This document is released with Libero SoC Design Suite v11.8 SP4 without changes from v11.8 SP3.

SmartPower User Guide

Libero SoC v11.8, v11.8 SP1, SP2, and SP3

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Welcome to SmartPower

Welcome to SmartPower, the Microsemi SoC state-of-the-art power analysis tool. SmartPower enables you to globally and in-depth visualize power consumption and potential power consumption problems within your design, so you can make adjustments – when possible – to reduce power.

SmartPower provides a detailed and accurate way to analyze designs for Microsemi SoC FPGAs: from top-level summaries to deep down specific functions within the design, such as gates, nets, IOs, memories, clock domains, blocks, and power supply rails.

You can analyze the hierarchy of block instances and specific instances within a hierarchy, and each can be broken down in different ways to show the respective power consumption of the component pieces.

SmartPower also analyses power by functional modes, such as Active, Flash*Freeze, Shutdown, Sleep, or Static, depending on the specific FPGA family used. You can also create custom modes that may have been created in the design. Custom modes can also be used for testing "what if" potential operating modes.

SmartPower has a very unique feature that enables you to create test scenario profiles. A profile enables you to create sets of operational modes, so you can understand the average power consumed by this combination of functional modes. An example may be a combination of Active, Sleep, and Flash*Freeze modes – as would be used over time in an actual application.

SmartPower generates detailed hierarchical reports of the power consumption of a design for easy evaluation. This enables you to locate the power consumption source and take appropriate action to reduce the power if possible.

SmartPower supports use of files in the Value-Change Dump (VCD) format, as specified in the IEEE 1364 standard, generated by the simulation runs. Support for this format lets you generate switching activity information from Model*Sim* or other simulators, and then utilize the switching activity-over-time results to evaluate average and peak power consumption for your design.

Starting SmartPower

Note: When you launch SmartPower, you must first set your target clock and data frequencies before you evaluate your power consumption.

You cannot launch SmartPower if your design is not in a post-layout state in Designer. If you invoke SmartPower before compiling your netlist, Designer guides you through the compile and layout process.

There are three ways to invoke the SmartPower analysis tool:

- Choose **SmartPower** from the **Tools** menu.
- Click the **SmartPower** icon in the Designer toolbar.
- Click the **SmartPower** button in Designer design flow.

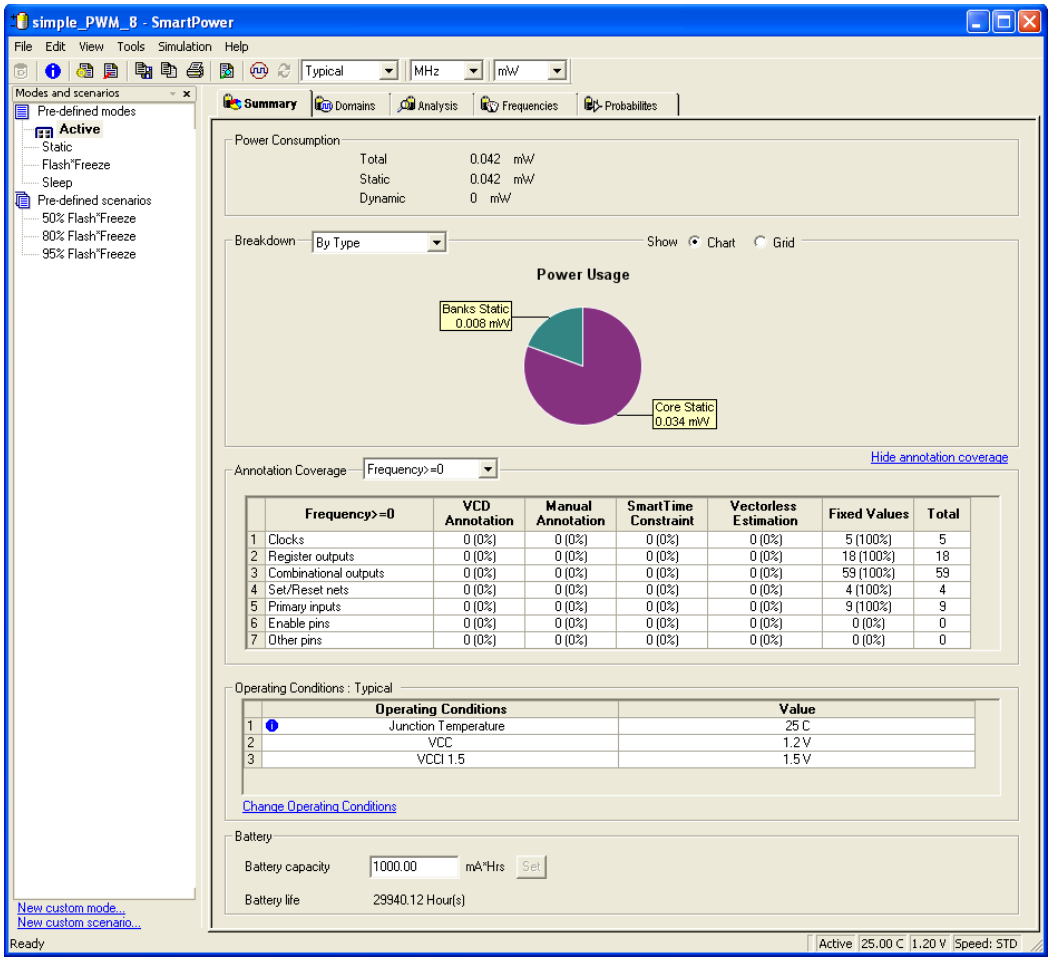


Figure 1 · SmartPower User Interface

SmartPower Interface

Summary Tab

The **Summary** tab is divided into five sections: **Power Consumption**, **Breakdown**, **Annotation Coverage**, **Operating Conditions**, and **Battery Life**.

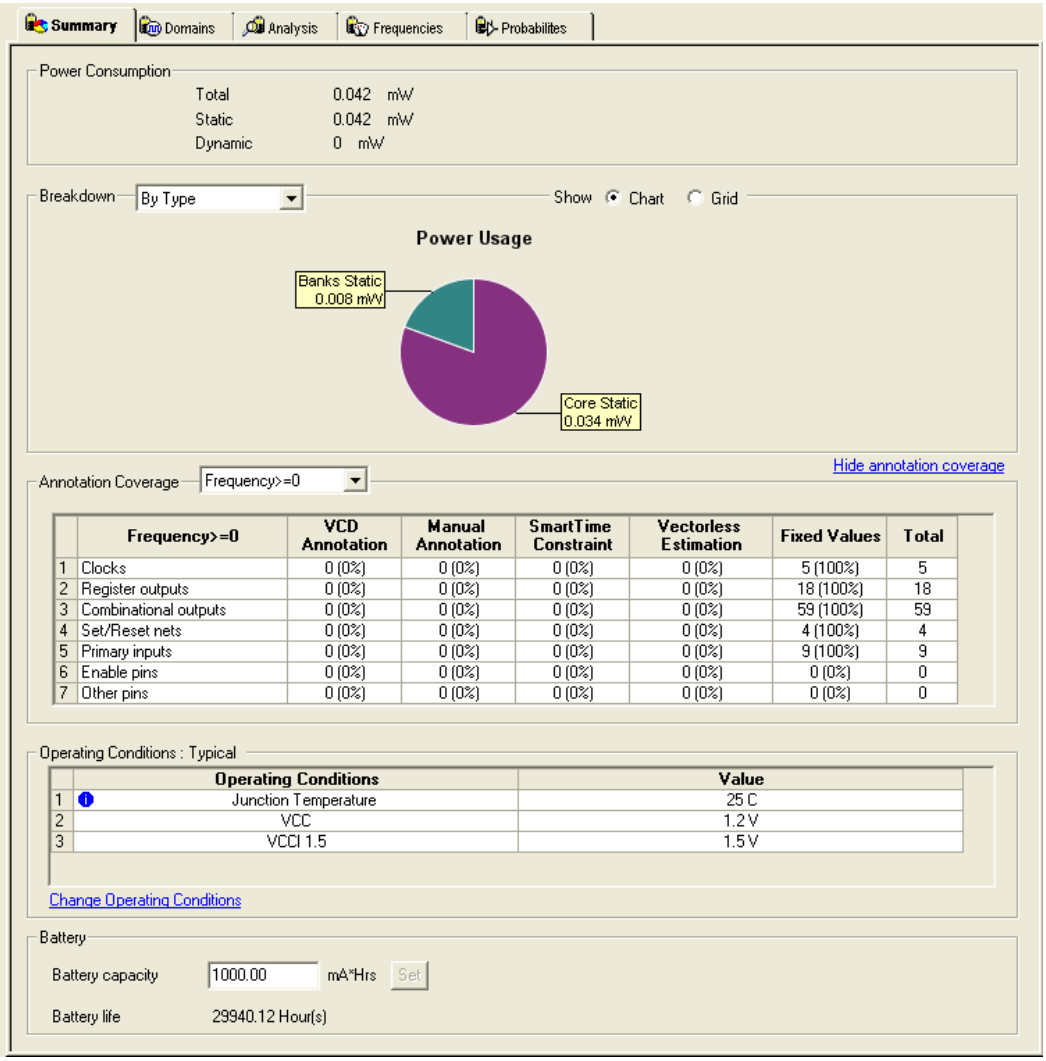


Figure 2 · SmartPower Summary Tab

Power Consumption

Displays the total power consumption and the static and dynamic power of the design. (Accurate only after you have entered your target clock and data frequencies).

Breakdown

Displays a breakdown of power consumption in the design. You can specify whether to see the power breakdown by type of component, by voltage rail, or by clock domain from the drop-down list.

Show

Displays power usage as a chart or as a grid.

When you select **By Type** from the drop-down list, the **Summary** tab displays a breakdown of the design's power usage by the following types:

- Net
- Gate
- I/O
- Memory
- Core Static
- Banks Static
- Analog (for Fusion Designs)

Any static power used by instances of a component in a design will be included in the appropriate category. As a result, the sum of the power in breakdown by type will equal the total of the static and dynamic power consumption of the design. Percentages displayed are fractions of the total power. Global nets are included in the net power types. To obtain the power of a clock, select breakdown by clock domain.

When you select **By Rail** from the drop-down list, the Summary tab displays a breakdown of the power usage by the rail that the power is drawn from and a breakdown for the current usage. For each rail, the power, voltage, and current drawn are displayed.

When you select **By Clock Domain** from the drop-down list, the Summary tab displays a breakdown of the power usage by the clock domain that the power is drawn from. For each clock domain, the power and percentage of power drawn are displayed. Dynamic power is accounted for in breakdown by clock, but static power is not associated by any clock.

When you select **By Mode** — available only when a scenario is selected in the Modes and Scenarios toolbar — the Summary tab displays power consumption, duration and power duration weight by mode.

Whether you selected **By Type**, **By Rail**, **By Mode**, or **By Clock Domain**, you can customize which columns are displayed in the grid by right-clicking the column headers. To exclude a column, remove its checkmark from the right-click menu. Right-click a column header to set the column default size for the selected column or for all columns, sort the values in ascending or descending order, or customize columns.

To sort the contents of a column, double-click a column header.

To export the contents of the grid to a file, from the **File** menu, choose **Export Grid** or click its associated toolbar button.

To print the grid, from the **File** menu, choose **Print Grid** or click its associated toolbar button.

To copy the grid, from the **Edit** menu, choose **Copy Grid** or click its toolbar button.

To copy the chart, click the contents of the chart, and from the right-click menu, choose **Copy Chart to Clipboard**.

To export the chart, click the contents of the chart, and from the right-click menu, choose **Export Chart to File**.

To rotate the chart by 90 degrees, click the contents of the chart, and from the right-click menu, choose **Rotate Chart Clockwise** or **Rotate Chart Counter-Clockwise**.

Annotation Coverage

Displays the number and percentage of pins annotated by each source (VCD, manual annotation, SmartTime constraint, vectorless estimation, and fixed values) for all clocks, register outputs, combinational outputs, set/reset nets, primary inputs, enable pins, and other pins.

To hide/show the annotation coverage, click the **Hide annotation coverage** or **Show annotation coverage** link.

Use the **Annotation Coverage Summary** drop-down menu to view probability or frequency annotation statistics (frequency=0 shows statistics for pins that have a frequency of 0).

VCD: displays the number/percentage of pins with frequencies/probabilities imported from a VCD file.

Manual annotation: displays the percentage of pins with manually-annotated frequencies/probabilities.

SmartTime constraint: displays the percentage of pins initialized with SmartTime.

Fixed values: displays the percentage of pins with default frequency/probability.

Vectorless estimation: displays the percentage of pins that have been annotated with vectorless estimation.

Operating Conditions

Displays the temperature and voltage operating conditions for the selected mode or scenario as specified in the Operating Conditions dialog box. When you select a scenario, the temperature and voltage operating conditions for each mode in the scenario are displayed.

To change the operating conditions, click the **Change Operating Conditions** link or from the **Tools** menu, choose **Operating Conditions**.

Battery Life

Enables you to set the battery capacity in mA/hr and reports the battery life.

Domains Tab

The **Domains** tab displays a list of existing domains with their corresponding clock and data frequencies and probabilities.

When you start SmartPower for the first time, it will automatically initialize frequencies from SmartTime with a default data toggle rate of 10%. However, if you update your timing constraints in SmartTime, you can use the Initialize Frequencies and Probabilities dialog box to update SmartPower with new frequencies from SmartTime. If you don't have timing constraints in SmartTime, you can manually initialize clock and data frequencies by directly editing the Domains tab grid, or you can use the Initialize Frequencies and Probabilities dialog box.

If you import a VCD file, the Domains tab will display average clock and data frequencies for each clock domain and input set. This average is calculated using VCD information.

Note: If you change a clock or data frequency in the Domains tab, it will only impact nets using the default estimation source. Nets use the default estimation source when they have not been manually set to a specific frequency in the Frequencies tab, and when they have not been set by importing a VCD file. To see explicitly the list of nets using the default estimation source, refer to the Frequencies tab.

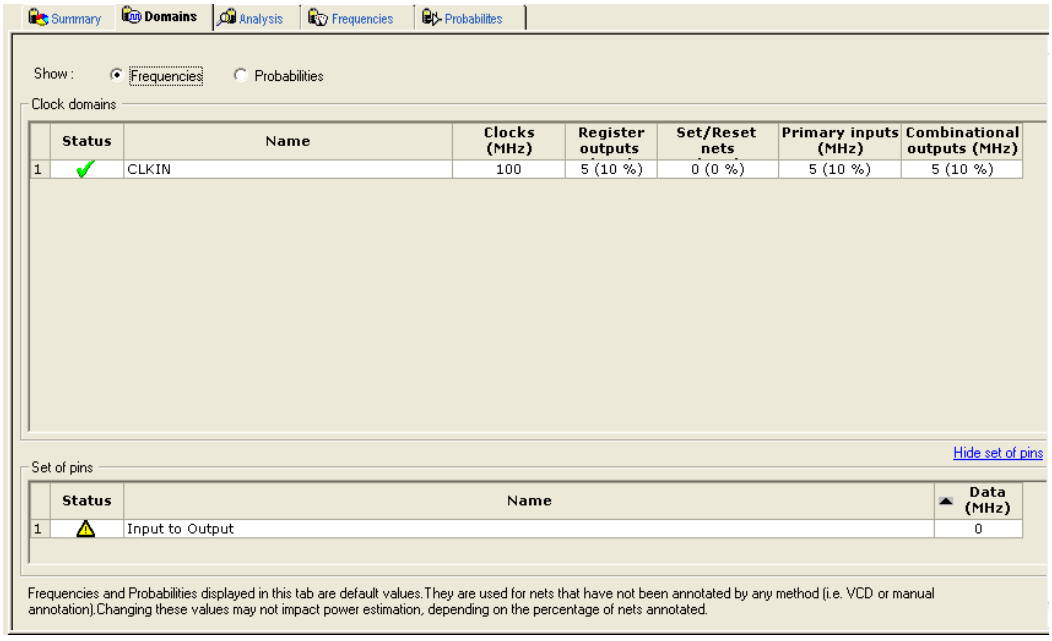


Figure 3 · SmartPower Domains Tab

Note: Data and clock frequencies are automatically set to zero when in non-active modes.

The Domains tab displays frequencies or probability data for clock domains and sets of pins. In this tab, you can add, edit, or remove domains or sets of pins, and change the clock and/or data frequency of a selected domain.

To hide or display the grid for set of pins, click the Hide/Show set of pins link.

You can edit frequency or probability data directly from the grid.

To create a new clock domain or set of pins:

1. Right-click the clock domain or set of pins and choose to add a new **create new clock domain** or **create new set of pins**.
2. Enter a name and click **OK**. The new clock domain or set of pins appears in the Domains tab.
3. Modify the frequency and probability data as needed.

Clock domain frequencies can be initialized by right-clicking the clock domain name and selecting **Initialize Frequencies and Probabilities**. If there is no frequency constraint set for this clock domain in SmartTime, the clock frequency of the domain will not be changed.

The status of a clock frequency or probability is displayed in the first column by an icon. Mouse over the icon to identify the status:

Table 1 · Clock Frequency/Probability Status

Icon	Description
	This clock has not been initialized
	No constraints available for this clock from SmartTime
	Average frequencies/probabilities imported from VCD
	Clock constraints imported from SmartTime
	This clock has been manually initialized

Note: This feature is only available when in active operating mode or when in a mode based on the Active mode.

The status of a set of pins is displayed in the first column by an icon. Mouse over the icon to identify the status:

Table 2 · Set of Pins Status

Icon	Description
	This set has not been initialized
	Average frequencies/probabilities imported from VCD
	This set has been manually initialized

Note: This feature is only available when in active operating mode or when in a mode based on the Active mode.

To remove one or multiple clock domains, select the clock domain(s), and click Remove Selected Domains(s).

To edit a clock domain or a set of pins:

1. Select the clock domain and from the right-click menu, choose **Edit Domain**. The Clock Domain or Set-of-Pins window appears.

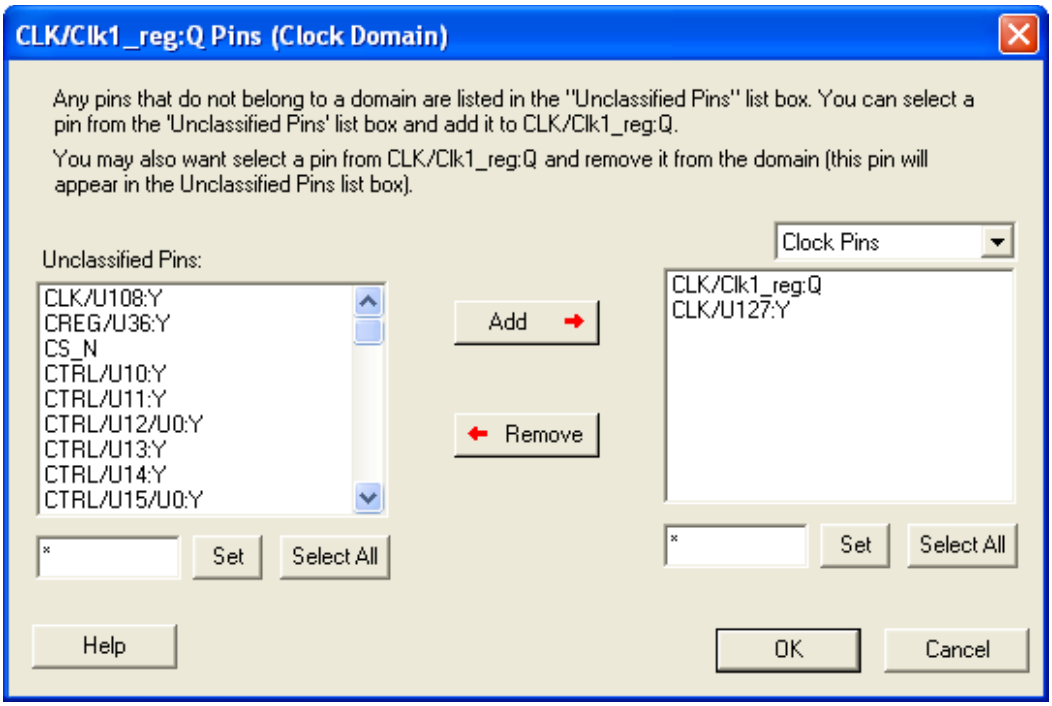


Figure 4 · Clock Domain Window

Any pins that do not belong to a domain are listed in the **Unclassified Pins** list box. You can select a pin from the **Unclassified Pins** list box and add it to the current domain. You may also select a pin from the current domain and remove it from the domain (this pin will appear in the **Unclassified Pins** list box).

Clock Pins and Data Pins: Select **Clock Pins** from the pull-down list to display all clock pins for the selected domain, or select **Data Pins** to display registers, asynchronous signals, primary input, and combinational signals for the selected domain.
Use the **filter** boxes to narrow your search for a specific pin. The boxes are text filters; * is a wildcard.

2. Click **OK**.

To delete a clock domain or a set-of-pins, select the clock domain or set-of-pins and from the right-click menu, choose **Remove Domain**.

Analysis Tab

The **Analysis** tab enables you to inspect detailed hierarchical reports of the power consumption. The **Analysis** tab consists of two windows: the **Hierarchy of Instances** window and the **Analysis** window.

