT\[0\] -pin 180
```

Note: Tcl commands are case sensitive. However, their arguments are not.

Entering Arguments on Separate Lines

To enter an argument on a separate line, you must enter a backslash (\) character at the end of the preceding line of the command as shown in the following example:

```
backannotate -dir \
{..\design} -name "fanouttest_ba.sdf" -format "SDF" -language "VERILOG" \
-netlist
```

See Also

Introduction to Tcl scripting

Basic syntax

[About Tcl commands](#)

backannotate

The `backannotate` command is equivalent to executing the Back-Annotate command within the Tools menu. You can export an SDF file, after layout, along with the corresponding netlist in the VHDL or Verilog format. These files are useful in backannotated timing simulation.

```
Backannotate -name file_name -format format_type -language language -dir
directory_name [-netlist] [-pin]
```

Arguments

-name *file_name*

Use a valid file name with this option. You can attach the file extension .sdf to the File_Name, otherwise the tool will append .sdf for you.

-format *format_type*

Only SDF format is available for back annotation

-language *language*

The supported Language options are

VHDL93 – For VHDL-93 style naming in SDF

VERILOG – For Verilog style naming in SDF

-dir *directory_name*

Specify the directory in which all the files will be extracted.

-netlist

Forces a netlist to be written. The netlist will be either in Verilog or VHDL depending on the

-pin

Designer exports the pin file with this option. The .pin file extension is appended to the design name to create the pin file.

Supported Families

All

Notes

We advise you to export both SDF and the corresponding VHDL/Verilog files. This will avoid name conflicts in the simulation tool.

Designer must have completed layout before this command can be invoked, otherwise the command will fail.

Exceptions

-pin is not supported for ProASIC and ProASIC^{PLUS} families.

Examples

Example 1:

```
backannotate
```

Uses default arguments and exports SDF file for back annotation

Example 2:

```
backannotate -dir \
```

```
{..\my_design_dir} -name "fanouttest_ba.sdf" -format "SDF" -language \ "VHDL93" -netlist
```

This example uses some of the options for VHDL

Example 3:

```
backannotate -dir \
```

Designer User's Guide

```
{..\design} -name "fanouttest_ba.sdf" -format "SDF" -language "VERILOG" \  
-netlist
```

This example uses some of the options for Verilog

Example 4:

```
If { [catch { backannotate -name "fanouttest_ba" -format "SDF" } ] } {  
    Puts "Back annotation failed"  
    # Handle Failure  
} else {  
    Puts "Back annotation successful"  
    # Proceed with other operations  
}
```

You can catch exceptions and respond based on the success of backannotate operation.

close_design

The close_design command closes the current design and brings Designer to a fresh state to work on a new design.

```
close_design
```

Arguments

None

Supported Families

All

Notes

This is equivalent to selecting the Close command in the File menu.

Exceptions

None.

Example

```
if { [catch { close_design } ] } {  
    Puts "Failed to close design"  
    # Handle Failure  
} else {  
    puts "Design closed successfully"  
    # Proceed with processing a new design  
}
```

See Also

[open_design](#), [close_design](#), [new_design](#)

compile

The compile command performs design rule check on the input netlist. Compile also performs some optimizations on the design through logic combining and buffer tree modifications. Compile options vary by family.

Supported Families

[MX, SX, SX-A, and eX](#)

[Axcelerator](#)

[ProASIC, ProASIC^{PLUS}](#)

[ProASIC3/E](#)

Compile Tcl arguments available for MX, SX, SX-A, and eX

```
compile -nl_pins_overwrite
```

Arguments

-nl_pins_overwrite

Overwrites the imported netlist with the changes made in PinEditor.

Notes

None

Exceptions

None

Example

```
if { [catch { compile nl_pins_overwrite } ] } {
    puts Failed compile
    # Handle Failure
} else {
    puts Compile successful
    # Proceed to Layout
}
```

Compile Tcl arguments available for Axcelerator

```
compile -combine_register value
```

Arguments

-combine_register *value*

The value should be ON for this optimization to take effect.

The following table shows the acceptable values for this argument:

Value	Description
on	Combines registers at the I/O into I/O-Registers.
off	Does not combine registers at the I/O

Notes

None

Exceptions

None

Example

```
compile -combine_register ON
```

Compile Tcl arguments available for ProASIC and ProASIC^{PLUS}

```
compile -ram_io_region <ON|OFF>
```

Arguments

-ram_io_region *value*

The following table shows the acceptable values for this argument:

Value	Description
ON	Includes RAM and I/O in the use_global and set_net_region constraints and in spines (LocalClock regions) created with the ChipPlanner tool in the MultiView Navigator
OFF	Does not include RAM and I/O in the use_global and set_net_region constraints and in spines (LocalClock regions) created with the ChipPlanner tool in the MultiView Navigator.

Default: ON for new designs; OFF for designs created with Designer v5.1 and earlier.

Notes

None

Exceptions

None

Example

```
compile -ram_io_region OFF
```

```
compile -ram_io_region ON
```

Compile Tcl Arguments Available for ProASIC3/E

```
compile
  -pdc_abort_on_error value
  -pdc_eco_display_unmatched_objects value
  -pdc_eco_max_warnings value
  -demote_globals value
  -demote_globals_max_fanout value
```

```

-promote_globals value
-promote_globals_min_fanout value
-promote_globals_max_limit value
-localclock_max_shared_instances value
-localclock_buffer_tree_max_fanout value
-combine_register value
-delete_buffer_tree value
-delete_buffer_tree_max_fanout value
-report_high_fanout_nets_limit value

```

Arguments

`-pdc_abort_on_error value`

Changes the “Abort on PDC error” behavior. The following table shows the acceptable values for this argument:

Value	Description
ON	Stops the flow if any error is reported in reading your PDC file
OFF	Skips errors in reading your PDC file and just report them as warnings.

Default: ON

Note: The flow always stops in the following two cases (even if this option is OFF):

If there is a Tcl error (for example, the command does not exist or the syntax of the command is incorrect)

The `assign_local_clock` command for assigning nets to LocalClocks fails. This may happen if any floor planning DRC check fails, such as, region resource check, fix macro check (one of the load on the net is outside the LocalClock region). If such an error occurs, then the Compile command fails. Correct your PDC file to proceed.

`-pdc_eco_display_unmatched_objects value`

Displays netlist objects in PDC that are not found in the imported netlist during Compile ECO mode. The following table shows the acceptable values for this argument:

Value	Description
ON	Reports netlist objects not found in the current netlist when reading the internal ECO PDC constraints
OFF	Specifies not to report netlist objects not found in the current netlist when reading the internal ECO PDC constraints

Default: OFF

`-pdc_eco_max_warnings value`

Defines the maximum number of errors/warnings in Compile ECO mode.

The value is the maximum number of error/warning messages to be displayed in the case of reading ECO constraints.

Default: 10000.

`-demote_globals value`

Enables/disables global clock demotion of global nets to regular nets. The following table shows the acceptable values for this argument:

Value	Description
OFF	Disables global demotion of global nets to regular nets
ON	Enables global demotion of global nets to regular nets

Default: OFF

`-demote_globals_max_fanout value`

Defines the maximum fanout value of a demoted net; where value is the maximum value

Default: 12

Note: A global net is not automatically demoted (assuming the option is on) if the resulting fanout of the demoted net (if it was demoted) is greater than the max fanout value. Actel recommends that the automatic global demotion only act on small fanout nets. Actel recommends that you drive high fanout nets with a clock network in the design to improve routability and timing.

`-promote_globals value`

Enables/disables global clock promotion. The following table shows the acceptable values for this argument:

Value	Description
ON	Enables global promotion of nets to global clock network
OFF	Disables global promotion of nets to global clock network

Default: OFF

`-promote_globals_min_fanout value`

Defines the minimum fanout of a promoted net; where value is the minimum fanout of a promoted net.

Default: 200

`-promote_globals_max_limit value`

Defines the maximum number of nets to be automatically promoted to global. The default value is 0. This is not the total number as nets need to satisfy the minimum fanout constraint to be promoted. The `promote_globals_max_limit` value does not include globals that may have come from either the netlist or PDC file (quadrant clock assignment or global promotion).

Note: Demotion of globals through PDC or Compile is done before automatic global promotion is done.

You may exceed the number of globals present in the device if you have nets already assigned to globals or quadrants from the netlist or by using a PDC file. The automatic global promotion adds globals on what already exists in the design.

`-localclock_max_shared_instances value`

Defines the maximum number of shared instances allowed to perform the legalization. This option is also available for quadrant clocks.

value is the maximum number of instances allowed to be shared by 2 LocalClock nets assigned to disjoint regions to perform the legalization (default is 12, range is 0-1000). If the number of shared instances is set to 0, no legalization is performed.

Note: If you assign quadrant clocks to nets using MultiView Navigator, no legalization is performed.

`-localclock_buffer_tree_max_fanout` *value*

Defines the maximum fanout value used during buffer insertion for clock legalization. This option is also available for quadrant clocks.

Set *value* to 0 to disable this option and prevent legalization (default value is 12, range is 0-1000). If the value is set to 0, no buffer insertion is performed. If the value is set to 1, there will be one buffer inserted per pin.

`-combine_register` *value*

Combines registers at the I/O into I/O-Registers. The following table shows the acceptable values for this argument:

Value	Description
ON	Combines registers at the I/O into I/O-Registers
OFF	Does not optimize and combine registers at the I/O.

Default: OFF

`-delete_buffer_tree` *value*

Enables/disables buffer tree deletion on the global signals. The buffer and inverter are deleted. The following table shows the acceptable values for this argument:

Value	Description
ON	Enables buffer tree deletion from the netlist
OFF	Disables buffer tree deletion from the netlist

Default: OFF

`-delete_buffer_tree_max_fanout` *value*

Defines the maximum fanout of a net after buffer tree deletion;

value is the maximum value; the default value is 12.

Note: A net does not automatically remove its buffer tree (assuming the option is on) if the resulting fanout of the net (if the buffer tree was removed) is greater than the max fanout value. Actel recommends that the automatic buffer tree deletion only act on small fanout nets. Actel recommends that you drive high fanout nets with a clock network in the design to improve routability and timing.

`-report_high_fanout_nets_limit` *value*

Enables flip-flop net sections in the compile report and defines the number of nets to be displayed in the high fanout.

Default: 10

Notes

None

Exceptions

None

Examples

```
compile \
  -pdc_abort_on_error "ON" \
  -pdc_eco_display_unmatched_objects "OFF" \
  -pdc_eco_max_warnings 10000 \
  -demote_globals "OFF" \
  -demote_globals_max_fanout 12 \
  -promote_globals "OFF" \
  -promote_globals_min_fanout 200 \
  -promote_globals_max_limit 0 \
  -localclock_max_shared_instances 12 \
  -localclock_buffer_tree_max_fanout 12 \
  -combine_register "OFF" \
  -delete_buffer_tree "OFF" \
  -delete_buffer_tree_max_fanout 12 \
  -report_high_fanout_nets_limit 10
```

export

The syntax and arguments for the **export** command vary depending on which device you are designing. Click the appropriate command in the following list to see the syntax, arguments, and other information:

```
export (ProASIC3/E)
export (ProASICPLUS, Axcelerator, ProASIC, MX, eX, and SX/SX-A)
```

extended_run_shell

This script runs multiple iterations of layout through Designer. Use this script from the tcl shell "acttclsh". **This is the script or command-line equivalent to using the multiple-pass layout (in the GUI).**

```
$ACTDIR/bin/acttclsh $ACTDIR/scripts/extended_run_shell.tcl
  -adb adbFilename [-n numIterations] [-timing_driven]
  [-c clockname] [-compare_script compareScript] [-save_all]
  [-stop_on_success] [-continue_from_last_seed]
  [-place value] [-incremental_place value]
  [-incremental_route value]
  [-effort_level n] [-timing_weight n]
```

Arguments

`$ACTDIR`

Location of the installation directory for Libero/Designer.

`[-adb adbFilename]`

This is the design file to run multiple iterations of layout.

`-timing_driven`

Set this switch to run timing driven layout.

`-c clockname`

Clock mode - the run with the minimum value of the maximum register to register delay for the specified clock is chosen as the best result. Default mode chooses the run with the highest frequency of the slowest clock as the best result.

Note: If '-compare_script compareScript' is specified, then that script will be used to determine the best run.

`-compare_script compareScript`

Sets the script that is used to determine whether a run is better than previous iterations. If only the script name is given (no path), then the script is assumed to be `$ACTDIR/scripts/<compareScript>`, otherwise the full path of the script must be given. The default is `iterate_reg2reg_compare.tcl` if the "-c clockname" option is used, and `iterate_minfreq_compare.tcl` otherwise.

`-save_all`

Saves all intermediate designs in `${adbFilename}_${iteration}.adb`. The best result is also stored in `$adbFilename` as well. The default behavior does not save all results.

`-stop_on_success`

Only perform iterations until the design is successful. When the `iterate_violations_compare.tcl` `isLayoutBetter` method is used, Success is defined as there being no negative slack (no timing violations). When the other `isLayoutBetter` methods are used there is no effect (all iterations are attempted).

`-continue_from_last_seed`

Use the def variable `MULTIPASS_LAYOUT_SEED_INDEX+1` as the starting seed.

`-place value`

Default is "on". The following table shows the acceptable values for this argument:

Value	Description
on	Implements place
off	Does not implement place

`-incremental_place value`

Sets incremental place. The following table shows the acceptable values for this argument:

Value	Description
on	Activates incremental place.
off	Deactivates incremental place

`-incremental_route` *value*

Default is "off".

The following table shows the acceptable values for this argument:

Value	Description
on	Activates incremental route
off	Deactivates incremental route

`[-effort_level n]`

This is an advanced option. N should be an integer. This option is available only for ProASIC^{PLUS}.

`[-timing_weight n]`

This is an advanced option. N should be an integer. This option is available only for ProASIC^{PLUS}.

Return: A non-zero value will be returned on error.

Supported Families

All

Notes

This is not a Tcl command. It is a shell script that can be run from the command line.

Exceptions

N/A

Example

N/A

See Also

N/A

get_defvar

The `get_defvar` command provides access to the internal variables within Designer and returns its value.

```
get_defvar variable
```

Arguments

The *variable* is the Designer internal variable.

Supported Families

All

Notes

This command also prints the value of the Designer variable on the log window.

Exceptions

None

Example

Example 1: Prints the design name on the log window.

```

get_defvar "DESIGN"
set variableToGet "DESIGN"
set valueOfVariable [get_defvar $variableToGet]
puts "The value is $valueOfVariable"

```

See Also

[set_defvar](#)

get_design_filename

The `get_design_filename` command can be used to retrieve the full qualified path of the design file.

```
get_design_filename
```

Arguments

None

Supported Families

All

Notes

The result will be an empty string if the design has not been saved to disk.

This command is equivalent to the command “`get_design_info DESIGN_PATH.`” This command predates `get_design_info` and is supported for backward-compatibility.

Exceptions

The command will return an error if a design is not loaded.

The command will return an error if arguments are passed.

Example

```

if { [ is_design_loaded ] } {
    set design_location [ get_design_filename ]
    if { $design_location != "" } {
        puts "Design is at $design_location."
    } else {
        puts "Design has not been saved to a file on disk."
    }
} else {
    puts "No design is loaded."
}

```

}

See Also

[get_design_info](#)

[is_design_loaded](#)

[is_design_modified](#)

[is_design_state_complete](#)

get_design_info

The `get_design_info` command can be used to retrieve some basic details of your design.

```
get_design_info value
```

Arguments

The argument must be one of the valid string values. The possible values are summarized in the table below:

Value	Description
name	Design name. The result is set to the design name string.
family	Silicon family. The result is set to the family name.
design_path	Fully qualified path of the design file. The result is set to the location of the .adb file. If a design has not been saved to disk, the result will be an empty string. This command replaces the command <code>get_design_filename</code> .
design_folder	Directory (folder) portion of the <code>design_path</code> .
design_file	Filename portion of the <code>design_path</code> .
cwdir	Current working directory. The result is set to the location of the current working directory
die	Die name. The result is set to the name of the selected die for the design. If no die is selected, this is an empty string.
Package	Package. The result is set to the name of the selected package for the design. If no package is selected, this is an empty string.
Speed	Speed grade. The result is set to the speed grade for the design. If no speed grade is selected, this is an empty string.

Supported Family

All

Notes

The result value of the command will be a string value.

Exceptions

The command will return an error if a design is not loaded.

The command will return an error if more than one argument is passed.

The command will return an error if the argument is not one of the valid values.

Example

The following example uses `get_design_info` to display the various values to the screen.

```

if { [ is_design_loaded ] } {
    puts "Design is loaded."
    set bDesignLoaded 1
} else {
    puts "No design is loaded."
    set bDesignLoaded 0
}
if { $bDesignLoaded != 0 } {
    set var [ get_design_info NAME ]
    puts "  DESIGN NAME:\t$var"
    set var [ get_design_info FAMILY ]
    puts "  FAMILY:\t$var"
    set var [ get_design_info DESIGN_PATH ]
    puts "  DESIGN PATH:\t$var"
    set var [ get_design_info DESIGN_FILE ]
    puts "  DESIGN FILE:\t$var"
    set var [ get_design_info DESIGN_FOLDER ]
    puts "  DESIGN FOLDER:\t$var"
    set var [ get_design_info CWDIR ]
    puts "  WORKING DIRECTORY: $var"
    set var [ get_design_info DIE ]
    puts "  DIE:\t$var"
    set var [ get_design_info PACKAGE ]
    puts "  PACKAGE:\t'$var'"
    set var [ get_design_info SPEED ]
    puts "  SPEED GRADE:\t$var"
    if { [ is_design_modified ] } {
        puts "The design is modified."
    } else {
        puts "The design is unchanged"
    }
}
puts "get_design.tcl done"

```

See Also

[get_design_filename](#)

[is_design_loaded](#)

[is_design_modified](#)

[is_design_state_complete](#)

import_aux

Imports the specified auxiliary file into the design. Equivalent to executing the Import Auxiliary Files command from the File menu.

```
import_aux -format file_type [-merge_timing] filename
```

Arguments

-format *file_type*

Specifies the file format of the file to import. You can import one of the following types of files: pdc, sdc, pin, dcf, saif, vcd, or crt.

-merge_timing *value*

Specifies whether to preserve all existing timing constraints when you import an SDC file. Same as selecting or unselecting the "Keep existing timing constraints" check box in the Import Files dialog box. The following table shows the acceptable values for the this option:

Value	Description
yes/true	Designer merges the timing constraints from the imported SDC file with the existing constraints saved in the constraint database.
no/false	The existing timing constraints are replaced by the constraints in the newly imported SDC file.

filename

Specifies the name of the auxiliary file to import.

Supported Families

ProASIC3/E, ProASIC^{PLUS}, Axcelerator, ProASIC, MX, eX, SX/SX-A

Notes

Auxiliary files are not audited and are handled as one-time data-entry or data-change events, similar to entering data using one of the interactive editors (for example, PinEditor or Timer).

Some timing constraints (such as multi_cycle) are not supported in the Timer GUI and must be implemented by importing the SDC file. If you import the SDC file as an auxiliary file, you do not have to re-compile your design. However, auditing is disabled when you import auxiliary files, and Designer cannot detect the changes to your SDC file(s) if you import them as auxiliary files.

Exceptions

For auxiliary SDC constraints in eX, SX-A, ProASIC^{PLUS}, Axcelerator and ProASIC3/E:

```
import_aux -format sdc -merge_timing yes/no ...
```

```
import_aux -format sdc -merge_all yes/no ...
```

```
import_aux -format sdc -merge yes/no ...
```

All NGT families support SDC. The import_aux command does not support any merge options for physical constraints.

For these families, in `import_source`, the `-merge_all` and `-merge` options are mapped only to `-merge_timing`. When recorded, the `import-aux` SDC always writes out `-merge_timing`.

Examples

```
import_aux -format sdc -merge_timing yes mydesign.sdc
import_aux -format pdc {C:/designs/mydesign.pdc}
```

See Also

[import_source](#)

[Importing auxiliary files](#)

[Importing source files](#)

Importing files

[Tcl documentation conventions](#)

import_source

Imports the specified source file into the design. Equivalent to executing the Import Source File command from the File menu.

```
import_source [-merge_timing value] [-merge_physical value] [-merge_all value] [-format file_type [-abort_on_error] [-top_entity] [-flavor value] filename]+
```

Arguments

`-merge_timing value`

Specifies whether to preserve all existing timing constraints when you import an SDC file. Same as selecting or unselecting the "Keep existing timing constraints" check box in the Import Files dialog box. The following table shows the acceptable values for this option:

Value	Description
yes	Designer merges the timing constraints from the imported SDC file with the existing constraints saved in the constraint database. If there is a conflict, the new constraint has priority over the existing constraint.
no	All existing timing constraints are replaced by the constraints in the newly imported SDC file.

`-merge_physical value`

Specifies whether to preserve all existing physical constraints when you import a PDC file. Same as selecting or unselecting the "Keep existing physical constraints" check box in the Import Files dialog box. The following table shows the acceptable values for this option:

Value	Description
yes	Designer preserves all existing physical constraints that you have entered either using one of the MVN tools (ChipPlanner, PinEditor, or the I/O Attribute Editor) or a previous GCF or PDC file. The software resolves any conflicts between new and existing physical constraints and displays the appropriate message.

no	All existing physical constraints are replaced by the constraints in the newly imported PDC file.
----	---

`-merge_all value`

Specifies whether to preserve all existing physical and timing constraints when you import an SDC and/or a PDC file. Same as selecting or unselecting the "Keep existing physical constraints" and "Keep existing timing constraints" check boxes in the Import Files dialog box. The following table shows the acceptable values for this option:

Value	Description
yes	Designer preserves all existing physical constraints that you have entered either using one of the MVN tools (ChipPlanner, PinEditor, or the I/O Attribute Editor) or a previous GCF or PDC file. The software resolves any conflicts between new and existing physical constraints and displays an appropriate message. Any existing timing constraints from your ADB are merged with the new information from your imported files. New constraints override any existing timing constraints whenever there is a conflict
no	All the physical constraints in the newly imported GCF or PDC files are used. All pre-existing physical constraints are lost. Existing timing constraints from the ADB are replaced by the new timing constraints from your imported file.

`-format file_type`

Specifies the file format of the file to import. You can import one of the following types of files: adl, edif, verilog, vhd, gcf, pdc, sdc, or crt.

`-abort_on_error`

Aborts a PDC file if it encounters an error during import.

`-top_entity`

Specifies the top entity to a VHDL file.

`-flavor`

Specifies the type of netlist. It can be edif, viewlogic, or mgc.

`filename`

Specifies the name of the source file to import.

Supported Families

ProASIC3/E, ProASIC^{PLUS}, Axcelerator, ProASIC, MX, eX, SX/SX-A

Notes

None.

Exceptions

Your script -merge options vary according to family as shown below:

For source SDC (no PDC/GCF) in eX and SX-A:

```
import_source -merge_timing yes/no ...
```

```
import_source -merge yes/no ...
import_source -merge_all yes/no ...
```

The eX and SX-A families do not support merging of physical constraints. For these families, in `import_source`, the `-merge_all` and `-merge` options are mapped just to `-merge_timing`.

For constraints in ProASIC^{PLUS}:

```
import_source -merge_physical yes/no ...
import_source -merge_all yes/no ...
import_source -merge yes/no ...
```

ProASIC^{PLUS} and ProASIC support GCF, but the `-merge` option in the `import_source` only affects GCF in terms of the physical constraints.

ProASIC does not support PreCompile import of the SDC files. The `-merge_timing` option has no effect on this `import_source` for ProASIC. The `-merge_all` and `-merge` options map to `-merge_physical` for ProASIC in `import_source`.

For ProASIC^{PLUS}, Axcelerator and ProASIC3/E:

```
import_source -merge_physical yes/no -merge_timing yes/no ...
import_source -merge_all yes/no ...
import_source -merge yes/no ...
```

The `-merge_all` and `-merge` options map to both `-merge_physical` and `-merge_timing` options for these families.

Examples

Consider the following sample scripts:

```
import_source \
  -merge_physical "no" \
  -merge_timing "yes"
  -format "EDIF" -edif_flavor "GENERIC" \
  {.\designs\mydesign.edn} \
  -format "sdc" \
  {.\designs\mydesign.sdc} \
  -format "pdc" -abort_on_error "no" \
  {.\designs\mydesign.pdc} \
import_source \
  -merge_physical "no" \
  -merge_timing "yes" \
  -format "verilog" \
  {mydesign.v}
import_source \
  -merge_physical "no" \
  -merge_timing "no"
  -format "vhdl" -top_entity "aclass" \
  {C:/mynetlist.vhd}
```

```
import_source \  
  -merge_physical "no" \  
  -merge_timing "no" \  
  -format "adl" {mydesign.adl
```

See Also

[import_source](#)

[Importing auxiliary files](#)

[Importing source files](#)

Importing files

[Tcl documentation conventions](#)

is_design_loaded

The `is_design_loaded` returns a Boolean value (0 for false, 1 for true) indicating if a design is loaded in the Designer software. True is returned if a design is currently loaded.

```
is_design_loaded
```

Arguments

None

Supported Family

All

Notes

Some Tcl commands are valid only if a design is currently loaded in Designer. Use the 'is_design_loaded' command to prevent runtime errors by checking for this before invoking the commands.

Exceptions

The command will return an error if arguments are passed.

Example

The following code will determine if a design has been loaded.

```
set bDesignLoaded [ is_design_loaded ]  
if { $bDesignLoaded == 0 } {  
  puts "No design is loaded."  
}
```

See Also

[get_design_filename](#)

[get_design_info](#)

[is_design_modified](#)[is_design_state_complete](#)

is_design_modified

The `is_design_modified` returns a Boolean value (0 for false, 1 for true) indicating if a design has been modified in the Designer software. True is returned if a design has been modified.