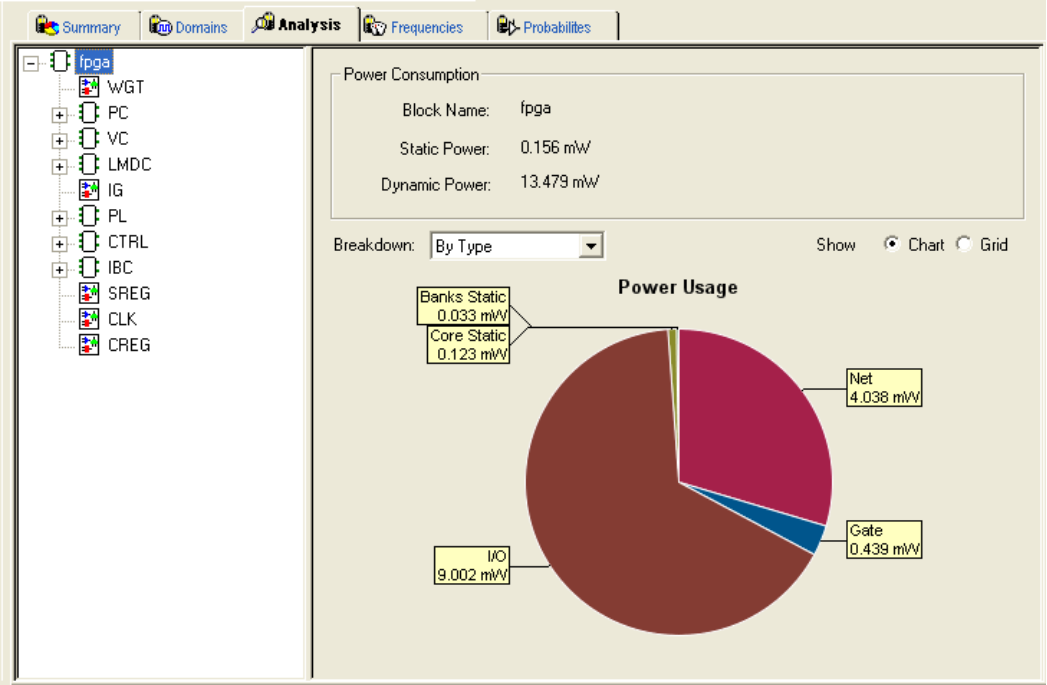


Figure 5 · SmartPower Analysis Tab

Hierarchy of Instances Window

SmartPower displays the hierarchy of instances in a list in the **Hierarchy of Instances** window. Sub-blocks of a block are shown in the tree when you click the plus sign (+) next to the block. Only hierarchical blocks are displayed in this list (no gates or nets).

When you select a block of the hierarchical tree, SmartPower displays its name and power consumption in the Analysis window.

Analysis Window

The **Analysis** window is divided into two sections: **Power Consumption** and **Breakdown**.

Power Consumption

Displays the name of the currently selected block from the hierarchy of instances window, as well as the static and dynamic power consumption of the selected block.

Show

Displays power usage as a chart (not available when breakdown by instance is selected) or as a grid.

Breakdown

Displays a breakdown of power usage of the currently selected block. Use the drop-down list to select whether to display the power breakdown by type of component, instance, or clock domain.

When you select **By Type** from the drop-down list, the Analysis tab displays a breakdown of the selected block's power usage by the following types:

- Net
- Gate
- I/O
- Memory
- Core Static
- Banks Static

- Analog

Any static power used by instances of a component in a design will be included in the appropriate category. As a result, the sum of the power in breakdown by type will equal the total of the static and dynamic power consumption of the design. Percentages displayed are fractions of the total power. Global nets are included in the net power types. To obtain the power of a clock, select breakdown by clock domain.

When you select **By Clock Domain** from the drop-down list, the Analysis tab displays a breakdown of the power usage by the clock domain that the power is drawn from. For each clock domain, the power and percentage of power drawn are displayed. Dynamic power is accounted for in breakdown by clock, but static power is not associated by any clock.

Whether you selected **By Type**, **By Instance** or **By Clock Domain**, you can customize which columns are displayed in the grid by right-clicking the column headers. To exclude a column, remove its checkmark from the right-click menu. Right-click a column header to set the column default size for the selected column or for all columns, sort the values in ascending or descending order, or customize columns.

To sort the contents of a column, double-click a column header.

To export the contents of the grid to a file, from the **File** menu, choose **Export Grid** or click its associated toolbar button.

To print the grid, from the **File** menu, choose **Print Grid** or click its associated toolbar button.

To copy the grid, from the **Edit** menu, choose **Copy Grid** or click its toolbar button.

To copy the chart, click the contents of the chart, and from the right-click menu, choose **Copy Chart to Clipboard**.

To export the chart, click the contents of the chart, and from the right-click menu, choose **Export Chart to File**.

To rotate the chart by 90 degrees, click the contents of the chart, and from the right-click menu, choose **Rotate Chart Clockwise** or **Rotate Chart Counter-Clockwise**.

To view an instance properties, right-click any instance and select **Instance Properties.** This brings the **Instance Properties** window, which displays the instance name, type and power and other properties specific to each type of instance, see image below.

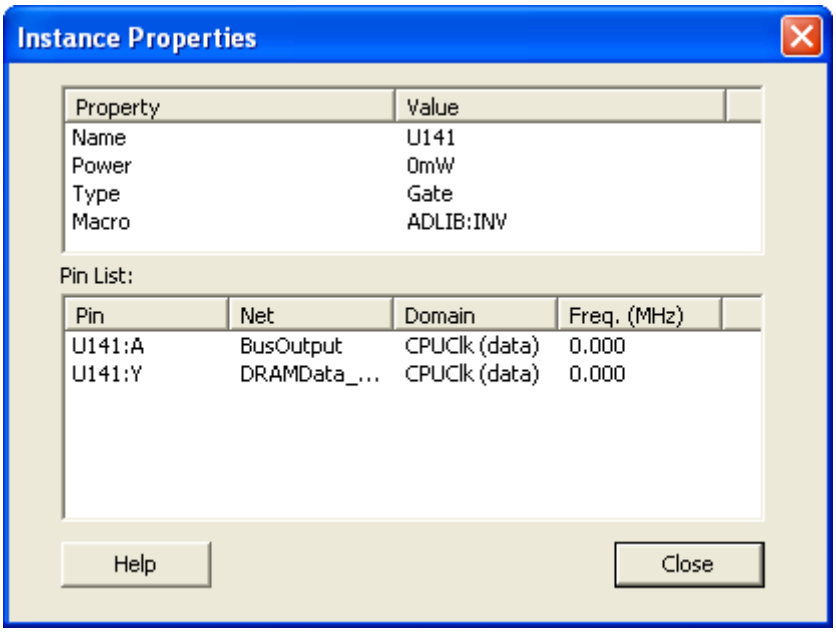


Figure 6 · Instance Properties: Gate

The **Instance Properties** allows you to access a list of pins of a gate and to check their domain and frequency.

See Also

Analyze results

Advanced Analysis of I/Os

Frequencies Tab

Use the **Frequencies** tab to attach switching frequency attributes to the interconnects of the design. The **Frequencies** tab is divided into **Switching Frequencies**, **Average Frequencies,** and **Annotation Statistics**.

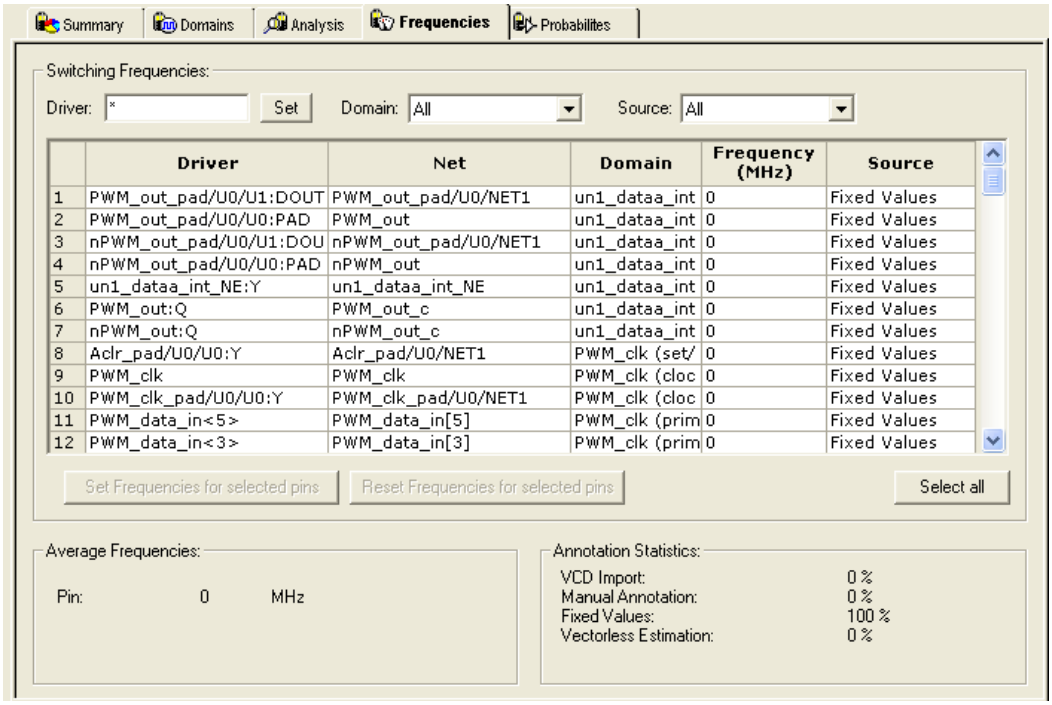


Figure 7 · SmartPower Frequencies Tab

Switching Frequencies

Displays the pins and lists the net, domain, frequency, and frequency source for each pin.

The **Driver** box enables you to filter the list of pins based on the criteria entered. Enter text in the filter box, and click **Set** to apply this text as a filter. Use the ***** character to display all pins or as a wildcard.

Use the **Domain** drop-down list to select a different domain (All, CLKIN, Default, or Input to Output).

Use the **Source** drop-down list to select a different source (All, Default, Manual Annotation, or VCD Import).

You can change the frequency by entering a new value in the **Frequency** column or by selecting multiple pins and pressing the **Set frequencies for selected pins** button and entering a new frequency. Use **Reset frequencies for selected pins** to revert to the default frequency.

To select all the pins, click **Select All**.

Average Frequencies

Displays the average frequency of all pins displayed in the grid.

Average Frequencies are useful when you import a VCD file or SAIF file. Since these files enable you to specify the frequency of each pin individually, it is often useful to know the average clock pin or data pin frequency for a particular clock domain.

If you did not specify a frequency annotation for any clock pin in this clock domain, the average value is equal to the default clock frequency of the clock domain. If you set one or several clock pins, SmartPower takes these specific annotations into account to compute an average value.

If you did not specify a frequency annotation for any data pin in this clock domain, the average value is equal to the default data frequency of the clock domain. If you set one or several data pins, SmartPower takes these specific annotations into account to compute an average value.

Annotation Statistics

VCD import: displays the percentage of pins with frequencies imported from the *.vcd file.

Manual annotation: displays the percentage of pins with manually-annotated frequencies.

Fixed values: displays the percentage of pins with default frequency.

Probabilities Tab

You can use the **Probabilities** tab to control the probabilities for all pins.

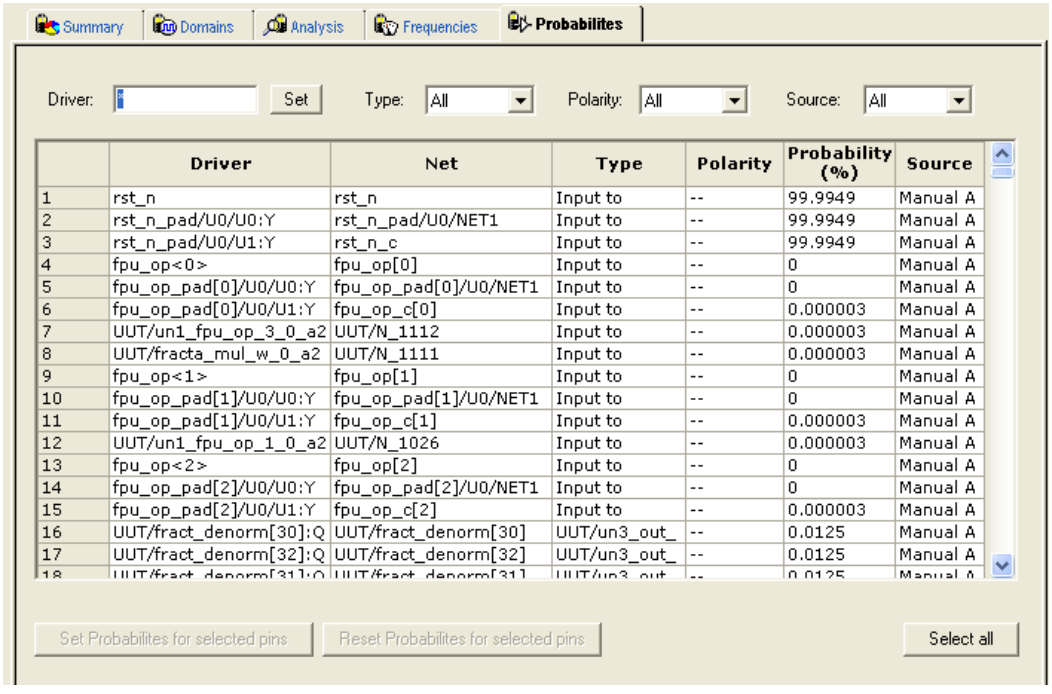
Bidirectional and Tristate I/Os: Controls the output probability of each tristate and bidirectional I/O. The probability is the percent of time that the I/O is used as an output. You can change the default value and set a specific value for each bidirectional or tristate I/O.

Memories: Controls the read cycle probability or the write cycle probability of a memory block. The probability is the percent of time that a memory block will be used either in a read cycle or a write cycle. You can change the default value as well as set a specific value for each enable pin of each memory block available in the design.

If an enable pin is active low, assign it a probability of 0% to completely enable the I/O or the memory block, or 100% to disable it completely.

In designs with a cascaded memory, all memory enable pins are shown in the Probabilities tab. To simulate real-world power consumption, selectively enable only some memory enable pins, as specified in the memory cascading structure. For purely vertical cascading, enable the pins belonging to one RAM block. For purely horizontal cascading, enable all pins belonging to all RAM blocks of the cascaded memory. You can find which RAM block corresponds to which pin by cross-probing with the MVN NetlistViewer.

The Probabilities tab displays the drivers, nets, types, polarity, rates, and source for each pin.



	Driver	Net	Type	Polarity	Probability (%)	Source
1	rst_n	rst_n	Input to	--	99.9949	Manual A
2	rst_n_pad/U0/U0:Y	rst_n_pad/U0/NET1	Input to	--	99.9949	Manual A
3	rst_n_pad/U0/U1:Y	rst_n_c	Input to	--	99.9949	Manual A
4	fpu_op<0>	fpu_op[0]	Input to	--	0	Manual A
5	fpu_op_pad[0]/U0/U0:Y	fpu_op_pad[0]/U0/NET1	Input to	--	0	Manual A
6	fpu_op_pad[0]/U0/U1:Y	fpu_op_c[0]	Input to	--	0.000003	Manual A
7	UUT/un1_fpu_op_3_0_a2	UUT/N_1112	Input to	--	0.000003	Manual A
8	UUT/fracta_mul_w_0_a2	UUT/N_1111	Input to	--	0.000003	Manual A
9	fpu_op<1>	fpu_op[1]	Input to	--	0	Manual A
10	fpu_op_pad[1]/U0/U0:Y	fpu_op_pad[1]/U0/NET1	Input to	--	0	Manual A
11	fpu_op_pad[1]/U0/U1:Y	fpu_op_c[1]	Input to	--	0.000003	Manual A
12	UUT/un1_fpu_op_1_0_a2	UUT/N_1026	Input to	--	0.000003	Manual A
13	fpu_op<2>	fpu_op[2]	Input to	--	0	Manual A
14	fpu_op_pad[2]/U0/U0:Y	fpu_op_pad[2]/U0/NET1	Input to	--	0	Manual A
15	fpu_op_pad[2]/U0/U1:Y	fpu_op_c[2]	Input to	--	0.000003	Manual A
16	UUT/fract_denorm[30]:Q	UUT/fract_denorm[30]	UUT/un3_out_	--	0.0125	Manual A
17	UUT/fract_denorm[32]:Q	UUT/fract_denorm[32]	UUT/un3_out_	--	0.0125	Manual A
18	UUT/fract_denorm[31]:Q	UUT/fract_denorm[31]	UUT/un3_out_	--	0.0125	Manual A

Figure 8 · SmartPower Probabilities Tab

The **Driver** box enables you to filter the list of drivers based on the criteria entered. Enter text in the filter box, and click **Set** to apply this text as a filter. Use the ***** character as a wildcard.

Use the **Type** drop-down list to filter the pin list by different type (All, All enable, CLKIN, Default, or Input to Output).

Use the **Polarity** drop-down list to filter the pin list by polarity (Low, High, or All).

Use the **Source** drop-down list to filter the pin list by source (All, Default Estimation, Manual Annotation, Saif Import, or VCD Import).

You can change the rate by entering a new value in the **Rate** column or by selecting multiple pins, pressing the **Set Probabilities for selected pins** button, and entering a new frequency in the Set Default Probabilities dialog box.

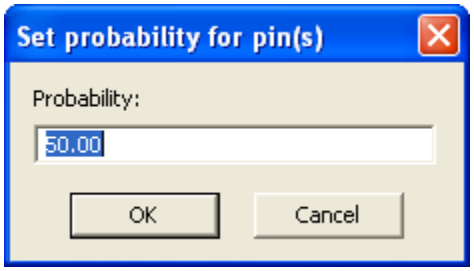


Figure 9 · Set Probability for Pins Dialog Box

Use **Reset Probabilities for selected pins** to revert to the default polarity.

You can change the default probability from the Domains tab.

To select all the drivers, click **Select All**.

You can set or reset the probabilities, set a default probability, copy, export, or print the grid by selecting one or multiple pins and choosing an option from the right-click menu.

See Also

Specify probabilities

Preferences Toolbar

The SmartPower Preferences toolbar gives you quick access to commonly used settings. Mouse over the toolbar button to view a description of the command. Use the drop-down list to select your settings.

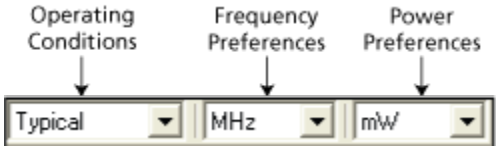


Figure 10 · SmartPower Preferences Toolbar

Operating Conditions: Enables you to set the operating conditions - Best, Typical, or Worst.

The actual voltage and temperature of a given operating condition is defined by the operating condition range selected for the current design (COM, IND, MIL, Auto, TGrade1, TGrade2, and Custom). For SmartPower, unlike SmartTime, the worst voltage is the upper bound of the range. That is, higher (worst-case) power comes from higher voltage, whereas higher voltage results in best-case speed.

Note: Worst-case and best-case calculations are available only for certain families and devices.

Frequency: Sets unit preferences for frequency – Hz, KHz, MHz.

Power Units: Sets unit preferences for power – W, mW, or uW.

See Also

SmartPower toolbar / menu commands

Modes and Scenarios Toolbar

The Modes and Scenarios toolbar displays all pre-defined modes, custom modes, pre-defined scenarios, and custom scenarios. The Modes and Scenarios toolbar is shown by default, but can be closed or undocked. To view the toolbar, from the **View** menu, choose **Modes and Scenarios toolbar**.

From this toolbar, you can:

- Select a pre-defined mode by clicking the mode name
- Select a custom mode by clicking the mode name
- Select a custom mode for power-driven layout by right-clicking the active-based mode and selecting **Use for PDPR**
- Re-import a VCD file from an Active mode or a custom mode by right-clicking the VCD file and selecting **Re-import VCD File**
- Remove a VCD file from an Active mode or a custom mode by right-clicking the VCD file and selecting **Remove VCD File from <mode name> Mode**; or from the **Simulation** menu, choose **Remove VCD File > <file name>**
- Generate a Cycle-Accurate Power report by right-clicking the VCD file and selecting **Cycle-Accurate Power Report**
- Generate an Activity and Hazards Power report by right-clicking the VCD file and selecting **Activity and Hazards Power Report**
- View the Cycle-Accurate Power analysis by right-clicking the VCD file and selecting **Cycle-Accurate Power Analysis**
- Create a new custom mode by clicking **Custom modes** and selecting **New Custom Mode**; or by clicking the **New Custom Mode** hyperlink
- Edit and delete a custom mode by right-clicking the mode name and selecting **Edit custom mode** or **Delete custom mode**
- Copy a custom or a pre-defined mode by right-clicking the mode name and selecting **Create a copy of this mode**
- Select a scenario by clicking the scenario name
- Create a new custom scenario by clicking **Scenarios** and selecting **New custom scenario**
- Edit and delete a custom scenario by right-clicking the scenario name and selecting **Edit custom scenario** or **Delete custom scenario**
- Copy a scenario by right-clicking the scenario name and selecting **Create a copy of this scenario**

Note: When a scenario is selected, only the Summary tab is available.

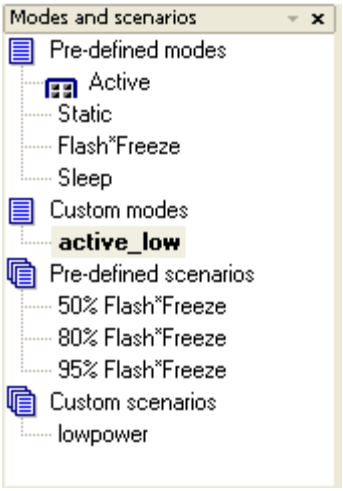


Figure 11 · Modes and Scenarios Toolbar

SmartPower Standard Toolbar and Menu Commands

The SmartPower standard toolbar contains commands for performing common SmartPower operations on your designs. Roll the mouse pointer over the toolbar button to view a description of the button. Click the button to access the command.

Table 3 · SmartPower Toolbar

Toolbar Button	Description
	Commit
	Settings Summary
	Operating Conditions
	Options
	Export Path Grid
	Copy Path Grid
	Print Grid
	Generate Power Report
	Initialize Frequencies and Probabilities
	Refreshes Vectorless Estimation

The PC and UNIX workstation versions of SmartPower have the same menus. However, some dialog boxes may look slightly different on the two platforms due to the different window environments. The functionality is the same on both platforms, though the locations of the fields and buttons on the dialog boxes may vary. The names of some fields may also vary between the PC and workstation versions.

File Menu

Menu	Description
Commit	Commits power information to Designer. You must commit your changes if you wish to save your settings in SmartPower. If you commit your changes, the information is stored in the .adb file, and your settings are restored the next time you open your design in SmartPower
Export Grid	Exports the selected area of the **Report** window to a text (.txt) file
Print Grid	Prints the selected area of the **Report** window
Settings Summary	Displays a summary of the power settings for the current design
Close	Closes SmartPower

Edit Menu

Menu	Sub-Menu	Description
Domains	New Clock Domain	Adds a clock domain
	New Set of Pins	Adds a set of pins
	Delete Domain	Deletes a clock domain
	Edit Domain	Edits a clock domain
Modes and Scenarios	Use for Analysis > *mode or scenario name*	Sets the selected mode or scenario to be used for analysis
	Use for PDPR > *mode or scenario name*	Sets the selected mode or scenario to be used for Power-Driven Layout
	Custom Modes > New Custom Mode	Creates a new custom mode
	Custom Modes > Edit Custom Mode	Edits a custom mode
	Custom Modes > Delete Custom Mode	Deletes a custom mode
	Custom Scenarios > New Scenario	Creates a new custom scenario
	Custom Scenarios > Edit Scenario	Edits a custom scenario
	Custom Scenarios > Delete Scenario	Deletes a custom scenario
Copy Grid	—	Copies the selected cells of the dynamic grid onto the clipboard

View Menu

Menu	Description
Standard Toolbar	Displays or hides the SmartPower Standard toolbar
Preferences Toolbar	Displays or hides the SmartPower Preferences toolbar
Modes and Scenarios Toolbar	Displays or hides the Modes and Scenarios toolbar
Unprocessed Simulation Files Toolbar	Displays or hides the Unprocessed Simulation Files toolbar

Menu	Description
Customize Columns	Selects and orders the columns displayed in the user interface
Reset Window Layout	Resets the window layout to the default layout

Tools Menu

Menu	Sub-Menu	Description
Initialize Frequencies and Probabilities	—	Imports clock constraints from SmartTime and enables the user to input frequencies and probabilities for the design
Operating Conditions	—	Enables the user to customize the operating conditions used in SmartPower
Options	—	Invokes the Options dialog box, where you can set analysis and display preferences
Reports	Power Report	Generates a power report
	Scenario Power Report	Generates a scenario power report
	Cycle Accurate Power Report	Generates a cycle accurate power report
	Activity and Hazards Power Report	Generates an activity and hazards power report
Cycle Accurate Power Analysis	—	Generates a cycle-accurate power analysis

Simulation Menu

Menu	Description
Import VCD File	Invokes the Import VCD Options dialog box
Remove VCD file	Removes the selected CVD file from the design
Audit files	Audits simulation files within the project

Help Menu

Menu	Description
Help on *current tab*	Displays the help content for the current tab
Help Topics	Opens the help files for SmartPower
SmartPower User's Guide	Displays the SmartPower User's Guide
Data Change History	Displays the data change history report

See Also

SmartPower preferences toolbar

Power - Settings Summary

The **Power - Settings Summary** dialog box displays a summary of the power settings for the current design.

To open the **Power - Settings Summary** dialog box, from the **File** menu, choose **Settings Summary** or click the icon in the SmartPower toolbar.

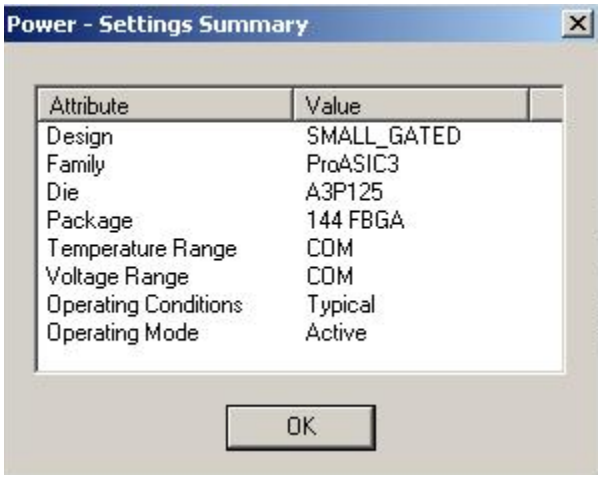


Figure 12 · Power - Settings Summary Dialog Box

The **Power - Settings Summary** dialog box displays the following information:

- **Design**: Displays the name of the design.
- **Family**: Displays the device family used in the design.
- **Die**: Displays the die.
- **Package**: Displays the package.
- **Temperature Range**: Displays the temperature range.
- **Voltage Range**: Displays the core supply voltage.
- **Operating Condition**: Displays the operating conditions that SmartPower uses to calculate static and dynamic power contributions.
- **Operating Mode**: Displays the operating mode that SmartPower uses to calculate static and dynamic power contributions.

Note: The status bar also shows the ambient temperature, VCCA and speed grade.

Initializing Frequencies and Probabilities

The **Initialize Frequencies and Probabilities** dialog box enables you to initialize the frequencies and probabilities for your design.

To open the **Initialize Frequencies and Probabilities** dialog box, from the **Tools** menu, choose **Initialize Frequencies and Probabilities**, or click the icon in the SmartPower toolbar.

Note: This feature is only available in the Active operating mode or modes derived from the Active mode.

The dialog box is organized in the following panels: General, Clocks, Register Outputs, Set/Reset Nets, Primary Inputs, Combinational Outputs, Enables Sets of Pins, and Other Sets of Pins.

General

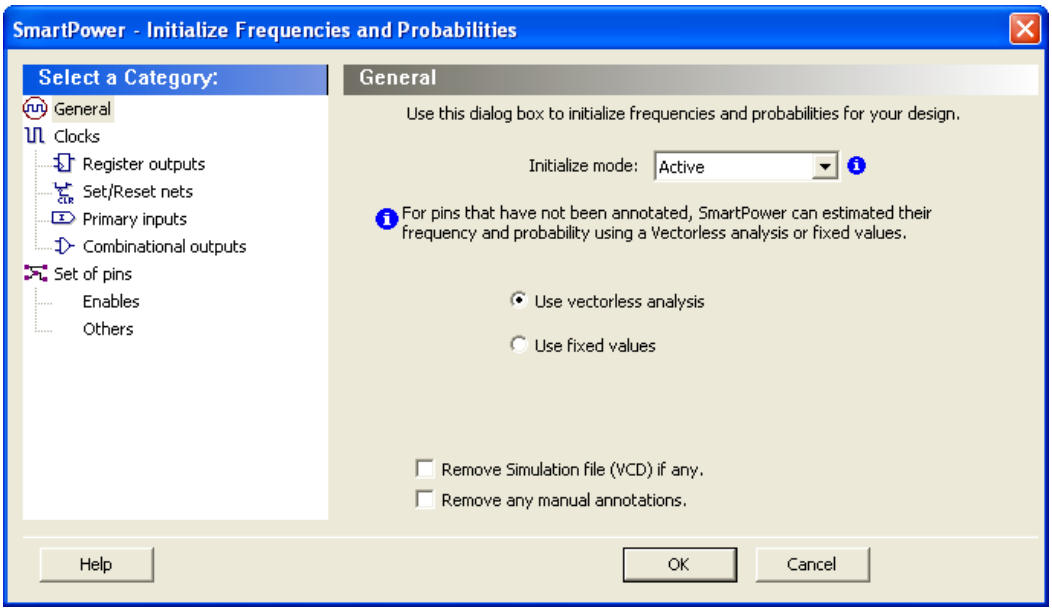


Figure 13 · Initialize Frequencies and Probabilities Dialog Box – General

Initialize mode – Select an active-based mode to initialize the frequencies and probabilities for.

For pins that have not been annotated, SmartPower can estimate their frequency and probability using vectorless analysis or fixed values:

Use vectorless analysis – SmartPower initializes frequencies and probabilities with vectorless analysis.

Use fixed values – SmartPower initializes frequencies and probabilities (%) of all registers with a default toggle rate (available only when using toggle rates), frequency, and probability.

Based on the selected mode, a warning appears with information on the annotated pins. If the selected mode contains any annotations, you can remove annotations by selecting one or both options below:

Remove simulation file (VCD) if any – Select this option to remove the simulation file for the selected mode.

Remove any manual annotations – Select this option to remove all manual pin annotations for the selected mode.

Clocks

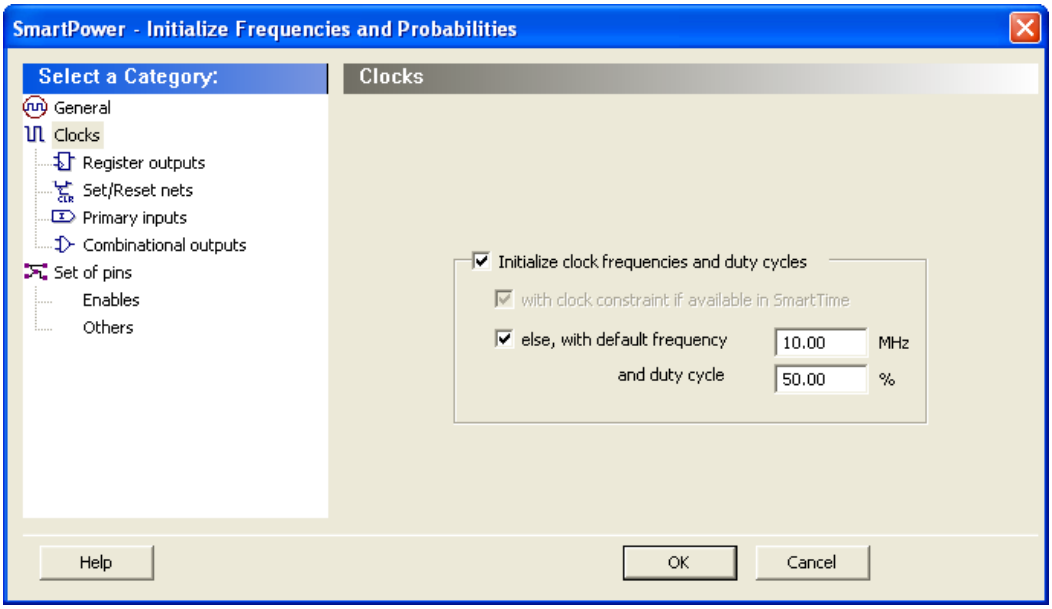


Figure 14 · Frequencies and Probabilities Dialog Box – Clocks

Initialize clock frequencies and duty cycles – Select this option to initialize clock frequencies and duty cycles, with:

with clock constraint if available in SmartTime: When only this box is checked, SmartPower initializes all clock domains in SmartPower with clock constraints from SmartTime. If there is no frequency constraint set for this clock domain in SmartTime, the clock frequency of the domain will not be updated.

else, with default frequency (MHz) and duty cycle (%): When only this box is checked, SmartPower initializes all clock domains in SmartPower with the specified default frequency and duty cycle.

Note: When both boxes (with clock constraint if available in SmartTime and with default frequency and duty cycle) are checked, SmartPower initializes all clock domains with clock constraints from SmartTime. If there is no frequency constraint set for a clock domain in SmartTime, it is initialized with the specified default frequency and duty cycle.

Register Outputs

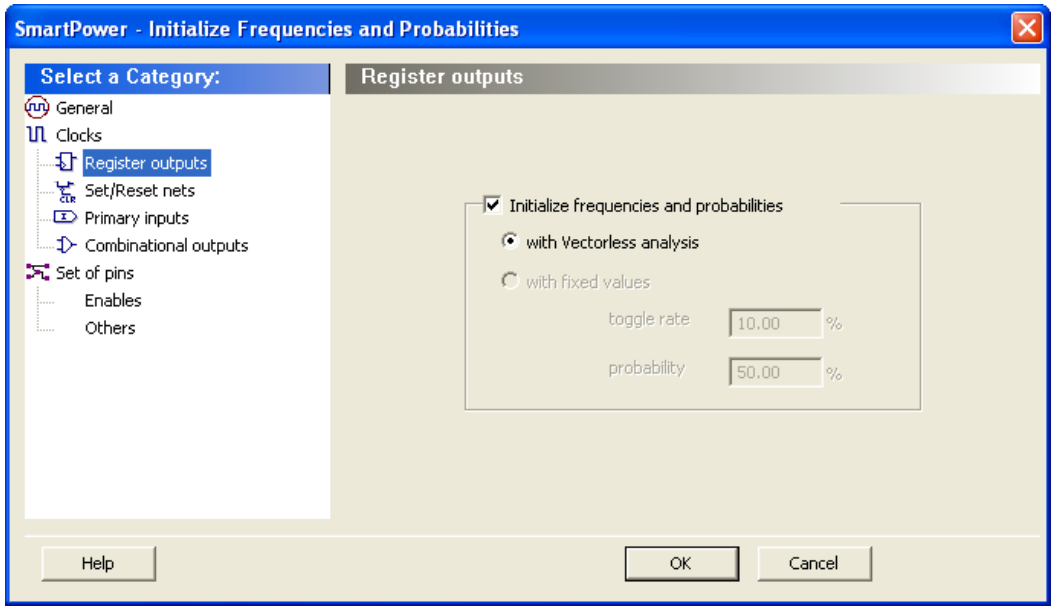


Figure 15 · Frequencies and Probabilities Dialog Box –Registers

Initialize frequencies and probabilities – Select this option to initialize frequencies and probabilities for register outputs in your design.

With vectorless analysis – SmartPower initializes frequencies and probabilities using vectorless analysis.

With fixed values: SmartPower initializes frequencies and probabilities (%) of all register outputs with a default toggle rate (available only when using toggle rates) or frequency (when not using toggle rates), and a default probability.

Set/Reset Nets

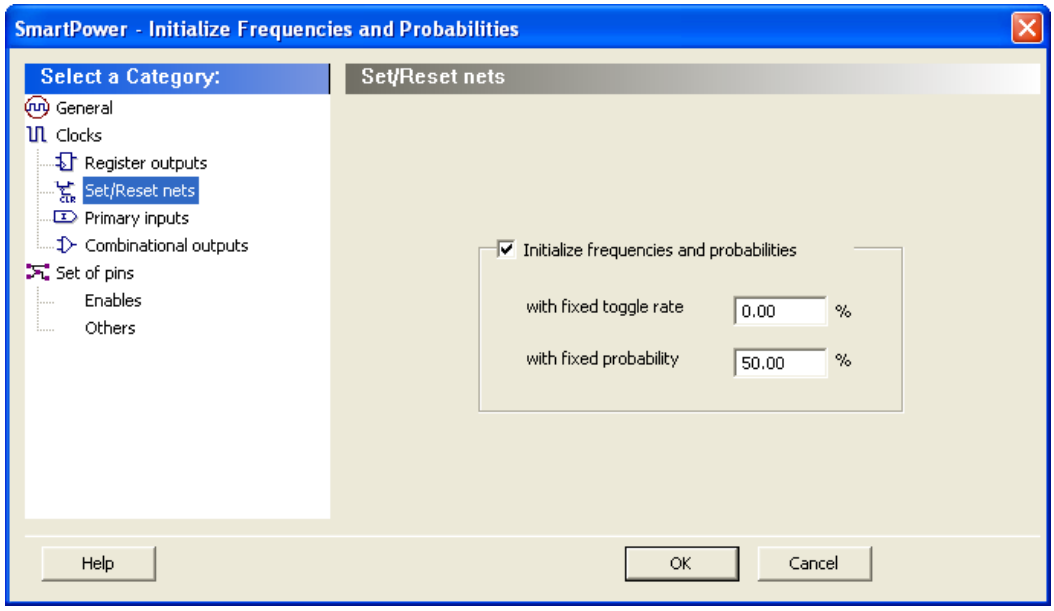


Figure 16 · Frequencies and Probabilities Dialog Box – Asynchronous

Initialize frequencies and probabilities – Select this option to initialize frequencies and probabilities for set/reset nets in your design.

With default toggle rate (%): SmartPower initializes frequencies and probabilities of all set/reset nets with the specified default toggle rate. This option is available only when using toggle rates.

With default frequency (MHz): SmartPower initializes all set/reset nets in SmartPower with the specified default frequency. This option is available only when not using toggle rates.

With default probability (%): SmartPower initializes probabilities of all set/reset nets with the specified default probability.

Primary Inputs

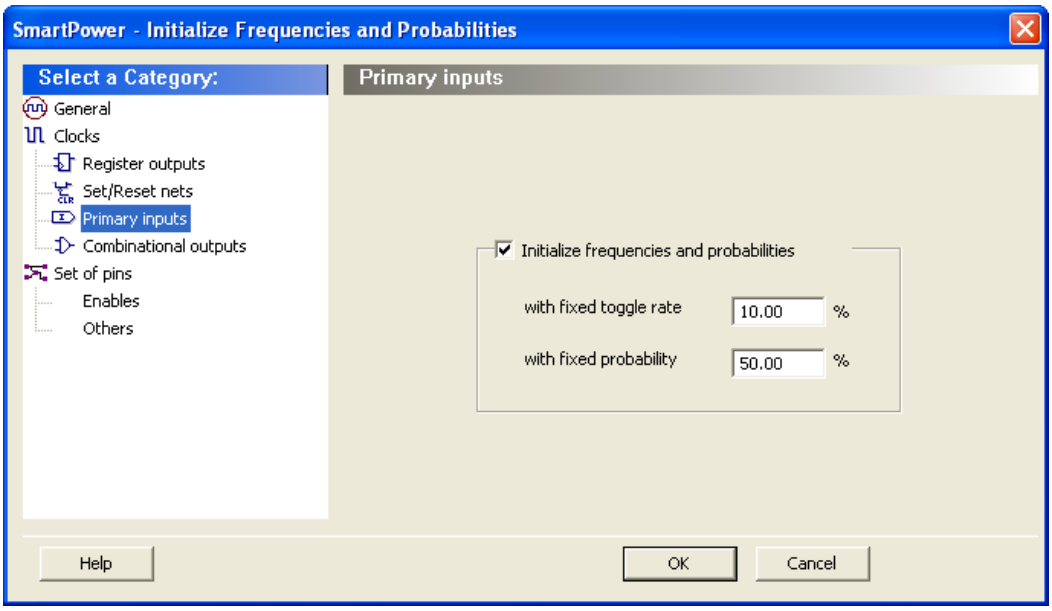


Figure 17 · Frequencies and Probabilities Dialog Box – Primary Inputs

Initialize frequencies and probabilities – Select this option to initialize frequencies and probabilities for the primary inputs in your design.

With default toggle rate (%): SmartPower initializes frequencies and probabilities of all primary inputs with the specified default toggle rate. This option is available only when using toggle rates.

With default frequency (MHz): SmartPower initializes all primary inputs in SmartPower with the specified default frequency. This option is available only when not using toggle rates.

With default probability (%): SmartPower initializes probabilities of all primary inputs with the specified default probability.

Combinational Outputs

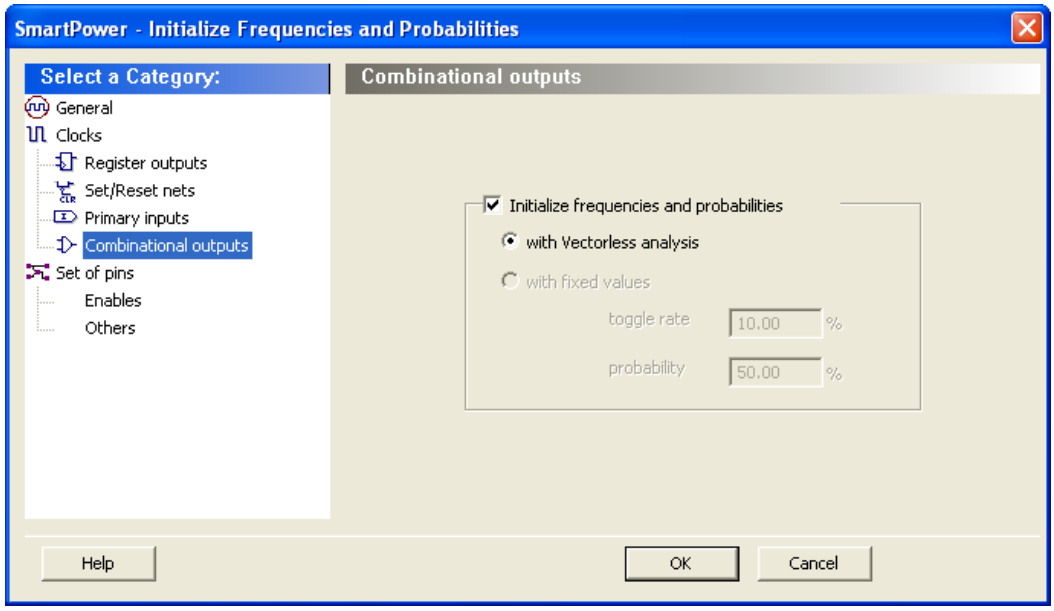


Figure 18 · Frequencies and Probabilities Dialog Box – Combinational

Initialize frequencies and probabilities – Select this option to initialize frequencies and probabilities for the combinational outputs in your design.

With vectorless analysis – SmartPower initializes frequencies and probabilities with vectorless analysis.

With fixed values: SmartPower initializes frequencies and probabilities (%) of all combinational outputs with a default toggle rate (available only when using toggle rates) or frequency (when not using toggle rates), and a default probability.