```
is_design_modified
```

Arguments

None

Supported Family

Family: All

Notes

Some Tcl commands are valid only if a design has been modified in Designer. Use the `is_design_modified` command to prevent runtime errors by checking for this before invoking the commands.

Exceptions

The command will return an error if arguments are passed.

Example

The following code will determine if a design has been modified.

```
set bDesignModified [ is_design_modified ]
if { $bDesignModified == 0 } {
    puts "Design has not been modified."
}
```

See Also

[get_design_filename](#)[get_design_info](#)[is_design_loaded](#)[is_design_state_complete](#)

is_design_state_complete

The `is_design_state_complete` command returns a Boolean value (0 for false, 1 for true) indicating if a specific design state is valid. True is returned if the specified design state is valid.

```
is_design_state_complete value
```

Arguments

The single argument must be one of the valid string values. The possible values are summarized in the table below:

Value	Description
SETUP_DESIGN	The design is loaded and the family has been specified for the design
DEVICE_SELECTION	The design has completed device selection (die and package). This corresponds to having successfully called the <code>set_device</code> command to set the die and package
NETLIST_IMPORT	The design has imported a netlist
COMPILE	The design has completed the compile command
LAYOUT	The design has completed the layout command
BACKANNOTATE	The design has exported a post-layout timing file (e.g. SDF)
PROGRAMMING_FILES	The design has exported a programming file (e.g. AFM)

Supported Family

All

Notes

Certain commands can only be used after Compile or Layout has been completed.

The `is_design_state_complete` command allows a script to check the design state before calling one of these state-limited commands.

Exceptions

The command will return an error if a design is not loaded.

The command will return an error if more than one argument is passed.

The command will return an error if the argument is not one of the valid values.

Example

The following code runs layout, but checks that the design state for layout is complete before calling backannotate.

```
layout -timing_driven
set bLayoutDone [ is_design_state_complete LAYOUT ]
if { $bLayoutDone != 0 } {
    backannotate -name {mydesign_ba} -format "SDF" -language "verilog"
}
}
```

See Also

[compile](#)

[get_design_filename](#)

[get_design_info](#)[is_design_loaded](#)[is_design_modified](#)[layout](#)[set_design](#)[set_device](#)

layout

Sets the layout mode and placer value; this command is identical to the layout command in the Designer GUI.

```
layout -value [-run_placer value]
```

Arguments

layout -value

Sets layout mode to be timing driven or standard. If not given, default is standard or the mode used in the previous layout command. Values are summarized in the table below:

Value	Description
timing_driven	Sets timing driven layout mode
standard	Sets standard layout mode

-run_placer|-placer|-place value

Invokes or skips placement. If set to OFF, previous placement will be used. Possible values are summarized in the table below. Note that all three of the commands (-run_placer, -placer, and -place) execute the same action.

Value	Description
ON	Invokes placement
OFF	Skips placement

Supported Families

All

Notes

Please refer to the Advanced Layout Options for your device family for more information.

Exceptions

None

Example

The following code runs layout and specifies the timing-driven option.

layout -timing_driven

See Also

[layout \(advanced options for SX family\)](#)

[layout \(advanced options for ProASIC\)](#)

[layout \(advanced options for Axcelerator\)](#)

layout (Advanced Options for the SX family)

This is equivalent to executing commands within the Advanced Layout Options dialog box for the SX, SX-A, and eX families.

```
layout [-timing_driven] [-incremental value] [-extended_run value] [-effort_level value] [-timing_weight value]
```

Arguments

-timing_driven

Sets layout mode to timing driven. If not given, default is standard or the mode used in the previous layout command.

-incremental *value*

Invokes or skips incremental mode. Possible values are summarized in the table below.

Value	Description
ON	Invokes incremental mode, and sets the previous routing information as the initial starting point
OFF	Skips incremental mode, discards previous information

-extended_run *value*

Invokes or skips extended_run mode. Possible values are summarized in the table below.

Value	Description
ON	Invokes extended run mode
OFF	Skips extended run mode

-effort_level *value*

Sets the effort level; number may range from 25 to 500.

-timing_weight *value*

Sets the timing weight value; number may range from 10 to 150.

Supported Families

SX,SX-A, eX

Notes

None

Exceptions

None

Example

```
layout [-timing_driven] [-incremental OFF] [-extended_run OFF] [-effort_level 50] [-timing_weight 100]
```

See Also

[layout](#)

[layout \(advanced options for ProASIC\)](#)

[layout \(advanced options for Axcelerator\)](#)

layout (Advanced Options for ProASIC and ProASIC^{PLUS})

This is equivalent to executing commands within the Advanced Layout Options dialog box. These commands perform the layout (placement and/or routing) for the design.

```
layout [-value]
[-run_placer value]
[-place_incremental value]
[-placer_seed value]
[-show_placer_seed]
[-timing_weight value]
[-run_router value]
[-route_incremental value]
```

Arguments

layout *-value*

Sets layout mode to be timing driven or standard. If not given, default is timing-driven. Values are summarized in the table below:

Value	Description
timing_driven	Sets timing driven layout mode
standard	Sets standard layout mode

-run_placer|*-placer*|*-place value*

Invokes or skips placement. If set to OFF, previous placement will be used. Possible values are summarized in the table below. Note that all three of the commands (*-run_placer*, *-placer*, and *-place*) execute the same action.

Value	Description
ON	Invokes placement
OFF	Skips placement

`-place_incremental|incremental value`

Sets your incremental placement options for layout. Values are summarized in the table below. Note that the `-place_incremental` and `-incremental` commands are interchangeable.

Value	Description
ON	Sets the previous placement as the initial starting point
OFF	(default) Discards previous placement
FIX	Sets the previously placed macros' locations as "FIXED" and continues to place the remaining ones

`-placer_seed value`

An integer value that you can set to change the initial random seed number for the placement.

`-show_placer_seed`

Causes Layout to display the initial random seed number used for the placement.

`-timing_weight value`

The timing weight for the placement. Values range from 1 to 4 in whole integers. The lower numbers give less weight to timing in the placement. Timing weight 4 is the same as timing driven placement using the option `-timing_driven`.

`-run_router|router|route value`

Invokes (if placement is successful) or skips routing. Values are described below.

Value	Description
ON	Invokes routing if placement is successful
OFF	Skips routing

`-route_incremental value`

Invokes or skips incremental mode. Possible values are summarized in the table below.

Value	Description
ON	Invokes incremental mode, and sets the previous routing information as the initial starting point
OFF	Skips incremental mode, discards previous information

Supported Families

ProASIC, ProASIC^{PLUS}

Notes

Please refer to the [ProASIC and ProASICPLUS Layout Options](#) for more information.

Exceptions

None

Example

```
layout
```

```
layout -standard
```

```
layout -timing_weight 3
```

```
layout -place_incremental FIX -route_incremental ON
layout -placer_seed 120
```

See Also

[layout](#) (for SX, SX-A, and eX)

[layout](#) (for Axcelerator)

layout (Advanced options for Axcelerator)

This is equivalent to executing commands within the Advanced Layout Options dialog box.

```
layout [-value]
[-run_placer value]
[-place_incremental value]
[-placer_seed value]
[-effort_level value]
[-run_router value]
[-route_incremental value]
```

Arguments

layout *-value*

Sets layout mode to be timing driven or standard. If not given, default is standard or the mode used in the previous layout command. Values are summarized in the table below:

Value	Description
timing_driven	Sets timing driven layout mode
standard	Sets standard layout mode

-run_placer|-placer|-place *value*

Invokes or skips placement. If set to OFF, previous placement will be used. Possible values are summarized in the table below. Note that all three of the commands (-run_placer, -placer, and -place) are interchangeable.

Value	Description
ON	Invokes placement
OFF	Skips placement

-place_incremental|-incremental *value*

Sets your incremental placement options for layout. Values are summarized in the table below. Note that the -place_incremental and -incremental commands are interchangeable.

Value	Description
ON	Sets the previous placement as the initial starting point

OFF	(default) Discards previous placement
FIX	Sets the previously placed macros' locations as "FIXED" and continues to place the remaining ones

-placer_seed *value*

An integer value that you can set to change the initial random seed number for the placement.

-effort_level *value*

The effort level for the placement. Values range from 1 to 5 in whole integers. The lower numbers tend to give a result more quickly, but higher levels yield better performance in timing and routability.

-run_router|-router|-route *value*

Invokes (if placement is successful) or skips routing. Values are described below.

Value	Description
ON	Invokes routing if placement is successful
OFF	Skips routing

-route_incremental *value*

Invokes or skips incremental mode. Possible values are described in the table below.

Value	Description
ON	Invokes incremental mode, and sets the previous routing information as the initial starting point
OFF	Skips incremental mode, discards previous information

Supported Families

Axcelerator

Notes

Please refer to the [Axcelerator Layout options](#) for more information.

Exceptions

N/A

Example

```
layout
layout -timing_driven -effort_level 4
layout -place_incremental FIX -route_incremental ON
layout -placer_seed 120
```

See Also

[layout](#) (for SX)

[layout](#) (for ProASIC)

new_design

The `new_design` command creates a new design.

```
new_design -name design_name -family family_name -path pathname
```

Arguments

`-name design_name`

The name of the design. This is used as the base name for most of the files generated from Designer.

`-family family_name`

The Actel device family for which the design is being targeted.

`-path path_name`

The physical path of the directory in which the design files will be created.

Supported Families

Family: All

Notes

You need all the 3 arguments for this command. This command will setup the Designer software for importing design source files.

Exceptions

None

Example

Example 1: Creates a new ACT3 design with the name “test” in the current folder.

```
new_design -name "test" -family "ACT3" -path {.
```

Example 2: These set of commands create a new design through variable substitution.

```
set desName "test"
set famName "ACT3"
set path {d:/examples/test}
new_design -name $desName -family $famName -path $path
```

Example 3: Design creation and catch failures

```
if { [catch { new_design -name $desName -family $famName -path $path }] } {
    Puts "Failed to create a new design"
    # Handle Failure
} else {
    puts "New design creation successful"
    # Proceed to Import source files
}
```

See Also

[close_design](#)

[open_design](#).

[save_design](#)

[set_design](#)

open_design

The `open_design` command opens an existing design into the Designer software.

```
open_design file_name
```

Arguments

`file_name`

is the complete adb file path. The complete path is not provided then the directory is assumed to be the current working directory.

Supported Families

All

Notes

All previously open designs must be closed before opening a new design.

Exceptions

None

Example

Example 1: Opens an existing design from the file “test.adb” in the current folder.

```
open_design {test.adb}
```

Example 2: Design creation and catch failures.

```
set designFile {d:/test/my_design.adb}
if { [catch { open_design $designFile } ] } {
    puts "Failed to open design"
    # Handle Failure
} else {
    puts "Design opened successfully"
    # Proceed to further processing
}
```

See Also

[close_design](#)

[new_design](#)

[save_design](#)

pin_assign

Use to either assign the named pin to the specified port or assign attributes to the specified port. This command has two syntax formats. The one you use depends on what you are trying to do. The first syntax format assigns the named pin to the specified port. The second one assigns attributes to the specified port.

```
pin_assign [-nofix] -port portname -pin pin_number
pin_assign -port portname [-iostd value] [-iothresh value] [-outload value] [-slew value] [-res_pull value]
```

Arguments

-nofix

Unlocks the pin assignment (by default, assignments are locked).

-port *portname*

Specifies the name of the port to which the pin is assigned.

-pin *pin_number*

Specifies the alphanumeric number of the pin to assign.

-iostd *value*

Sets the I/O standard for this pin. Choosing a standard allows the software to set other attributes such as the slew rate and output loading. If the voltage standard used with the I/O is not compatible with other I/Os in the I/O bank, then assigning an I/O standard to a port will invalidate its location and automatically unassign the I/O. The following table shows the acceptable values for the supported devices:

I/O Standard	ProASIC PLUS	Axcelerator	ProASIC	RTSX-S	SX/SX-A	eX
CMOS				X		
CUSTOM				X	X	X
GTLP25	X	X				
GTLP33	X					
GTL33	X	X				
GTL25	X	X				
HSTL1	X	X				
HSTLII	X					
LVC MOS33	X		X			
LVC MOS25	X	X				
LVC MOS25_50	X		X			

LVC MOS18	X	X	X			
LVC MOS15	X	X	X			
LVDS		X				
LVPECL	X*	X				
LVTTL	X	X	X	X	X	
TTL	X	X	X	X	X	
PCI	X	X	X	X	X	X
PCIX	X	X	X			
SSTL2I	X	X				
SSTL2II	X	X				
SSTL3I	X	X				
SSTL3II	X	X				

*Supported only on dedicated LVPECL I/Os.

`-iothresh value`

Sets the compatible threshold level for inputs and outputs. This attribute is for SX-A and RTSX-S families only. The default I/O threshold is based upon the I/O standard. You can set the I/O Threshold independently of the I/O specification in the PinEditor tool by selecting **CUSTOM** in the I/O Standard cell. The following table shows the acceptable values for the supported devices (SX-A, RTSX-S, and eX):

Value	Description
CMOS	RTSX-S devices only. An advanced integrated circuit (IC) manufacturing process technology for logic and memory, characterized by high integration, low cost, low power, and high performance. CMOS logic uses a combination of p-type and n-type metal-oxide-semiconductor field effect transistors (MOSFETs) to implement logic gates and other digital circuits found in computers, telecommunications, and signal processing equipment.
LVTTL	(Low-Voltage TTL) A general purpose standard (EIA/JESDSA) for 3.3V applications. It uses an LVTTL input buffer and a push-pull output buffer.
PCI	A computer bus for attaching peripheral devices to a computer motherboard in a local bus. This standard supports both 33 MHz and 66 MHz PCI bus applications. It uses an LVTTL input buffer and a push-pull output buffer. With the aid of an external resistor, this I/O standard can be 5V-compliant for most families, excluding ProASIC3/E families.

`-slew value`

Sets the output slew rate. Slew control affects only the falling edges. Rising edges are not affected. This attribute is only available for LVTTL, PCI, and PCI outputs. For LVTTL, it can either be high or low. For PCI and PCIX, it can only be set to high. The following table shows the acceptable values for the supported devices (ProASIC ^{PLUS}, Axcelerator, ProASIC, SX-A, RTSX-S, and eX):

Value	Description
high	Sets the I/O slew to high
low	Sets the I/O slew to low

`-res_pull value`

Allows you to include a weak resistor for either pull-up or pull-down of the input buffer. The following table shows the acceptable values for the supported devices (ProASIC ^{PLUS}, Axcelerator, ProASIC, SX-A/RTSX-S, and eX):

Value	Description
up	Includes a weak resistor for pull-up of the input buffer
down	Includes a weak resistor for pull-down of the input buffer
none	Does not include a weak resistor

`-out_load` *value*

Indicates the output-capacitance value based on the I/O standard selected. This option is not available in ACTgen. This attribute determines what Timer will use as the loading on the output pin and applies only to outputs. You can enter a capacitive load as an integral number of picofarads (pF). The default is $35pF$. This attribute is available only for the following devices: ProASIC ^{PLUS}, Axcelerator, ProASIC, SX-A/RTSX-S, and eX.

Supported Families

ProASIC ^{PLUS}, Axcelerator, ProASIC, SX, SX-A, RTSX-S, and eX

Notes

You must use `pin_commit` after this command (see Examples below) to save the changes to your design.

The `-iothresh` argument is also referred to as "Loading" in some families.

You can use this command for designs created with PinEditor in MVN and PinEditor Standalone.

This command does not support MX and SX devices.

The following table provides a summary of all supported I/O features for SX-A, RTSX-S, and eX devices:

I/O Standard	Device			Output Slew-rate Control	Power-Up State Control	Hot-Swap	Loading (pf)
	SX-A	eX	RT54SX-S				
2.5V LVCMOS	X	X		X	X	Yes	35
3.3V LVTTTL	X	X	X	X	X	Yes	35
5V TTL	X	X	X	X	X	Yes	35
3.3V PCI	X		X	High	X	No	10
5V PCI	X		X	High	X	Yes	50
5V CMOS			X	X	X	Yes	35

Exceptions

None

Examples

```
pin_assign -port usw0 -pin A2
```

```
pin_assign -port usw0 -iostd LVTTTL -slew Low -res_pull Down
```

See Also

[pin_commit](#)

[pin_fix](#)

[pin_unassign](#)

[Tcl documentation conventions](#)

pin_commit

Saves the pin assignments to the design (.adb) file.

```
pin_commit
```

Arguments

None

Supported Families

ProASIC ^{PLUS}, Axcelerator, ProASIC, SX, SX-A, RTSX-S, MX, and eX

Notes

To save your changes, you must add the `pin_commit` command to the end of the script.

You can use this command for designs created with PinEditor in MVN and PinEditor Standalone.

Exceptions

None

Examples

```
pin_commit
```

See Also

[pin_fix](#)

[pin_unfix](#)

[pin_assign](#)

[pin_unassign](#)

[Tcl documentation conventions](#)

pin_fix

Locks the pin assignment for the specified port, so the pins cannot be moved during place-and-route.

```
pin_fix -port portname
```

Arguments

`-port portname`

Specifies the name of the port to which the pin must be locked at its assigned location.

Supported Families

ProASIC ^{PLUS}, Axcelerator, ProASIC, SX, SX-A, RTSX-S, MX, and eX

Notes

You cannot move locked pins during place-and-route.

You can assign only one pin to a port.

You must use `pin_commit` after this command (see Examples below) to save the changes to your design.

You can use this command for designs created with PinEditor in MVN and PinEditor Standalone.

Exceptions

None

Examples

```
pin_fix -port clk
pin_commit
```

See Also

[pin_commit](#)

[pin_unfix](#)

[pin_assign](#)

[pin_unassign](#)

[Tcl documentation conventions](#)

pin_fix_all

Locks all the assigned pins on the device so they cannot be moved during place-and-route.

```
pin_fix_all
```

Arguments

None

Supported Families

ProASIC ^{PLUS}, Axcelerator, ProASIC, SX, SX-A, RTSX-S, MX, and eX

Notes

You cannot move locked pins during place-and-route.

You must use `pin_commit` after this command (see Examples below) to save the changes to your design.

You can use this command for designs created with PinEditor in MVN and PinEditor Standalone.

Exceptions

None

Example

```
pin_fix_all
pin_commit
```

See Also

[pin_commit](#)

[pin_fix](#)

[pin_unfix](#)

[pin_assign](#)

[pin_unassign](#)

[Tcl documentation conventions](#)

pin_unassign

Unassigns the pin from the specified port. The unassigned pin location is then available for other ports. (Only one pin can be assigned to a port.)

```
pin_unassign -port portname
```

Arguments

-port *portname*

Specifies the name of the port for which the pin must be unassigned.

Supported Families

ProASIC ^{PLUS}, Axcelerator, ProASIC, SX, SX-A, RTSX-S, MX, and eX

Notes

You must use `pin_commit` after this command (see Examples below) to save the changes to your design.

You can use this command for designs created with PinEditor in MVN and PinEditor Standalone.

Exceptions

None

Examples

```
pin_unassign -port "clk"
```

```
pin_commit
```

See Also

[pin_commit](#)

[pin_fix](#)

[pin_fix_all](#)

[pin_unfix](#)

[pin_assign](#)

[pin_unassign](#)

[Tcl documentation conventions](#)

pin_unassign_all

Unassigns all the pins from all the ports so that all pin locations are available for assignment.

```
pin_unassign_all
```

Arguments

None

Supported Families

ProASIC ^{PLUS}, Axcelerator, ProASIC, SX, SX-A, RTSX-S, MX, and eX

Notes

You must use `pin_commit` after this command (see Example below) to save the changes to your design.

You can use this command for designs created with PinEditor in MVN and PinEditor Standalone.

Exceptions

None

Examples

```
pin_unassign_all
pin_commit
```

See Also

[pin_commit](#)

[pin_fix](#)

[pin_unfix](#)

[pin_assign](#)

[pin_unassign](#)

[Tcl documentation conventions](#)

pin_unfix

Unlocks the pins assigned to the specified port, so the pins can be moved during place-and-route.

```
pin_unfix -port portname
```

Arguments

`-port portname`

Specifies the name of the port containing pins to unlock.

Supported Families

ProASIC ^{PLUS}, Axcelerator, ProASIC, SX, SX-A, RTSX-S, MX, and eX

Notes

You can move locked pins during place-and-route.

You must use the `pin_commit` command after this command (see Examples below) to save the changes to your design.

You can use this command for designs created with PinEditor in MVN and PinEditor Standalone.

Exceptions

None

Examples

```
pin_unfix -port rst
pin_commit
```

See Also

[pin_commit](#)

[pin_fix](#)

[pin_assign](#)

[pin_unassign](#)

[Tcl documentation conventions](#)

report

The `report` command provides you with frequently-used information in a convenient format.

You can generate the following types of reports using this command:

- Status Report
- Timing Report
- Timing Violations Report
- Flip-flop Report
- Power Report
- Pin Report
- I/O Bank Report

save_design

The `save_design` command saves the current design in Designer to a file.

```
save_design filename
```

Arguments

The design is written to a file denoted by the variable *filename* as an ADB file.

Supported Families

All

Notes

If filename is not a complete path name, the ADB file is written into the current working directory.

Exceptions

None

Example

Example 1: Saves the design to a file “test.adb” in the current folder.

```
save_design {test.adb}
```

Example 2: Save design and check if it saved successfully.

```
set designFile {d:/test/my_design.adb}
if { [catch { save_design $designFile }] } {
    puts "Failed to save design"
    # Handle Failure
} else {
    puts "Design saved successfully"
    # Proceed to make further changes
}
```

See Also

[close_design](#),

[new_design](#)

[open_design](#).

set_design

This `set_design` command specifies the design name, family and path in which Designer will process the design. This step is absolutely required before importing the source files.

```
set_design -name design_name -family family_name -path path_name
```

Arguments

`-name design_name`

The name of the design. This is used as the base name for most of the files generated from Designer.

`-family family_name`

The Actel device family for which the design is being targeted.

`-path path_name`

The physical path of the directory in which the design files will be created.

Supported Families

All

Notes

You need all 3 arguments for this command to setup your design.

Example

Example 1: Sets up the design and checks if there are any errors

```
set_design -name "test" -family "Axcelerator" -path {.  
set desName "test  
set famName "ACT3"  
set path {d:/examples/test}  
if { [catch { set_design -name $desName -family $famName -path $path }] } {  
    Puts "Failed setup design"  
    # Handle Failure  
} else {  
    puts "Design setup successful"  
    # Proceed to Import source files  
}  
}
```

See Also

[new_design](#),

[set_device](#)

set_device

The `set_device` command specifies the type of device and its parameters.

Syntax

```
set_device -family family_name -die die_name -package package_name -speed speed_grade  
-voltage voltage -voltrange volt_range -temprange temp_range -iostd default_io_std -  
pci value -jtag value -probe value -trst value
```

Arguments

`-family family_name`

Specifies the name of the FPGA device family.

`-die die_name`

Specifies the part name.

`-package package_name`

Specifies the selected package for the device.

`-speed speed_grade`

Specifies the speed grade of the part.

`-voltage voltage`

Specifies the core voltage of the device.

`-voltrange volt_range`

Specifies the voltage range to be applied for the device. It is generally MIL, COM and IND denoting Military, Commercial and Industrial respectively.

`-temprange temp_range`

Specifies the voltage range to be applied for the device. It is generally MIL, COM and IND denoting Military, Commercial and Industrial respectively.

`-iostd default_io_std`

Specifies the default I/O Standard of the part.

`-pci value`

Specified if the device needs to configure the IO for PCI specification. Values are summarized in the table below.

Value	Description
yes	Device is configured for PCI specification
no	Device is not configured for PCI specification

`-jtag value`

Specifies if pins need to be reserved for JTAG. Values are summarized in the table below.

Value	Description
yes	Pins are reserved for JTAG
no	Pins are not reserved for JTAG

`-probe value`

Specifies if the pins need to be preserved for probing. Values are summarized in the table below.

Value	Description
yes	Pins are preserved for probing
no	Pins not preserved for probing

`-trst value`

Specifies if the pins need to be reserved for JTAG test reset. Values are summarized in the table below.

Value	Description
yes	Pins are preserved for JTAG test reset
no	Pins are not preserved for JTAG test reset

Supported Families

All

Notes

At least one option must be specified for this command. Some of the options may not apply for certain families that do not support the features.

Example

Example 1: Setting up a PA design.

```
set_device -die "APA075" -package "208 PQFP" -speed "STD" -voltage "2.5" \
-jtag "yes" -trst "yes" -temprange "COM" -voltrange "COM"
```

See Also

[new_design](#).

[set_design](#)

set_defvar

The `set_defvar` command sets an internal variable in the Designer system.

```
set_defvar variable value
```

Arguments

Variable must be a valid Designer internal variable and could be accompanied by an optional value. If the *value* is provided, the *variable* is set the *value*. If the *value* is null the *variable* is reset.

Supported Families

All

Notes

Must have at least one argument.

Exceptions

None

Example

Example 1:

```
set_defvar "FORMAT" "VHDL"
```

Sets the FORMAT internal variable to VHDL.

Example 2:

```
set variableToSet "DESIGN"
```

```
set valueOfVariable "VHDL"
set_defvar $variableToSet $valueOfVariable
```

These commands set the FORMAT variable to VHDL, shows the use of variables for this command.

See Also

[get_defvar](#)

smartpower_add_pin_in_domain

Adds a pin into a clock or set domain.

```
smartpower_add_pin_in_domain -pin_name {pin_name} -pin_type {value} -domain_name
{domain_name} -domain_type {value}
```

Arguments

`-pin_name {pin_name}`

Specifies the name of the pin to add to the domain.

`-pin_type {value}`

Specifies the type of the pin to add. The following table shows the acceptable values for this argument:

Value	Description
clock	The pin to add is a clock pin
data	The pin to add is a data pin

`-domain_name {domain_name}`

Specifies the name of the domain in which to add the specified pin.

`-domain_type {value}`

Specifies the type of domain in which to add the specified pin. The following table shows the acceptable values for this argument:

Value	Description
clock	The domain is a clock domain
set	The domain is a set domain

Supported Families

ProASIC3/E, ProASIC^{PLUS}, Axcelerator, and ProASIC

Notes

The `domain_name` must be a name of an existing domain.

The `pin_name` must be a name of a pin that exists in the design.

Exceptions

None

Examples

The following example adds a clock pin to an existing Clock domain:

```
smartpower_add_pin_in_domain -pin_name { XCMP3/U0/U1:Y } -pin_type {clock} -domain_name {clk1} -  
domain_type {clock}
```

The following example adds a data pin to an existing Set domain:

```
smartpower_add_pin_in_domain -pin_name {XCMP3/U0/U1:Y} -pin_type {data} -domain_name {myset} -  
domain_type {set}
```

See Also

[smartpower_remove_pin_of_domain](#)

[Tcl documentation conventions](#)

smartpower_commit

Saves the changes made to the Designer database.

```
smartpower_commit
```

Arguments

None

Supported Families

ProASIC3/E, ProASIC^{PLUS}, Axcelerator, and ProASIC

Notes

None

Exceptions

None

Examples

```
smartpower_commit
```

See Also

[smartpower_restore](#)

[Tcl documentation conventions](#)

smartpower_create_domain

Creates a new clock or set domain.

```
smartpower_create_domain -domain_type {value} -domain_name {domain_name}
```


Arguments

`-domain_type {value}`

Specifies the type of domain to create. The following table shows the acceptable values for this argument:

Value	Description
clock	The domain is a clock domain
set	The domain is a set domain

`-domain_name {domain_name}`

Specifies the name of the new domain.

Supported Families

ProASIC3/E, ProASIC^{PLUS}, Axcelerator, and ProASIC

Notes

The domain name cannot be the name of an existing domain.

The domain type must be either clock or set.

Exceptions

None

Examples

The following example creates a new clock domain named "clk2":

```
smartpower_create_domain -domain_type {clock} -domain_name {clk2}
```

The following example creates a new set domain named "myset":

```
smartpower_create_domain -domain_type {set} -domain_name {myset}
```

See Also

[smartpower_remove_domain](#)

[Tcl documentation conventions](#)

smartpower_remove_domain

Removes an existing clock or set domain.

```
smartpower_remove_domain -domain_type {value} -domain_name {domain_name}
```

Arguments

`-domain_type {value}`

Specifies the type of domain to remove. The following table shows the acceptable values for this argument:

Value	Description
clock	The domain is a clock domain

```
set The domain is a set domain
```

```
-domain_name {domain_name}
```

Specifies the name of the domain to remove.

Supported Families

ProASIC3/E, ProASIC^{PLUS}, Axcelerator, and ProASIC

Notes

The domain name must be the name of an existing domain.

The domain type must be either clock or set.

Exceptions

None

Examples

The following example removes the clock domain named "clk2":

```
smartpower_remove_domain -domain_type {clock} -domain_name {clk2}
```

The following example removes the set domain named "myset":

```
smartpower_remove_domain -domain_type {set} -domain_name {myset}
```

See Also

[smartpower_create_domain](#)

[Tcl documentation conventions](#)

smartpower_remove_pin_frequency

Removes the frequency associated with a specific pin. This pin will have a default frequency based on its domain.

```
smartpower_remove_pin_frequency -pin_name {pin_name}
```

Arguments

```
-pin_name {pin_name}
```

Specifies the name of the pin for which the frequency will be removed.

Supported Families

ProASIC3/E, ProASIC^{PLUS}, Axcelerator, and ProASIC

Notes

The *pin_name* must be the name of a pin that already exists in the design and already belongs to a domain.

Exceptions

None

Examples

The following example removes the frequency from the pin named "count8_clock":

```
smartpower_remove_pin_frequency -pin_name {count8_clock}
```

See Also

[smartpower set pin frequency](#)

[Tcl documentation conventions](#)

smartpower_remove_pin_of_domain

Removes a clock pin or a data pin from a Clock or Set domain, respectively.

```
smartpower_remove_pin_of_domain -pin_name {pin_name} -pin_type {value} -domain_name {domain_name} -domain_type {value}
```

Arguments

-pin_name {*pin_name*}

Specifies the name of the pin to remove from the domain.

-pin_type {*value*}

Specifies the type of the pin to remove. The following table shows the acceptable values for this argument:

Value	Description
clock	The pin to remove is a clock pin
data	The pin to remove is a data pin

-domain_name {*domain_name*}

Specifies the name of the domain from which to remove the pin.

-domain_type {*value*}

Specifies the type of domain from which the pin is being removed. The following table shows the acceptable values for this argument:

Value	Description
clock	The domain is a clock domain
set	The domain is a set domain

Supported Families

ProASIC3/E, ProASIC^{PLUS}, Axcelerator, and ProASIC

Notes

The domain name must be the name of an existing domain.

The pin name must be the name of an existing pin.

Exceptions

None

Examples

The following example removes the clock pin named "XCMP3/U0/U1:Y" from the clock domain named "clockh":

```
smartpower_remove_pin_of_domain -pin_name {XCMP3/U0/U1:Y}
-pin_type {clock} -domain_name {clockh} -domain_type {clock}
```

The following example removes the data pin named "count2_en" from the set domain named "InputSet":

```
smartpower_remove_pin_of_domain -pin_name {count2_en} -pin_type
{data} -domain_name {InputSet} -domain_type {set}
```

See Also

[smartpower_add_pin_in_domain](#)

[Tcl documentation conventions](#)

smartpower_restore

Restores all power information previously committed in SmartPower.

```
smartpower_restore
```

Arguments

None

Supported Families

ProASIC3/E, ProASIC^{PLUS}, Axcelerator, and ProASIC

Notes

None

Exceptions

None

Examples

```
smartpower_restore
```

See Also

[smartpower_commit](#)

[Tcl documentation conventions](#)

smartpower_set_domain_frequency

Sets the frequency of a domain in megahertz (MHz).

```
smartpower_set_domain_frequency -domain_type {value} -domain_name {domain_name} -
clock_freq {value} -data_freq {value} -pin_freq {value}
```

Arguments

`-domain_type {value}`

Specifies the type of domain to set. The following table shows the acceptable values for this argument:

Value	Description
clock	The domain is a clock domain
set	The domain is a set domain

`-domain_name {domain_name}`

Specifies the name of the domain for which the frequency will be set.

`-clock_freq {value}`

Specifies the clock frequency in megahertz (MHz), which can be any positive decimal number. This argument is available only for a clock domain.

`-data_freq {value}`

Specifies the data frequency in megahertz (MHz), which can be any positive decimal number. This argument is available only for a clock domain.

`-pin_freq {value}`

Specifies the value of the pin frequency in megahertz (MHz), which can be any positive decimal number, which can be any positive decimal number. This argument is available only for a set domain.

Supported Families

ProASIC3/E, ProASIC^{PLUS}, Axcelerator, and ProASIC

Notes

The domain type must be either “clock” or “set.”

The domain name must be the name of an existing domain.

The clock frequency must be a positive decimal number. Specifying the unit as part of the frequency value is optional. You must enter a space between the frequency value and the unit. You set the clock frequency only for clock domains.

The data frequency must be a positive decimal number. Specifying the unit as part of the data frequency value is optional. You must enter a space between the data frequency value and the unit.

Exceptions

None

Examples

The following example sets the clock and data frequency of a clock domain:

```
smartpower_set_domain_frequency -domain_type {clock} -domain_name {clk1} -clock_freq {32} or {30 MHz}
-data_freq {3} or {3 Mhz}
```

The following example sets the data frequency of a set domain:

```
smartpower_set_domain_frequency -domain_type {set} -domain_name {set1} -data_freq {10}
```

See Also

[smartpower_create_domain](#)

[smartpower_remove_domain](#)

[Tcl documentation conventions](#)

smartpower_set_pin_frequency

Sets the frequency of a pin in megahertz (MHz). If you do not use this command, each pin will have default frequency based on its domain.

```
smartpower_set_pin_frequency -pin_name {pin_name} -pin_freq {value}
```

Arguments

-pin_name {*pin_name*}

Specifies the name of the pin for which the frequency will be set.

-pin_freq {*value*}

Specifies the value of the frequency in MHz, which can be any positive decimal number.

Supported Families

ProASIC3/E, ProASIC^{PLUS}, Axcelerator, and ProASIC

Notes

The *pin_name* must be the name of a pin that already exists in the design and already belongs to a domain.

When specifying the unit, a space must be between the frequency value and the unit.

Exceptions

None

Examples

This example sets the frequency of the pin named "count8_clock" to 100 MHz:

```
smartpower_set_pin_frequency -pin_name {count8_clock} -pin_freq {100}
```

See Also

[smartpower_remove_pin_frequency](#)

[Tcl documentation conventions](#)

timer_add_clock_exception

Adds an exception to or from a pin with respect to a specified clock.

```
timer_add_clock_exception -clock clock_name -pin pin_name -dir from_value to_value
```

Arguments

`-clock clock_name`

Specifies the name of the clock.

`-pin pin_name`

Specifies the exception on the pin in a synchronous network that should be excluded from the specified clock period.

`-dir {from_value to_value}`

Specifies direction. The *from_value* refers to paths starting at that particular pin and *to_value* refers to paths ending at that particular pin.

Supported Families

ProASIC3/E, ProASIC^{PLUS}, Axcelerator, ProASIC, MX, eX, and SX/SX-A

Notes

None

Exceptions

None

Examples

The following example adds a clock exception from the pin `reg_q_a_10/U0:CLK` with respect to the clock `clk`.

```
timer_add_clock_exception -clock {clk} -pin {reg_q_a_10/U0:CLK} -dir {from}
```

The following example adds a clock exception to the pin `reg_q_a_10/U0:E` with respect to the clock `clk`.

```
timer_add_clock_exception -clock {clk} -pin {reg_q_a_10/U0:E} -dir {to}
```

See Also

[timer_remove_clock_exception](#)

[Tcl documentation conventions](#)

timer_add_pass

Adds a pin to the list of pins for which the path must be shown passing through, in the Timer.

```
timer_add_pass -pin pin_name
```

Arguments

`-pin pin_name`

Specifies the name of the pin to be included for displaying the timing path through it.

Supported Families

ProASIC3/E, ProASIC^{PLUS}, Axcelerator, ProASIC, MX, eX, and SX/SX-A

Notes

Setting a pass on a module pin enables you to see a path through individual pins.

Exceptions

None

Examples

This example adds a pass through the pin named "reg_q_a_0:CLK" in the design:

```
timer_add_pass -pin {reg_q_a_0:CLK}
```

This example adds a pass through a clear pin named "reg_q_a_0:CLR" in the design:

```
timer_add_pass -pin {reg_q_a_0:CLR}
```

See Also

[timer_add_stop](#)

[Tcl documentation conventions](#)

timer_add_stop

Adds the specified pin to the list of pins through which the paths will not be displayed in the Timer.

```
timer_add_stop -pin pin_name
```

Arguments

-pin *pin_name*

Specifies the name of the pin to be excluded from displaying the path.

Supported Families

ProASIC3/E, ProASIC^{PLUS}, Axcelerator, ProASIC, MX, eX, and SX/SX-A

Notes

Without stop points, you see all the paths from pad to pad in the design. If you do not want to see the paths going through registers clock pins, you could specify these as stop points. The path going through those pins would not be displayed.

Exceptions

None

Examples

The following example adds a stop to the pin named "a<2>" in the design:

```
timer_add_stop -pin {a<2>}
```

The following example adds a stop to a clock and a clear pin named "reg_q_a_0:CLR" in the design:

```
timer_add_stop -pin {reg_q_a_0:CLK}
```

```
timer_add_stop -pin {reg_q_a_0:CLR}
```

See Also

[timer_add_pass](#)

[Tcl documentation conventions](#)

timer_commit

Saves the changes made to constraints into the Designer database.

```
timer_commit
```

Arguments

None

Supported Families

ProASIC3/E, ProASIC^{PLUS}, Axcelerator, ProASIC, MX, eX, and SX/SX-A

Notes

None

Exceptions

None

Examples

```
timer_commit
```

See Also

[timer_restore](#)

[Tcl documentation conventions](#)

timer_get_path

Displays the path between the specified pins in the Log window.

```
timer_get_path -from source_pin -to destination_pin \
[-exp value ] \
[-sort value ] \
[-order value ] \
[-case value ] \
[-maxpath maximum_paths ] \
[-maxexpath maximum_paths_to_expand] \
[-mindelay minimum_delay] \
[-maxdelay maximum_delay] \
[-breakatclk value ] \
[-breakatclr value ]
```

Arguments

-from *source_pin*

Designer User's Guide

Specifies the name of the source pin for the path.

`-to destination_pin`

Specifies the name of the destination pin for the path.

`-exp value`

Specifies whether to expand the path. The following table shows the acceptable values for this argument:

Value	Description
yes	Expands the path
no	Does not expand the path

`-sort value`

Specifies whether to sort the path by either the actual delay or slack value. The following table shows the acceptable values for this argument:

Value	Description
actual	Sorts the path by the actual delay value
slack	Sorts the path by the slack value

`-order value`

Specifies whether the maximum list size is based on the longest or shortest paths. The following table shows the acceptable values for this argument:

Value	Description
long	Base the maximum list size on the longest path in the design
short	Base the maximum list size on the shortest path in the design

`-case value`

Specifies whether the report will include timing values for the worst, typical, or best cases. The following table shows the acceptable values for this argument:

Value	Description
worst	Includes timing values for the worst cases
typ	Includes timing values for typical cases
best	Includes timing values for the best cases

`-maxpath maximum_paths`

Specifies the maximum number of paths to display.

`-maxexpath maximum_paths_to_expand`

Specifies the maximum number of paths to expand.

`-breakatclk value`

Specifies whether to break the paths at the register clock pins. The following table shows the acceptable values for this argument:

Value	Description
yes	Breaks the paths at the register clock pins
no	Does not break the paths at the register clock pins

`-breakatclr value`

Specifies whether to break the paths at the register clear pins. The following table shows the acceptable values for this argument:

Value	Description
yes	Breaks the paths at the register clear pins
no	Does not break the paths at the register clear pins

Supported Families

ProASIC3/E, ProASIC^{PLUS}, Axcelerator, ProASIC, MX, eX, and SX/SX-A

Notes

None

Exceptions

None

Examples

The following example returns the paths from input port `headdr_dat<31>` to the input pin of register `u0_headdr_data1_reg/data_out_t_31` in typical conditions.

```
timer_get_path -from "headdr_dat<31>" \
-to "u0_headdr_data1_reg/data_out_t_31/U0:D" \
-case typ \
-exp "yes" \
-maxpath "100" \
-maxexpapth "10"
```

The following example returns the paths from clock pin of register `gearbox_inst/bits64_out_reg<55>` to the output port `pma_tx_data_64bit[55]`

```
timer_get_path -from "gearbox_inst/bits64_out_reg<55>/U0:CLK" \
-to {pma_tx_data_64bit[55]} \
-exp "yes"
```

See Also

[Tcl documentation conventions](#)

timer_get_clock_actuals

Displays the actual clock frequency in the Log window, when Timer is initiated.

```
timer_get_clock_actuals -clock clock_name
```

Arguments

-clock *clock_name*

Specifies the name of the clock with the frequency (or period) to display.

Supported Families

ProASIC3/E, ProASIC^{PLUS}, Axcelerator, ProASIC, MX, eX, and SX/SX-A

Notes

None

Exceptions

None

Examples

This example displays the actual clock frequency of clock "clk1" in the Log window:

```
timer_get_clock_actuals -clock clk1
```

See Also

[timer_get_clock_constraints](#)

[Tcl documentation conventions](#)

timer_get_clock_constraints

Returns the constraints (period, frequency, and duty cycle) on the specified clock.

```
timer_get_clock_constraints -clock clock_name
```

Arguments

-clock *clock_name*

Specifies the name of the clock with the constraint to display.

Supported Families

ProASIC3/E, ProASIC^{PLUS}, Axcelerator, ProASIC, MX, eX, and SX/SX-A

Notes

None

Exceptions

None

Examples

The following example displays the clock constraints on the clock named "clk" in the Log window:

```
timer_get_clock_constraints -clock clk
```

See Also

[timer_get_clock_actuals](#)

[Tcl documentation conventions](#)

timer_get_maxdelay

Displays the maximum delay constraint between two pins in a path in the Log window.

```
timer_get_maxdelay -from source_pin -to destination_pin
```

Arguments

-from *source_pin*

Specifies the name of the source pin in the path.

-to *destination_pin*

Specifies the name of the destination pin in the path.

Supported Families

ProASIC3/E, ProASIC^{PLUS}, Axcelerator, ProASIC, MX, eX, and SX/SX-A

Notes

You can use the following macros in this command:

`$in()`

to specify all input pins

`$out()`

to specify all output pins

`$reg(clock_name)`

to specify all registers related to *clock_name*

Exceptions

None

Examples

The following example displays the maximum delay constraint from all registers of clk166 to all output pins in the Log window:

```
timer_get_maxdelay -from {$reg(clk166) [*]} -to {$out() [*]}
```

The following example displays the maximum delay constraint from the pin clk166 to the pin reg_q_a_9_/U0:CLK in the Log window:

```
timer_get_maxdelay -from {clk166} -to {reg_q_a_9_/U0:CLK}
```

The following example displays, in the Log window, the maximum delay constraint from all input pins to all registers of clock166 and also checks for errors in the command:

```
if [ catch {timer_get_maxdelay -from {$in() [*]} -to {$reg(clk) [*]}} ] {
    puts "Error getting max_delay information"
} else {
    puts "Successfully obtained max_delay information"
}
```

See Also

[timer_set_maxdelay](#)

[Tcl documentation conventions](#)

timer_get_path_constraints

Displays the path constraints that were set as the maximum delay constraint in the Timer.

```
timer_get_path_constraints
```

Arguments

None

Supported Families

ProASIC3/E, ProASIC^{PLUS}, Axcelerator, ProASIC, MX, eX, and SX/SX-A

Notes

If no maximum delay constraints are set, this command will not report any delay values. The information is displayed in the Log window.

Exceptions

None

Examples

The following example displays the paths set in the Timer as the maximum delay constraint in the Log window:

```
timer_get_maxdelay -from {$reg(clk166) [*]} -to {$out() [*]}
```

See Also

[timer_set_maxdelay](#)

[Tcl documentation conventions](#)

timer_remove_clock_exception

Removes the previously set clock constraint.

```
timer_remove_clock_exception -clock clock_name -pin pin_name -dir {value}
```

Arguments

-clock clock_name

Specifies the name of the clock from which to remove the constraint.

-pin pin_name

Specifies the name of the pin to remove.

-dir {from_value to_value}

Specifies direction. The *from_value* refers to the paths that start at that pin and *to_value* refers to the paths that end at that pin.

Supported Families

ProASIC3/E, ProASIC^{PLUS}, Axcelerator, ProASIC, MX, eX, and SX/SX-A

Notes

None

Exceptions

None

Examples

This example removes a clock exception from the pin reg_q_a_10_/U0:CLK with respect to the clock clk:

```
timer_remove_clock_exception -clock {clk} -pin {reg_q_a_10_/U0:CLK} -dir {from}
```

This example removes a clock exception to the pin reg_q_a_10_/U0:E with respect to the clock clk:

```
timer_remove_clock_exception -clock {clk} -pin {reg_q_a_10_/U0:E} -dir {to}.
```

See Also

[time_add_clock_exception](#)

[Tcl documentation conventions](#)

timer_remove_pass

Removes the path pass constraint that was previously entered.

```
timer_remove_pass -pin pin_name
```

Arguments

-pin pin_name

Specifies the name of the pin from which to remove the path pass constraint.

Supported Families

ProASIC3/E, ProASIC^{PLUS}, Axcelerator, ProASIC, MX, eX, and SX/SX-A

Notes

None

Exceptions

None

Examples

The following example removes the pass constraint from the clock pin `reg_q_a_0:CLK`:

```
timer_remove_pass -pin {reg_q_a_0:CLK}
```

See Also

[timer_add_pass](#)

[Tcl documentation conventions](#)

timer_remove_stop

Removes the path stop constraint on the specified pin that was previously entered.

```
timer_remove_stop -pin pin_name
```

Arguments

`-pin pin_name`

Specifies the name of the pin from which to remove the path stop constraint.

Supported Families

ProASIC3/E, ProASIC^{PLUS}, Axcelerator, ProASIC, MX, eX, and SX/SX-A

Notes

Export of script writes the constraint wrong with `timer_remove_pass` instead of `timer_remove_stop`.

Exceptions

None

Examples

The following example removes the path stop constraint on the clear pin `reg_q_a_0:CLR`:

```
timer_remove_stop -pin {reg_q_a_0:CLR}
```

See Also

[timer_add_stop](#)

[Tcl documentation conventions](#)

timer_restore

Restores constraints previously committed in Timer.

```
timer_restore
```


Arguments

None

Supported FamiliesProASIC3/E, ProASIC^{PLUS}, Axcelerator, ProASIC, MX, eX, and SX/SX-A**Notes**

None

Exceptions

None

Examples

timer_restore

See Also[timer_commit](#)[Tcl documentation conventions](#)

timer_setenv_clock_freq

Sets a required clock frequency for the specified clock in megahertz (MHz).

```
timer_setenv_clock_freq -clock clock_name -freq value [-dutycycle dutycycle]
```

Arguments`-clock clock_name`

Specifies the name of the clock for which to set the required frequency.

`-freq value`

Specifies the frequency in MHz.

`-dutycycle dutycycle`

Specifies the duty cycle for the clock constraint.

Notes

None

Exceptions

None

Examples

The following example sets a clock frequency of 100MHz on the clock clk1:

```
timer_setenv_clock_freq -clock {clk1} -freq 100.00
```

See Also[timer_setenv_clock_period](#)

[Tcl documentation conventions](#)

timer_setenv_clock_period

Sets the clock period constraint on the specified clock.

```
timer_setenv_clock_period -clock clock_name [-unit {value}] -period period_value [-dutycycle dutycycle]
```

Arguments

-clock *clock_name*

Specifies the name of the clock for which to set the period.

-unit {*value*}

Specifies the unit for the clock period constraint. The default is ns. The following table shows the acceptable values for this argument:

Value	Description
ns	nanoseconds
ps	picoseconds

-period *period_value*

Specifies the period in the specified unit.

-dutycycle *dutycycle*

Specifies the duty cycle for the clock constraint.

Notes

None

Exceptions

None

Examples

The following example sets a clock period of 2.40ns on the clock named clk1:

```
timer_setenv_clock_period -clock {clk1} -unit {ns} -period 2.40
```

See Also

[Tcl documentation timer_setenv_clock_freq](#)

[conventions](#)

timer_set_maxdelay

Adds a maximum delay constraint to the specified path.

```
timer_set_maxdelay -from source_pin -to destination_pin [-unit {value} -delay
delay_value
```

Arguments

-from *source_pin*

Specifies the name of the source pin in the path.

-to *destination_pin*

Specifies the name of the destination pin in the path.

-unit {*value*}

Specifies whether the delay unit is in nanoseconds or picoseconds. The following table shows the acceptable values for this argument:

Value	Description
ns	Sets the delay in nanoseconds
ps	Sets the delay in picoseconds

-delay *delay_value*

Specifies the actual delay value for the path.

Supported Families

ProASIC3/E, ProASIC^{PLUS}, Axcelerator, ProASIC, MX, eX, and SX/SX-A

Notes

You can use the following macros in this command:

`$in()`

to specify all input pins

`$out()`

to specify all output pins

`$reg(clock_name)`

to specify all registers related to *clock_name*

Exceptions

None

Examples

The following example sets a maximum delay of 20 nanoseconds from all registers of clk166 to all output pins:

```
timer_set_maxdelay -from {$reg(clk166)[*]} -to {$out()[*]} -unit {ns} -delay 20.00
```

The following example sets a maximum delay of 30 nanoseconds from all input pins to all output pins:

```
timer_set_maxdelay -from {$in()[*]} -to {$out()[*]} -unit {ns} -delay 30.00
```

See Also

[timer_get_maxdelay](#)

[Tcl documentation conventions](#)

timer_remove_all_constraints

Removes all the timing constraints in the current design.