Enables

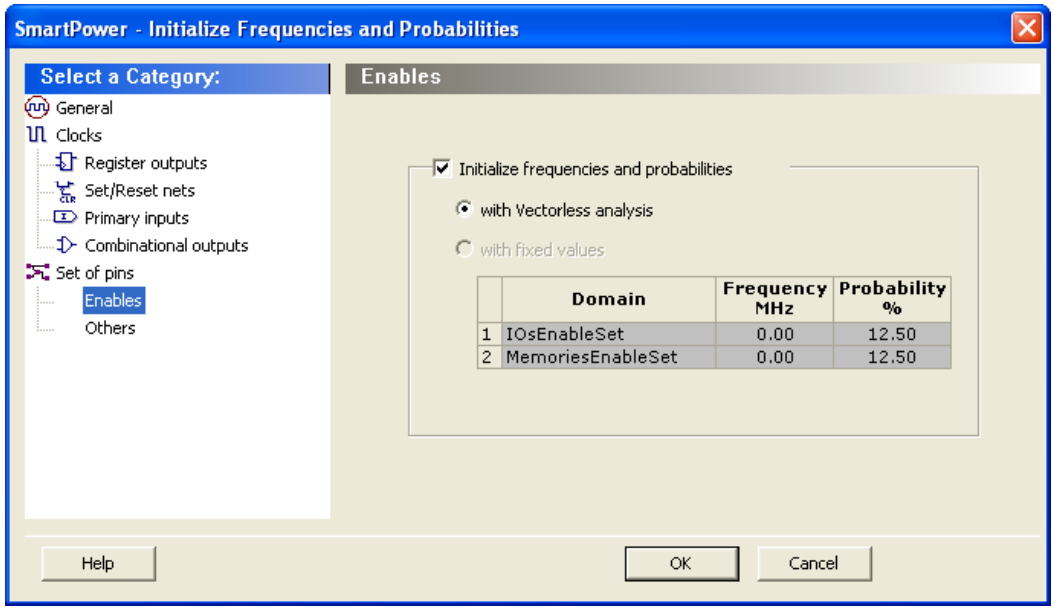


Figure 19 · Frequencies and Probabilities Dialog Box – Enables

Initialize frequencies and probabilities – Select this option to initialize frequencies and probabilities for the enable sets of pins in your design.

With vectorless analysis – SmartPower initializes frequencies and probabilities with vectorless analysis.

With fixed values: SmartPower initializes frequencies and probabilities of all enables sets of pins with the specified default probability and frequency.

Others

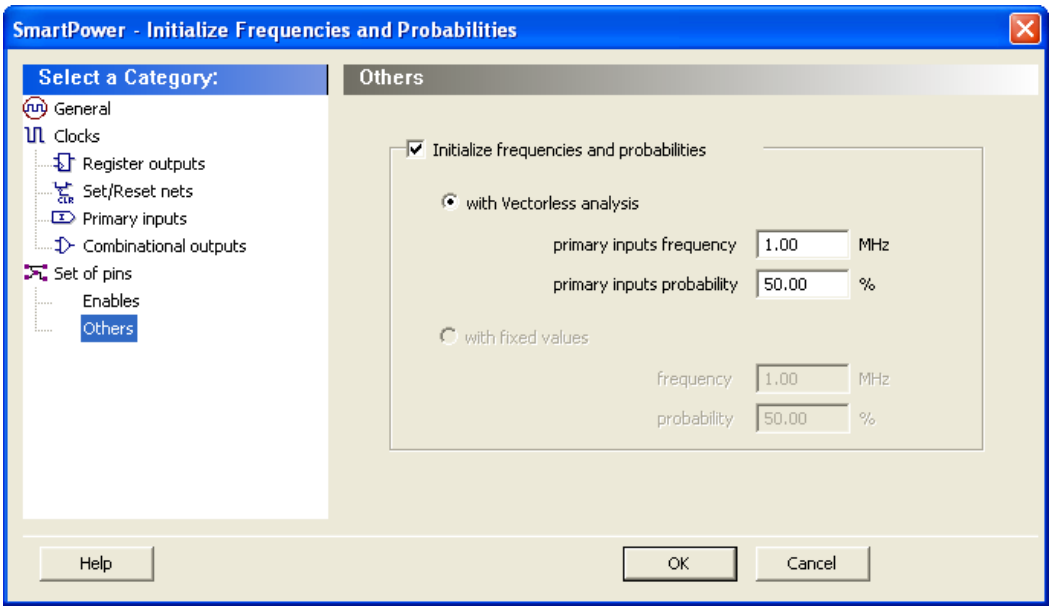


Figure 20 · Frequencies and Probabilities Dialog Box – Others

Initialize frequencies and probabilities – Select this option to initialize frequencies and probabilities for the other sets of pins in your design with default values.

With vectorless analysis – SmartPower initializes frequencies and probabilities with vectorless analysis as specified in the primary inputs frequency and probability.

With fixed values: SmartPower initializes frequencies and probabilities (%) of all other sets of pins with a default frequency and probability.

See Also

Domains Tab

Vectorless Analysis

Power Options

Enables you to set options that affect the graphical and textual reports.

To open the SmartPower **Power Options** dialog box:

- From the **File** menu choose **Options**
- Select the **Options** panel in the **Power Report** dialog box.
- Click the  icon in the SmartPower toolbar.

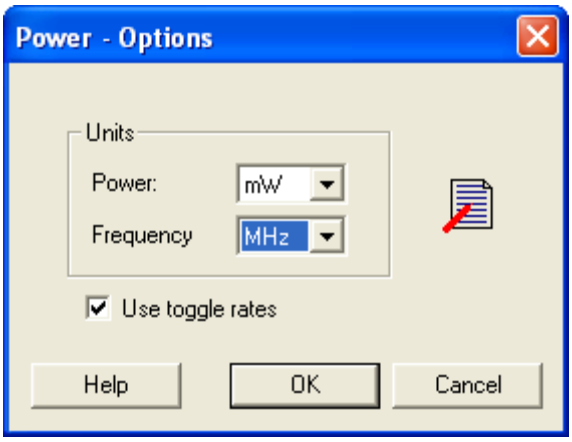


Figure 21 · SmartPower Preferences Dialog Box

There are two sections: **Units** and **Use Toggle Rates**.

- **Units:** Sets unit preferences for power (W, mW, υW) and frequency (Hz, KHz, MHz).
- **Use Toggle Rates:** When toggle rates are active (**Use Toggle Rates** box is checked), the data frequency of all the clock domains is defined as a function of the clock frequency. This updates the data frequency automatically when you update the clock frequency. Toggle rates enable you to specify the data frequency as a percentage of clock frequency, but you can no longer specify the data frequency as a number, only as a percentage of the clock frequency. To specify data frequencies, clear the **Use Toggle Rates** option in the **Preferences** window.

You can set the data frequency percentage when you create a new clock domain with toggle rates active. In addition, when toggle rates are active you can set the data frequency percentage in the Domain and Frequencies tabs.

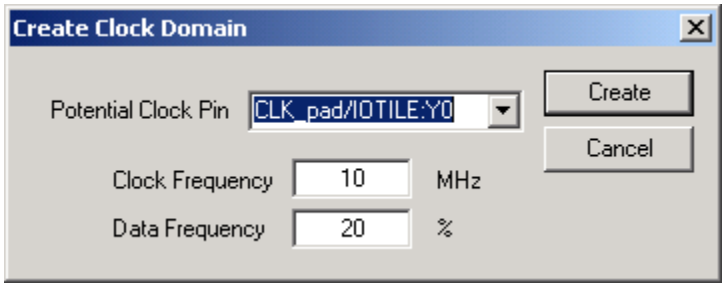


Figure 22 · Create Clock Domain – Toggle Rates Enabled

Operating Conditions

The SmartPower Operating Conditions dialog box enables you to customize the operating conditions used in SmartPower for voltage and temperature.

Note: Changes will apply only to SmartPower and will not change the operating conditions set in Designer.

The General panel enables you to select the operating condition you want to apply to SmartPower: Best, Typical, or Worst.

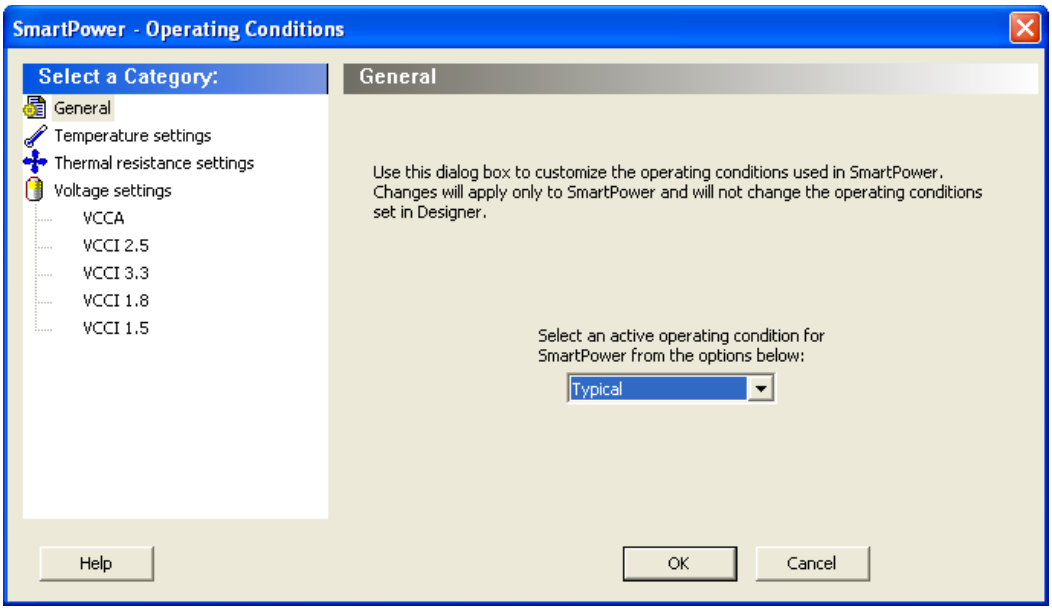


Figure 23 · SmartPower Operating Conditions Dialog Box - General

You can customize temperature settings in the Temperature Settings panel, and the voltage settings in the Voltage Settings panels — each VCC voltage used in the design appears under Voltage settings.

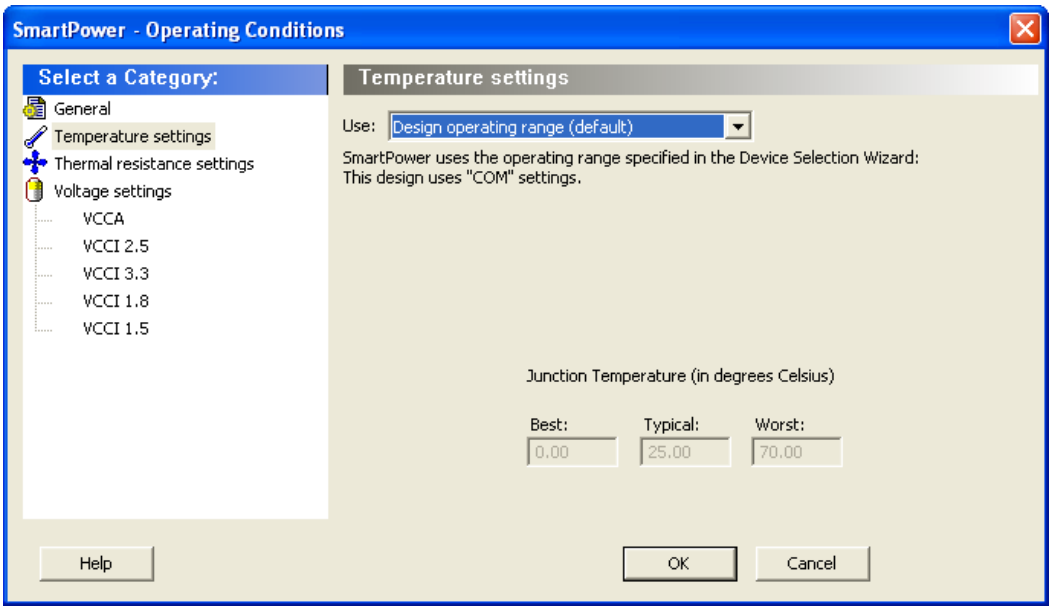


Figure 24 · SmartPower Operating Conditions Dialog Box - Temperature Settings

Select one of three options to specify the temperature or voltage settings:

- **Design operating range (default)**: sets the temperature or voltage operating range as specified in your Project Settings..
- **Custom operating range**: sets the temperature (junction or ambient) or voltage operating range for the current design in SmartPower only. You can enter temperature values in degrees Celsius and voltage values in volts for Best, Typical, and Worst.
- **Mode by mode operating range**: sets the temperature (junction or ambient) or voltage for each mode in SmartPower only. You can use the grid to enter temperature values in degrees Celsius and voltage values in volts for each mode, or select multiple modes in the grid, and click the **Set values for selected modes** button to enter the same values for all selected modes.

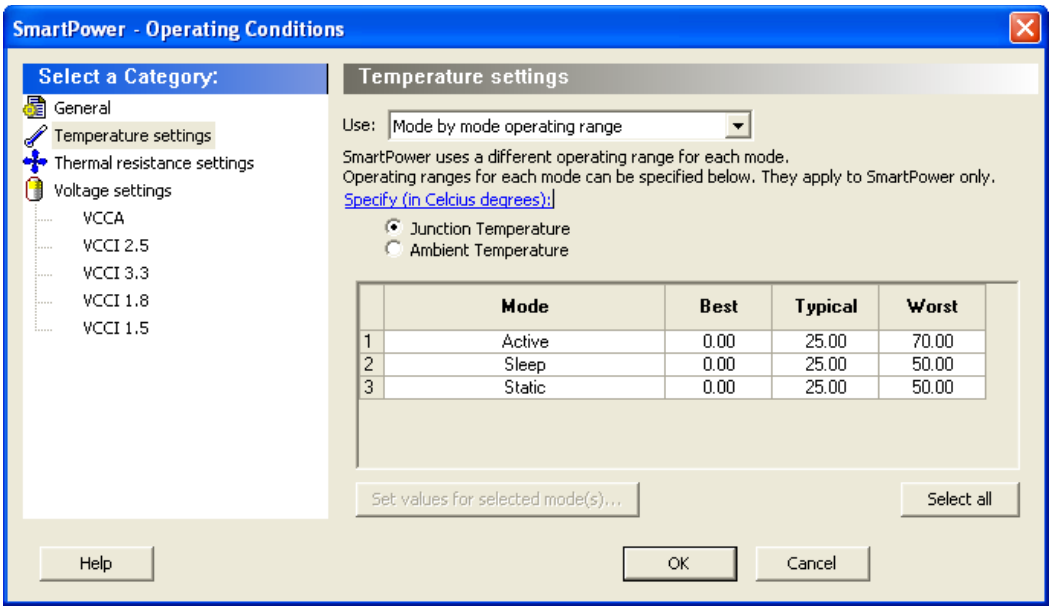


Figure 25 · SmartPower Operating Conditions Dialog Box - Mode-Specific Temperature Settings

The junction temperature and static power are computed iteratively until they converge.

The formulas are:

$$T_J = T_A + \theta_{JA} \cdot (P_{dynamic} + P_{static})$$

$$P_{static} = f(T_J) = P_0 + P_1 \cdot T_J$$

If the computed junction temperature is outside the operating condition range (smaller than the best case value or greater than the worst case value), a violation warning will be reported.

Both T_J and P_{static} will be re-computed when any of the following parameters are changed:

- Ambient temperature
- Cooling style
- Custom thermal resistance,

or any parameters/options that affect the static or dynamic power values:

- Junction Temperature Display Mode
- Operating Condition (Affect dynamic power)
- Operating Mode (Affect dynamic power)
- Any of the clock domain frequencies (Affect dynamic power)

If you specified the Ambient temperature in the Temperature Settings panel, you can select the thermal characteristic for $Theta_{JA}$.

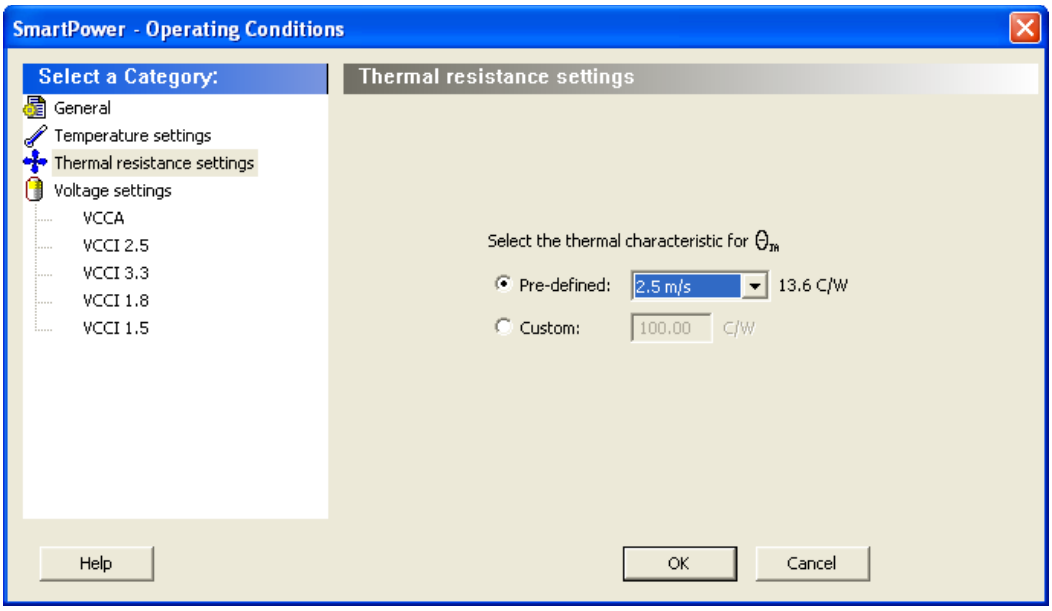


Figure 26 · SmartPower Operating Conditions Dialog Box - Thermal Resistance Settings

The thermal resistance is predefined for Still Air, 300 ft/min and Case Cooling. To enter a custom thermal resistance, select **Custom** from the **Cooling** field, and change the value.

SmartPower also reports the thermal resistance, $Theta_{JA}$.

See Also

SmartPower toolbar / menu commands

SmartPower preferences toolbar

Custom Operating Modes

SmartPower enables you to use pre-defined and custom operating modes. A pre-defined operating mode is an inherent mode of a family of devices that comes with a number of hard availability constraints on the FPGA resources. Custom operating modes are user-defined modes based on one of the pre-defined modes available for the family, where parameters such as clock, data, and toggle rate frequencies have been customized. A custom mode can also be linked to a VCD.

Custom modes can be used:

- To define additional modes where the chip is in the active pre-defined mode, but where the clock frequencies or the toggle rates are scaled up or down.
- To import multiple VCD files that capture individual steps that take place in different modes.
- To define a sequence of modes with a duration for each mode and get an estimate of the overall power consumption, from which extrapolate the battery life for the application. The Scenario Power report enables you to define a sequence of modes and estimate the weighted average of the power consumption of the chip over the whole sequence.
- To define additional modes where the chip is in a pre-defined mode, but the junction/ambient temperature or the rails' voltage modes are different.

To set the current mode:

From the **Edit** menu in SmartPower, choose **Modes and Scenarios > Use for Analysis >** *mode name*; or select the mode in the Modes and Scenarios toolbar.

To create a new custom mode:

1. From the **Edit** menu in SmartPower, choose **Modes and Scenarios > Custom Modes > New Custom Mode**; or click **Custom Modes** in the Modes and Scenarios toolbar, and select **New custom mode**. This brings up the New Custom Mode dialog box.

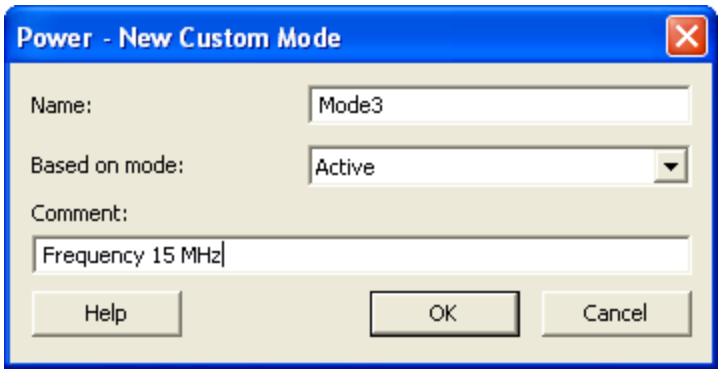


Figure 27 · New Custom Mode Dialog Box

2. Enter the mode name, select the base mode, and enter comments that describe the mode. The base mode can be either a user-defined custom mode or the active mode. The new mode will inherit all clock and data frequencies and annotations of its base mode.
3. Click **OK**. The newly created operating mode is set as default in the Modes and Scenarios toolbar.

To edit a custom mode:

1. From the **Edit** menu in SmartPower, choose **Modes and Scenarios > Custom Modes > Edit Custom Mode**; or right-click the mode in the Modes and Scenarios toolbar, and select **Edit custom mode**. This brings up the Edit Custom Mode dialog box.

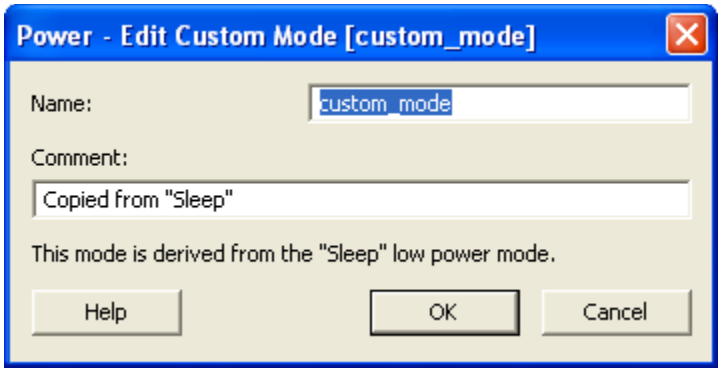


Figure 28 · Edit Custom Mode Dialog Box

2. Edit the mode name and comments.
3. Click **OK**.

Note: You can only use the Edit Mode dialog box to edit the name and comment of the current mode. To edit the mode properties such as clock and data frequencies, use the SmartPower tabs.

To copy a custom mode:

1. Right-click the mode in the Modes and Scenarios toolbar, and select **Create a copy of this mode**. This brings up the New Custom Mode dialog box.