```
timer_remove_all_constraints
```

Arguments

None

Supported Families

ProASIC3/E, ProASIC^{PLUS}, Axcelerator, ProASIC, MX, eX, and SX/SX-A

Notes

None

Exceptions

None

Examples

The following example removes all of the constraints from the design and then commits the changes:

```
timer_remove_all_constraints  
timer_commit
```

See Also

[timer_commit](#)

[Tcl documentation conventions](#)

About Design Constraints

Design constraints are specifications for placing, implementing, naming, and timing considerations of physical and logical assignments. They are usually either restrictions or properties in your design. There are several types of constraints: routing, timing, area, mapping, and placement constraints.

Timing constraints

Location and region assignment constraints (placing and routing)

I/O assignment constraints (pin location and I/O attributes)

Attributes

You use constraints to ensure that a design meets timing performance and required pin assignments.

Designer supports both physical and timing constraints. You can set constraints by either using Actel's interactive tools or by importing constraint files directly into Designer.

Designer Naming Conventions

The names of ports, instances, and nets in an imported netlist are sometimes referred to as their *original names*. Port names appear exactly as they are defined in a netlist. For example, a port named A/B appears as A/B in ChipPlanner, PinEditor, and I/O Attribute Editor in MultiView Navigator. Instances and nets display the original names plus an escape character (\) before each backslash (/) and each slash (/) that is not a hierarchy separator. For example, the instance named A/\B is displayed as A\\B.

The names of ports, instances, and nets that you use in PDC commands depends on the device for which you are writing the PDC command. Following are Designer's naming conventions by device.

ProASIC3/E

The following components use a netlist's original names:

- PDC reader/writer

- SDC reader/writer

- Compile report

- SDF/Netlist writer for back annotation

- MultiView Navigator tools: PinEditor, ChipPlanner, and I/O Attribute Editor (NetlistViewer uses compile names instead)

The following components use a netlist's compile names:

- NetlistViewer in MultiView Navigator

- Timer

- Smart power

Axcelerator

Use the compiled names for all components.

ProASIC and ProASIC PLUS

For ports, instances, and nets, use their original names in GCF files.

See Also

[PDC Naming Conventions](#)

[SDC Command Limitations](#)

Location and Region Assignment Constraints

Location and region assignment constraints are physical constraints for setting location and region assignments for a specific architecture and device.

You can create and edit regions on your chip and assign logic to those regions using the ChipPlanner tool or by importing constraint files. ChipPlanner works with **ProASIC3E**, **ProASIC3**, **ProASIC PLUS**, **Axcelerator**, and **ProASIC** devices.

Alternatively, you can import constraint files to set or change your location and region assignments. The type of constraint file you use depends on your device family. See [Types of physical constraints](#) for more information.

I/O Assignment Constraints

I/O assignment constraints are physical constraints for setting the pin location and I/O attributes for a specific architecture and device.

You can configure and assign input and output macros and their attributes to pins using the PinEditor tool or by importing constraint files. There are two different versions of PinEditor. The version you use depends on which product family you are designing for:

For **ProASIC3E**, **ProASIC3**, **ProASIC^{PLUS}**, **Axcelerator**, and **ProASIC** devices, use PinEditor in MultiView Navigator. To edit I/O attributes, use the I/O Attribute Editor tool.

For all other families, use the standalone version of PinEditor which has a built-in I/O attribute editor.

When you open your design (.adb) file, Designer automatically presents you with the appropriate tools in the Design Flow window.

You can also choose to import constraint files to set or change your location and region assignments. The type of constraint file you use depends on your device family. See [Types of physical constraints](#) for more information.

Attributes

In an FPGA schematic, attributes are the instructions assigned to symbols or nets. These instructions can indicate the placement, routing, naming, and other characteristics of the symbols or nets. Designer uses this information during the place-and-route of a design. Some constraints are also referred to as attributes.

See "I/O Attribute Editor" in the MultiView Navigator User's Guide for more detailed information about input and output attributes. For details about specific attributes, see the Designer User's Guide.

Constraint Entry

Overview - Entering Constraints

You can enter design constraints in two ways:

Using a **constraint editor tool**. Designer's constraint editors are graphical user interface (GUI) tools for creating and modifying physical, logical, and timing constraints. Using these tools enables you to enter constraints without having to understand GCF, PDC, or other file syntax. Which constraint editor you use depends on which type of device you are designing.

For **ProASIC3E**, **ProASIC3**, **ProASIC^{PLUS}**, **Axcelerator**, and **ProASIC** devices, use the tools within the MultiView Navigator:

- ChipPlanner - Sets location and region assignments
- PinEditor in MVN - Sets the pin location constraints
- I/O Attribute Editor - Sets I/O attributes

For all other families, you will use the following tools:

- ChipEditor - Sets location and region assignments
- PinEditor Standalone - Sets I/O attributes and pin location constraints

Importing a **constraint file**: GCF, PDC, SDC, DCF, and PIN. The type of file you use depends on which type of device you are designing.

- GCF (ProASIC and ProASIC^{PLUS} families)
- PDC (Axcelerator, ProASIC3E, and ProASIC3 families)
- SDC (Axcelerator, ProASIC3E, ProASIC3, ProASIC^{PLUS}, eX, and SX-A families)

- DCF (earlier Antifuse families such as eX, SX-A, and SX)
- PIN (only valid for earlier Antifuse families such as eX, SX-A, and SX)

Using Constraint Editors

Assigning I/O Constraints

I/O assignment constraints are physical constraints for setting the pin location and I/O attributes for a specific architecture and device.

To assign I/O constraints for **ProASIC3E**, **ProASIC3**, **ProASIC PLUS**, **Axcelerator**, and **ProASIC** families, use PinEditor and I/O Attribute Editor in MultiView Navigator.

PinEditor in MVN - Sets the pin location constraints.

I/O Attribute Editor - Sets I/O attributes.

For all other families, use PinEditor Standalone to set the I/O attributes and pin location constraints.

PinEditor is the package layout tool for assigning I/O ports to package pins. You can use the I/O Attribute Editor tool for viewing, sorting, and editing I/O attributes. Additionally, you can use this tool to lock and unlock pins in your design. PinEditor Standalone has a built-in I/O attribute editor.

You can also assign I/O constraints in PDC or GCF files and then import them into your design.

See the MultiView Navigator User's Guide for more information on how to assign and modify I/O constraints. See the Design Constraints chapter of the Designer User's Guide for more information about constraints.

Assigning Location and Region Constraints

You can set constraints for locations and regions using the ChipPlanner or ChipEditor tool as well as via constraint files. You can use constraints to view routing information and influence the place and route of your design for more optimal results

The tool you use depends on which product family you are designing for:

For **ProASIC3E**, **ProASIC3**, **ProASIC PLUS**, **Axcelerator**, and **ProASIC** devices, use ChipPlannerChipPlanner. ChipPlanner is the floorplanning tool you use to create and edit regions on your chip and assign logic to these regions.

For other design families, use ChipEditorChipEditor. ChipEditor is a graphical application for viewing and assigning I/O and logic macros.

If you choose to use constraint files to set your location and region assignments, the exact constraint file you use depends on your device family. See [Types of physical constraints](#)Types of physical constraints for more information.

When you open your design (.adb) file, Designer automatically presents you with the appropriate tools in the Design Flow window.

You can also assign location and region constraints in PDC or GCF files and then import them into your design.

See the MultiView Navigator User's Guide for more information on how to assign and modify location and region constraints. See the Design Constraints chapter of the Designer User's Guide for more information about constraints.

Using Constraint Files

PDC

About Physical Design Constraint (PDC) Files

A PDC file is a Tcl script file specifying physical constraints. This file can be imported and exported from Designer. Any constraint that you can enter using the PinEditor in MVN or ChipPlanner tool, you can also use in a PDC file.

Only ProASIC3/E, and Axcelerator devices support PDC files.

Designer supports the following PDC commands.

Command	Action
assign_global_clock	Assigns user-defined nets to global clock networks by promoting the net using a CLKINT macro
assign_local_clock	Assigns user-defined nets to local clock routing (Axcelerator) or to either LocalClock or QuadrantClock regions (ProASIC3/E)
assign_net_macros	Assigns the macros connected to a net to a specified defined region
assign_region	Assigns macros to a pre-specified region
define_region	Defines a rectilinear region
define_region	Defines a rectangular region
delete_buffer_tree	Removes all buffers and inverters from a given net for ProASIC3 and ProASIC3E devices
dont_touch_buffer_tree	Restores all buffers and inverters that were removed from a given net with the delete_buffer_tree command
move_region	Moves a region to new coordinates
reset_floorplan	Deletes all defined regions. Placed macros are not affected
reset_io	Resets all attributes on a macro to the default values
reset_iobank	Resets an I/O banks technology to the default technology
reset_net_critical	Resets net criticality to default level
set_io	Sets the attributes of an I/O
set_iobank	Specifies the I/O bank's technology
set_location	Places a given logic instance at a particular location
set_multitile_location	Assigns specified two-tile and four-tile macros to specified locations on the chip
set_net_critical	Sets net criticality, which is issued to influence placement and routing in favor of performance
set_vref	Specifies which pins are VREF pins
set_vref_defaults	Sets the default VREF pins for specified banks
unassign_global_clock	Assigns clock nets to regular nets
unassign_local_clock	Unassigns the specified user-defined net from a LocalClock or QuadrantClock region
unassign_macro_from_region	Unassigns macros from a specified region, if they are assigned to that region
unassign_net_macro	Unassigns macros connected to a specified net from a defined region

[undefine_region](#)

Removes the specified region

Note: PDC commands are case sensitive. However, their arguments are not.

See Also

[About design constraints](#)

[Exporting files](#)

[Importing PDC files](#)

[Importing auxiliary files](#)

[PDC syntax conventions](#)

[PDC naming conventions](#)

Importing PDC Files (ProASIC3E, ProASIC3, and Axcelerator Families Only)

You can import a PDC file as either a source, or as an auxiliary file.

Importing PDC file as a Source file

When importing a PDC file as a source file, the netlist must also be imported along with the PDC commands. Furthermore, when importing the PDC file as a source file, you have the option of keeping the existing physical constraints. The Keep Existing Physical Constraints option in the Import Source Files dialog box enables you to merge or replace existing constraints when you re-import new or modified PDC file.

Select the **Keep Existing Physical Constraints** option to preserve all existing physical constraints that you have entered either using one of the MVN tools (ChipPlanner, PinEditor, or the I/O Attribute Editor) or a previous PDC file. The software will resolve any conflicts between new and existing physical constraints and display the appropriate message. The Keep Existing Constraints option is **Off** by default. When this option is **Off**, all the physical constraints in the newly imported PDC files are used. All pre-existing constraints are lost. When this option is **On**, the physical constraints from the newly imported PDC files are merged with the existing constraints.

Importing PDC file as an Auxiliary file

When importing a PDC file as an auxiliary file, the new or modified PDC constraints are merged with the existing constraints. The software resolves any conflicts between new and existing physical constraints and displays the appropriate message. The following PDC commands are not supported when the PDC file is imported as an auxiliary file:

```
set_io - register Yes | No
assign_local_clock
unassign_local_clock
assign_global_clock (not for Axcelerator)
unassign_global_clock (not for Axcelerator)
delete_buffer_tree (not for Axcelerator)
```

dont_touch_buffer_tree (not for Axcelerator)

Note: See the help topic for each command in your PDC file to make sure it is supported in an auxiliary file.

You can specify the following types of constraints in a Physical Design Constraint (PDC) file:

- I/O standards and attributes
- VCCI and VREF for all or some of the banks
- Pin assignments
- Placement locations
- Net criticality (Axcelerator only)
- Region creation and assignment
- LocalClock creation and deletion
- Global clock assignments and un-assignments

Note: File names or paths with spaces may not import into Designer. Rename the file or path, removing the spaces, and then re-import the file.

Types of Constraints

Constraints are used to ensure that a design meets timing performance and required pin assignments. For ProASIC and ProASIC^{PLUS} families, the types of constraints that can be defined in a GCF constraint file include:

[Timing constraints](#)

[Global resource constraints](#)

[Netlist optimization constraints](#)

[Placement constraints](#)

ProASIC and ProASIC^{PLUS} Timing Constraints

Timing constraints are used to ensure that a design meets the required timing performance.

ProASIC Timing Constraints

Constraints can be entered using a ProASIC constraints file (.gcf) or using an SDF path constraints file. These forward SDF files are generated by synthesis tools. The two formats cannot be combined in one file. However, SDF files and ProASIC (.gcf) constraint files can be used for the same design. Place-and-Route considers timing constraints and attempts to meet them. After routing, Designer displays a message that indicates if your timing constraints were met.

ProASIC^{PLUS} Timing Constraints

ProASIC^{PLUS} supports only SDC timing constraint files. (GCF timing constraints are no longer supported.) If you open a ProASIC^{PLUS} design with GCF timing constraints in Designer it converts your GCF timing constraints to SDC constraints automatically. After your GCF timing constraints are converted Designer creates an SDC file with your new constraint information. You do NOT have to re-import your SDC file to get your constraints, it happens internally. See the related topics below for more information on GCF to SDC timing constraint conversion.

Place-and-route considers your timing constraints and attempts to meet them. After routing, Designer displays a message that indicates if your timing constraints were met.

GCF to SDC Timing Constraints Conversion

Each GCF timing constraint maps to a specific SDC timing constraint. Use the list below to evaluate the corresponding constraints.

Note: GCF to SDC conversion is only supported for ProASIC^{PLUS} devices.

GCF Timing Constraint	SDC Timing Constraint
create_clock	create_clock
set_false_path	set_false_path
set_input_to_register_delay	set_max_delay
set_multicycle_path	set_multicycle_path
set_register_to_output_delay	set_max_delay
set_max_path_delay	set_max_delay

GCF Syntax Conventions

A ProASIC constraint consists of a statement and an argument, terminated by a semicolon. Statements are not case sensitive. However, cell instance, net, and port names used as arguments may be quoted and are case sensitive. Except for white spaces, all ASCII characters can be used. Comments are allowed in constraints files and must be preceded by two forward slashes (//). Time values are given in nanoseconds. When constraints are duplicated, the last one specified for a specific item overwrites any previous similar constraints already specified for the considered item.

This section describes syntax conventions for notation, user data variables, and comments. Comments begin with double slashes (//) and are terminated by a newline character.

Syntax Conventions for Notation

Notation	Description
item	Represents a syntax item
item ::= definition	item is defined as definition
item ::= definition1 = definition2	item is defined as either definition1 or definition2 (Multiple alternative syntax definitions are allowed)
[item]	Item is optional

{ item }	Item is a list of required items. At least one item must appear.
KEYWORD	Keywords appear in uppercase characters in bold type for easy identification, but are not case sensitive.
VARIABLE	Represents a variable and appears in uppercase characters for easy identification

Syntax Conventions for User Data Variables

Variable	Description
FILEIDENTIFIER	Represents a hierarchical filename.
IDENTIFIER	Represents the name of a design object. Can be a block, cell instance, net, or port. IDENTIFIERS can use any ASCII character except the white space and the slash (/), which is the hierarchical divider character (see QPATH below). IDENTIFIERS are case sensitive
POSFLOAT	Represents a positive real number; for example, 4.3, 1.15, 2.35
POSNUMBER	Represents a positive integer; for example, 1, 12, 140, 64. When representing time, POSNUMBER is expressed in nanoseconds (ns)
QPATH	Represents a hierarchical IDENTIFIER. The levels of the hierarchy are represented by IDENTIFIERS divided by a slash (/). The QPATH hierarchical IDENTIFIER may or may not be quoted

Synopsys Design Constraints (SDC) Files

Designer accepts an SDC constraint file generated by a third-party tool. This file is used to communicate design intent between tools and provide clock and delay constraints. The Synopsys Design Compiler and Prime Time can generate SDC descriptions, or you can generate the SDC file manually.

Command	Action
create_clock (SDC clock constraint)	Determines the maximum register-to-register delay in the design
set_false_path (SDC false path constraint)	Identifies paths in the design that are to be marked as false, so that they are not considered during timing analysis

set_max_delay (SDC max path constraint)	Sets the path delay of the specified ports to a restricted value
set_multicycle_path (SDC multiple cycle path constraint)	Defines the multicycle path
set_load (SDC load constraint)	Sets the capacitance to a specified value on a specified port

Generated SDC files

There can be slight differences between a user-generated SDC file and SDC files generated by other tools. For example, suppose you write the following constraint:

```
create_clock -period 100 clk
```

The SDC file from Design Compiler generates the same constraint in a different format:

```
create_clock -period 100 -waveform {0 50}
[get_ports {clk}]
```

The SDC file from Prime Time generates this constraint in yet another format:

```
create_clock -period 100.000000 -waveform
{0.000000\ 50.000000}[get_ports {clk}]
```

As long as constraint syntax and arguments conform to the syntax rules described in Designer online help, the SDC files are accepted by Timer.

About DCF Files

Delay constraint information can be described in a *.dcf file and imported into Designer. The DCF language was developed to interact directly with the Timer tool and is therefore not a recommended method.

Note: DCF files are only valid with earlier Antifuse families such as eX, SX-A, and SX. Although they are supported in eX and SX-A, Actel recommends that you use SDC files for all your constraints.

DCF files are platform dependent. If you transfer from PC to UNIX or vice-versa, you must manually translate carriage-returns (unix2dos, dos2unix, or via ftp). PC text files have an extra character for carriage returns compared to UNIX text files.

Supported command categories:

Categories	Action
global clocks	Describes the clock waveforms from the global clock distribution network; local clocks, such as gated clocks, are not directly supported
max delays/min delays	Describes max/min delays
io arrival times	Defines the arrival time to an input port
global stops	Defines pins in don't care or false path
pin loads	Defines the capacitance loading on package pins

DCF Syntax Rules

The syntax rules for DCF are listed below. Note that these rules cannot be used as a parsing grammar. Terminal symbols are in upper case. Non-terminal symbols, which are enclosed with $\langle \rangle$, are in lower case. Symbols enclosed with $[]$ are optional. The symbol $|$ separates alternatives.

```

<DCF> =
<sec_def_name>
<sec_io_arr>
<sec_min_del>
<sec_max_del>
<sec_clk>
<sec_global_stop>
<sec_def_name> =
SECTION TOP_LEVEL_DEF_NAME <stop>
<variable>.
END <stop>
<sec_io_arr> =
SECTION IO_ARRIVAL_TIMES <stop>
[<io_arr_clauses>]
END <stop>
<io_arr_clauses> = <io_arr_clause> | <io_arr_clause> <io_arr_clauses>
<io_arr_clause> = [<number>:] <number> <timeunit> <io_list>.
<io_list> = <io> | <io> <io_list>
<io> = INPAD | OUTPAD | <variable>
<sec_max_del> =
SECTION MAX_DELAYS <stop>
<delay_clauses>
END <stop>
<sec_min_del> =
SECTION MIN_DELAYS <stop>
<delay_clauses>
END <stop>
<delay_clauses> = <delay_clause> | <delay_clause> <delay_clauses>
<delay_clause> =
DELAY <time>; SOURCE <source_list>; SINK <sink_list>;
[STOP <stop_list>; [PASS <pass_list>]].
<source_list> = {<sources>} [EXCEPT {<sources>}]
<sources> = INPAD | CLOCKED | <name_list>
<name_list> = <variable> | <variable> <name_list>

```

```

<sink_list> = {<sinks>}[EXCEPT {<sinks>}]
<sinks> = OUTPAD | GATED | <name_list>
<stop_list> = {<name_list>} [EXCEPT {<sinks>}]
<pass_list> = {<name_list>} [EXCEPT {<sinks>}]
<sec_clk> =
SECTION GLOBAL_CLOCKS <stop>
[<waveform_clauses>]
[<relational_clauses>]
END <stop>
<waveform_clauses> = <waveform_clause> | <waveform_clause> <waveform_clauses>
<waveform_clause> = WAVEFORM <variable> RISE <time>
FALL<time> PERIOD <time> [EXCEPT SOURCE {macrolist}]
[EXCEPT SINK {macrolist}].
<relational_clauses> = <check_clause> | <check_clause> <check_clauses>
<check_clause> =
MULTICYCLE <variable> SOURCE CYCLE<value> [EXCEPT <name_list>]
[; DESTINATION <clkname> CYCLE<value> <clkname> CYCLE<value>
[EXCEPT<name_list>]].
<clkname> = <clockMacro>
<time> = <number> <unit>
<number> = <int>
<stop> = . | /* NULL */
<unit> = NS | MS | PS
<variable> = same as variable in C language.
<int> = same as int in C language.
sec_global_stops =
Section GLOBAL_STOPS.
{<pinNameList>}.
End.
<sec_pin_loads> =
Section PIN_LOADS.
<pinLoadClauses>
End.
<pinLoadClauses> = <pinLoadClause> | <pinLoadClause>l<pinLoadClauses>]
<pinLoadClause> = <number> <capUnit> [TTL | CMOS] <pinNameList>.
<capUnit> = PF | NF | UF | MF

```

PIN

About PIN Files

Pin location information may be described in a *.pin file and imported into Designer.

Note: PIN files are only valid with earlier Antifuse families such as eX, SX-A, and SX. Although pin files are supported in Axcelerator, Actel recommends that you use PDC files for all your constraints.

Supported Syntax

Keywords	Action
DEF	Define top-level design entity
PIN	Define I/O location

DEF

Syntax

DEF <design_name>.

Example

```
DEF TARG32_WRP.
```

This example defines top-level structure as TARG32_WRP.

PIN

Syntax

```
PIN <pin_name>;
PIN:<package_pin_number>.
```

Example

```
PIN RST;
PIN:156.
```

This example assigns signal RST to package pin 156.

I/O Standards Compatibility Matrix

Not all I/O standards are compatible with each other in the same device. Click the device name in the following list to see which I/O standards are compatible for your device:

[ProASIC3E](#)

[ProASIC3](#)

[Axcelerator](#)

I/O Standards And I/O Attributes Applicability

Not all I/O attributes are applicable to all I/O standards. Click the device name in the following list to see the I/O attributes that you can modify per I/O standard for your device:

ProASIC3E

ProASIC3

Axcelerator

GCF Constraint Quick Reference

[create_clock](#)

[dont_fix_globals](#)

[dont_optimize](#)

[dont_touch](#)

[generate_paths](#)

[net_critical_ports](#)

[optimize](#)

[set_auto_global](#)

[set_critical](#)

[set_critical_port](#)

[set_empty_location](#)

[set_empty_io](#)

[set_global](#)

[set_initial_io](#)

[set_initial_location](#)

[set_io](#)

[set_input_to_register_delay](#)

[set_location](#)

[set_max_fanout](#)

[set_max_path_delay](#)

[set_net_region](#)

[use_global](#)

About Global Resource Constraints

Each ProASIC and ProASIC^{PLUS} device includes four global networks that have access to every tile. These four global networks provide high speed, low skew routing resources to signals such as clocks and global resets.

Once the netlist is imported, Designer sets global resource parameters and promotes the highest fanout nets to the remaining global resources unless the `dont_fix_globals` statement has been specified in a constraint file.

Note: When using the `dont_fix_globals` statement, global assignments made in the constraint files and design netlist will be honored (the constraint file entries will take precedence).

These global resource parameters can be supplemented by including global resource constraints in a constraint file. Global resource constraints can define which signals are assigned to global resources and which signals cannot be promoted to global resources. Global resource constraints can also override the default action that selects high fanout nets for use by the global resources.

Priority Order for Global Promotion

While assigning signals to global resources, Designer considers this information in the given priority:

1. `set_global` and `set_io` statements (instances of those global cells, which cannot be demoted)
2. Nets with the highest potential fanout above 32 (after removal of all buffers and inverters)
3. Global cell instantiation in a netlist (global cells which can be demoted)

Note: By default, a net with a fanout of less than 32 will not be promoted to global automatically unless the `set_global` or `set_io` constraint statements is used for this net. You can override this threshold of 32 by using the `set_auto_global_fanout` constraint statement.

dont_fix_globals

Use this statement to turn off the default action that automatically corrects the choice of global assignment to use only the highest fanout nets.

```
dont_fix_globals;
```

read

Use this statement to specify the name of a constraint file. A constraint file can contain multiple `read` statements. For example, you can put pin assignments in one file, optimization constraints in another, placement constraints in yet another, and read them all in through a master constraint file. The syntax is:

```
read [ -eco] [ -initial] file ;
```

where

`-eco` specifies that the constraint file is to be read in eco mode (engineering change order). In this mode, no errors will be reported when certain nets or instances are not found in the design. Instead a warning is generated.

`-initial` specifies that the constraint file is to be read in initial mode. In this mode, all fixed location statements will be interpreted as initial locations instead.

`file` (required) is the name of the constraint file, surrounded by double quotes.

The following example statements instruct the Designer to use constraints from the GCF files `pinmap.gcf` and `decoder.gcf`. A full path specification is given for `pinmap.gcf`. The file `decoder.gcf` has no path specification and is assumed to be in the design working directory.

```
read "/net/aries/designs/pinmap.gcf";  
read "decoder.gcf";
```

set_auto_global

Use this statement to specify the maximum number of global resources to be used. The tool assigns global resources to high-fanout signals automatically.

If the user specifies a number that exceeds the actual number of global resources available in the device, Designer ignores the statement. If the user specifies 0, no automatic assignment to global resources will take place.

```
set_auto_global number ;
```

For example, the following statement specifies that of the possible four global nets available, the tool can automatically promote only two high-fanout nets:

```
set_auto_global 2;
```

set_auto_global_fanout

Use this statement to set the minimum fanout a net must have to be considered for automatic promotion to a global. By default this is set to 32.

```
set_auto_global_fanout number ;
```

For example, the following statement determines that a net must have at least a fanout of 12 before Designer considers it for automatic promotion to a global resource.

```
set_auto_global_fanout 12;
```

set_global

Use this statement to classify nets as global nets.

```
set_global hier_net_name [ , hier_net_name ... ];
```

For example:

```
set_global u1/u3/net_clk, u3/u1/net_7;
```

set_noglobal

Use this statement for classifying nets to avoid automatic promotion to global nets.

```
set_noglobal hier_net_name [ , hier_net_name ... ];
```

For example:

```
set_noglobal u2/u8/net_14;
```

If the net was previously assigned to a global resource, this statement will demote it from the global resource.

use_global

This statement allows you to specify a single spine (LocalClock) or a rectangle of spine region which may encompass more than one spine region.

```
use_global T2 <net_name>;
```

```
use_global B1, T3 <net_name>;
```

For example, if you give the spine rectangle as B1, T3, the driven instances of the given net get a region constraint which encloses the rectangle, including the spine rectangle B1, T1, B2, T2, B2, T3.

The constraint tries to place the driver as close to center of the rectangle as possible.

The RAMs and I/Os are assigned to the LocalClock region unless the Compile option "Include RAM and I/O in Spine and Net Regions" is cleared. For designs created with v5.1 or earlier, this option is cleared by default. See "Compile Options" in the online help for more information.

You can specify the following type of rectangles:

1. Bn, Bm : $n \leq m$ will mean Bn, Bn+1, ... Bm
2. Tn, Tm : $n \leq m$ will mean Tn, Tn+1, ... Tm
3. Bn, Tm : $n \leq m$ will mean Bn, Tn, Bn+1, Tn+1 ... Bm, Tm
4. Tn, Bm : $n \leq m$ will mean Bn, Tn, Bn+1, Tn+1 ... Bm, Tm

See table for a summary of available spines.

Global Spine Usage

Device	Spine
A500K050	T1 to T3
	B1 to B3
A500K130	T1 to T5
	B1 to B5
A500K180	T1 to T6
	B1 to B6
A500K270	T1 to T7
	B1 to B7
APA075	T1 to T3
	B1 to B3
APA150	T1 to T4

	B1 to B4
APA300	T1 to T4
	B1 to B4
APA450	T1 to T6
	B1 to B4
APA600	T1 to T7
	B1 to B7
APA750	T1 to T8
	B1 to B8
APA1000	T1 to T11
	B1 to B11

Note that T1 and B1 are the leftmost top and bottom global spines, respectively.

Netlist Optimization Constraints

Netlist optimization attempts to remove all cells from a netlist that have no effect on the functional behavior of the circuit. This reduces the overall size of a design and produces faster place-and-route times. This optimization is based on the propagation of constants and inverter pushing and takes advantage of inverted inputs of the basic logic elements. Refer to the *ProASIC 500K Family* and *ProASIC PLUS* datasheet for detailed information.

Netlist optimization can be controlled by including netlist optimization constraints in constraint files submitted to Designer.

By default, all optimizations will be performed on the netlist. To control the amount of optimization that takes place, netlist optimization constraints can be used. Netlist optimization constraints can turn off all optimizations or disable the default action that allows all optimizations to limit the type of optimizations performed. The constraints can also define a maximum fanout to be allowed after optimizations are performed and isolate particular instances and hierarchical blocks from the effect of optimization.

After completion of netlist optimization, the design is a functionally identical representation of the design produced internally for use by Designer. View the design's layout after successful placement and routing. After optimization, a number of instances that do not contribute to the functionality of the design may have been removed.

To keep the SDF file consistent with the original input netlist, deleted cells are written with zero delay so that back-annotation is performed transparently.

Netlist Optimization Constraint Syntax

The following netlist optimization options are available for all netlist optimization constraints.

buffer - removes all buffers in the design, provided that the maximum fanout is not exceeded.

const - replaces all logical elements with one or more inputs connected to a constant (logical “1” or “0”) by the appropriate logic function. If the replacement logic function is identified as an inverter or buffer, that element is removed.

dangling - recursively removes all cells driving unconnected nets.

inverter - removes all inverters in the design provided that the maximum fanout is not exceeded.

dont_optimize

This statement does not optimize your buffers or inverters; instead, it removes them. When followed by one or more of the netlist optimization options, this statement turns off the named option (and preserves it).

If you have buffers or inverters that are connected to global nets, promoted global nets, or spine nets, this command is ignored and buffers and inverters are still removed. To avoid removing them, use the [dont_touch](#) option.

```
dont_optimize [{ <option> }];
```

Where <option> is one or more of the following:

buffer, inverter, const, dangling

dont_touch

This statement enables you to selectively disable optimization of named hierarchical instances. You can use the wildcard character (*) to isolate all sub-blocks under the named block. If you use this constraint, any instances (including buffers and inverters that are connected to global nets, promoted global nets, and spine nets) stay intact.

```
dont_touch hier_instance_name [, hier_instance_name ... ];
```

optimize

This statement turns on all netlist optimizations (the default mode). When followed by one or more of the netlist optimization types, this statement enables only the named optimization(s).

```
optimize [{ inverter buffer const dangling} ];
```

For example:

```
optimize buffer inverter;
```

set_max_fanout

Use this statement to specify the maxFanout limit on the specified nets. Use when optimizing the buffers and inverters. The buffers and inverters are not removed if the fanout for the given net exceeds the given limit. If no net name is given, then the command is applied to all the nets in the design. The net name can be a simple net or a name having wildcard characters.

The set_max_fanout constraint is optimized to accept individual net names. If you specify a net name, the set_max_fanout constraint applies only to the named net or nets and not to the entire design.

```
set_max_fanout NUMBER <net_name_wildcard>;
```

Placement Constraints

It is possible to use placement constraints to specify block-instance and macro placement. You can specify initial, fixed, region, and macro placements. Also, placement obstructions (locations that are not to be used and thus to be kept empty during placement instances) can be specified.

For example, a constraint that places two connected blocks close together usually improves the timing performance for those blocks. Similarly, a constraint that assigns an I/O pin to a particular net forces the router to make the connection between the driving or receiving cell and the I/O itself.

Like all constraints, placement constraints limit Designer's freedom when processing the design. For instance, assigning a fixed location makes that location unavailable during placement optimization. Such removal usually limits the program's ability to produce a chip-wide solution.

Command	Action
net_critical_ports	Specifies a specific subset of critical ports on a net
set_critical	Specifies critical nets and their relative criticality over other critical nets
set_critical_port	Identifies design I/O ports that have above-normal criticality. The criticality number scales is the same for the <code>set_critical</code> statement
set_empty_io	Specifies a location in which no I/O pin should be placed; the location can be specified by side and offset or by name
set_empty_location	Specifies a location in which no cell should be placed
set_initial_io	Assigns package pins to I/O ports or locates I/O ports at a specified side of a device
set_initial_location	Locates a cell instance at specified x, y coordinates
set_io	Assigns package pins to I/O ports or locates I/O ports at a specified side or location of a device; this constraint is a hard constraint and cannot be overruled by the placer
set_location	Locates a cell instance at specified x,y coordinates
set_net_region	Enables you to put all the connected instances, driver, and all the driven instances for the net(s) into the target rectangle specified in the constraint

Macro

```
macro name (x1, y1 x2, y2) {
macro_statements
}
```

Where *name* is the macro name identifier, x1, y1 is the lower left coordinates of the macro, and x2, y2 is the upper right coordinates of the macro. The macro constraint must precede the corresponding `set_location` that places the macro in the GCF file(s).

For example:

```
macro mult (1,1 6,6) {
set_location...
}
```

Now you can use the “`set_location`” or `set_initial_location` statements to place or initially place a sub-design instance by calling its macro and then applying a translation and rotation. .

```
set_initial_location (x, y) hier_subdesign_inst_name
```

```
macro_name [transformations];
```

For example:

```
set_location (3,3) a/b mult flip lr;
```

Where hier_subdesign_inst_name is the hierarchical name of the instance of the sub-design, x, y is the final location of the lower left corner of the macro after all transformations have been completed, macro_name - is the name of previously defined macro, and transformations are optional, and any of the following in any order:

- flip lr** - flip cell from left to right
- flip ud** - flip cell from up to down
- rotate 90 cw** - rotate 90° clockwise
- rotate 270 cw** - rotate 270° clockwise
- rotate 90 ccw** - rotate 90° counter-clockwise
- rotate 180 ccw** - rotate 180° counter-clockwise
- rotate 270 ccw** - rotate 270° counter-clockwise

The transformations are processed in the order in which they are defined in the statement.

For example:

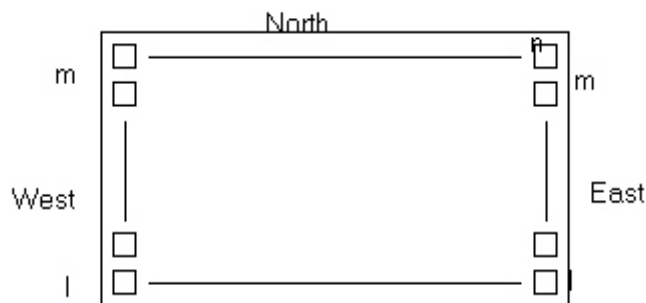
```
set_initial_location (3,3) a/b mult flip lr;
```

Package Pin and Pad Location

Generally, you are concerned with the mapping of signals (ports) to the pins of the selected package. However, you may want to control the allocation of signals to particular pads. This is accomplished by assigning ports to the pad location rather than to the package pin. Because all pads are pre-bonded to package pins, the effect is to assign ports to package pins, with the emphasis on pad location rather than package pin.

Pad location is described by the letters N (North), S (South), E (East) or W (West) followed by a space and a number. This location code determines the direction and offset of the pad with respect to the die.

The top edge of the viewer contains the North pads and the right edge contains the East pads. The number refers to the pad position along its edge. For example, N 48 corresponds to the 48th pad along the North edge of the die. The figure below shows the numbering system used for pad location.



net_critical_ports

Use this statement to specify a specific subset of critical ports on a net.

For example, the following statement identifies two inputs of the net /u1/u2/net1 that are more critical than all other connections on that net. All other connections on the net will be buffered with a BUF cell that will be placed in a tile to reduce fanout delay on the specified inputs:

```
net_critical_ports /u1/u2/net1 nandbk1.A sigproc.C;
```

set_critical

Use this statement to specify critical nets and their relative criticality over other critical nets.

```
set_critical criticality_number hier_net_name
[,hier_net_name ...];
```

Where *criticality_number* is from 1 to 5 (1 being the default criticality for every net and 5 the highest). *hier_net_name* is the full hierarchical net name.

For example, the statements below set the timing of u1/u2/net1 more critical than u1/u2/net5 and u1/u2/net3:

```
set_critical 5 /u1/u2/net1;
set_critical 2 /u1/u2/net5, u1/u2/net3;
```

set_critical_port

Use this statement to identify design I/O ports that have above-normal criticality. The criticality number scale is the same for the `set_critical` statement.

```
set_critical_port criticality_number signal_name
[,signal_name ...];
```

Where *signal_name* is the name of a user-defined signal associated with a specific I/O pin on the part.

For example, the following statement sets all nets associated with device ports IOBus[3] and IOBus[5] to have criticality 3:

```
set_critical_port 3 IOBus[3], IOBus[5];
```

set_empty_io

Use this statement to specify a location in which no I/O pin should be placed. The location can be specified by side and offset or by name.

```
set_empty_io { package_pin | pad_location};
```

For example, the following statement forces pin B5 and the pin associated with the fourth tile on the North side to be empty:

```
set_empty_io B5, (N,4);
```

set_empty_location

Use this statement to specify a location in which no cell should be placed.

```
set_empty_location ( x ,y);
set_empty_location (xmin ,ymin xmax ,ymax );
```

Where x, y (required) are the (x, y) tile coordinates that specify the empty cell location and $x_{bl}, y_{bl}, x_{tr}, y_{tr}$ (required) are the x, y tile coordinates for the bottom left and top right corner of the region.

Only white spaces are allowed between the coordinates.

For example, the following statement informs the placement program that location (3, 7) is unavailable for cell placement:

```
set_empty_location( 3 ,7);
set_empty_location(113 ,1 60 ,80 );
```

set_initial_io

Use this statement to initially assign package pins to I/O ports or locate I/O ports at a specified side of a device. The placer can reassign or relocate the cells during place-and-route.

```
set_initial_io { package_pin | pad_location } io_port_name
[, io_port_name , ... ];
```

Where `package_pin` is a package pin number for a specified I/O cell.

If you use `package_pin`, only one `io_port_name` argument is allowed (required if no pin location is given). `pad_location` is one of N, S, E, or W, followed by a pad location number on the chip. It constrains the pin location of a specified I/O cell to a specific pad location on the chip. Only one `io_port_name` argument is allowed. `io_port_name` (required) is the name of an I/O port to be assigned to a package pin or located at a specified edge of a package.

The following example statement initially places the I/O associated with net in3 to package pin A11:

```
set_initial_io A11 in3;
```

The following example statement initially places the I/O associated with net in4 on the fourth tile on the

North side:

```
set_initial_io (N,4) in4;
set_initial_io to a side is missing.
```

For example,

```
set_initial_io S in5; // assigns in5 to the South side
```

Multiple comma-separated ports can be specified when they are assigned to a side.

set_initial_location

Use this statement to initially locate a cell instance at specified x, y coordinates. The placer can relocate the cell instance during place-and-route.

```
set_initial_location ( x, y ) hier_inst_name ;
```

Where x, y (required) are the x, y tile coordinates for the location of a specified cell instance and `hier_inst_name` (required) is the hierarchical path to a cell instance.

For example:

```
set_initial_location (43,105) bk3/fp5/nand3_4;
```

set_io

Use this statement to either assign package pins to I/O ports or locate I/O ports at a specified side or location of a device. This constraint is a hard constraint and can not be overruled by the placer. This may have an impact on the timing results of a design. If a hard constraint is not suitable, use the `set_initial_io` constraint.

```
set_io {..|..} netName/portName;
```

For example:

```
set_io A9 in1;
set_io (S,22) in2;
set_io N in3;    // assigns in3 to the North side
```

Multiple comma-separated ports can be specified when they are assigned to a side.

set_io_region

This constraint enables you to place specific I/O instances into a target rectangular region. The global I/Os are excluded from this constraint.

The syntax is:

```
set_io_region (x1, y1 x2, y2) p1 [, p2, p3, .... , pn] ;"
```

where

`x1, y1 x2, y2` are the lower left and upper right corners of the rectangle that define the region

`p1, ... , pn` is a list of one or more I/O instance names or ports.

If multiple instances or ports are listed, they must be separated by commas. For example:

```
set_io_region (0,41 0,48) "acc[3]", "acc[4]";
```

set_location

Use this statement to locate a cell instance at specified x,y coordinates. The placer cannot relocate the cell instance during place-and-route.

```
set_location ( x,y) hier_inst_name ;
set_location (x bl ,y bl x tr ,y tr ) hier_inst_name/*;
```

Where `x, y` (required) are the (x, y) tile coordinates that specify the empty cell location and `x bl , y bl x tr , y tr` (required) are the x, y tile coordinates for the bottom left and top right corner of the region.

For example:

```
set_location (1,15) u4/u3/nand3_4;
set_location (1,1 32,32) datapath/*;
```

This statement has been extended to allow you to place a sub-design instance by calling its macro and then applying a translation and rotation. The syntax is:

```
set_location (x, y) hier_subdesign_inst_name macro_name
[transformations];
```

where

`hier_subdesign_inst_name` is the hierarchical name of the instance of the sub-design; (x, y) is the final location of the lower left corner of the macro after all transformations have been completed; `macro_name` is the name of the previously defined macro; `transformations` are optional, and any of the following in any order:

```
flip lr - flip cell from left to right
flip ud - flip cell from up to down
rotate 90 cw - rotate 90 ° clockwise
rotate 180 cw - rotate 180 ° clockwise
rotate 270 cw - rotate 270 ° clockwise
rotate 90 ccw - rotate 90 ° counter-clockwise
rotate 180 ccw - rotate 180 ° counter-clockwise
```

set_memory_region

Use this statement to create a region and assign memory to it. You can only assign names of memory macros to the region. Do not specify names of individual tiles.

For cascaded memory, the `set_memory_region` constraint applies to the whole cascaded block, even if your statement mentions only one macro out of the whole cascaded block.

Syntax

```
set_memory_region (x1,y1 x2,y2) memory1_name [,...,memoryn_name];
```

Arguments

$(x1, y1 \ x2, y2)$

Where $x1, y1$ specifies the bottom-left corner and $x2, y2$ specifies the top-right corner of the rectangle that defines the region in which the memory macros will be assigned. The macros are constrained to this region.

`memory1_name, ...`

Specifies the memory macro(s) to assign to the region. Macro names are hierarchical names in the user netlist.

You can use wildcards in macro names. The wildcard character (*) matches any string.

Examples:

```
set_memory_region (1,101 32,101) M1/U0;
set_memory_region (1,101 48,101) M1/U0,M1/U1;
set_memory_region (1,101 128,101) M1/U*;
```

You can also use `set_net_region` and `use_global` to assign memory to regions.

Additionally, you can use the MultiView Navigator (MVN) to create regions that include memory. MVN regions can span core, I/O, and/or memory.

set_net_region

This GCF constraint enables you to put all the connected instances, driver, and all the driven instances for the net(s) into the target rectangle specified in the constraint. It puts the region constraint on all the connected instances, which will be processed by the placer. You can use wildcards in the net name.

The RAMs and I/Os are assigned to the LocalClock region unless the Compile option “Include RAM and I/O in Spine and Net Regions” is cleared. For designs created with v5.1 or earlier, this option is cleared by default. See "Compile Options" in the online help for more information.

```
set_net_region (x1,y2 x2,y2) <net_name_wildcard>;
```

Note: Only white spaces are allowed between the coordinates.

GCF Timing Constraints

create_clock

Use this statement to define clocks for the design. Multiple clocks can be specified for a given design.

```
create_clock -period <period_value> {netname|portname}
```

Where `period_value` is the clock period in nanoseconds and `netname|portname` is the name of the net through which the clocks gets propagated or name of the external port.

For example, the following statement creates a clock on external port `clk` with a period of 25.0 nanoseconds.

```
create_clock -period 25.0 clk;
```

generate_paths

Use this statement to modify the way Designer generates internal path constraints for the placer to do timing-driven placement.

```
generate_paths [-cover_design] [-max_paths <maxpaths>
[-top <percentage>];
```

Where `-cover_design` indicates to Designer to use the cover design algorithm instead of the default worst paths algorithm, `-max_paths` is the maximum number of paths that will be generated (default is 20% of the number of nets with minimum of 1000 or if `cover_design` is specified, twice the number of nets with a minimum of 1000), `-top` indicates the top percentage of worst paths that will be generated (default is 20%).

The cover design algorithm ensures that the generated set of paths span the entire design; every pin of every instance participates in at least one path.

After the timing analysis is done, the worst paths algorithm starts recording the signal paths starting from the worst slack. It stops after some number of paths is generated; as a result, only some part of the design may be covered by the paths.

For example, the following statement generates 4,000 maximum paths using the `-cover_design` algorithm.

```
generate_paths -cover_design -max_paths 4000;
```

set_false_path

Use this statement to define false paths in the design. These paths are not considered in the timing driven place-and-route system.

```
set_false_path [-from from_port] [-through any_port] [-to to_port];
```

Where `from_port` must be an input port of the design or a register or memory instance output pin, `to_port` must be an output port of the design or a register or memory instance input pin, `any_port` must be any instance pin. Wildcards are permitted.

For example, the following statement sets all paths starting from `resetd` which are going through instance `const2` as false paths.

```
set_false_path -from resetd -through const2/*;
```

set_input_to_register_delay

Use this statement to define the timing budget for incoming signals to reach a register.

```
set_input_to_register_delay <delay> [-from inp_port];
```

Where *delay* is the timing budget for this input path, *inp_port* is a register or memory instance output pin. Wildcards are permitted.

For example, the following statement specifies that the timing budget is 22 nanoseconds to the register from all inputs whose names start with the letter "I".

```
set_input_to_register_delay 22 -from I*;
```

set_max_path_delay

Use this statement to constrain the maximum delay on paths. The calculate timing task will report a note in the timing report file if this delay is not met.

```
set_max_path_delay delay_value
hier_inst_name.inst_port_name
[, hier_inst_name .inst_port_name , ... ];
```

Where *delay_value* is a floating integer for delay in nanoseconds, *hier_inst_name* is the hierarchical path to a cell instance, and *inst_port_name* is a port name of a cell instance.

For example:

```
set_max_path_delay 12.5 "mult4/mult/nand2_2".Y, "mult4/mult/
nand3_1".A, "mult4/mult/nand3_1".Y, "mult4/mult/nor2_2".A;
```

set_multicycle_path

Use this constraint to define how many clock cycles a signal has to travel through these paths. The budget of these paths will be a multiple of the period of the clock controlling the from port.

```
set_multicycle_path <num_cycles> -from reg_port [-through_any_port] [-to_port];
```

Where *num_cycles* is the number of clock cycles in which the signal needs to propagate through the path, *reg_port* is a register or memory instance, *to_port* must be an output port of the design or a register or memory instance input pin, *any_port* must be any instance pin. Wildcards are permitted.

For example, the following statement specifies it takes two clock cycles to reach signals from instance pins */us/u1/dff*.q* to instance pins */u4/mem1/*.D*.

```
set_multicycle_path 2 -from /us/u1/dff*.q -to /u4/mem1/*.D;
```

set_register_to_output_delay

Use this statement to define the timing budget for outgoing signals to be clocked out.

```
set_register_to_output_delay <delay> -to out_port;
```

Where *delay* is the timing budget for this output path, *out_port* must be an output port of the design. Wildcards are permitted.

For example, the following statement specifies the timing budget for clocking out signals on output ports starting with "O" is 22 nanoseconds.

```
set_register_to_output_delay 22 -to O*;
```

About Physical Design Constraint (PDC) Files

A PDC file is a Tcl script file specifying physical constraints. This file can be imported and exported from Designer. Any constraint that you can enter using the PinEditor in MVN or ChipPlanner tool, you can also use in a PDC file.

Note: Only ProASIC3/E and Axcelerator devices support PDC files.

Designer supports the following PDC commands.

Command	Action
assign_global_clock	Assigns user-defined nets to global clock networks by promoting the net using a CLKINT macro
assign_local_clock	Assigns user-defined nets to local clock routing (Axcelerator) or to either LocalClock or QuadrantClock regions (ProASIC3/E)
assign_net_macros	Assigns the macros connected to a net to a specified defined region
assign_region	Assigns macros to a pre-specified region
define_region	Defines a rectilinear region
define_region	Defines a rectangular region
delete_buffer_tree	Removes all buffers and inverters from a given net for ProASIC3 and ProASIC3E devices
dont_touch_buffer_tree	Restores all buffers and inverters that were removed from a given net with the delete_buffer_tree command
move_region	Moves a region to new coordinates
reset_floorplan	Deletes all defined regions. Placed macros are not affected
reset_io	Resets all attributes on a macro to the default values
reset_iobank	Resets an I/O banks technology to the default technology
reset_net_critical	Resets net criticality to default level
set_io	Sets the attributes of an I/O
set_iobank	Specifies the I/O bank's technology
set_location	Places a given logic instance at a particular location
set_multitile_location	Assigns specified two-tile and four-tile macros to specified locations on the chip
set_net_critical	Sets net criticality, which is issued to influence placement and routing in favor of performance
set_vref	Specifies which pins are VREF pins
set_vref_defaults	Sets the default VREF pins for specified banks
unassign_global_clock	Assigns clock nets to regular nets
unassign_local_clock	Unassigns the specified user-defined net from a LocalClock or QuadrantClock region
unassign_macro_from_region	Unassigns macros from a specified region, if they are assigned to that region
unassign_net_macro	Unassigns macros connected to a specified net from a defined region
undefine_region	Removes the specified region

Note: PDC commands are case sensitive. However, their arguments are not.

See Also

[About design constraints](#)

[Exporting files](#)

[Importing PDC files](#)

[Importing auxiliary files](#)

[PDC syntax conventions](#)

[PDC naming conventions](#)

PDC Syntax Conventions

The following table shows the typographical conventions that are used for the PDC command syntax.

Syntax Notation	Description
<code>command -argument</code>	Commands and arguments appear in Courier New typeface.
<i>variable</i>	Variables appear in blue, italic Courier New typeface. You must substitute an appropriate value for the variable.
<code>[-argument <i>value</i>] [<i>variable</i>]+</code>	Optional arguments begin and end with a square bracket with one exception: if the square bracket is followed by a plus sign (+), then users must specify at least one argument. The plus sign (+) indicates that items within the square brackets can be repeated. Do not enter the plus sign character.

Note: PDC commands are case sensitive. However, their arguments are not.

Examples

Syntax for the `assign_local_clock` (Axcelerator) command followed by a sample command:

```
assign_local_clock -type value -net netname [LocalClock_region]+
```

```
assign_local_clock -type hclk -net reset_n tile1a tile2a
```

Syntax for the `set_io` (Axcelerator) command followed by a sample command:

```
set_io portname [-iostd value] [-register value] [-out_drive value] [-slew value] [-res_pull value] [-out_load value] [-pinname value] [-fixed value] [-in_delay value]
```

```
set_io ADDOUT2 \  
  -iostd PCI \  
  -register yes \  
  -out_drive 16 \  
  -slew high \  
  -out_load 10 \  
  -pinname T21 \  
  \
```


-fixed yes

Wildcard Characters

You can use the following wildcard characters in names used in PDC commands:

Wildcard	What it does
\	Interprets the next character literally
?	Matches any single character
*	Matches any string
[]	Matches any single character among those listed between brackets (that is, [A-Z] matches any single character in the A-to-Z range)

Note: The matching function requires that you add a slash (\) before each slash in the port, instance, or net name when using wildcards in a PDC command and when using wildcards in the Find feature of the MultiView Navigator. For example, if you have an instance named “A/B12” in the netlist, and you enter that name as “A\\B*” in a PDC command, you will not be able to find it. In this case, you must specify the name as A\\B*.

Special Characters ([], { }, and \)

Sometimes square brackets ([]) are part of the command syntax. In these cases, you must either enclose the open and closed square brackets characters with curly brackets ({ }) or precede the open and closed square brackets ([]) characters with a backslash (\). If you do not, you will get an error message.

For example:

```
set_iobank {mem_data_in[57]} -fixed no 7 2
```

or

```
set_iobank mem_data_in\[57\] -fixed no 7 2
```

Entering Arguments on Separate Lines

To enter an argument on a separate line, you must enter a backslash (\) character at the end of the preceding line of the command as shown in the following example:

```
set_io ADDOUT2 \
    -iostd PCI \
    -register Yes \
    -out_drive 16 \
    -slew High \
    -out_load 10 \
    -pinname T21 \
    -fixed Yes
```

See Also

[About PDC files](#)

[PDC naming conventions](#)

PDC Naming Conventions

Note: The names of ports, instances, and nets in an imported netlist are sometimes referred to as their *original names*.

Rules for displaying original names

Port names appear exactly as they are defined in a netlist. For example, a port named A/B appears as A/B in ChipPlanner, PinEditor, and I/O Attribute Editor in MultiView Navigator.

Instances and nets display the original names plus an escape character (\) before each backslash (/) and each slash (/) that is not a hierarchy separator. For example, the instance named A/\B is displayed as A\\/\B.

Which name do I use in PDC commands?

The names of ports, instances, and nets in a netlist displayed in MultiView Navigator (MVN) for ProASIC3/E devices are names taken directly from the imported netlist. However, the names displayed in MVN for Axcelerator devices are the compiled names. Compiled names remove special characters such as slash (/) and backslash (\) characters and replace them with the underscore character.

Using PDC Commands for Axcelerator

When importing PDC commands for Axcelerator devices, always use the post-compiled names of ports, instances, and nets. You can see the post-compiled names in MultiView Navigator or the compile report.

Using PDC Commands for ProASIC3/E

When writing PDC commands for ProASIC3/E devices, follow these rules:

Always use the macro name as it appears in the netlist. (See "Merged elements" in this topic for exceptions.)

Names from a netlist: For port names, use the names exactly as they appear in the netlist. For instance and net names, add an escape character (\) before each backslash (\) and each slash (/) that is not a hierarchy separator.

Names from MVN and compile report: Use names as they appear in MultiView Navigator or the compile report.

For wildcard names, always add an extra backslash (\) before each backslash.

Always apply the PDC syntax conventions to any name in a PDC command.

The following table provides examples of names as they appear in an imported netlist and the names as they should appear in a PDC file:

Type of name and its location	Name in the imported netlist	Name to use in PDC file
Port name in netlist	A/:B1	A/:B1
Port name in MVN	A/:B1	A/:B1
Instance name in a netlist	A/:B1 A\$(1)	A\\/:B1 A\$(1)
Instance name in the netlist but using a wildcard character in a PDC file	A/:B1	A\\\\/:B*
Instance name in MVN or a compile report	A\/:B1	A\\/:B1
Net name in a netlist	Net1/:net1	Net1\\/:net1
Net name in MVN or a compile report	Net1\/:net1	Net1\\/:net1

When exporting PDC commands, the software always exports names using the PDC rules described in this topic.

Case sensitivity when Importing PDC Files (ProASIC3/E only)

The following table shows the case sensitivity in the PDC file based on the source netlist.

File type	Case sensitivity
Verilog	Names in the netlist are case sensitive.
Edif	Names in the netlist are always case sensitive because we use the Rename clause, which is case sensitive.
Vhdl	Names in the netlist are not case sensitive unless those names appear between slashes (/).

For example, in VHDL, capital "A" and lowercase "a" are the same name, but \A\ and \a\ are two different names. However, in a Verilog netlist, an instance named "A10" will fail if spelled as "a10" in the set_location command:

```
set_location A10 (This command will succeed.)
```

```
set_location a10 (This command will fail.)
```

Which Name to Use in the Case of Merged Elements (ProASIC3/E only)

The following table indicates which name to use in a PDC command when performing the specified operation:

Operation	Name to use
I/O connected to PLL with a hardwired connection	PLL instance name
I/O combined with FF or DDR	I/O instance name
Global promotion	<Driver instance of the net>_CLKINT

See Also

[About PDC files](#)

[PDC syntax conventions](#)

assign_global_clock

Assigns user-defined nets to global clock networks by promoting the net using a CLKINT macro.