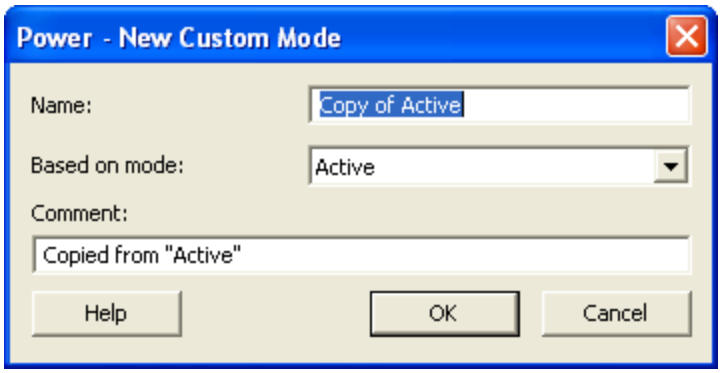


Figure 29 · New Custom Mode Dialog Box

2. Edit the mode name and comments.
3. Click **OK**.

To delete a custom mode:

1. From the **Edit** menu in SmartPower, choose **Modes and Scenarios > Custom Modes > Delete Custom Mode**; or right-click the mode in the Modes and Scenarios toolbar, and select **Delete Mode**. This brings up the Delete Custom Mode dialog box.

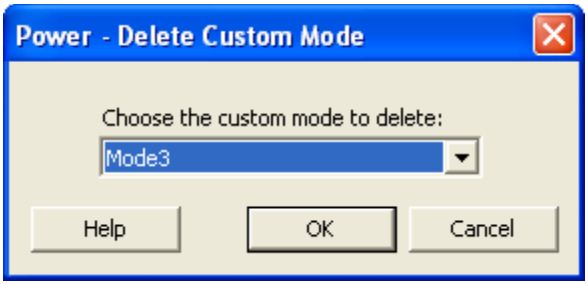


Figure 30 · Delete Custom Mode Dialog Box

2. Select the mode from the pull down and click **OK**.

Note: You can only delete custom operating modes. Pre-defined modes cannot be deleted.

Scenarios

A scenario is a sequence of previously defined operating modes with a specific duration for each mode. When you create a new design, SmartPower will automatically create some pre-defined scenarios that can be used as is, or copied to create a new scenario based on the pre-defined one.

Note: Pre-defined scenarios cannot be deleted or edited.

To set the current scenario for analysis:

From the **Edit** menu in SmartPower, choose **Modes and Scenarios > Use for Analysis >** <*scenario name*>; or select the scenario in the Modes and Scenarios toolbar.

Note: When a scenario is selected, only the Summary tab is available.

To create a new custom scenario

1. From the **Edit** menu in SmartPower, choose **Modes and Scenarios > Custom Scenarios > New Custom Scenario**; or click **Scenarios** in the Modes and Scenarios toolbar, and select **New custom scenario**. This brings up the New Custom Scenario dialog box.
2. Enter the scenario name, enter a duration (total duration for the sequence must equal to 100%) and select previously defined operating modes for this sequence.
3. Click **OK**. The newly created scenario is set as default in the Modes and Scenarios toolbar.

To edit a custom scenario:

1. From the **Edit** menu in SmartPower, choose **Modes and Scenarios > Custom Scenarios > Edit Custom Scenario**; or right-click the scenario in the Modes and Scenarios toolbar, and select **Edit custom scenario**. This brings up the Edit Custom Scenario dialog box.

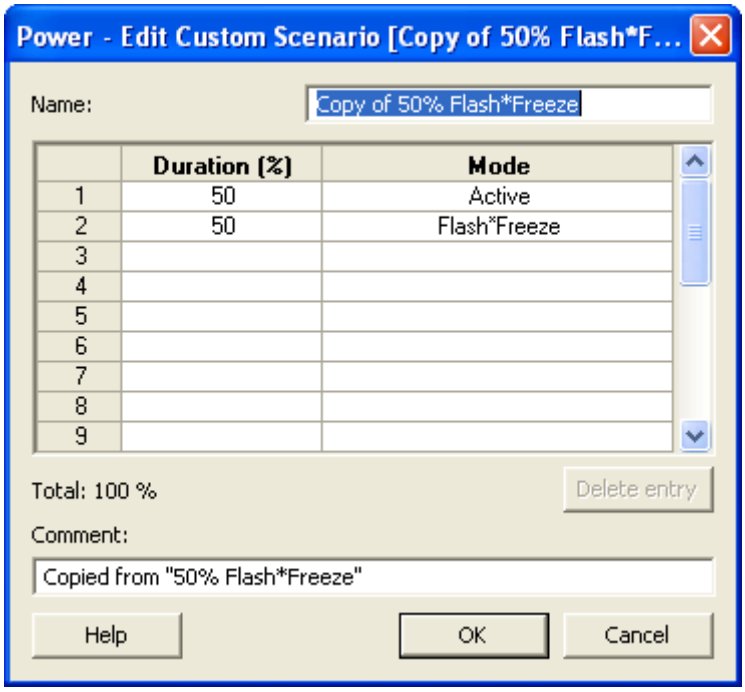


Figure 31 · Edit Custom Scenario Dialog Box

2. Edit the information.
3. Click **OK**.

To copy a scenario:

1. Right-click the scenario in the Modes and Scenarios toolbar, and select **Create a copy of this scenario**. This brings up the New Custom Scenario dialog box.

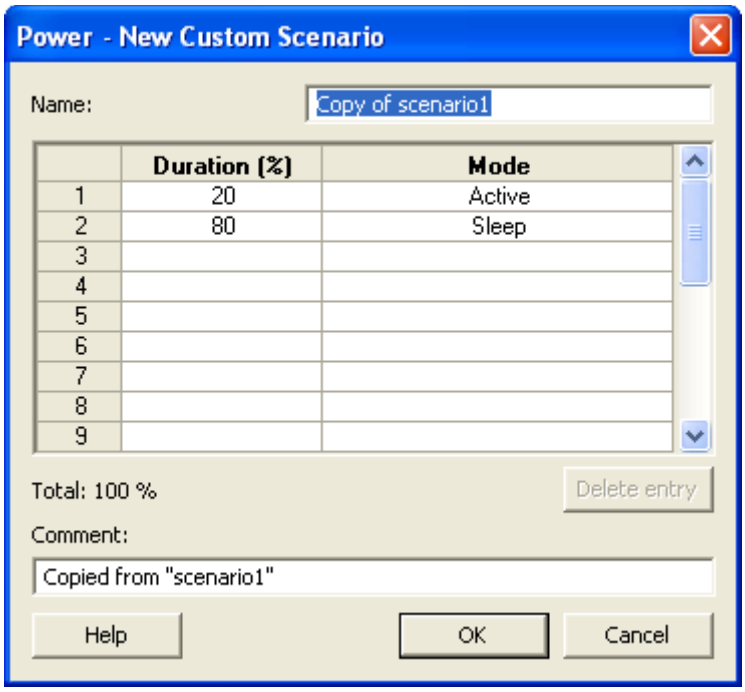


Figure 32 · New Custom Scenario Dialog Box

2. Edit the information.
3. Click **OK**.

To delete a custom scenario:

1. From the **Edit** menu in SmartPower, choose **Modes and Scenarios > Custom Scenarios > Delete Custom Scenario**; or right-click the scenario in the Modes and Scenarios toolbar, and select **Delete Scenario**. This brings up the Delete Custom Scenario dialog box.

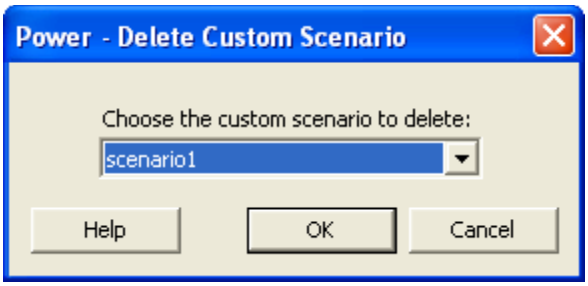


Figure 33 · Delete Custom Scenario Dialog Box

2. Select the scenario from the pull down and click **OK**.

Power Reports

The power report enables you to quickly determine if any power consumption problems exist in your design.

To generate a power report:

1. From the Designer **Tools** menu, choose **Reports > Power > Power**. The Power Report dialog box appears.
2. Select the options you want to include in the report, and then click **OK**. The power report appears in a separate window.

   You can also generate the power report from within SmartPower. From the **Tools** menu, choose **Reports > Power Report**, or click the **Report** button to open the **Report** dialog box. By default, the report includes global design information and a power summary. Specify which results you want to display by selecting the categories and their options.

The power report dialog box is organized in the following panels: General, Operating Conditions, Options, Breakdown by Instance, Frequency Summary, and Probability Summary.

General

The general panel enables you to select what to include in the report, the report format, and the mode that you want to generate the report for.

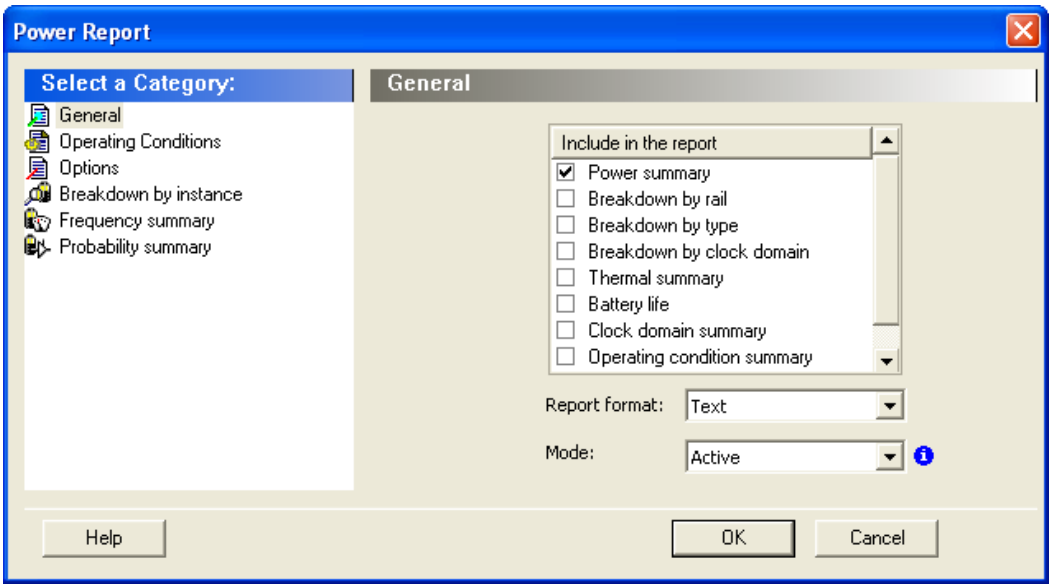


Figure 34 · SmartPower Power Report Dialog Box - General Panel

Include in the Report

Select the option(s) that you want to include in the Power Report:

Power summary – This section reports the static, dynamic and total power consumption of the design.

Breakdown by rail – This section shows the power consumption of each rail.

Breakdown by type – This section enables reporting on the power consumption according to: gates, nets, clocks, core static, IOs and memories.

Breakdown by clock domain – This section enables reporting on the power consumption of each clock domain.

Thermal summary – This section includes a thermal report. The ambient temperature can be defined by the operating conditions or defined by the ambient temperature.

When the first option is selected, the following characteristics are reported:

- Operating conditions
- Temperature range
- Junction temperature

When the second option is selected, the following characteristics are reported:

- Ambient temperature
- Cooling style
- Package
- Thermal resistance Theta-JA
- Junction temperature
- Temperature range
- Junction temperature range limits specification

Battery Life – This section reports the battery life.

Clock Domain Summary – This section reports the clock and data frequencies for each clock domain.

Operating Condition Summary – This section reports the operating conditions.

Annotation Coverage - This section reports the number and percentage of pins annotated by each source (VCD, manual annotation, SmartTime constraint, vectorless estimation, and fixed values) for all clocks, register outputs, combinational outputs, set/reset nets, primary inputs, enable pins, and other pins

Report Format

Select **Text** or **CSV** (Comma Separated Value) as the desired export format.

Mode

Select a mode to generate the report for.

Operating Conditions

The Operating Conditions panel enables you to select the operating conditions for the current report.

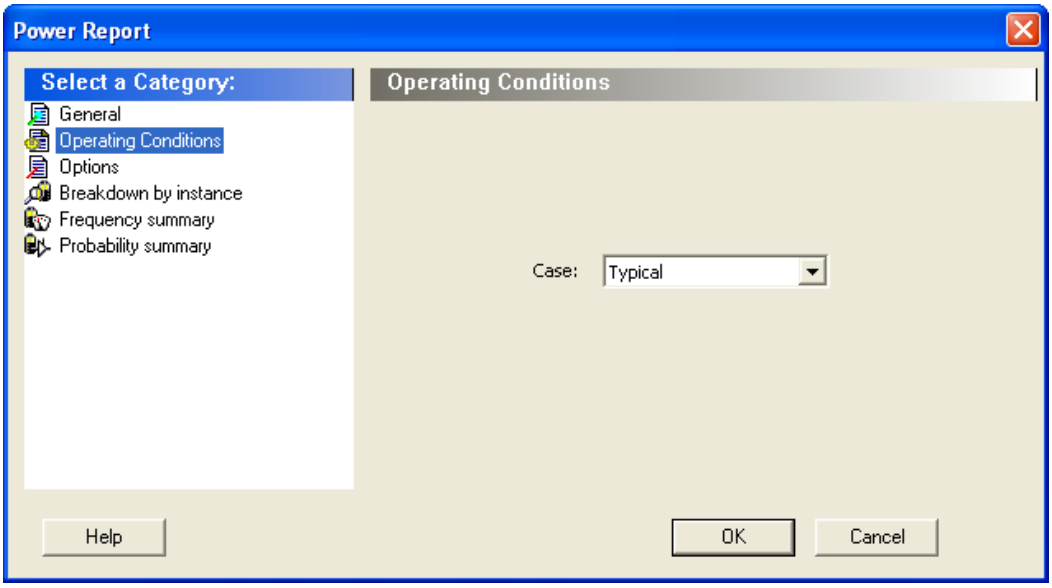


Figure 35 · SmartPower Power Report Dialog Box - Operating Conditions Panel

Options

The Options panel enables you to select power and frequency units and to use toggle rates.

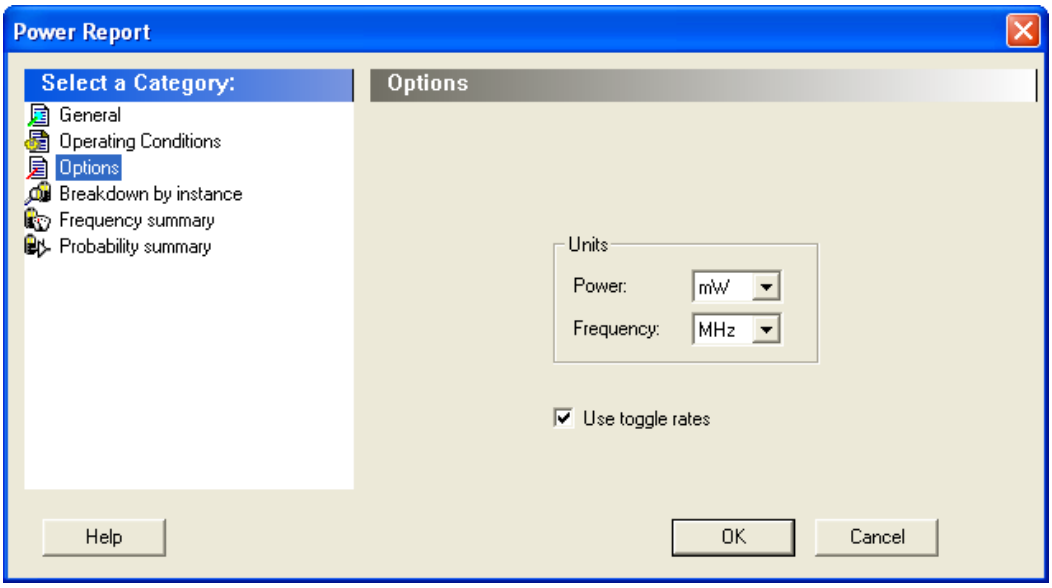


Figure 36 · SmartPower Power Report Dialog Box - Options Panel

Units

Frequency: Sets unit preferences for frequency - Hz, KHz, MHz.

Power Units: Sets unit preferences for power - W, mW, or uW.

Use Toggle Rates

When toggle rates are active (**Use Toggle Rates** box is checked), the data frequency of all the clock domains is defined as a function of the clock frequency. This updates the data frequency automatically when you update the clock frequency. Toggle rates enable you to specify the data frequency as a percentage of clock frequency, but you can no longer specify the data frequency as a number, only as a percentage of the clock frequency. To set the data frequency again, clear the **Use Toggle Rates** option.

Breakdown by Instance

From this panel you can include the breakdown by instance in the report and set specific options.

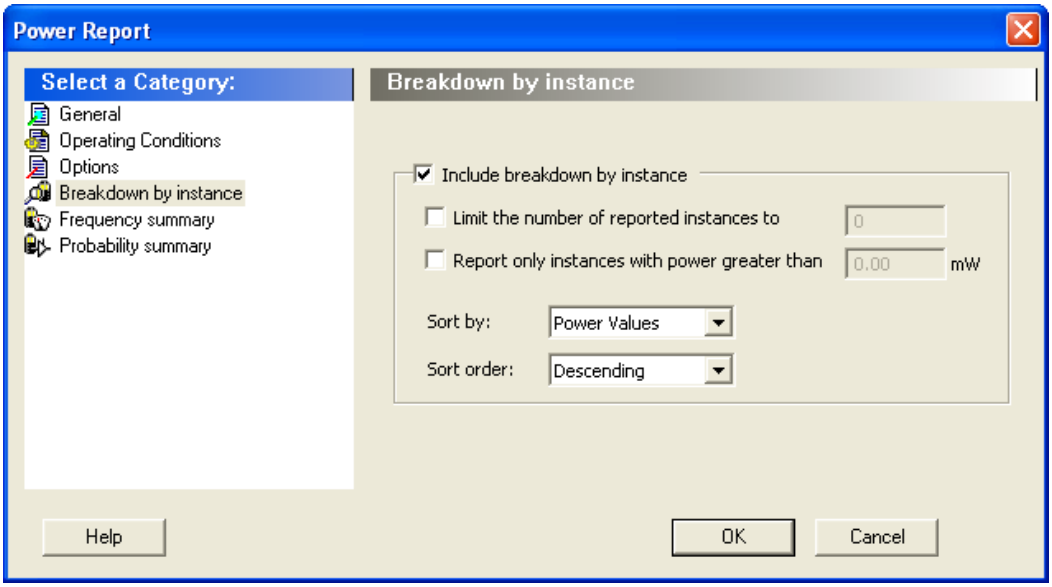


Figure 37 · SmartPower Power Report Dialog Box - Breakdown By Instance Panel

Include breakdown by instance – This section shows the power consumption of each element that has been instantiated in the design: gates, nets, memories, and IOs.

The breakdown by instance can be filtered by:

- **Limit the number of reported instances to:** will limit the number of instances reported to the specified number.
- **Report only instances with power greater than:** any instance with power consumption below the selected value will not be reported.

This section can be sorted by selecting the preferred method:

- **Sort by:** Name (alphabetical) or Power Values
- **Sort Order:** Ascending or Descending

Note: The filter reduces the number of lines in the report, one per instance.

Frequency Summary

From this panel you can include the frequency summary in the report and set specific options.

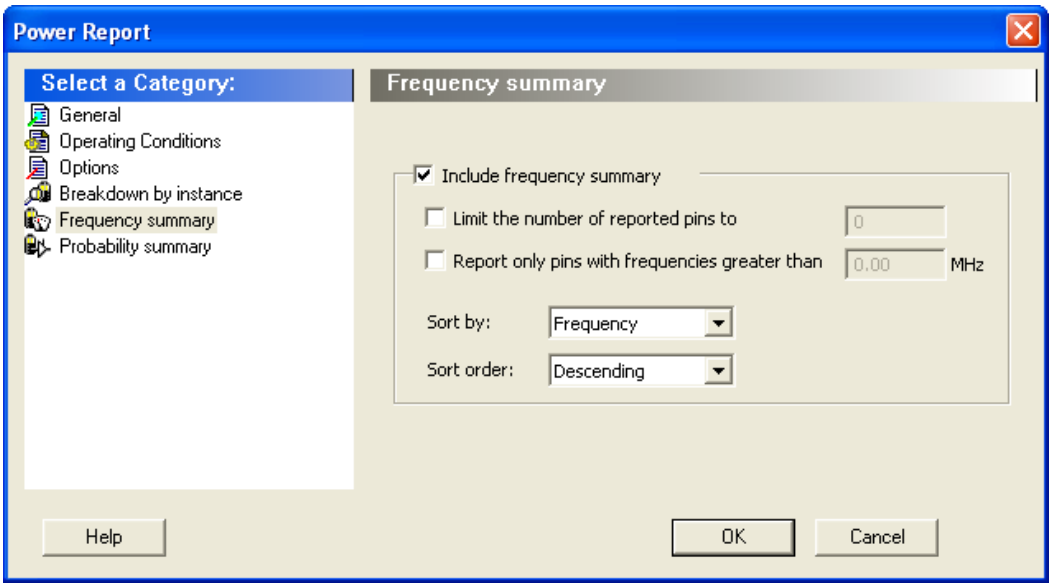


Figure 38 · SmartPower Power Report Dialog Box - Frequency Summary Panel

Include frequency summary – This section shows the frequency summary and reports the pin, net, domain, frequency, and frequency source for each pin.

The frequency summary can be filtered by:

- **Limit the number of reported pins to:** will limit the number of pins reported to the specified number.
- **Report only pins with frequencies greater than:** any pin with a frequency below the selected value will not be reported.

This section can be sorted by selecting the preferred method:

- **Sort by:** Pin Name, Net Name, Domain, Frequency, or Source
- **Sort Order:** Ascending or Descending

Probability Summary

From this panel you can include the probability summary in the report and set specific options.