```
assign_global_clock -net netname
```

Arguments

-net netname

Specifies the name of the net to promote to a global clock network. The net is promoted using a CLKINT macro, which you can place on a chip-wide clock location.

Supported Families

ProASIC3/E

Notes

The assign_global_clock command is not supported in auxiliary PDC files.

Exceptions

None

Examples

```
assign_global_clock -net globalReset
```

See Also

[assign_local_clock \(Axcelerator\)](#)

[assign_local_clock \(ProASIC3/E\)](#)

[unassign_global_clock](#)

[PDC syntax conventions](#)

[PDC naming conventions](#)

assign_local_clock

The syntax and arguments for the **assign_local_clock** command vary depending on which device you are designing. Click the device name in the following list to see the syntax, arguments, and other information for the assign_local_clock command for that particular device:

[assign_local_clock \(ProASIC3/E\)](#)

[assign_local_clock \(Axcelerator\)](#)

assign_net_macros

Assigns to a user-defined region all the macros that are connected to a net.

```
assign_net_macros region_name [net1]+
```

Arguments

region_name

Specifies the name of the region to which you are assigning macros. The region must exist before you use this command. See [define_region \(rectangular\)](#) or [define_region \(rectilinear\)](#). Because the [define_region](#) command returns a region object, you can write a simple command such as `assign_net_macros [define_region]+ [net]+`

net1

You must specify at least one net name. Net names are AFL-level (Actel flattened netlist) names. These names match your netlist names most of the time. When they do not, you must export AFL and use the AFL names. Net names are case insensitive. Hierarchical net names from ADL are not allowed. You can use the following wildcard characters in net names:

Wildcard	What it does
\	Interprets the next character as a non-special character
?	Matches any single character
*	Matches any string
[]	Matches any single character among those listed between brackets (that is, [A-Z] matches any single character in the A-to-Z range)

Supported Families

ProASIC3/E and Axcelerator

Notes

Placed macros (not connected to the net) that are inside the area occupied by the net region are automatically unplaced.

Net region constraints are internally converted into constraints on macros. PDC export results as a series of `assign_region <region_name> macro1` statements for all the connected macros.

Net region constraints may result in a single macro being assigned to multiple regions. These net region constraints result in constraining the macro to the intersection of all the regions affected by the constraint.

Exceptions

If the region does not have enough space for all of the macros, or if the region constraint is impossible, the constraint is rejected and a warning message appears in the Log window.

For overlapping regions, the intersection must be at least as big as the overlapping macro count.

If a macro on the net cannot legally be placed in the region, it is not placed and a warning message appears in the Log window.

Examples

```
assign_net_macros cluster_region1 keyin1int20Z_62
```

See Also

[unassign_net_macro](#)

[PDC syntax conventions](#)

[PDC naming conventions](#)

assign_region

Constrains a set of macros to a specified region.

```
assign_region region [macro_name]+
```

Arguments

region

Specifies the region to which the macros are assigned. The macros are constrained to this region. Because the `define_region` command returns a region object, you can write a simpler command such as `assign_region [define_region]+ [macro_name]+`

macro_name

Specifies the macro(s) to assign to the region. You must specify at least one macro name. You can use the following wildcard characters in macro names:

Wildcard	What it does
\	Interprets the next character as a non-special character
?	Matches any single character
*	Matches any string

[]	Matches any single character among those listed between brackets (that is, [A-Z] matches any single character in the A-to-Z range)
----	--

Supported Families

ProASIC3/E and Axcelerator

Notes

The region must be created before you can assign macros to it.

Exceptions

You can assign only hard macros or their instances to a region. You cannot assign a group name. A hard macro is a logic cell consisting of one or more silicon modules with locked relative placement.

Examples

In the following example, two macros are assigned to a region:

```
assign_region cluster_region1 des01/G_2722_0_and2 des01/data1_53/U0
```

See Also

[unassign_macro_from_region](#)

[PDC_syntax_conventions](#)

[PDC_naming_conventions](#)

define_region (rectangular region)

Defines either a rectangular region or a [rectilinear region](#).

```
define_region [-name region_name] -type region_type [x1 y1 x2 y2]+
```

Arguments

-name *region_name*

Specifies the region name. The name must be unique. Do not use reserved names such as “bank0” and “bank<N>” for region names. If the region cannot be created, the name is empty. A default name is generated if a name is not specified in this argument.

-type *region_type*

Specifies the region type. The default is inclusive.

Region Constraint	Conditions
Empty	No macros can be assigned to an empty region
Exclusive	Only contains macros assigned to the region
Inclusive	Can contain macros both assigned and unassigned to the region

x1 y1 x2 y2

Specifies the series of coordinate pairs that constitute the region. These rectangles may or may not overlap. They are given as *x1 y1 x2 y2* (where *x1, y1* is the lower left and *x2 y2* is the upper right corner in row/column coordinates). You must specify at least one set of coordinates.

Supported Families

ProASIC3/E and Axcelerator

Notes

Unlocked macros in empty or exclusive regions are unassigned from that region.

You cannot create empty or exclusive regions in areas that contain locked macros.

Use inclusive or exclusive region constraints if you intend to assign logic to a region. An inclusive region constraint with no macros assigned to it has no effect. An exclusive region constraint with no macros assigned to it is equivalent to an empty region.

Exceptions

If macros assigned to a region exceed the area's capacity, an error message appears in the Log window.

Examples

The following example defines an empty rectangular region.

```
define_region -name cluster_region1 -type empty 100 46 102 46
```

See Also

[define_region \(rectilinear region\)](#)

[PDC syntax conventions](#)

[PDC naming conventions](#)

define_region (rectilinear region)

Defines either a rectilinear region or a [rectangular region](#).

```
define_region [-name region_name] -type region_type [x1 y1 x2 y2]+
```

Arguments

`-name region_name`

Specifies the region name. The name must be unique. Do not use reserved names such as “bank0” and “bank<N>” for region names. If the region cannot be created, the name is empty. A default name is generated if a name is not specified in this argument.

`-type region_type`

Specifies the region type. The default is inclusive.

Region Constraint	Conditions
Empty	No macros can be assigned to an empty region
Exclusive	Only contains macros assigned to the region
Inclusive	Can contain macros both assigned and unassigned to the region

`x1 y1 x2 y2`

Specifies the series of coordinate pairs that constitute the region. These rectangles may or may not overlap. They are given as x1 y1 x2 y2 (where x1, y1 is the lower left and x2 y2 is the upper right corner in row/column coordinates). You must specify at least one set of coordinates.

Supported Families

ProASIC3/E and Axcelerator

Notes

Unlocked macros in empty or exclusive regions are unassigned from that region.

You cannot create empty or exclusive regions in areas that contain locked macros.

Use inclusive or exclusive region constraints if you intend to assign logic to a region. An inclusive region constraint with no macros assigned to it has no effect. An exclusive region constraint with no macros assigned to it is equivalent to an empty region.

You can define a rectilinear region only in a PDC file; you cannot define a rectilinear region using the MultiView Navigator tool.

Exceptions

If macros assigned to a region exceed the area's capacity, an error message appears in the log window.

Examples

The following example defines a region with the name RecRegion. This region contains two rectangular areas.

```
define_region -name RecRegion -type Exclusive 0 40 3 42 0 77 7 79
```

See Also

[define_region \(rectangular region\)](#)

[PDC syntax conventions](#)

[PDC naming conventions](#)

delete_buffer_tree

Instructs the Compile command to remove all buffers and inverters from a given net.

```
delete_buffer_tree -net [netname]+
```

Arguments

-net netname

Specifies the names of the nets from which to remove buffer or inverter trees. This command takes a list of names. You must specify at least one net name. You can use the following wildcard characters in net names:

Wildcard	What it does
\	Interprets the next character as a non-special character
?	Matches any single character
*	Matches any string
[]	Matches any single character among those listed between brackets (that is, [A-Z] matches any single character in the A-to-Z range)

Supported Families

ProASIC3/E

Notes

In the ProASIC3E and ProASIC3 architectures, inverters are considered buffers because all tile inputs can be inverted. This rule is also true for all Flash architectures but not for Antifuse architectures.

Exceptions

The `delete_buffer_tree` command is not supported in auxiliary PDC files.

Examples

```
delete_buffer_tree net1
delete_buffer_tree netData\[*\]
```

See Also

[don't touch buffer tree](#)

[PDC syntax conventions](#)

[PDC naming conventions](#)

dont_touch_buffer_tree

Undoes the `delete_buffer_tree` command. That is, it restores all buffers and inverters that were removed from a given net.

```
dont_touch_buffer_tree -net netname
```

Arguments

`-net netname`

Specifies the name of the net with the buffers and inverters to restore.

Supported Families

ProASIC3/E

Notes

The `dont_touch_buffer_tree` command is not supported in auxiliary PDC files.

Exceptions

None

Examples

This example prevents the software from removing buffer trees on the `reset_n` net:

```
dont_touch_buffer_tree -net reset_n
```

See Also

[delete buffer tree](#)

[PDC syntax conventions](#)

[PDC naming conventions](#)

move_region

Moves the named region to the coordinates specified.

```
move_region region_name [x1 y1 x2 y2]+
```

Arguments

region_name

Specifies the name of the region to move. This name must be unique.

x1 y1 x2 y2

Specifies the series of coordinate pairs representing the location in which to move the named region. These rectangles can overlap. They are given as *x1 y1 x2 y2*, where *x1, y1* represents the lower-left corner of the rectangle and *x2 y2* represents the upper-right corner. You must specify at least one set of coordinates.

Supported Families

ProASIC3/E and Axcelerator

Notes

None

Exceptions

None

Examples

This example moves the region named RecRegion to a new region which is made up of two rectangular areas:

```
move_region RecRegion 0 40 3 42 0 77 7 79
```

See Also

[PDC syntax conventions](#)

[PDC naming conventions](#)

reset_floorplan

Deletes all regions.

```
reset_floorplan
```

Arguments

None

Supported Families

Axcelerator

Notes

None

Exceptions

None

Examples

reset_floorplan

See Also[PDC syntax conventions](#)[PDC naming conventions](#)

reset_io

Restores all attributes of an I/O macro to its default values. Also, if the port is assigned, it will become unassigned.

```
reset_io portname -attributes value
```

Arguments*portname*

Specifies the port name of the I/O macro to be reset. You can use the following wildcard characters in port names:

Wildcard	What it does
\	Interprets the next character as a non-special character
?	Matches any single character
*	Matches any string
[]	Matches any single character among those listed between brackets (that is, [A-Z] matches any single character in the A-to-Z range)

-attributes *value*

Preserve or not preserve the I/O attributes during incremental flow. The following table shows the acceptable values for this argument:

Value	Description
yes	Unassigns all of the I/O attributes and resets them to their default values.
no	Unassigns only the port.

Supported Families

ProASIC3/E and Axcelerator

Notes

None

Exceptions

None

Examples

```
reset_io a
```

Resets the I/O macro "a" to the default I/O attributes and unassigns it.

```
reset_io b_*
```

Resets all I/O macros beginning with "b_" to the default I/O attributes and unassigns them.

```
reset_io b -attributes no
```

Only unassigns port b from its location.

See Also

[set_io](#)

[PDC syntax conventions](#)

[PDC naming conventions](#)

reset_iobank

Resets an I/O bank's technology to the default technology, which is specified using the Designer software in the Device Selection Wizard.

```
reset_iobank bankname
```

Arguments

bankname

Specifies the I/O bank to be reset to the default technology. For example, for ProASIC3E and Axcelerator devices, I/O banks are numbered 0-7 (bank0, bank1,.. bank7).

Supported Families

ProASIC3/E and Axcelerator

Notes

Any pins that are assigned to the specified I/O bank but are incompatible with the default technology are unassigned.

Exceptions

None

Examples

The following example resets I/O bank 4 to the default technology:

```
reset_iobank bank4
```

See Also

[set_iobank](#)

[PDC syntax conventions](#)

[PDC naming conventions](#)

reset_net_critical

Resets the critical value to its default. Net criticality can vary from 1 to 10, with 1 being the least critical and 10 being the most. The default is 5. Criticality numbers are used in timing driven place-and-route.

Increasing a net's criticality forces place-and-route to keep instances connected to the net as close as possible, at the cost of other (less critical) nets.

```
reset_net_critical [netname]+
```

Arguments

netname

Specifies the name of the net to be reset to the default critical value. You must specify at least one net name. You can use the following wildcard characters in net names:

Wildcard	What it does
\	Interprets the next character as a non-special character
?	Matches any single character
*	Matches any string
[]	Matches any single character among those listed between brackets (that is, [A-Z] matches any single character in the A-to-Z range)

Supported Families

Axcelerator

Notes

None

Exceptions

None

Examples

This example resets the net preset_a to the default criticality of 5:

```
reset_net_critical preset_a
```

See Also

[set_net_critical](#)

[PDC syntax conventions](#)

[PDC naming conventions](#)

set_io

The syntax and arguments for the **set_io** command vary depending on which device you are designing. Click the command next to the device name in the following list to see the syntax, arguments, and other information for the **set_io** command for that particular device:

[set_io \(ProASIC3E\)](#)

[set_io \(ProASIC3\)](#)

[set_io \(Axcelerator\)](#)

set_iobank

The syntax and arguments for the **set_iobank** command vary depending on which device you are designing. Click the command next to the device name in the following list to see the syntax, arguments, and other information for the **set_io** command for that particular device:

[set_iobank \(ProASIC3E\)](#)

[set_iobank \(ProASIC3\)](#)

[set_iobank \(Axcelerator\)](#)

set_location

Assigns the specified macro to a particular location on the chip.

```
set_location macro_name -fixed value x y
```

Arguments

macro_name

Specifies the name of the macro in the netlist to assign to a particular location on the chip.

-fixed *value*

Sets whether the location of this instance is fixed (that is, locked). Locked instances are not moved during layout. The default is yes. The following table shows the acceptable values for this argument:

Value	Description
yes	The location of this instance is locked.
no	The location of this instance is unlocked.

x *y*

The *x* and *y* coordinates specify where to place the macro on the chip. Use the ChipPlanner tool to determine the *x* and *y* coordinates of the location.

Supported Families

ProASIC3/E and Axcelerator

Notes

Use the post-compiled macro name when specifying the macro name.

Exceptions

None

Examples

This example assigns and locks the macro with the name "mem_data_in\[57\]" at the location x=7, y=2:

```
set_iobank mem_data_in\[57\] -fixed no 7 2
```

See Also

[set_multitile_location](#)

[PDC syntax conventions](#)

[PDC naming conventions](#)

set_multitile_location (ProASIC3/E)

Assigns specified two-tile and four-tile macros to specified locations on the chip. Use this command only for multi-tile, flip-flop macros and, in some cases, enable flip-flop macros).

```
set_multitile_location macro_name [-fixed value] \  
-location {x y} \  
-tile {name1 relative_x1 relative_y1} \  
-tile {name2 relative_x2 relative_y2} \  
[-tile {name3 relative_x3 relative_y3} \  
[-tile {name4 relative_x4 relative_y4} \  
]
```

Arguments

macro_name

Specifies the hierarchical name of the macro in the netlist to assign to a particular location on the chip.

-fixed *value*

Sets whether the location of this set of macros is fixed (that is, locked). Locked macros are not moved during layout. The default is yes. The following table shows the acceptable values for this argument:

Value	Description
yes	The location of this instance is locked.
no	The location of this instance is unlocked.

-location {*x y*}

The x and y coordinates specify the absolute placement of the macro on the chip. You can use the ChipPlanner tool to determine the x and y coordinates of the location.

```
-tile {name1 relative_x1 relative_y1}
```

Specifies the hierarchical name and location, relative to the macro specified as the *macro_name*, of the first tile in a two- or four-tile macro. The relative placement of macro *name1* inside the macro cannot be offset by more than one. (See Notes below for placement rules.) If the macro uses four-tile macros, then you must define all four tiles. Likewise, if the macro uses two-tile macros, you must define both tiles.

You can place the following two-tile and four-tile macros with the `set_multitile_location` command:

Four-tile macro	DFN1P1C1	DFI1P1C1	DFN0P1C1	DFI0P1C1
Two-tile macro	DLN1P1C1	DLI1P1C1	DLN0P1C1	DLI0P1C1

Due to the ProASIC3/E architecture, if the CLR and PRE pins are NOT driven by a clock net (global, quadrant or local clock net), the enable flip-flop macros (shown below) are mapped to two-tile flip-flop macros. When CLR and PRE pins are not driven by a clock net, you must use the `set_multitile_location` command instead of the `set_location` command.

DFN1E1C0	DFN0E1C0	DFN1E0C0	DFN0E0C0	DFN1E1C1
DFN0E1C1	DFN1E0C1	DFN0E0C1	DFN1E1P1	DFN0E1P1
DFN1E0P1	DFN0E0P1	DFN1E1P0	DFN0E1P0	DFN1E0P0
DFN0E0P0	DFI1E1C1	DFI0E1C1	DFI1E0C1	DFI0E0C1
DFI1E1C0	DFI0E1C0	DFI1E0C0	DFI0E0C0	DFI1E1P1
DFI0E1P1	DFI1E0P1	DFI0E0P1	DFI1E1P0	DFI0E1P0
DFI1E0P0	DFI0E0P0			

During compile, Designer maps the specified enable flip-flop macro to a two-tiled macro.

If the CLR and PRE pins are driven by a clock net, Designer maps these macros to one tile during compile. In this case, you cannot use the `set_multitile_location` command to place them. Instead, you must use the `set_location` command.

Supported Families

ProASIC3/E

Notes

For two-tile flip-flop macros, the software appends U0 and U1 to the macro name. For four-tile flip-flop macros, the software appends U0, U1, U2 and U3 to the macro name.

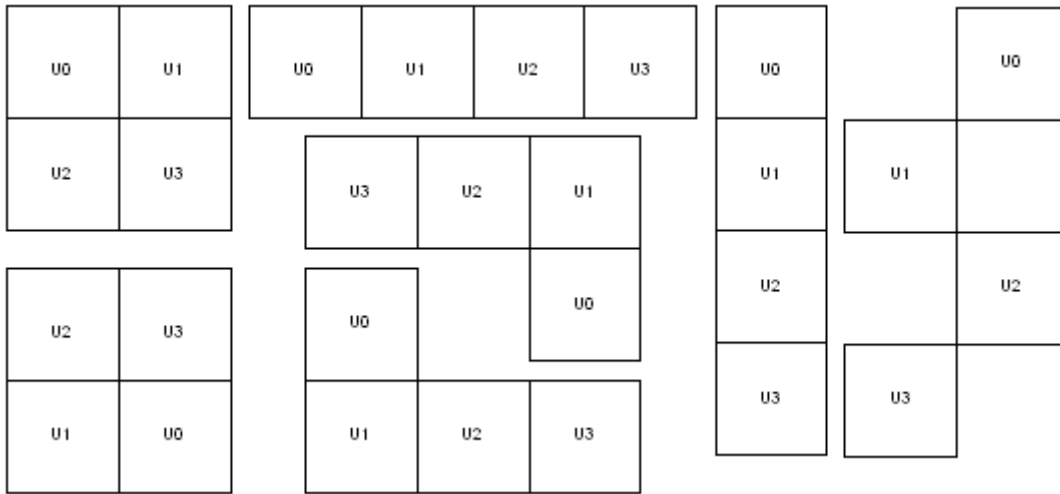
The macros specified in the `-tile` option cannot be offset by more than one.

To ensure efficiency, you must use local connections between certain tiles in the macros. The distance between U0 and U1, U1 and U2, and U2 and U3 must not be more than one in either direction (X or Y). The required local connection between tiles is denoted by the dashes below:

Four-tile macros: U0 --- U1 --- U2 --- U3

Two-tile macros: U0 --- U1

Examples of possible placement configurations:



Exceptions

None

Examples

This example assigns and locks the macro with instance name “multi_tileff/U0 “ at the location X=10, Y=10 by specifying the relative positions of all the macros.

```
set_multitile_location multi_tileff -location {10 10} \
    -tile { multi_tileff/U0 0 0 } \
    -tile { multi_tileff/U1 0 1 } \
    -tile { multi_tileff/U2 0 2 } \
    -tile { multi_tileff/U3 0 3 } -fixed yes
```

As a result of this command, the four-tile macro placement looks like this:

U3
10,13
U2
10,12
U1
10,11
U0
10,10

The second example shows you how to configure a two-tile macro:

```
set_multitile_location multi_tileff -location {10 10} \
```

```
-tile { multi_tileeff/U0 0 0 } \
-tile { multi_tileeff/U1 1 0 }
```

As a result of this command, the two-tile macro placement looks like this:

U0	U1
10,10	11,1

See Also

[set_location](#)

[PDC syntax conventions](#)

[PDC naming conventions](#)

set_net_critical

Sets the net criticality, which influences place-and-route in favor of performance.

```
set_net_critical criticality_number [hier_net_name]+
```

Arguments

criticality_number

Sets the criticality level from 1 to 10, with 1 being the least critical and 10 being the most critical. The default is 5. Criticality numbers are used in timing-driven place and route.

hier_net_name

Specifies the net name, which can be an AFL (Actel Flattened Netlist) net name or a net regular expression using wildcard characters. You must specify at least one net name. You can use the following wildcard characters in names:

Wildcard	What it does
\	Interprets the next character as a non-special character
?	Matches any single character
*	Matches any string
[]	Matches any single character among those listed between brackets (that is, [A-Z] matches any single character in the A-to-Z range)

Supported Families

Axcelerator

Notes

The command must have at least two parameters.

The net names are AFL names, which means they must be visible in Timer and ChipPlanner.

Increasing a net's criticality forces place-and-route to keep instances connected to the specified net as close as possible at the cost of other (less critical) nets.

Exceptions

None

Examples

This example sets the criticality level to 9 for all addr nets:

```
set_net_critical 9 addr*
```

See Also

[reset_net_critical](#)

[PDC syntax conventions](#)

[PDC naming conventions](#)

set_vref

Assigns a VREF pin to a bank. The ProASIC3E and Axcelerator families support VREF pins; however, the ProASIC3 family does not.