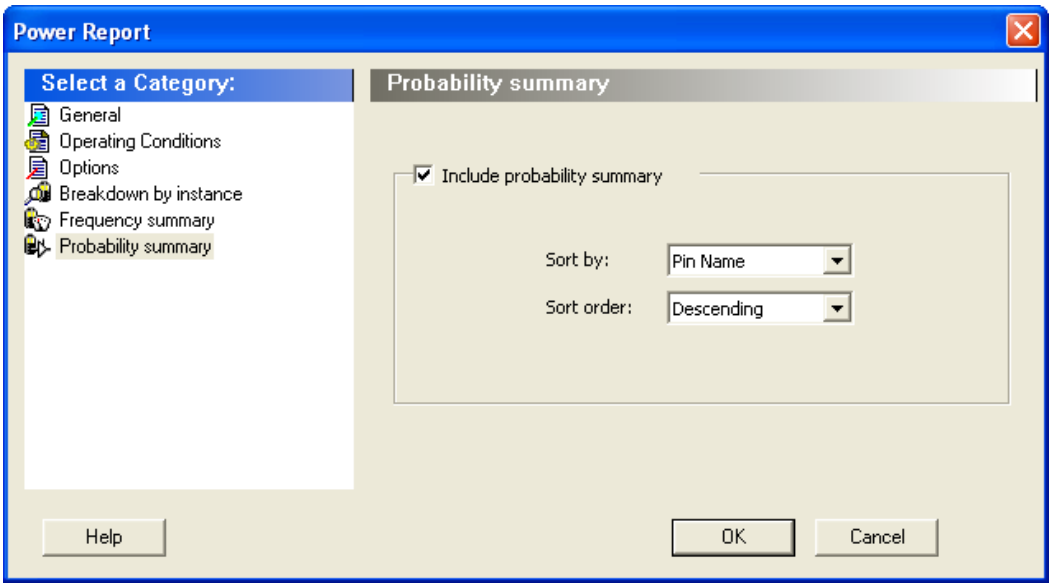
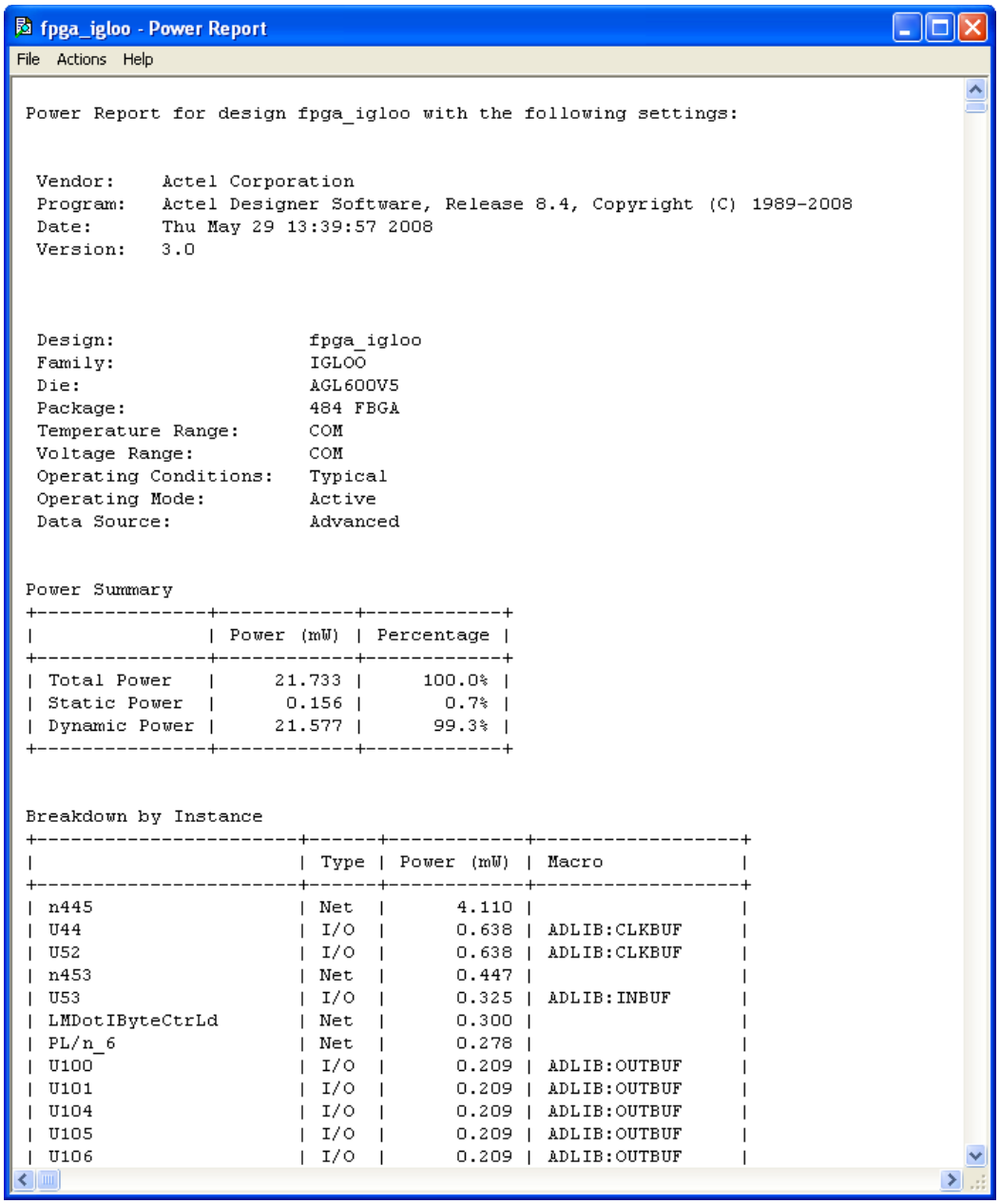


Figure 39 · SmartPower Power Report Dialog Box - Probability Summary Panel

Include probability summary – This section shows the probability summary and reports the driver, net, rate, source, and type for each pin.

This section can be sorted by selecting the preferred method:

- **Sort by:** Pin Name, Net Name, Rate, Source, or Type
- **Sort Order:** Ascending or Descending



fpga_igloo - Power Report

File Actions Help

```
Power Report for design fpga_igloo with the following settings:


 Vendor:    Actel Corporation
 Program:   Actel Designer Software, Release 8.4, Copyright (C) 1989-2008
 Date:      Thu May 29 13:39:57 2008
 Version:   3.0



 Design:                 fpga_igloo
 Family:                 IGLOO
 Die:                    AGL600V5
 Package:                484 FBGA
 Temperature Range:      COM
 Voltage Range:          COM
 Operating Conditions:   Typical
 Operating Mode:         Active
 Data Source:            Advanced


Power Summary
+---------------+------------+------------+
|               | Power (mW) | Percentage |
+---------------+------------+------------+
| Total Power   |     21.733 |     100.0% |
| Static Power  |      0.156 |       0.7% |
| Dynamic Power |     21.577 |      99.3% |
+---------------+------------+------------+


Breakdown by Instance
+----------------------+------+------------+------------------+
|                      | Type | Power (mW) | Macro            |
+----------------------+------+------------+------------------+
| n445                 | Net  |      4.110 |                  |
| U44                  | I/O  |      0.638 | ADLIB:CLKBUF     |
| U52                  | I/O  |      0.638 | ADLIB:CLKBUF     |
| n453                 | Net  |      0.447 |                  |
| U53                  | I/O  |      0.325 | ADLIB:INBUF      |
| LMDotIByteCtrLd      | Net  |      0.300 |                  |
| PL/n_6               | Net  |      0.278 |                  |
| U100                 | I/O  |      0.209 | ADLIB:OUTBUF     |
| U101                 | I/O  |      0.209 | ADLIB:OUTBUF     |
| U104                 | I/O  |      0.209 | ADLIB:OUTBUF     |
| U105                 | I/O  |      0.209 | ADLIB:OUTBUF     |
| U106                 | I/O  |      0.209 | ADLIB:OUTBUF     |
```

Figure 40 · SmartPower Report

In addition to the information selected on the **Power Reports** dialog box, the report contains global design information.

Global design information: This section shows the target family, the package and the die. It also shows information about the operating conditions, speed grade, and power mode. This option is set by default.

See Also

Report (Power)

Scenario Power Report

The scenario power report enables you to select a previously defined scenario and calculate the average power consumption and the battery life for this scenario.

To generate a scenario power report:

Note: In order to generate a scenario power report, your design must contain one or more scenarios.

1. From the Designer **Tools** menu, choose **Reports > Power > Power Scenario**. The Scenario Power Report dialog box appears.
2. Select the options you want to include in the report, and then click **OK**. The scenario power report appears in a separate window.

You can also generate the scenario power report from within SmartPower. From the **Tools** menu, choose **Reports > Scenario Power Report**, or click the **Scenario Power Report** button to open the Power Scenarios dialog box. By default, the report includes global design information and power sequencer summary. Specify which results you want to display by checking the boxes to be included in the report.

The power report dialog box is organized in the following panels: General, Operating Conditions, Options, and Battery Life.

General

The general panel enables you to select what to include in the report, the report format, and the scenario you want to generate the report for.

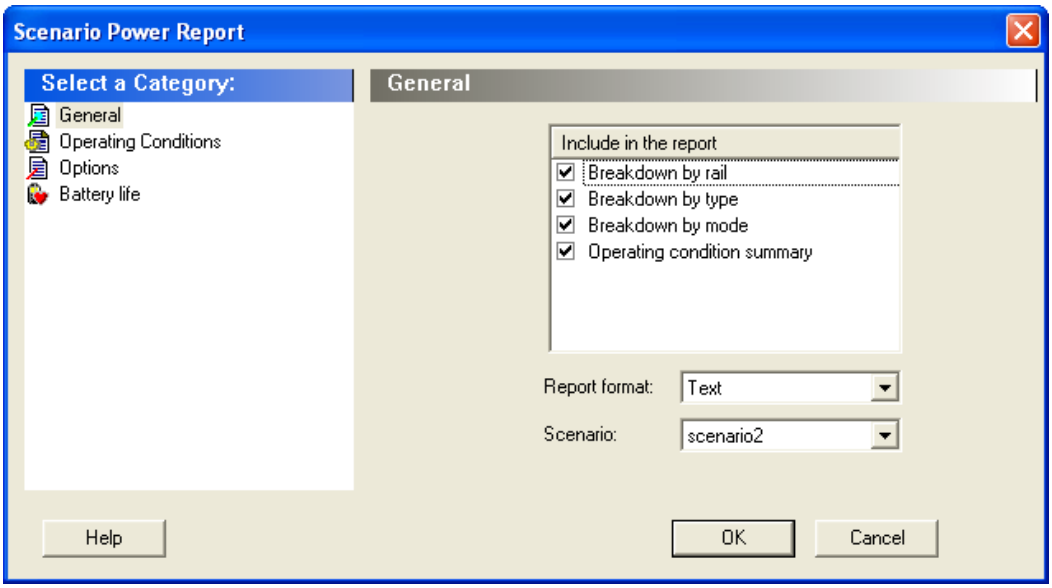


Figure 41 · SmartPower Scenario Power Report Dialog Box – General Panel

Include in the Report

Breakdown by Rail – This section shows the power consumption of each rail.

Breakdown by Type – This section enables reporting on the power consumption according to: gates, nets, clocks, core static, IOs, and memories.

Breakdown by Mode – This section enables reporting on the power consumption by mode.

Operating Condition Summary – This section reports the operating conditions.

Report Format

Select **Text** or **CSV** (Comma Separated Value) as the desired export format.

Scenario

Select a previously defined scenario to generate the report from.

Operating Conditions

The Operating Conditions panel enables you to select the operating conditions case for the current design.

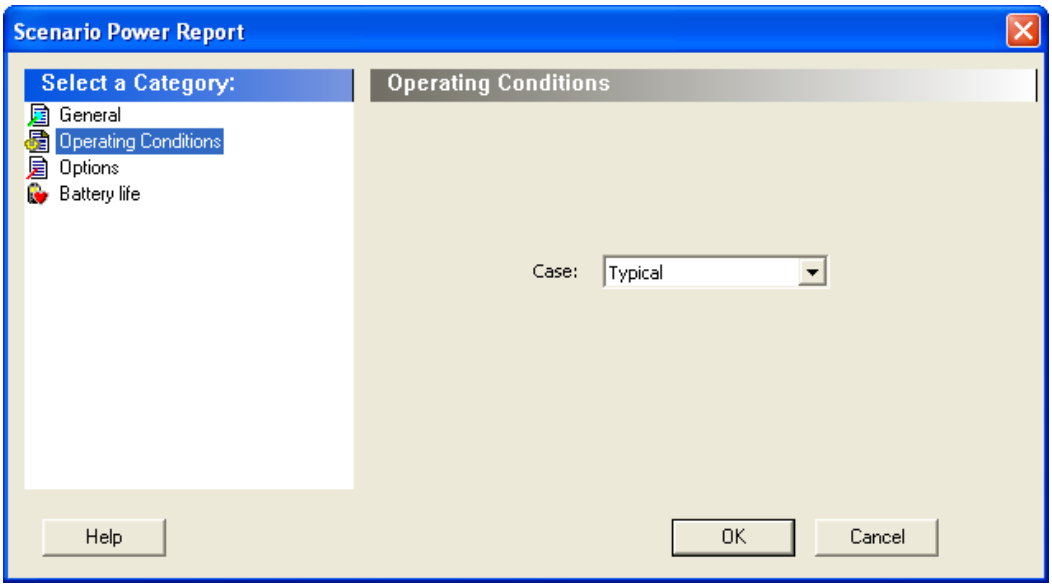


Figure 42 · SmartPower Scenario Power Report Dialog Box – Operating Conditions Panel

Options

The Options panel enables you to select power and frequency units and to use toggle rates.

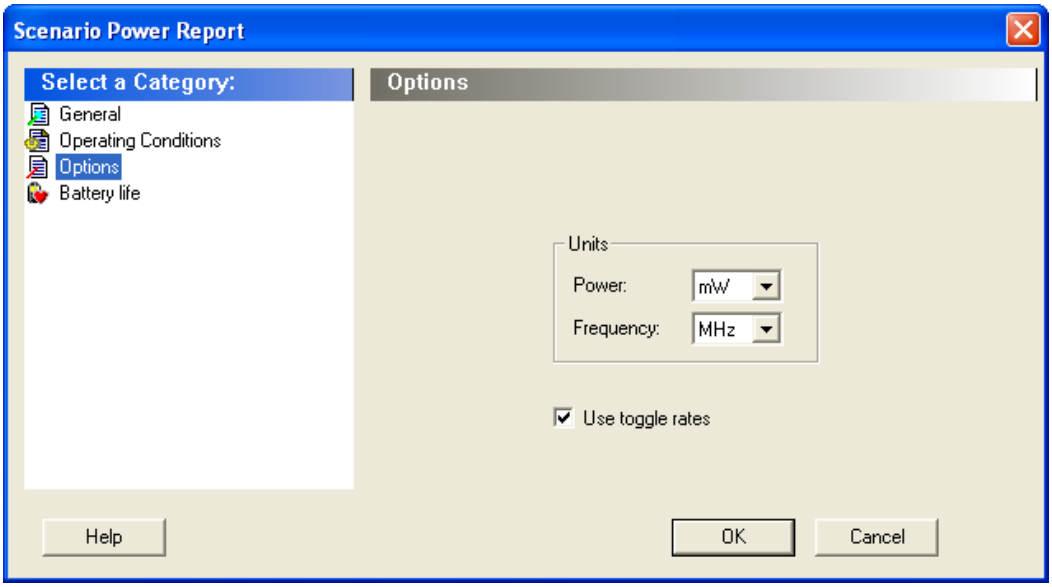


Figure 43 · SmartPower Scenario Power Report Dialog Box – Options Panel

Units

Frequency: Sets unit preferences for frequency – Hz, KHz, MHz.

Power Units: Sets unit preferences for power – W, mW, or υW.

Use Toggle Rates

When toggle rates are active (**Use Toggle Rates** box is checked), the data frequency of all the clock domains is defined as a function of the clock frequency. This updates the data frequency automatically when you update the clock frequency. Toggle rates enable you to specify the data frequency as a percentage of clock frequency, but you can no longer specify the data frequency as a number, only as a percentage of the clock frequency. To set the data frequency again, clear the **Use Toggle Rates** option.

Battery Life

The Battery Life panel enables reporting of the battery capacity and the battery life. Enter a battery capacity in MA/Hrs.

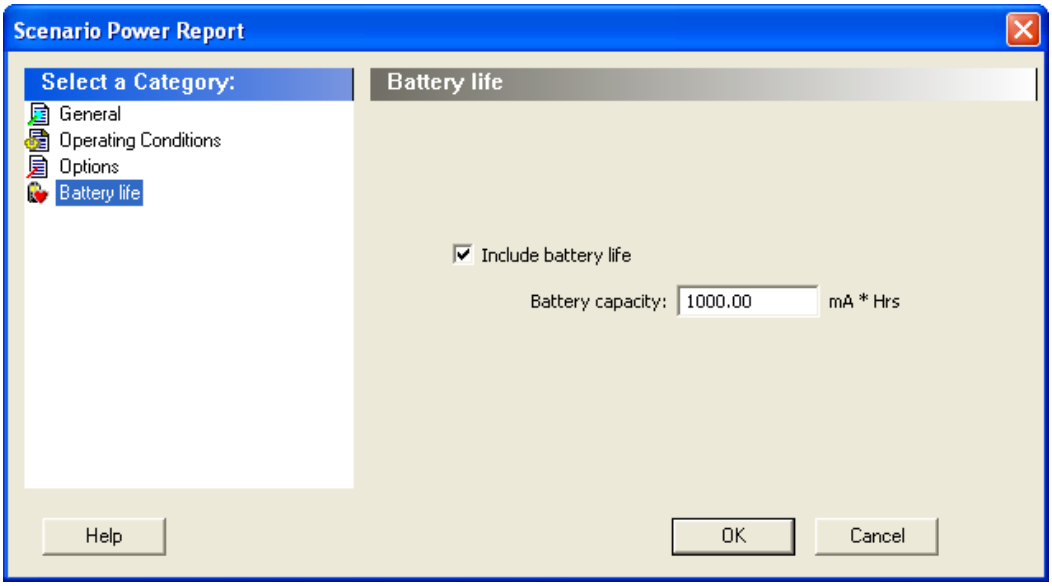


Figure 44 · SmartPower Scenario Power Report Dialog Box – Battery Life Panel

The SmartPower scenario power report returns the average power consumption and battery life for this sequence.

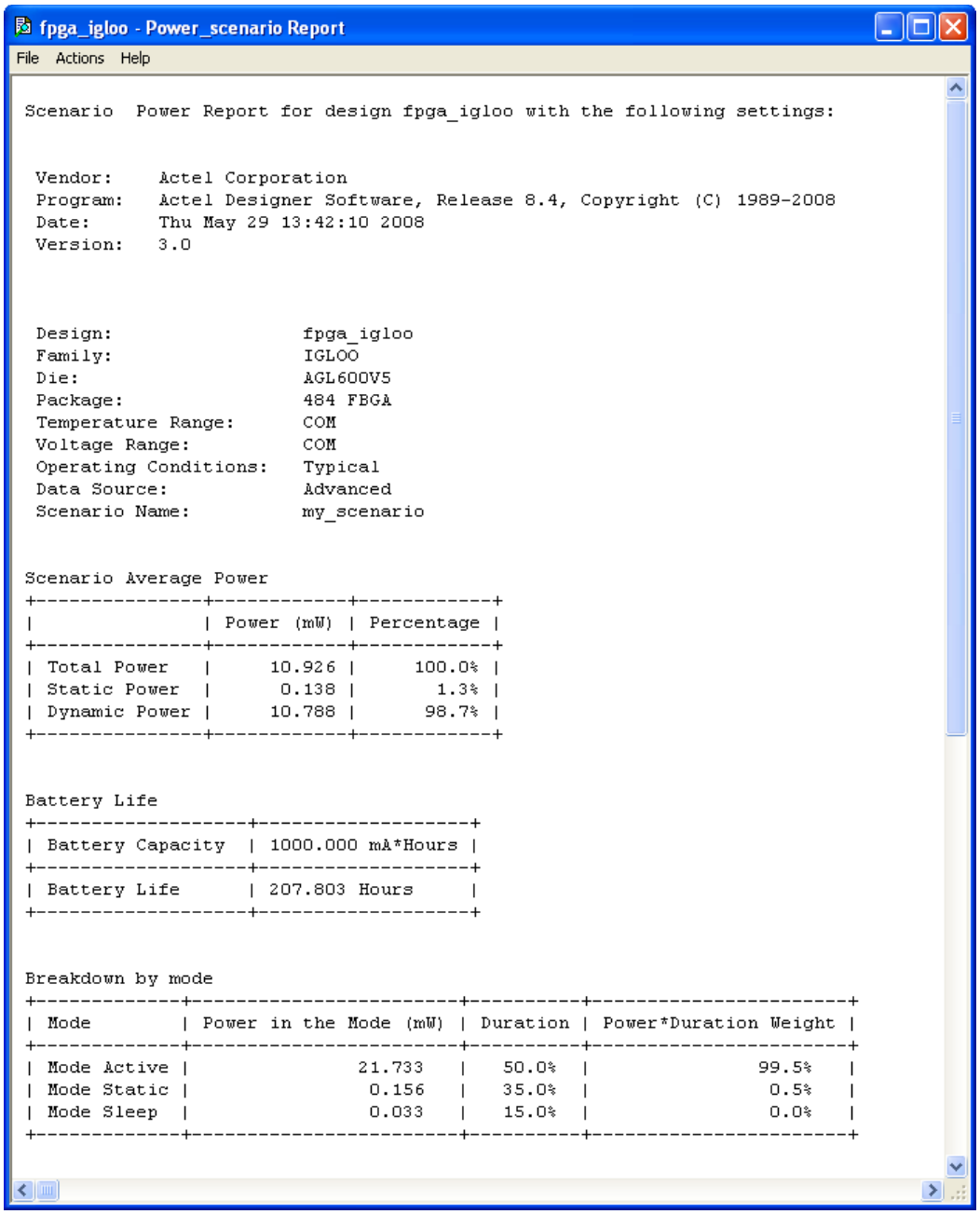


Figure 45 · SmartPower Scenario Power Report

In addition to the information selected on the **Scenario Power Reports** dialog box, the report contains global design information, a mode summary and the sequence average power.

Global design information: This section shows the target family, the package and the die. It also shows information about the operating conditions, speed grade and power mode. This option is set by default.

Power Summary: This section reports the power consumption of the sequence by mode. This option is set by default.

Sequence Average Power: This section reports the average power consumption of the sequence. This option is set by default.

See Also

Report (Sequencer)

Cycle-Accurate Power Reports

Traditional power analysis based on a VCD simulation file reports an average power for the entire simulation time. Based on a VCD simulation file, the cycle-accurate power analysis will report one power value per clock period (or half-period) instead of an average power for the whole simulation. This feature allows to easily identify the worst cycle in terms of power performance; and helps to understand and further minimize power consumption by facilitating the analysis of data-dependent power variations, as well as dynamic power variations due to clock-gating, or even clock frequency variations.

To generate a cycle-accurate power report:

1. From the Designer **Tools** menu, choose **Reports > Power > Power Cycle Accurate**. The Cycle Accurate Power Report dialog box appears.
2. Select the options you want to include in the report, and then click **OK**. The cycle accurate power report appears in a separate window.

You can also generate the cycle accurate power report from within SmartPower. From the **Tools** menu, choose **Reports > Cycle Accurate Power Report** to open the cycle accurate power report dialog box; or select a vcd file from the Modes and Scenarios toolbar, and from the right-click menu, select **Tools > Power Cycle Accurate**.

The cycle-accurate power report dialog box is organized in the following panels: General, Sampling Period, Partial Parsing, Top-Level Name, Glitch Filtering, and History Size Reduction.

General

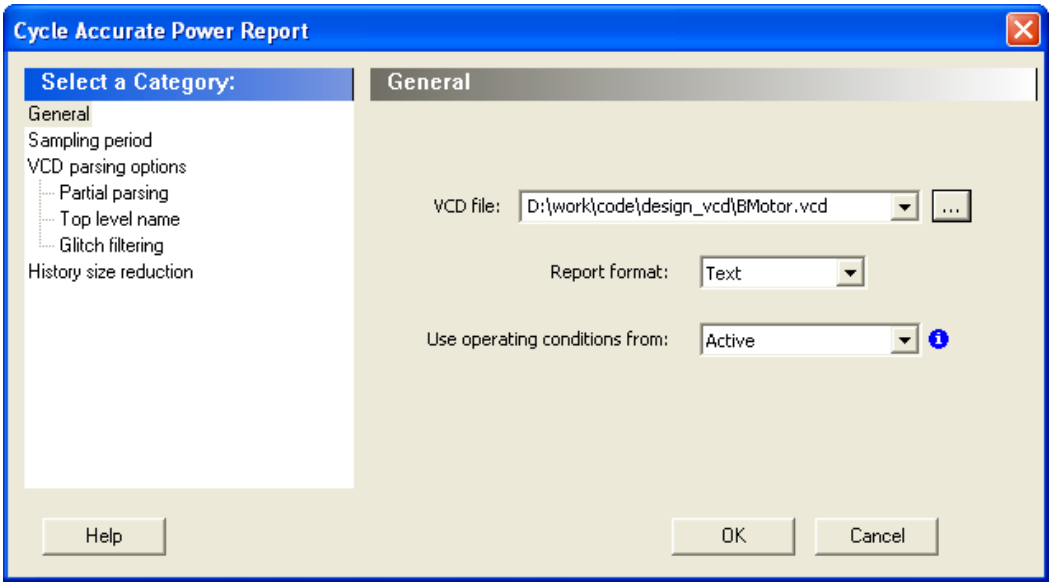


Figure 46 · SmartPower Cycle Accurate Power Report Dialog Box – General

VCD file - Select the VCD file you want to import.

Report format – Select **Text** or **CSV** (Comma Separated Value) as the desired export format.

Use operating conditions from – Select the mode from which the operating conditions will be used.

Sampling Period

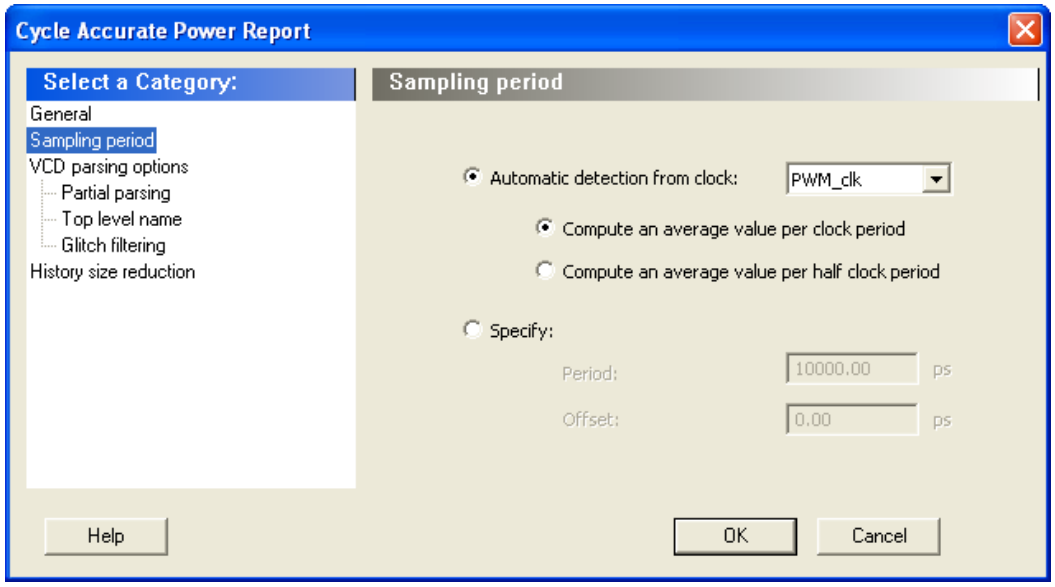


Figure 47 · SmartPower Cycle Accurate Power Report Dialog Box – Sampling Period

Automatic detection from clock – This option automatically detects the sampling period from the fastest clock. You can also select any other clock in your design. You can specify whether the average value is computed per period or half-period.

Specify – Select this option to specify the period and offset used to calculate the sampling period.

Partial Parsing

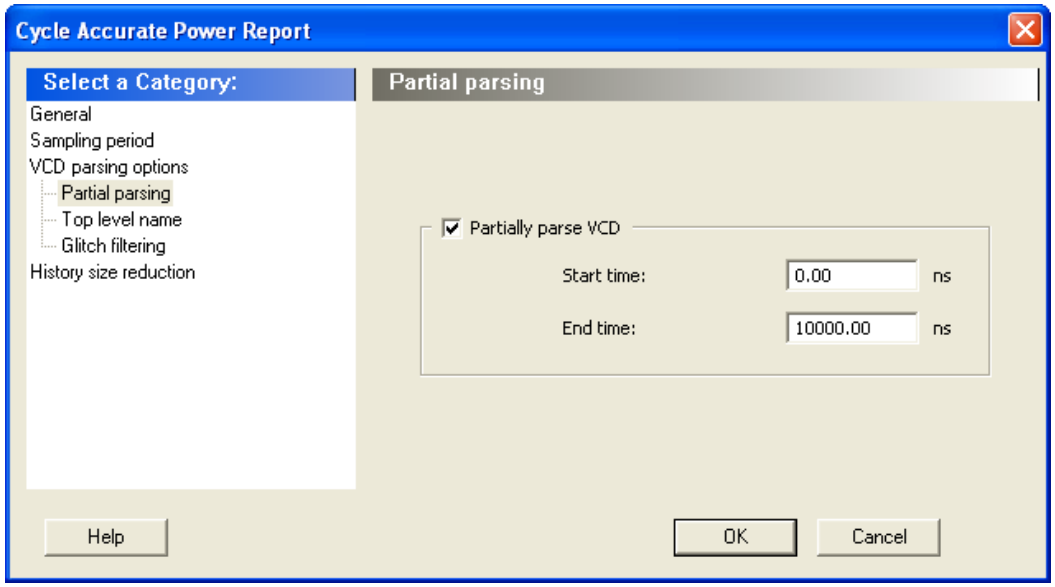


Figure 48 · SmartPower Cycle Accurate Power Report Dialog Box – Partial Parsing

Partially parse VCD file – Specify the Start and End times to partially parse the VCD file. This option can be used for large VCD files.

Top-Level Name

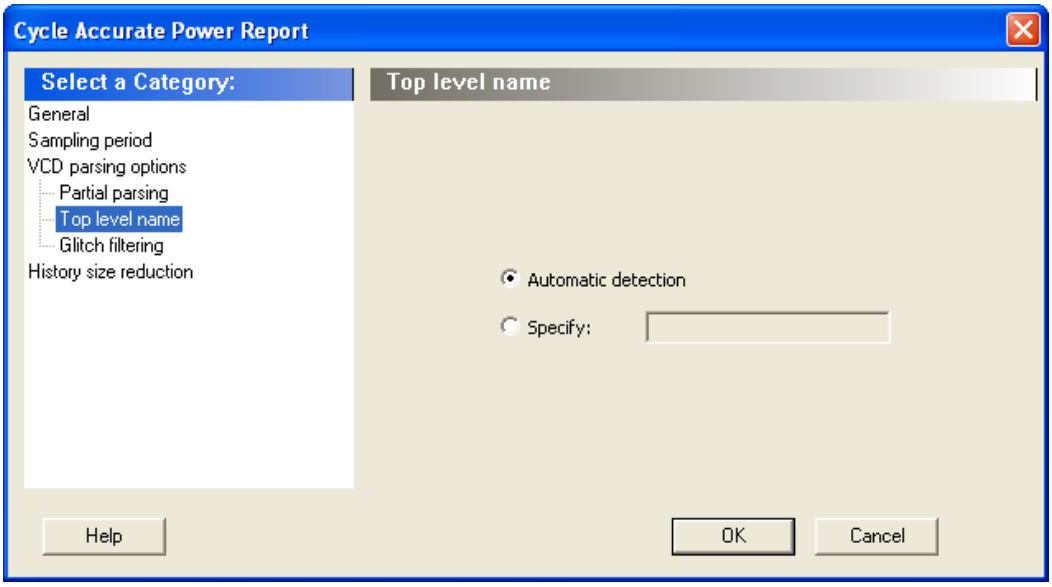


Figure 49 · SmartPower Cycle Accurate Power Report Dialog Box – Top-Level Name

This option enables you to select how the top-level name is specified. Select **Automatic Detection** to let the VCD reader automatically detect the top-level name of the design, or select **Specify** to manually specify the top-level name.

Glitch Filtering

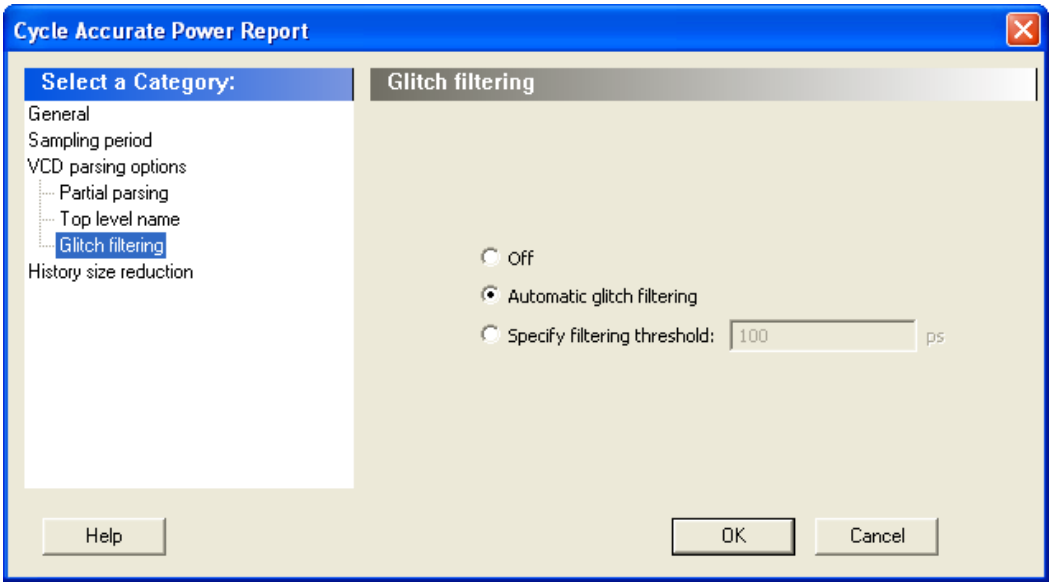


Figure 50 · SmartPower Cycle Accurate Power Report Advanced Options Dialog Box – Glitch Filtering

This panel enables you to filter out pulses of short durations by selecting **Automatic Glitch Filtering** or by entering a value in the **Specify Filtering Threshold** field. The default glitch filtering option is **Automatic Glitch Filtering**.

History Size Reduction

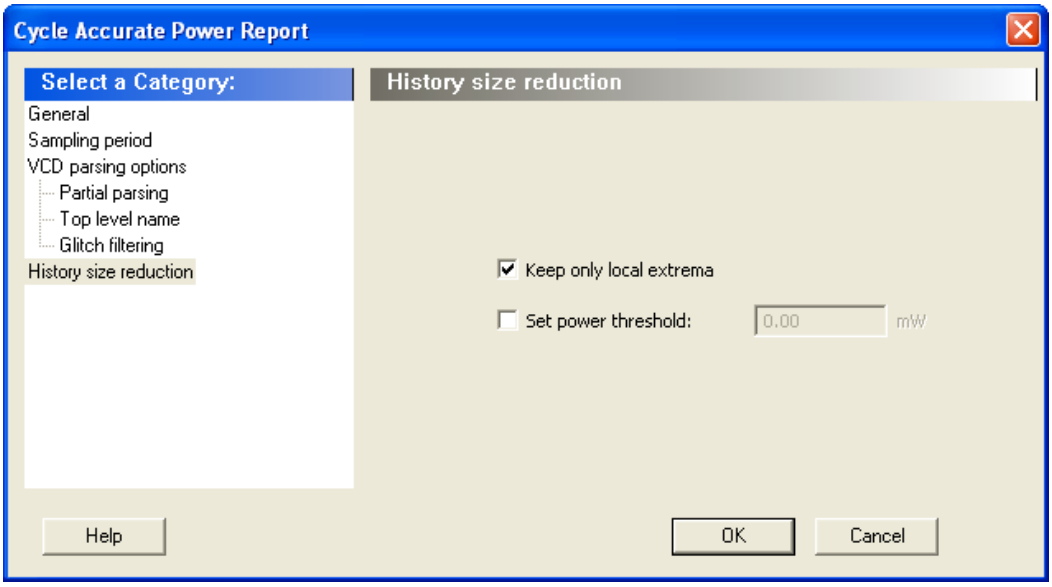


Figure 51 · SmartPower Cycle Accurate Power Report Advanced Options Dialog Box – History Size Reduction

This panel enables you to limit the history size by keeping only local extrema or setting a power threshold. The results are displayed in the cycle accurate power report below.

simple_PWM_8 - Power_cycle_accurate Report

File Actions Help

```
Actel Corporation - Actel Designer Software Release 8.4 (Version 8.4.0.0)
Copyright (c) 1989-2008
Date: Thu May 29 13:53:58 2008

Design : simple_PWM_8
Family : IGLOO
Die : AGL600V2
Package : 256 FBGA
Temperature Range : COM
Voltage Range : COM
Operating Conditions : Typical
Operating Mode : Static
Data Source : Advanced

Vcd File: D:/work/code/design_vcd/BMotor.vcd

Max Power Report
+-------+-----------------+--------------+-----------+
| Cycle | Start Time (ps) | End Time(ps) | Power(mW) |
+-------+-----------------+--------------+-----------+
| 21    | 2000000         | 2100000      | 0.508     |
+-------+-----------------+--------------+-----------+


Cycle Based Power Report
+-------+-----------------+--------------+-----------+
| Cycle | Start Time (ps) | End Time(ps) | Power(mW) |
+-------+-----------------+--------------+-----------+
| 1     | 0               | 100000       | 0.101     |
| 2     | 100000          | 200000       | 0.161     |
| 11    | 1000000         | 1100000      | 0.161     |
| 13    | 1200000         | 1300000      | 0.207     |
| 16    | 1500000         | 1600000      | 0.182     |
| 17    | 1600000         | 1700000      | 0.203     |
| 18    | 1700000         | 1800000      | 0.180     |
| 21    | 2000000         | 2100000      | 0.508     |
| 22    | 2100000         | 2200000      | 0.180     |
| 23    | 2200000         | 2300000      | 0.188     |
| 24    | 2300000         | 2400000      | 0.182     |
| 25    | 2400000         | 2500000      | 0.199     |
| 26    | 2500000         | 2600000      | 0.180     |
| 29    | 2800000         | 2900000      | 0.238     |
| 30    | 2900000         | 3000000      | 0.180     |
| 31    | 3000000         | 3100000      | 0.188     |
| 32    | 3100000         | 3200000      | 0.182     |
```

Figure 52 · SmartPower Cycle Accurate Power Report

Activity and Hazards Reports

Traditional Power Analysis based on a VCD simulation file reports an average power value that will account for all nets switching in the design. This switching includes functional transitions and spurious transitions. Due to the delay of each gate, paths arriving at one internal gate may have different propagation delays. Therefore, a gate may exhibit multiple spurious transitions before settling to the correct logic level. The Activity and Hazards Power Report allows to quickly identify gates and nets of the design that consume power because of spurious transitions. This is helpful to understand and further minimize power consumption. The activity and hazards report reads a VCD file and reports transitions and hazards for each clock cycle of the VCD file.

To generate an activity and hazards power report:

1. From the Designer **Tools** menu, choose **Reports > Power > Power Activity and Hazards**. The Activity and Hazards Power Report dialog box appears.

2. Select the options you want to include in the report, and then click **OK**. The activity and hazards report appears in a separate window.

You can also generate the activity and hazards report from within SmartPower. From the **Tools** menu, choose **Reports > Activity and Hazards Report**; or select a vcd file from the Modes and Scenarios toolbar, and from the right-click menu, select **Tools > Power Activity and Hazards**

The activity and hazards report dialog box is organized in the following panels: General, Partial Parsing, Top-Level Name, Glitch Filtering, and Clock Domains.

General

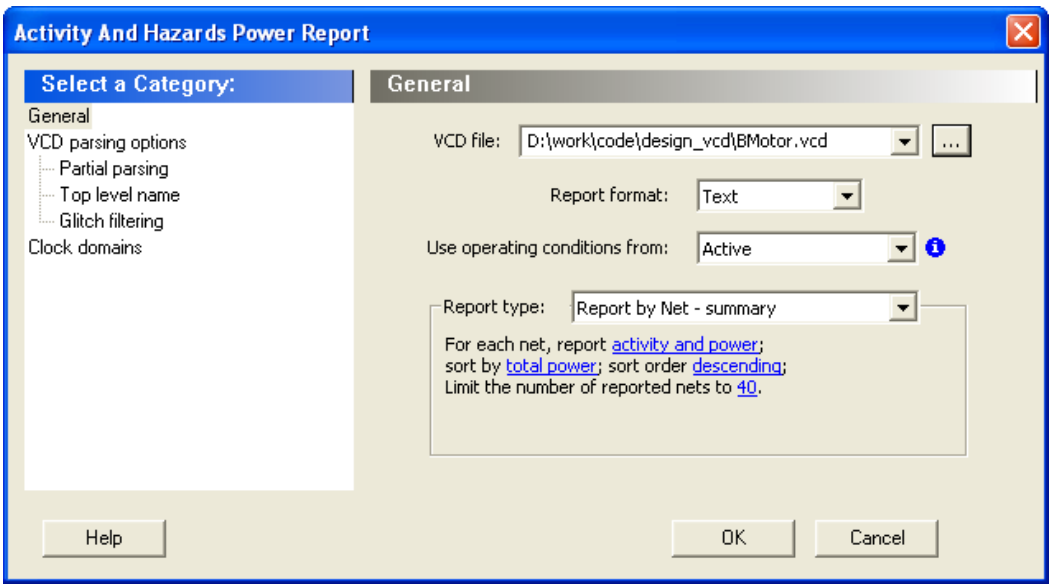


Figure 53 · SmartPower Activity and Hazards Report Dialog Box – General

VCD file – Select the VCD file you want to import.

Report format – Select **Text** or **CSV** (Comma Separated Value) as the desired export format.

Use operating conditions from – Select the mode from which the operating conditions will be used.

Report type – Select the report type:

- Report by net – summary: summary report by net
- Report by net – detailed: detailed report by cycle
- Report by cycle – summary: summary report by net
- Report by cycle – detailed: detailed report by cycle

The selected report type reports activity and power for each net sorted by power in descending order and limits the number of reported nets to 20 by default. To change these options, click each option and from the pop-up menu, select the desired option:

- Report: Select the query report type: activity, power, or activity and power.
- Sort by: Select the query sort by functional power, functional transitions, spurious power, spurious transitions, or total power.
- Sort order: Select the query sort order: ascending or descending.
- Limit the number of reported nets: Enter the query filter limit.

Partial Parsing

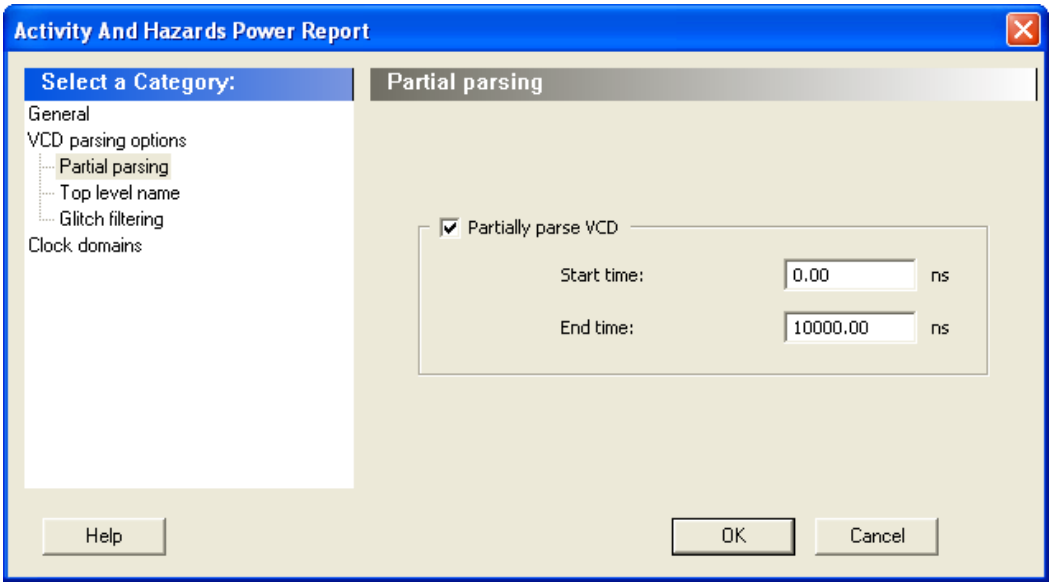


Figure 54 · SmartPower Activity and Hazards Report Dialog Box – Partial Parsing

Partially parse VCD file – Specify the Start and End times to partially parse the VCD file. This option can be used for large VCD files.