```
set_vref -bank [bankname] [pinnum]+
```

Arguments

-bank bankname

Specifies the name of the bank in which the VREF pin is located. For example, for ProASIC3E and Axcelerator devices, I/O banks are numbered 0-7. Therefore, their bank names are bank0, bank1, bank2, etc.

pinnum

Specifies the alphanumeric pin name of the VREF pin(s). You must specify at least one pin number.

Supported Families

ProASIC3E and Axcelerator

Notes

While the bank name is optional, you must not specify pin names that do not belong to the bank. Pins that do not belong to a bank that require a VREF are ignored.

Some I/O technologies need VREF settings. Some technologies may also need a minimum number of VREF pins for every certain number of input pins. These details are device dependent. Refer to the databook for your device for details. Designer can assign default VREF pins. However, the number of VREF pins Designer assigns may be too conservative, and you may not need as many VREF pins as the default assignment.

Exceptions

None

Examples

The following example assigns pins A1 and B10 from I/O bank1 as VREF pins:

```
set_vref -bank bank1 A1 B10
```

See Also

[set_vref_defaults](#)

[PDC syntax conventions](#)

[PDC naming conventions](#)

set_vref_defaults

Sets the default VREF pins for the specified bank. This command is ignored if the bank does not need a VREF pin.

```
set_vref_defaults bankname
```

Arguments

bankname

Specifies the name of the bank in which the default VREF pin is located. For ProASIC3E and Axcelerator devices, banks are numbered from 0-7. Therefore, their bank names are bank0, bank1, bank2, etc.

Supported Families

ProASIC3E and Axcelerator

Notes

The ProASIC3 family does not support VREF pins.

Some I/O technologies need VREF settings. Some technologies may also need a minimum number of VREF pins for every certain number of input pins. These details are device dependent. Refer to the databook for your device for details. Designer can assign default VREF pins. However, the number of VREF pins Designer assigns may be too conservative, and you may not need as many VREF pins as the default assignment.

Exceptions

None

Examples

This example sets the default VREF pins for Bank 1:

```
set_vref_defaults bank1
```

See Also

[set_vref](#)

[PDC syntax conventions](#)

[PDC naming conventions](#)

unassign_global_clock

Demotes clock nets to regular nets.

```
unassign_global_clock -net netname
```

Arguments

`-net netname`

Specifies the name of the clock net to demote to a regular net.

Supported Families

ProASIC3/E

Notes

The `unassign_global_clock` command is not supported in auxiliary PDC files.

Exceptions

You cannot assign “essential” clock nets to regular nets. Clock nets that are driven by the following macros are “essential” global nets: CLKDLY, PLL, and CLKBIBUF.

Examples

```
unassign_global_clock -net globalReset
```

See Also

[assign_global_clock](#)

[PDC_syntax_conventions](#)

[PDC_naming_conventions](#)

unassign_local_clock

Unassigns the specified user-defined net from a LocalClock or QuadrantClock region.

```
unassign_local_clock -net netname
```

Arguments

`-net netname`

Specifies the name of the user-defined net to unassign.

Supported Families

ProASIC3/E and Axcelerator

Notes

You can create QuadrantClocks only for ProASIC3E and ProASIC3 devices.

The `unassign_local_clock` command is not supported in auxiliary PDC files.

Exceptions

None

Examples

```
unassign_local_clock -net reset_n
```

See Also

`assign_local_clock` (Axcelerator)

`assign_local_clock` (ProASIC3/E)

[PDC syntax conventions](#)

[PDC naming conventions](#)

unassign_macro_from_region

Specifies the name of the macro to be unassigned.

```
unassign_macro_from_region [region_name] macro_name
```

Arguments

region_name

Specifies the region where the macro or macros are to be removed.

macro_name

Specifies the macro to be unassigned from the region. Macro names are case sensitive. You cannot use hierarchical net names from ADL. However, you can use the following wildcard characters in macro names:

Wildcard	What it does
\	Interprets the next character as a non-special character
?	Matches any single character
*	Matches any string
[]	Matches any single character among those listed between brackets (that is, [A-Z] matches any single character in the A-to-Z range)

Supported Families

ProASIC3/E and Axcelerator

Notes

None

Exceptions

If the macro was not previously assigned, an error message is generated.

Examples

```
unassign_macro_from_region macro21
```

See Also

[PDC syntax conventions](#)

[PDC naming conventions](#)

unassign_net_macro

Unassigns macros connected to a specified net.

```
unassign_net_macro region_name [net1]+
```

Arguments

region_name

Specifies the name of the region containing the macros in the net(s) to unassign.

net1

Specifies the name of the net(s) that contain the macros to unassign from the specified region. You must specify at least one net name. Optionally, you can specify additional nets to unassign.

Supported Families

ProASIC3/E and Axcelerator

Notes

None

Exceptions

If the region is currently not assigned, an error message appears in the Log window if you try to unassign it.

Examples

```
unassign_net_macro cluster_region1 keyinlintZ0Z_62
```

See Also

[assign_net_macros](#)

[PDC syntax conventions](#)

[PDC naming conventions](#)

undefine_region

Removes the specified region.

```
undefine_region region_name
```

Arguments

region_name

Specifies the region to be removed.

Supported Families

ProASIC3/E and Axcelerator

Notes

All macros assigned to the region are unassigned.

Exceptions

To use this command, the region must have been previously defined.

Examples

```
undefine_region cluster_region1
```

See Also

[define_region \(rectangular region\)](#)

[define_region \(rectilinear region\)](#)

[PDC syntax conventions](#)

[PDC naming conventions](#)

Design Object Access Commands

Design object access commands are SDC commands. Most constraint commands require a command argument. Designer supports the SDC access commands shown below:

Design Object	Access Command
Clock	get_clocks
Port	get_ports
Input ports	all_inputs
Output ports	all_outputs
Pin	get_pins

get_clocks

Returns the named clock specified by an argument.

Syntax

```
get_clocks <pattern>
```

Argument

`pattern`

Specifies the pattern to match to the Timer potential clock names (port or pin names in the design).

If this command is used as a `-from` argument in `max delay` ([set_max_path_delay](#)), `false path` ([set_false_path](#)), and `multicycle constraints` ([set_multicycle_path](#)), the clock pins of all the registers related to this clock are used as path start points.

If this command is used as a `-to` argument in `max delay` ([set_max_path_delay](#)), `false path` ([set_false_path](#)), and `multicycle constraints` ([set_multicycle_path](#)), the synchronous pins of all the registers related to this clock are used as path endpoints.

Example

```
set_max_delay -from [get_ports data1] -to \
[get_clocks ck1]
```

get_pins

Returns the named pins specified by an argument.

Syntax

```
get_pins <pattern>
```

Argument

`pattern`

Specifies the pattern to match the pins.

Example

```
create_clock -period 10 [get_pins clock_gen/reg2:Q]
```

get_ports

Returns the named ports specified by an argument.

Syntax

```
get_ports <pattern>
```

Argument

`pattern`

Specifies the pattern to match the ports. This is equivalent to the macros `$in()[<pattern>]` when used as `-from` argument and `$out()[<pattern>]` when used as `-to` argument or `$ports()[<pattern>]` when used as a `-through` argument.

Example

```
create_clock -period 10 [get_ports CK1]
```

all_inputs

Returns all the input or inout ports of the design.

Syntax

```
all_inputs
```

Argument

None.

Example

```
set_max_delay -from [all_inputs] -to [get_clocks clk]
```

all_outputs

Returns all the output or inout ports of the design.

Syntax

```
all_outputs
```

Argument

None.

Example

```
set_max_delay -from [all_inputs] -to [all_outputs]
```

create_clock (SDC clock constraint)

The `create_clock` constraint is associated with a specific clock in a sequential design and determines the maximum register-to-register delay in the design.

Supported Families

SX-A, eX, RTAX-S, Axcelerator, RTAX-S, ProASIC^{PLUS} and ProASIC3/E

Syntax

```
create_clock -period period_value [-waveform edge_list] source
```

Arguments

`period_value`

Mandatory argument specified in ns. No clock is created if the period is not supplied.

`edge_list`

This is optional and is supported as a duty cycle in the current version of Designer. If supplied, it must contain exactly two edges. The duty cycle info will then be added to the clock constraint.

`source`

Mandatory argument that specifies the source of the clock:

a single design port name; for instance `clk`

a single pin name; for instance `reg1:CLK`. This name can be hierarchical (for instance `toplevel/block1/reg2:CLK`)

a list of one name in curly brackets (either port or pin); for instance: `{A}` or `{toplevel/pll:clk1}`

an object accessor that will refer to one pin/port name for instance: `[get_ports {clk}]` or `[get_pins reg:CLK]`

Note: No wildcard is accepted. The pin or port must exist in the design.

Valid Command Examples

```
create_clock -period 5 CK1
create_clock -period 4 -waveform {0 2} CK1
create_clock -period 6 [get_ports {CK1}]
```

Invalid Command Examples

```
create_clock -period 10
```

This command is invalid because there is no name supplied.

```
create_clock -period 3 [get_ports {CK1 CK2}]
```

This command is invalid because more than one name is used for the source.

```
create_clock -period 11 -waveform {0 2 5 7} CK1
```

This command is invalid because the supplied waveform has more than two edges.

```
create_clock CLK1 -period 20 -waveform 3 13
```

This command is invalid because this syntax of waveform is invalid.

set_false_path (SDC false path constraint)

The `set_false_path` constraint identifies paths in the design that are to be marked as false, so that they are not considered during timing analysis.

Supported Families

SX-A, eX, RTSX-S, Axcelerator, RTAX-S, ProASIC^{PLUS}, and ProASIC3/E

Syntax

```
set_false_path -through through_point
```

Argument

`through_point`

Specifies a pin or port through which the disabled paths must pass.

a single design port name or pin name; for instance `clk` or `toplevel/block1/inst1:A`

a list of one name in curly brackets (either port or pin); for instance: `{A}` or `{U0:D}`

an object accessor that will refer to one name; for instance: `[get_ports {d}]` or `[get_pins S:Y]`

Valid Command Examples

```
set_false_path -through U0/U1:Y
set_false_path -through {Data2}
set_false_path -through [get_pins {U1/S:Y}]
```

Invalid Command Examples

```
set_false_path
```

This is invalid because there is no argument supplied.

set_load (SDC load constraint)

Sets the capacitance to a specified value on a specified port.

Supported Families

SX-A, eX, RTSX-S, Axcelerator, RTAX-S, ProASIC3, and ProASIC3E

Syntax

```
set_load load_value port
```

Arguments

Note: All arguments are mandatory.

`load_value`

Specifies the capacitance value. The *load_value* is an integer. There is no default value.

`port`

Specifies the port in the design on which the capacitance is to be set.

a single design output port name; for instance `o1`

a list of one output port name in curly brackets; for instance: `{Out}`

an object accessor that will refer to one output port name for instance: `[get_ports{ex}]`

Note: Wildcards are not allowed.

Valid Command Examples

```
set_load 35 out_p
```

```
set_load 40 {O1}
```

```
set_load 25 [get_ports out]
```

Invalid Command Examples

```
set_load 30
```

This is invalid because there is no port supplied.

set_max_delay (SDC max path constraint)

The `set_max_delay` constraint sets the path delay between the specified ports to a restricted value.

Supported Families

SX-A, eX, RTSX-S, ProASIC^{PLUS} (APA), Axcelerator, RTAX-S, and ProASIC3/E

Syntax

```
set_max_delay delay_value -from from_list -to to_list
```

Arguments

`delay_value`

Mandatory argument. The unit is ns. There is no default value. A negative or null value is not allowed.

`from_list`

Mandatory collection of start point names: primary input or inout port, clock pins of registers:

a single pin/port name; for instance `reg1:CLK`

a list of pins/ports enclosed in curly brackets; for instance `{A}` or `{toplevel/pll:clk1 toplevel/pll:clk2}`

an object accessor: for instance `[get_ports {A B}]` or `[get_pins reg:CLK]`

Note: Wildcards are accepted.

`to_list`

Mandatory collection of end point names: primary output or inout port, synchronous pins of registers:

a single pin/port name; for instance `reg2:D`

a list of pins/ports enclosed in curly brackets; for instance `{O*}` or `{out1 out2}`

an object accessor: for instance `[get_ports {ex}]` or `[get_pins reg*:D]`

Note: Wildcards are accepted.

Valid Command Examples

```
set_max_delay 9 -from [get_pins reg1:CLK] -to [get_ports {out1 out2}]
```

```
set_max_delay 7.5 -from {reg2:CLK} -to [all_outputs]
```

```
set_max_delay 3.0 -from [get_ports {Data}] -to out
```

```
set_max_delay 2.7 -from {A B} -to [get_pins {reg2*}]
```

```
set_max_delay 0.5 -from [get_ports {C*}] -to [get_clocks {clk1 clk2}]
```

Invalid Command Example

```
set_max_delay -from [get_ports {IN10 IN11}]
```

This is invalid because the `to_list` and `delay_value` are not supplied.

set_multicycle_path (SDC multiple cycle path constraint)

Defines a path that takes multiple clock cycles.

Supported Families

ProASIC^{PLUS}, Axcelerator, RTAX-S, and ProASIC3/E

Syntax

```
set_multicycle_path path_multiplier [-from from_list] [-to to_list]
```

Arguments

`path_multiplier`

Mandatory integer that specifies the number of cycles the data path must have for setup and hold, relative to the startpoint clock before data is required at the endpoint.

`from_list`

Specifies a list of timing path startpoint names: primary input or inout port, clock pins of registers:

a single pin/port name; for instance reg1:CLK

a list of pins/ports enclosed in curly brackets; for instance {A} or {toplevel/pll:clk1 toplevel/pll:clk2}

an object accessor: for instance [get_ports {A B}] or [get_pins reg:CLK]

Note: Wildcards are accepted.

to_list

Specifies a list of timing path endpoint names: primary output or inout port, synchronous pins of registers:

a single pin/port name; for instance reg2:D

a list of pins/ports enclosed in curly brackets; for instance {O*} or {out1 out2}

an object accessor: for instance [get_ports {ex}] or [get_pins reg*:D]

Note: Wildcards are accepted.

Valid Command Examples

```
set_multicycle_path 2 -from [get_ports {reg1*}] \  
-to {reg2:D}  
set_multicycle_path 2 -from {reg:CLK}  
set_multicycle_path 2 -to [get_ports {o1 o2}]  
set_multicycle_path 3 -from data1 -to [get_pins {reg1*}]  
set_multicycle_path 2 -from {reg1:CLK} -to [get_clocks {clk}]
```

Invalid Command Examples

```
set_multicycle_path -from [get_ports {IN0 IN1}]
```

This is invalid because the path multiplier is not supplied.

SDC Command Limitations

Not all object and design constraint commands are supported in Designer. There are limitations on SDC support. Refer to the latest Designer series Release Notes for the latest supported Object Access, Design Constraints, and Supported Features.

Naming Conventions

You can use * in the object names except for the clocks ([create_clock \(SDC clock constraint\)](#)) and load ([set_load \(SDC load constraint\)](#)).

For ProASIC^{PLUS} and ProASIC3/E families: Some special characters are not allowed in the Actel internal netlists. In case the user netlist contains object names with such characters and constraints are set on these, the tool does a mapping between user and internal object names. The Timer GUI displays the internal netlist object names, although these could be different from the object names in the SDC file. Timer applies the correct constraints on these object names.

Multiple Files

When you import SDC as a source file, you can specify multiple SDC files in the **File > Import Source Files** dialog box.

When you import SDC as auxiliary file, you can specify only one file in the **File > Import Auxiliary Files** dialog box.

global_clocks

The GLOBAL_CLOCKS section is used to describe the clock waveforms from the global clock distribution networks. Local clocks, such as gated clocks, are not directly supported. The clock waveforms are used to generate automatically the timing constraints of the paths between two sequential elements. To allow more user control when clocks interact, there are provisions to specify the clock period transitions, which should be considered. By default, the closest transitions are used when two clocks interact. The clock waveform specification has the following format:

```
WAVEFORM clkname RISE value FALL value PERIOD value [EXCEPT SOURCE {sequential list }| EXCEPT SINK{sequential list}].
```

clkname is the name of the macro driving the clock network.

RISE/FALL/PERIOD can be specified as either an integer or a floating point number followed by an unit selected from {NS, US, PS}. The default time unit is 0.1ns.

EXCEPT {SOURCE|SINK} {list of sequential elements} is the list of sequential elements which should not be included as endpoints in the automatically generated paths involving sequential elements.

The MULTICLOCK specification is used to specify which clock periods should be considered during the generation of the path constraints involving sequential elements. The default specification is to consider only the closest clock periods of the SOURCE and DESTINATION clocks. This specification has the following syntax:

```
MULTICYCLE SOURCE clkA CYCLE value EXCEPT {seqlist}; DESTINATION clkB CYCLE value EXCEPT {seqlist}.
MULTICYCLE SOURCE clkA CYCLE value EXCEPT {seqlist}.
```

clkA/clkB is the name of the macro driving the clock network.

EXCEPT {seqlist}: By default all sequential elements clocked by the clock driver are included. The EXCEPT seqlist is a list of all the sequential elements or specific pins to be excluded.

CYCLE value. By default, the closest transitions are considered. CYCLE provides the ability to use transitions from one or more clock periods past the closest transition. CYCLE zero indicates the closest transitions. CYCLE one skips the closest set of transitions and uses the next set of transitions. The term cycle is used to avoid confusion with the term period in the clock waveform specification. This allows you to specify a cycling-stealing clocking regime.

max_delays/min_delays

The sections MAX_DELAYS and MIN_DELAYS use the following format:

```
DELAY value timeunit; SOURCE {source_name_list} [EXCEPT {source_name_list}]; SINK {sink_name_list} [EXCEPT {sink_name_list}]; [STOP {stop_name_list}]; [PASS {bypass_name_list}].
```

value can be specified as an integer.

timeunit allows {PS, NS, US}.

source_name_list is a list of signal sources. It can be one of the following: a macro output pin, macro name, or primary input.

sink_name_list is a list of signal destinations. It can be a name of a macro or a primary output.

EXCEPT allows you to exclude certain sources or sinks from consideration.

stop_name_list is the list of pin names through which further propagation of signals will not be considered. This allows you to eliminate certain paths from consideration.

bypass_name_list is the list of latches which are allowed to be intermediate path points. By default, latches are considered to be sinks or path terminals.

INPAD/OUTPAD/GATED are valid values for any of the lists, such as source_name_list or stop_name_list.

Normally there is no need to specify any timing requirements from any source to any sink clocked by an external global clock. This timing requirement can be generated automatically from the GLOBAL_CLOCK specifications and the sequential elements setup and hold times. For example, the timing constraint from a primary input to a sequential element can be derived from the sequential elements clocking waveform and the signal arrival time of the primary input.

A problem exists when two different internally-generated clock signals interact. This is due to the unpredictable and unknown skew between the two clock networks because of the routing delays from:

```
PAD >> internalMacro >> CLKINT
```

where CLKINT is the input pin of the global clock distribution network. The automatically generated path constraints will not incorporate the skew between the two clocks. In such cases, the path constraints should be expressed explicitly using the MAX/MIN_DELAYS section.

NOTE: The most stringent timing constraint dominates. Hence, all general constraints should be looser than the specific constraints. For example, in the following example, the 26.0ns constraint dominates the 42.0ns constraint:

```
DELAY 42.0 ns SOURCE INPAD SINK OUTPAD.
DELAY 26.0 ns SOURCE {$1I23:Q $1I24:Q} SINK {ack_0}.
```

If the general constraint is tighter than the specific constraint, the specific constraint will effectively become a no-operation. In the following example, the looser constraint of 42.0ns has no effect since the general constraint of 26.0ns dominates.

```
DELAY 26.0 ns SOURCE INPAD SINK OUTPAD.
DELAY 42.0 ns SOURCE {$1I23:Q $1I24:Q} SINK {ack_0}.
```

This implies that a specific path or paths which has (have) looser timing constraints must be explicitly excluded using the EXCEPT syntax. This is especially important for the path constraints generated automatically from the global clock specification. For example, the ENABLE signal for a flip-flop is sometimes allowed to be much slower than the DATA signal. The constraint associated with the DATA signal can be inferred from the global clocking specification; however, in order for a looser constraint to be associated with the ENABLE signal, the ENABLE input pin must appear in the appropriate EXCEPT list in the GLOBAL_CLOCK section.

The section MAX_DELAYS can be empty if there are no purely combinatorial paths from external sources to external sinks, and if every sequential element in the design is clocked by an external global clock. In this case, the timing constraints are generated automatically using the information in the GLOBAL_CLOCK section. Likewise, the MIN_DELAYS section can be empty.

One final word about external/internal sinks and sources with regard to the flip-flops and/or latches in the IOs: these flip-flops act as internal, not external, sources/sinks.

io_arrival_times

The section IO_ARRIVAL_TIMES uses the following format:

```
[early_arrival_time:] late_arrival_time timeunit {source_io_list} EXCEPT {source_io_list}.
```

{early, late}_arrival_time is signal arrival time relative to the reference time.

source_io_list is an INPAD or primary input pin.

Note that the section IO_ARRIVAL_TIMES can be empty. For example,

```
SECTION IO_ARRIVAL_TIMES.
END.
```

is entirely equivalent to

```
SECTION IO_ARRIVAL_TIMES.
0 0 {INPAD}.
```


END

global_stops

The GLOBAL_STOPS section is used to disable dont care/false paths by preventing the specified pins from being used in ANY timingcritical paths. Any path involving pins that appear in this section should be removed from consideration.

pin_loads

The PIN_LOADS section is used to specify the capacitance loading and logic (TTL/CMOS) at a package pin. The default logic family is TTL. The format is:

```
capValue capUnit [TTL/CMOS]{[macList|pinList]} [EXCEPT {}].
```

I/O Attributes Reference (alphabetical order)

I/O Attributes by Family

Other than the four common attributes supported by all device families, the following table includes the attributes that each Actel device family supports.

Attribute	Family								
	ProASIC3E	ProASIC3	ProASIC PLUS	Axcelerator	ProASIC	SX-A	SX	eX	MX
Bank Name	X	X		X					
I/O Standard	X	X	X	X	X	X	X	X	X
I/O Threshold						X	X	X	X
Output Drive	X	X		X					
Slew	X	X				X	X	X	X
Power Up State						X	X	X	X
Resistor Pull	X	X		X		X			
Schmitt Trigger	X								
Input Delay	X			X					
Skew	X	X							
Output Load	X	X	X	X	X	X	X	X	X
Use Register	X	X		X					
Hot Swappable	X	X		X				X	

Refer to the appropriate datasheet for information about I/O standards for different families.

Bank Name

Purpose: Displays the name of the bank to which the I/O macro has been assigned. You cannot change the bank name.

Families	Supported
ProASIC3E	Yes
ProASIC3	Yes
ProASIC ^{PLUS}	No
Axcelerator	Yes
ProASIC	No
SX-A	No
SX	No
eX	No
MX	No

Hot Swappable

The I/O standard specified and the selected voltage determine this **read-only** attribute.

Purpose: Indicates whether the I/O pin is hot swappable.

Families	Supported
ProASIC3E	Yes
ProASIC3	No
ProASIC PLUS	No
Axcelerator	Yes
ProASIC	No
SX-A	Yes
SX	No
eX	Yes
MX	No

Values:

If checked or ON (all standards except PCI and PCIX), a clamp diode is NOT included to allow proper hot-swap behavior. If not checked or OFF (PCI and PCIX only), the clamp diode is included as required by those specifications, but the I/O is NOT hot swappable.

Input Delay

Purpose: Indicates whether the input path delay elements are to be programmed. If they will be programmed, this option adds the specified input delay to the input path.

Families	Supported
ProASIC3E	Yes

ProASIC3	No
ProASIC PLUS	No
Axcelerator	Yes
ProASIC	No
SX-A	No
SX	No
eX	No
MX	No

Values: Use this attribute to turn the input delay on or off.

Default value: The default value is off.

For ProASIC3E devices, you specify the input delay per pin. You will see the actual delay only in Timer or in the SDF file.

Note: The actual input delay is a function of the operating conditions and is automatically computed by the delay extractor when a timing report is generated.

For Axcelerator devices, you specify the input delay per bank. You then set its input delay with the slider in the Other I/O Bank Attributes dialog box. Possible values are 0 to 31.

PDC command for setting this attribute: `-set_io in_delay` (See the `set_io` command for Axcelerator and for ProASIC3E in the PDC Command Reference section of the Designer User's Guide.)

I/O Standard

Purpose: Use the I/O standard attribute to assign an I/O standard to an I/O macro.

Families	Supported
ProASIC3E	Yes
ProASIC3	Yes
ProASIC PLUS	Yes
Axcelerator	Yes
ProASIC	Yes
SX-A	Yes
SX	No
eX	No
MX	No

Note: Voltage referenced I/O inputs require an input referenced voltage (VREF). You must assign VREF pins to Axcelerator and ProASIC3E devices before running Layout.

The ProASIC3E, ProASIC3, and Axcelerator devices support multiple I/O standards (with different I/O voltages) in a single die. You can use I/O Attribute Editor to set I/O standards and attributes, or alternatively you can export and import this information using a PDC file.

Not all devices support all I/O standards. The following table shows you which I/O standards are supported by each device.

I/O Standard	ProASIC3E	ProASIC3	ProASIC PLUS	Axcelerator	ProASIC	SX-A

Designer User's Guide

CMOS	X					X
CUSTOM	X					X
GTL+	X			X		
GTL 3.3V	X			X		
GTL 2.5V	X			X		
HSTL Class I	X			X		
HSTL Class II	X					
LVCMOS 3.3V	X	X				
LVCMOS 2.5V	X		X	X	X	
LVCMOS 2.5V/5.0V	X	X				
LVCMOS 1.8V	X	X		X		
LVCMOS 1.5V	X	X	X	X	X	
LVDS	X	X		X		
LVPECL	X	X	X*	X		
LVTTTL/TTL	X	X	X	X	X	
PCI	X	X	X	X	X	
PCI-X 3.3V	X	X		X		
SSTL2 Class I and II	X			X		
SSTL3 Class I and II	X			X		

*Supported only on dedicated LVPECL I/Os.

Note: For a list of I/O standards for all other families, refer to the datasheet for your specific device.

Descriptions

Following are brief descriptions of the I/O standard attributes in the table above:

CMOS (Complementary Metal-Oxide-Semiconductor)

An advanced integrated circuit (IC) manufacturing process technology for logic and memory, characterized by high integration, low cost, low power, and high performance. CMOS logic uses a combination of p-type and n-type metal-oxide-semiconductor field effect transistors (MOSFETs) to implement logic gates and other digital circuits found in computers, telecommunications, and signal processing equipment.

CUSTOM

An option in the I/O Attribute Editor that enables you to customize individual I/O settings such as the I/O threshold, output slew rates, and capacitive loadings on an individual I/O basis. For example, PCI mode output can be set to low-slew rate. For more information, go to the Actel web site and check the datasheet for your device.

GTL 2.5V (Gunning Transceiver Logic 2.5 Volts)

A low-power standard (JESD 8.3) for electrical signals used in CMOS circuits that allows for low electromagnetic interference at high speeds of transfer. It has a voltage swing between 0.4 volts and 1.2 volts, and typically operates at speeds of between 20 and 40MHz. The VCCI must be connected to 2.5 volts.

GTL 3.3V (Gunning Transceiver Logic 3.3 Volts)

Same as GTL 2.5V above, except the VCCI must be connected to 3.3 volts.

GTL+ (Gunning Transceiver Logic Plus)

An enhanced version of GTL that has defined slew rates and higher voltage levels. It requires a differential amplifier input buffer and an open-drain output buffer. Even though output is open-drain, the VCCI must be connected to either 2.5 volts or 3.3 volts for Accelerator, ProASIC3, and ProASIC3E device support.

HSTL Class I and II (High-Speed Transceiver Logic)

A general-purpose, high-speed 1.5V bus standard (EIA/JESD 8-6) for signalling between integrated circuits. The signalling range is 0 V to 1.5V, and signals can be either single-ended or differential. HSTL requires a differential amplifier input buffer and a push-pull output buffer. It has four classes, of which Actel supports Class I and II. These classes are defined by standard EIA/JESD 8-6 from the Electronic Industries Alliance (EIA):

Class I (unterminated or symmetrically parallel terminated)

Class II (series terminated)

Class III (asymmetrically parallel terminated)

Class IV (asymmetrically double parallel terminated)

LVCMOS 3.3V (Low-Voltage CMOS for 3.3 Volts)

An extension of the LVCMOS standard (JESD 8-5) used for general-purpose 3.3V applications.

LVCMOS 2.5V (Low-Voltage CMOS for 2.5 Volts)

An extension of the LVCMOS standard (JESD 8-5) used for general-purpose 2.5V applications.

LVCMOS 2.5V/5.5V (Low-Voltage CMOS for 2.5 and 5.0 Volts)

An extension of the LVCMOS standard (JESD 8-5) used for general-purpose 2.5V and 5.0V applications.

LVCMOS 1.8V (Low-Voltage CMOS for 1.8 Volts)

An extension of the LVCMOS standard (JESD 8-5) used for general-purpose 1.8V applications. It uses a 3.3V-tolerant CMOS input buffer and a push-pull output buffer.

LVCMOS 1.5V (Low-Voltage CMOS for 1.5 volts)

An extension of the LVCMOS standard (JESD 8-5) used for general-purpose 1.5V applications. It uses a 3.3V-tolerant CMOS input buffer and a push-pull output buffer.

LVDS (Low-Voltage Differential Signal)

A moderate-speed differential signalling system, in which the transmitter generates two different voltages which are compared at the receiver. It requires that one data bit be carried through two signal lines; therefore, you need two pins per input or output. It also requires an external resistor termination. The voltage swing between these two signal lines is approximately 350mV (millivolts). Accelerator devices contain dedicated circuitry supporting a high-speed LVDS standard that has its own user specification.

LVPECL (Low-Voltage Positive Emitter Coupled Logic)

PECL is another differential I/O standard. It requires that one data bit is carried through two signal lines; therefore, two pins are needed per input or output. It also requires an external resistor termination. The voltage swing between these two signal lines is approximately 850mV. When the power supply is +3.3V, it is commonly referred to as low-voltage PECL (LVPECL).

LVTTL/TTL (Low-Voltage Transistor-Transistor Level)

A general purpose standard (EIA/JESDSA) for 3.3V applications. It uses an LVTTL input buffer and a push-pull output buffer.

PCI (Peripheral Component Interface)

A computer bus for attaching peripheral devices to a computer motherboard in a local bus. This standard supports both 33 MHz and 66 MHz PCI bus applications. It uses an LVTTL input buffer and a push-pull output buffer. With the aid of an external resistor, this I/O standard can be 5V-compliant for most families, excluding ProASIC3/E families.

PCI-X (Peripheral Component Interface Extended)

An enhanced version of the PCI specification that can support higher average bandwidth; it increases the speed that data can move within a computer from 66 MHz to 133 MHz. PCI-X is backward-compatible, which means that devices can operate at conventional PCI frequencies (33 MHz and 66 MHz). PCI-X is also more fault-tolerant than PCI.

SSTL2 Class I and II (Stub Series Terminated Logic 2.5V)

A general-purpose 2.5V memory bus standard (JESD 8-9) for driving transmission lines. This standard was designed specifically for driving the DDR (double-data-rate) SDRAM modules used in computer memory. It requires a differential amplifier input buffer and a push-pull output buffer. It has two classes, of which Actel supports both.

SSTL3 Class I and II (Stub Series Terminated Logic for 3.3V)

A general-purpose 3.3V memory bus standard (JESD 8-8) for driving transmission lines.

PDC command for setting this attribute: `-set_io` (See the `set_io` command for ProASIC3E, ProASIC3, or Axcelerator in the PDC Command Reference section of the Designer User's Guide.)

I/O Threshold

Purpose: Indicates the compatible threshold level for inputs and outputs.

Families	Supported
ProASIC3E	No
ProASIC3	No
ProASIC PLUS	No
Axcelerator	No
ProASIC	No
SX-A	Yes
SX	Yes
eX	Yes
MX	Yes

Values: Use this attribute to set the compatible threshold level for inputs and outputs. Your options are CMOS, LVTTL, or PCI.

Default value: The default I/O threshold displayed is based upon the I/O standard. If you want to set the I/O threshold independently of the I/O specification, you must select CUSTOM in the I/O standard cell.

Locked

Purpose: Indicates whether you can change the current pin assignment during layout.

Families	Supported
----------	-----------

ProASIC3E	Yes
ProASIC3	Yes
ProASIC ^{PLUS}	Yes
Axcelerator	Yes
ProASIC	Yes
SX-A	Yes
SX	Yes
eX	Yes
MX	Yes

Values: Use this attribute to lock or unlock the pin assignment. Selecting the check box locks the pin assignment. Clearing the check box unlocks the pin assignment. If locked, you cannot change the pin assignment. If not locked, you can.

PDC command for setting this attribute: `-set_io -fixed` (See the `set_io` command for ProASIC3E, ProASIC3, or Axcelerator in the PDC Command Reference section of the Designer User's Guide.)

Macro Cell

Purpose: Indicates the type of I/O macro. This value is read only and is applicable only to the I/O Attribute Editor (that is, you cannot use it in GCF or PDC files).

Families	Supported
ProASIC3E	Yes
ProASIC3	Yes
ProASIC ^{PLUS}	Yes
Axcelerator	Yes
ProASIC	Yes
SX-A	Yes
SX	Yes
eX	Yes
MX	Yes

Output Drive

Purpose: Every I/O standard has an output drive preset; however, for some I/O standards, you can choose which one to use. The higher the drive, the faster the I/O. The faster the I/O, the more power consumed by the I/O.

Families	Supported
ProASIC3E	Yes
ProASIC3	Yes
ProASIC ^{PLUS}	No
Axcelerator	Yes
ProASIC	No
SX-A	No
SX	No
eX	No
MX	No

Values: Use this attribute to set the strength of the output buffer to between 2 and 24 mA, weakest to strongest, depending on your device family. The LVTTTL output buffer has four programmable settings of its drive strength. Other I/O standards have full strength.

The list of I/O standards for which you can change the output drive and the list of values you can assign for each I/O standard is family-specific. Refer to the datasheet for your device for more information.

PDC command for setting this attribute: `-set_io -out_drive` (See the `set_io` command for ProASIC3E, ProASIC3, or Axcelerator in the PDC Command Reference section of the Designer User's Guide.)

Output Load or Loading (pf)

Note: In MVN tools, the column heading for this attribute is "Output load." In non-MVN tools, the column heading for this attribute is "Loading (pf)."

Purpose: Indicates the output-capacitance value based on the I/O standard selected in the I/O Standard cell. This option is not available in ACTgen.

Families	Supported
ProASIC3E	Yes
ProASIC3	Yes
ProASIC ^{PLUS}	Yes
Axcelerator	Yes
ProASIC	Yes
SX-A	Yes
SX	Yes
eX	Yes
MX	Yes

Values: You can enter a capacitive load as an integral number of picofarads. 35pF is the default.

Default value: The default value is based upon the I/O specification set in the I/O Standard cell. If necessary, you can change the output capacitance default setting to improve timing definition and analysis. Both the capacitive loading on the board and the Vil/Vih trip points of driven devices affect output-propagation delay.

Timer, Timing-Driven Layout, Timing Report, and Back-Annotation automatically uses the modified delay model for delay calculations.

PDC command for setting this attribute: `-set_io -out_load` (See the `set_io` command for ProASIC3E, ProASIC3, or Axcelerator in the PDC Command Reference section of the Designer User's Guide.)

Pin Number

Purpose: Use this attribute to change a pin assignment by choosing one of the legal values from the drop-down list. If the pin has been assigned, the pin number appears in this column. If it hasn't been assigned, "Unassigned" appears in this column.

Families	Supported
ProASIC3E	Yes
ProASIC3	Yes
ProASIC ^{PLUS}	Yes
Axcelerator	Yes
ProASIC	Yes
SX-A	Yes

SX	Yes
eX	Yes
MX	Yes

PDC command for setting this attribute: `-set_io -pinname` (See the `set_io` command for ProASIC3E, ProASIC3, or Axcelerator in the PDC Command Reference section of the Designer User's Guide.)

Port Name

Purpose: Indicates the port name of the I/O macro. This value is read only.

Families	Supported
ProASIC3E	Yes
ProASIC3	Yes
ProASIC ^{PLUS}	Yes
Axcelerator	Yes
ProASIC	Yes
SX-A	Yes
SX	Yes
eX	Yes
MX	Yes

Power-Up State

Purpose: Indicates the power-up state of the pin.

Families	Supported
ProASIC3E	No
ProASIC3	No
ProASIC ^{PLUS}	No
Axcelerator	No
ProASIC	No
SX-A	Yes
SX	Yes
eX	Yes
MX	Yes

Values: Use this attribute to set the power-up state. Your choices are None, High, and Low.

Default value: The default value is **None**.

Resistor Pull

Purpose: Allows inclusion of a weak resistor for either pull-up or pull-down of the input buffer.

Families	Supported
ProASIC3E	Yes
ProASIC3	Yes

ProASIC ^{PLUS}	No
Axcelerator	Yes
ProASIC	No
SX-A	Yes
SX	No
eX	No
MX	No

Values: Use this attribute to set the resistor pull. Your choices are None, Up (pull-up), or Down (pull-down).

Default value: The default value is **None** except when an I/O exists in the netlist as a port, is not connected to the core, and is configured as an output buffer. In that case, the default setting is for a weak pull-down.

PDC command for setting this attribute: `-set_io -res_pull` (See the `set_io` command for ProASIC3E, ProASIC3, or Axcelerator in the PDC Command Reference section of the Designer User's Guide.)

Schmitt Trigger

Purpose: A schmitt trigger is a buffer used to convert a slow or noisy input signal into a clean one before passing it to the FPGA. This is a simple, low-cost solution for a user working with low slew-rate signals. Using schmitt-trigger buffers guarantees a fast, noise-free, input signal to the FPGA.

Actel recommends that you use a schmitt trigger to buffer a signal if input slew rates fall below the values outlined in the specification for SX-A and RTSX-S devices. Depending on the application, different schmitt-trigger buffers can be used to fulfill the requirements.

Schmitt-trigger buffers are categorized in three configurations:

- Fixed threshold voltages with non-inverted outputs

- Fixed threshold voltages and inverted outputs

- Variable threshold voltages with non-inverted outputs

With the aid of schmitt-trigger buffers, low slew-rate applications can also be handled with ease. Implementation of these buffers is simple, not expensive, and flexible in that different configurations are possible depending on the application. The characteristics of schmitt-trigger buffers (e.g. threshold voltage) can be fixed or user-adjustable if required.

Families	Supported
ProASIC3E	Yes
ProASIC3	No
ProASIC ^{PLUS}	Yes*
Axcelerator	No
ProASIC	No
SX-A	No
SX	No
eX	No
MX	No

*Although ProASIC^{PLUS} supports the schmitt-trigger attribute, you cannot edit this attribute with the MultiView Navigator tools. Instead, it has to be instantiated in the schematic or the netlist.

Values: A schmitt trigger has two possible states: on or off. The trigger for this circuit to change states is the input voltage level. That is, the output state depends on the input level, and will change only as the input crosses a pre-defined threshold.

Default value: The default value is On.

For more information, please see the "Using Schmitt Triggers for Low Slew-Rate Input" Application Note on the Actel web site.

PDC command for setting this attribute: `-set_io -schmitt_trigger` (See the `set_io` command for ProASIC3E in the PDC Command Reference section of the Designer User's Guide.)

Skew

Purpose: Indicates whether there is a fixed additional delay between the enable/disable time for a tristatable I/O. (A tristatable I/O is an I/O with three output states: high, low, and high impedance.) 2 ns delay on rising edge, 0 ns delay on falling edge.

Families	Supported
ProASIC3E	Yes
ProASIC3	Yes
ProASIC ^{PLUS}	No
Axcelerator	No
ProASIC	No
SX-A	No
SX	No
eX	No
MX	No

Values: You can set the skew for a clock to either **on** or **off**.

Default value: The default skew displayed in the I/O Attribute Editor is **off**.

Note: A Tri State or "tristatable" logic gate has three output states: high, low, and high impedance. In a high impedance state, the output acts like a resistor with infinite resistance, which means the output is disconnected from the rest of the circuit.

PDC command for setting this attribute: `-set_io -skew` (See the `set_io` command for ProASIC3E or ProASIC3 in the PDC Command Reference section of the Designer User's Guide.)

Slew

The slew rate is the amount of rise or fall time an input signal takes to get from logic low to logic high or vice versa. It is commonly defined to be the propagation delay between 10% and 90% of the signal's voltage swing.

Purpose: Indicates the slew rate for output buffers. Generally, available slew rates are high and low.

Families	Supported
ProASIC3E	Yes
ProASIC3	Yes
ProASIC ^{PLUS}	No
Axcelerator	Yes
ProASIC	No
SX-A	Yes
SX	Yes
eX	Yes
MX	Yes

Values: You can set the slew rate for the output buffer to either **high** or **low**. The output buffer has a programmable slew rate for both high-to-low and low-to-high transitions. The low slew rate is incompatible with 3.3V PCI requirements.

For ProASIC3E and ProASIC3 families, you can edit the slew for designs using LVTTTL, all LVCMOS, or PCIX I/O standards. The other I/O standards have a preset slew value.

For the Axcelerator family, you can edit the slew only for designs using the LVTTTL I/O standard. For those devices that support additional slew values, Actel recommends that you use the high and low values and let the software map to the appropriate absolute slew value.

Default value: The default slew displayed in the I/O Attribute Editor is based on the selected I/O standard. For example, PCI mode sets the default output slew rate to High.

Note: One way to eliminate problems with low slew rate is with external schmitt triggers.

In some applications, you may require a very fast (i.e. high slew rate) signal, which approaches an ideal switching transition. You can accomplish this by either reducing the track resistance and/or capacitance on the board or increasing the drive capability of the input signal. Both of these options are generally time consuming and costly. Furthermore, the closer the input signal approaches an ideal one, the greater the likelihood of unwanted effects such as increased peak current, capacitive coupling, and ground bounce. In many cases, you may want to incorporate a finite amount of slew rate into your signal to reduce these effects. On the other hand, if an input signal becomes too slow (i.e. low slew rate), then noise around the FPGA's input voltage threshold can cause multiple state changes. During the transition time, both input buffer transistors could potentially turn on at the same time, which could result in the output of the buffer to oscillate unpredictably. In this situation, the input buffer could still pass signals. However, these short, unpredictable oscillations would likely cause the device to malfunction. Actel has performed reliability tests on RTSX-S devices and the reliability of the device is guaranteed for signals with slew rates up to 500µs. This test has not been performed on the SX-A family. For more information, see the *RTSX-S TR/TF Experiment* report on the Actel web site.

PDC command for setting this attribute: `-set_io -slew` (See the `set_io` command for ProASIC3E, ProASIC3, or Axcelerator in the PDC Command Reference section of the Designer User's Guide.)

Use Register

Purpose: The input and output registers for each individual I/O can be activated by selecting the check box associated with an I/O. The I/O registers are NOT selected by default.

Families	Supported
ProASIC3E	Yes
ProASIC3	Yes
ProASIC ^{PLUS}	No
Axcelerator	Yes
ProASIC	No
SX-A	No
SX	No
eX	No
MX	No

PDC command for setting this attribute: `-set_io -register` (See the `set_io` command for ProASIC3E, ProASIC3, or Axcelerator in the PDC Command Reference section of the Designer User's Guide.)

<Jerome, for "ProASIC3E Restrictions" below - what does this mean? Can you explain it so the user can understand?>

ProASIC3E Restrictions: New DRC must be developed for I/O register combining. The following architecture rules must be enforced:

1. DDR_REG and DDR_OUT macro must be combinable. There are no resources in the core tiles to implement the I/O DDR macros.
 - a. I/O to DDR_REG fanout =1.

b. DDR_OUT to I/O fanout =1.

c. If DDR_REG and DDR_OUT are combined on the same I/O, they must share the same clear signal.

d. Flip-flops will not be combined in an I/O in the presence of DDR combining on the same I/O.

ProASIC3 restrictions: The default I/O register combining behavior is controlled by a user global variable set in Compile.

Actel Headquarters

Actel Corporation is a supplier of innovative programmable logic solutions, including field-programmable gate arrays (FPGAs) based on Antifuse and Flash technologies, high-performance intellectual property (IP) cores, software development tools, and design services targeted for the high-speed communications, application-specific integrated circuit (ASIC) replacement, and radiation-tolerant markets.

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Index

.	
.lok file extension	8
A	
Actel headquarters	185
ADB file association.....	11
Adding applications.....	9
ADL file	41
AFL file	41
AFM file.....	41
Analyzing Power	33
Analyzing Timing.....	33
Applications, starting from Designer.....	9
assign_global_clock	141
assign_net_macros.....	142
assign_region.....	143
assigning I/O constraints	113
attributes	
defined.....	112
I/O attributes	171
I/O standard.....	173
Audit settings.....	17
Auxiliary files	
importing.....	62
Auxiliary files.....	17
AX layout options.....	27
Axcelerator layout	27
B	
Backannotate, Tcl Command.....	48
Back-Annotation.....	5, 33
bank name.....	172
BIT file	41
BSDL file	41
buffer	
schmitt trigger	180
C	
COB file	41
Command limitations, SDC.....	168
Compile, Tcl Command	51
Constraints	
assigning I/O.....	113
assigning location and region.....	113
attributes	112
defined	112
entering	112
GCF constraints	116
I/O assignment.....	112
location and region assignment.....	111
PDC constraints	114, 137
Physical constraints.....	26
SDC constraints	118
Timing constraints	26, 118
types.....	25, 110
Constraints	26
Converting GCF to SDC constraints	117
create_clock, SDC constraint	164
CRT (file).....	41
D	
DCF file	26, 41
DCF files, About	119
DCF Syntax Rules.....	120
define_region	144, 145
delete_buffer_tree	146
design constraints	
types.....	25, 110
Device Selection Wizard.....	12
DIO file	41
Directory	10
dont_fix_globals Tcl command.....	124
dont_optimize Tcl command.....	128
dont_touch Tcl command.....	128
E	
EDN file	41
Effort level	27, 30
Exporting	
EDN files	41

Designer User's Guide

Files.....	41
SAIF files.....	41
Tcl files.....	41
VCD files.....	41
VHD files.....	41
extended run layout.....	32
extended_run_shell.....	56
extended-run layout.....	32

F

Files	
importing auxiliary.....	62
importing source.....	63
files/Tcl.....	45
Flash Layout.....	28
Flip-Flop report.....	37
FUS file.....	41

G

GCF constraints.....	116
GCF File.....	17, 26, 41
GCF placement constraints.....	129
GCF syntax.....	117
GCF timing constraints, converting to SDC.....	117
global_clocks.....	169
global_stops.....	171

H

hot swap.....	172
---------------	-----

I

I/O assignment constraints.....	112
I/O attributes	
bank name.....	172
by family.....	171
hot swap.....	172
I/O standard.....	173
I/O threshold.....	176
input delay.....	172
loading.....	178
locked.....	176
macro cell.....	177
output drive.....	177

output load.....	178
pin number.....	178
port name.....	179
power-up state.....	179
resistor pull.....	179
schmitt trigger.....	180
skew.....	181
slew.....	181
use register.....	182
I/O attributes.....	122
I/O attributes.....	171
I/O constraints	
assigning.....	113
I/O standard.....	173
I/O standards	
compatibility.....	122
I/O standards.....	122
I/O threshold.....	176
import_aux.....	62
import_source.....	63
Importing	
auxiliary files.....	17, 115
PDC files.....	115
Importing.....	15
Importing GCF files.....	15
Importing SDC files.....	15
input delay.....	172
Internet.....	10, 11

K

keep existing.....	18
--------------------	----

L

Layout	
Accelerator (advanced options in Tcl).....	73
ProASICPLUS (advanced options in Tcl).....	71
SX (advanced options in Tcl).....	70
Layout options eX/SX/SX-A, advanced.....	30
Layout options, eX, SX, SX-A.....	29
Layout Options, ProASIC and ProASICPLUS.....	29
loading.....	178
LOC file.....	41
location and region assignment	

constraints	111
location and region constraints	
assigning	113
LOG file	41
Log Window, Preferences in Designer	11

M

macro cell	
attribute	177
multi pass layout	32
multipass layout	32
multi-pass layout	32

N

Netlist optimization constraint syntax	128
New tools	9
New version, software update	10

O

Opening existing designs	8
output drive	177
output load	178

P

PDC commands	
assign_global_clock	141
assign_net_macros	142
assign_region	143
define_region	144, 145
delete_buffer_tree	146
dont_touch_buffer_tree	147
move_region	148
reset_floorplan	148
reset_io	149
reset_iobank	150
reset_net_critical	151
set_io	152
set_iobank	152
set_location	152
set_net_critical	156
set_vref	157
set_vref_defaults	158
syntax conventions	138

unassign_global_clock	158
unassign_macro_from_region	160
unassign_net_macros	161
undefine_region	161
PDC constraint file	17, 41, 47
PDC file	
importing PDC files	114, 115, 137
PDC files	
syntax conventions	138
PDF file	12
physical constraints	111, 112, 114, 137
physical design constraints	114, 137
pin	
assigning to a port	77
committing	80
locking assignment to a port	80, 81
unassigning	82
unassigning all	83
unlocking from a port	83
PIN file	41
Pin Files, About	122
pin number	178
pin_assign	77
pin_commit	80
pin_fix	80
pin_fix_all	81
pin_unassign	82
pin_unassign_all	83
pin_unfix	83
place-and-route, ProASIC and ProASICPLUS	28
Placement constraints/GCF	129
Power Analysis	33
power-up state	179
PRB file	41
Preferences, Designer	10, 11, 12
ProASIC timing constraints	116
ProASICPLUS timing constraints	116
Proxy	11

R

Reports	
Designer reports	35

Designer User's Guide

Flip-flop reports	37
Pin reports	36
Status reports	35
reset_floorplan	148
reset_io	149
reset_iobank	150
reset_net_critical	151
resistor pull	179
S	
SAIF file	41
Save	
Design directory	10
schmitt trigger	180
SDC constraints	
Command limitations	168
Constraints, converting from GCF	117
create_clock	164
Design object access commands	162
Importing Auxiliary files	17
SDC file summary	118
set_false_path	165
set_max_delay	166
set_multicycle_path	167
SDC file	26
SDF file	41
SEG file	41
set_auto_global	125
set_auto_global_fanout	125
set_false_path, SDC constraint	165
set_iobank	152
set_location	152
set_max_delay, SDC constraint	166
set_multicycle_path, SDC constraint	167
set_net_critical	156
set_vref	157
set_vref_defaults	158
skew	181
slew	181
Software update	10
Source files	

importing	63
Source files	15
Starting applications from Designer	9
STF file	41
syntax	
PDC files	138
Syntax Rules, DCF	120

T

TCL	41, 45, 47, 60, 66, 67, 90
Tcl commands	
import_aux	62
import_source	63
pin_assign	77
pin_commit	80
pin_fix	80
pin_fix_all	81
pin_unassign	82, 83
pin_unfix	83
Tcl files	45
tcl script files	
PDC commands	114, 137
Technical Support	186
Timing Analysis, Overview	33
Timing driven layout	28
Tools menu	9
Troubleshooting	186

U

unassign_global_clock	158
unassign_macro_from_region	160
unassign_net_macros	161
undefine_region	161
UNIX	12
Updates	10
use register	182

V

VCD file	41
Version Checking	10

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