Top-Level Name

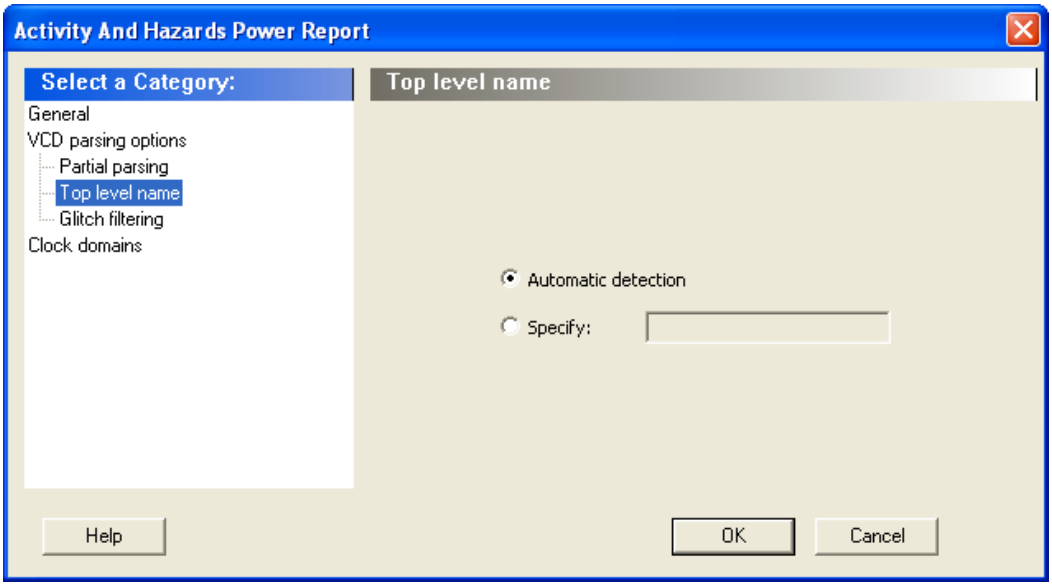


Figure 55 · SmartPower Activity and Hazards Report Dialog Box – Top-Level Name

This option enables you to select how the top-level name is specified. Select **Automatic Detection** to let the VCD reader automatically detect the top-level name of the design, or select **Specify** to manually specify the top-level name.

Glitch Filtering

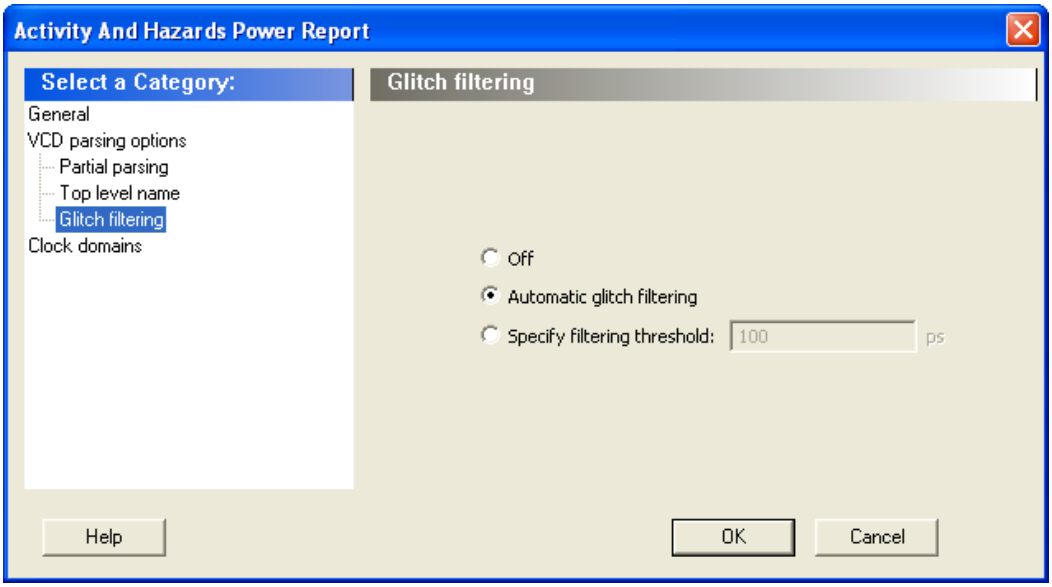


Figure 56 · SmartPower Activity and Hazards Report Advanced Options Dialog Box – Glitch Filtering

This option enables you to filter out pulses of short durations by selecting **Automatic Glitch Filtering** or by entering a value in the **Specify Filtering Threshold** field. The default glitch filtering option is **Automatic Glitch Filtering**.

Clock Domains

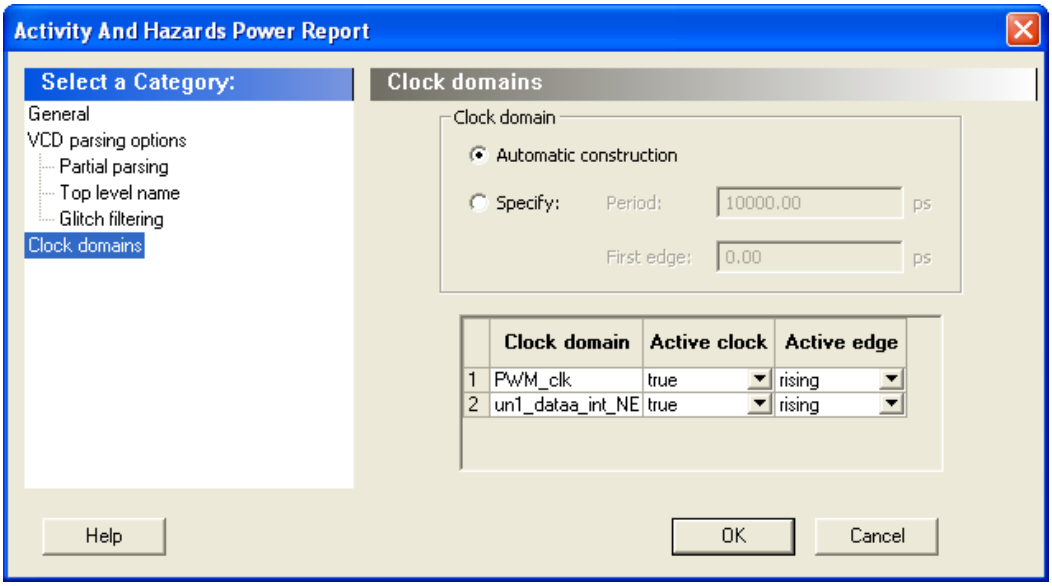


Figure 57 · SmartPower Activity and Hazards Report Advanced Options Dialog Box – Clock Domains

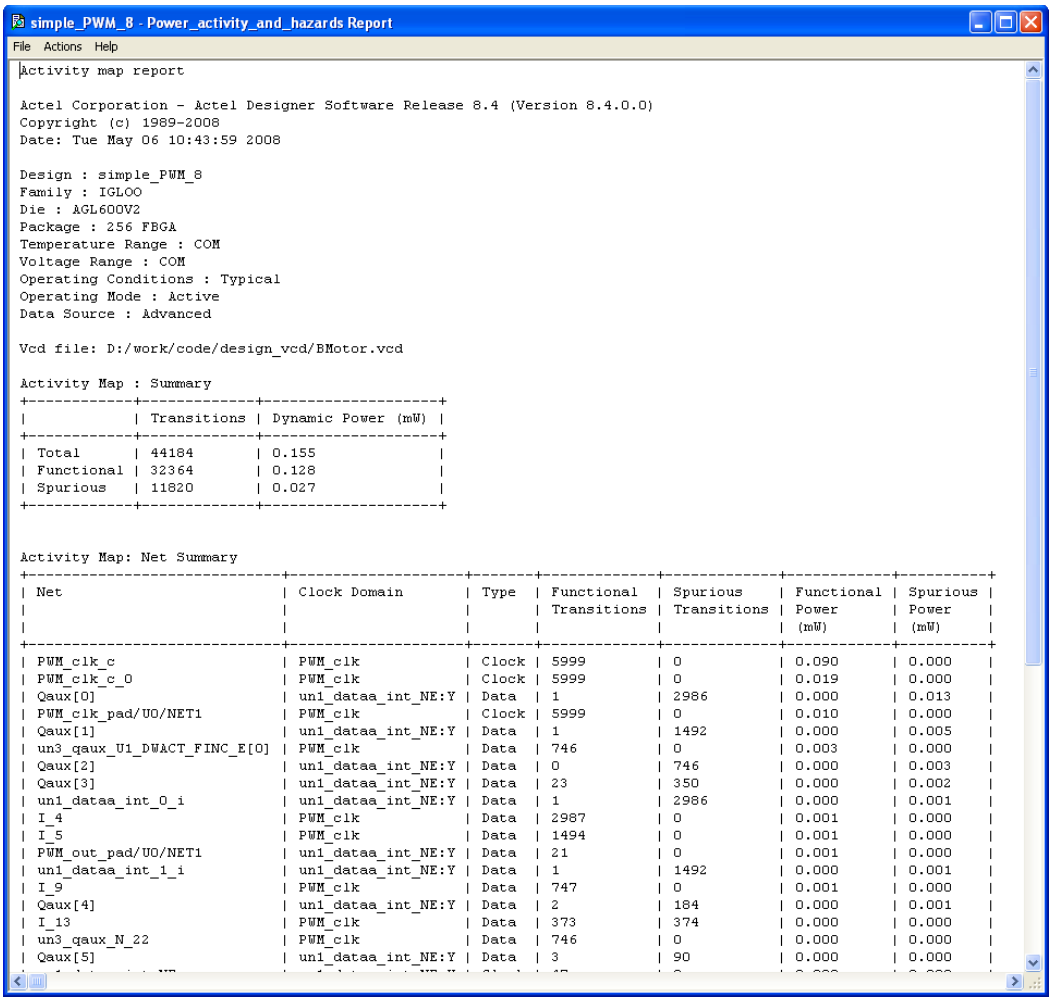
The clock domain can be automatically constructed or it can be specified by the user.

Automatic construction – This option automatically constructs the clock domain. SmartPower automatically analyzes your design to assess if a clock is active and what is the active edge.

Specify – Select this option to specify the period and first edge.

Use the clock domain table to set the active edge (rising, falling or both) and to set a clock as transparent.

The results are displayed in the activity and hazards power report below.



simple_PWM_8 - Power_activity_and_hazards Report

File Actions Help

```
Activity map report

Actel Corporation - Actel Designer Software Release 8.4 (Version 8.4.0.0)
Copyright (c) 1989-2008
Date: Tue May 06 10:43:59 2008

Design : simple_PWM_8
Family : IGLOO
Die : AGL600V2
Package : 256 FBGA
Temperature Range : COM
Voltage Range : COM
Operating Conditions : Typical
Operating Mode : Active
Data Source : Advanced

Vcd file: D:/work/code/design_vcd/BMotor.vcd

Activity Map : Summary
+------------+-------------+--------------------+
|            | Transitions | Dynamic Power (mW) |
+------------+-------------+--------------------+
| Total      | 44184       | 0.155              |
| Functional | 32364       | 0.128              |
| Spurious   | 11820       | 0.027              |
+------------+-------------+--------------------+


Activity Map: Net Summary
+-----------------------------+----------------------+-------+-------------+-------------+------------+----------+
| Net                         | Clock Domain         | Type  | Functional  | Spurious    | Functional | Spurious |
|                             |                      |       | Transitions | Transitions | Power      | Power    |
|                             |                      |       |             |             | (mW)       | (mW)     |
+-----------------------------+----------------------+-------+-------------+-------------+------------+----------+
| PWM_clk_c                   | PWM_clk              | Clock | 5999        | 0           | 0.090      | 0.000    |
| PWM_clk_c_0                 | PWM_clk              | Clock | 5999        | 0           | 0.019      | 0.000    |
| Qaux[0]                     | un1_dataa_int_NE:Y   | Data  | 1           | 2986        | 0.000      | 0.013    |
| PWM_clk_pad/U0/NET1         | PWM_clk              | Clock | 5999        | 0           | 0.010      | 0.000    |
| Qaux[1]                     | un1_dataa_int_NE:Y   | Data  | 1           | 1492        | 0.000      | 0.005    |
| un3_qaux_U1_DWACT_FINC_E[0] | PWM_clk              | Data  | 746         | 0           | 0.003      | 0.000    |
| Qaux[2]                     | un1_dataa_int_NE:Y   | Data  | 0           | 746         | 0.000      | 0.003    |
| Qaux[3]                     | un1_dataa_int_NE:Y   | Data  | 23          | 350         | 0.000      | 0.002    |
| un1_dataa_int_0_i           | un1_dataa_int_NE:Y   | Data  | 1           | 2986        | 0.000      | 0.001    |
| I_4                         | PWM_clk              | Data  | 2987        | 0           | 0.001      | 0.000    |
| I_5                         | PWM_clk              | Data  | 1494        | 0           | 0.001      | 0.000    |
| PWM_out_pad/U0/NET1         | un1_dataa_int_NE:Y   | Data  | 21          | 0           | 0.001      | 0.000    |
| un1_dataa_int_1_i           | un1_dataa_int_NE:Y   | Data  | 1           | 1492        | 0.000      | 0.001    |
| I_9                         | PWM_clk              | Data  | 747         | 0           | 0.001      | 0.000    |
| Qaux[4]                     | un1_dataa_int_NE:Y   | Data  | 2           | 184         | 0.000      | 0.001    |
| I_13                        | PWM_clk              | Data  | 373         | 374         | 0.000      | 0.000    |
| un3_qaux_N_22               | PWM_clk              | Data  | 746         | 0           | 0.000      | 0.000    |
| Qaux[5]                     | un1_dataa_int_NE:Y   | Data  | 3           | 90          | 0.000      | 0.000    |
```

Figure 58 · SmartPower Activity and Hazards Report

Cycle-Accurate Power Analysis

The Cycle-Accurate Power Analysis reports cycle-accurate power data in a graphical form. In the analysis window, you can specify ranges and compute averages for each range, define a list of watched blocks, obtain power usage of a single block or cycle, or obtain power usage of multiple blocks over several cycles.

To generate a cycle-accurate power analysis:

1. From the SmartPower **Tools** menu, choose **cycle-accurate Power Analysis**; or select a vcd file from the Modes and Scenarios toolbar, and from the right-click menu, select **Tools > cycle-accurate Power Analysis**. The cycle-accurate Power Analysis dialog box appears.
2. Select the options you want to include in the report, and then click **OK**. The cycle-accurate power report appears in a separate window.

The cycle-accurate power analysis dialog box is organized in the following panels: General, Sampling Period, Partial Parsing, Top-Level Name, and Glitch Filtering.

General

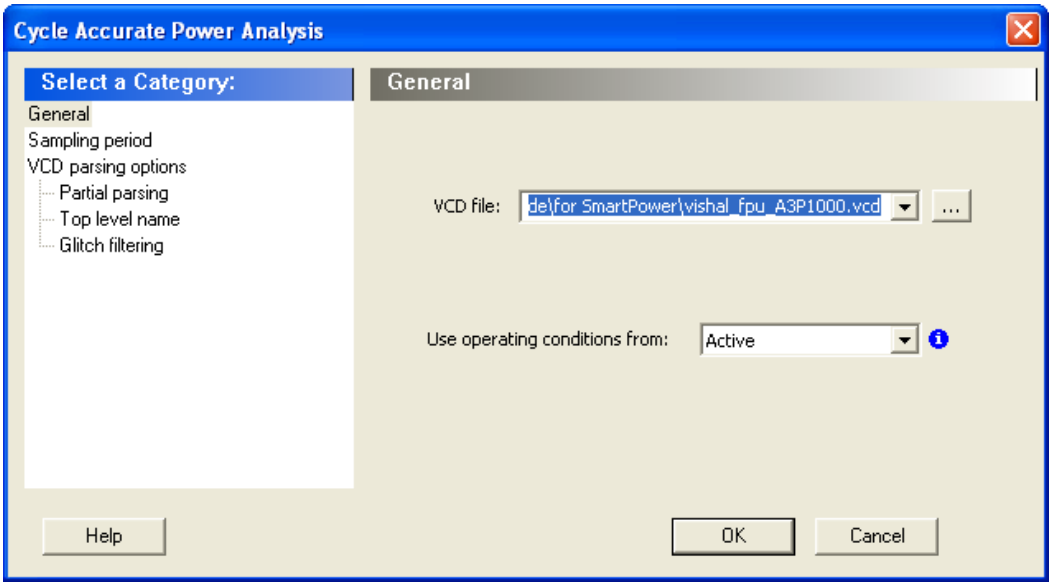


Figure 59 · SmartPower cycle-accurate Power Analysis Dialog Box – General

VCD file – Select the VCD file you want to import.

Use operating conditions from – Select the mode from which the operating conditions will be used.

Sampling Period

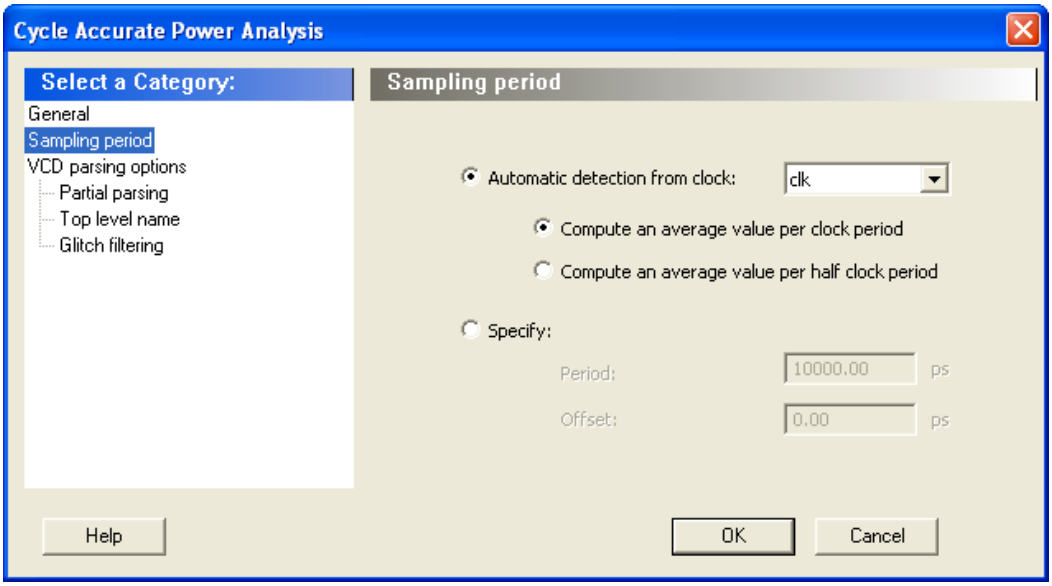


Figure 60 · SmartPower cycle-accurate Power Analysis Dialog Box – Sampling Period

Automatic detection from clock – This option automatically detects the sampling period from the fastest clock. You can also select any other clock in your design. You can specify whether the average value is computed per period or half-period.

Specify – Select this option to specify the period and offset used to calculate the sampling period.

Partial Parsing

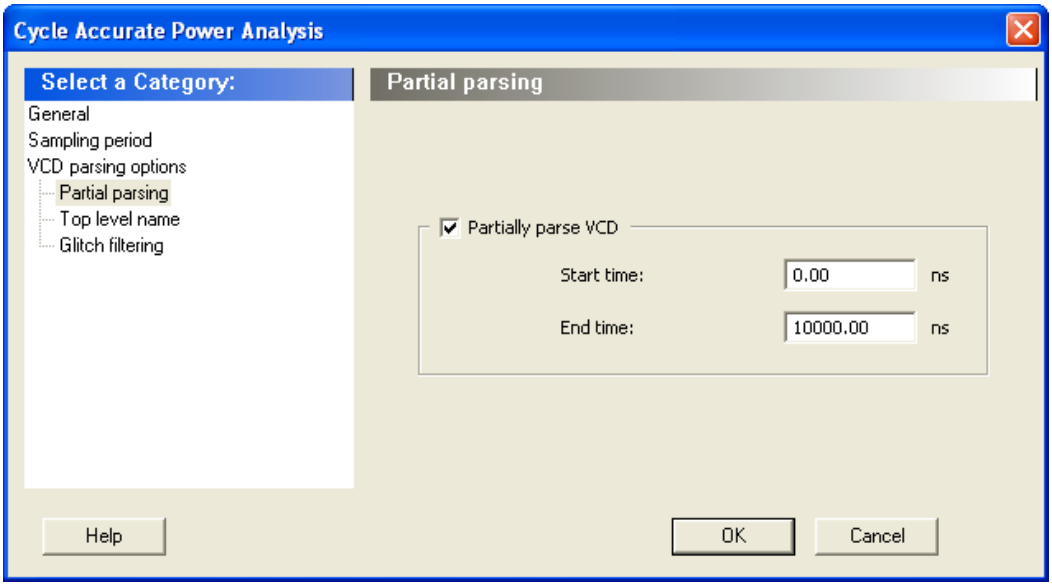


Figure 61 · SmartPower cycle-accurate Power Analysis Dialog Box – Partial Parsing

Partially parse VCD file – Specify the Start and End times to partially parse the VCD file. This option can be used for large VCD files.

Top-Level Name

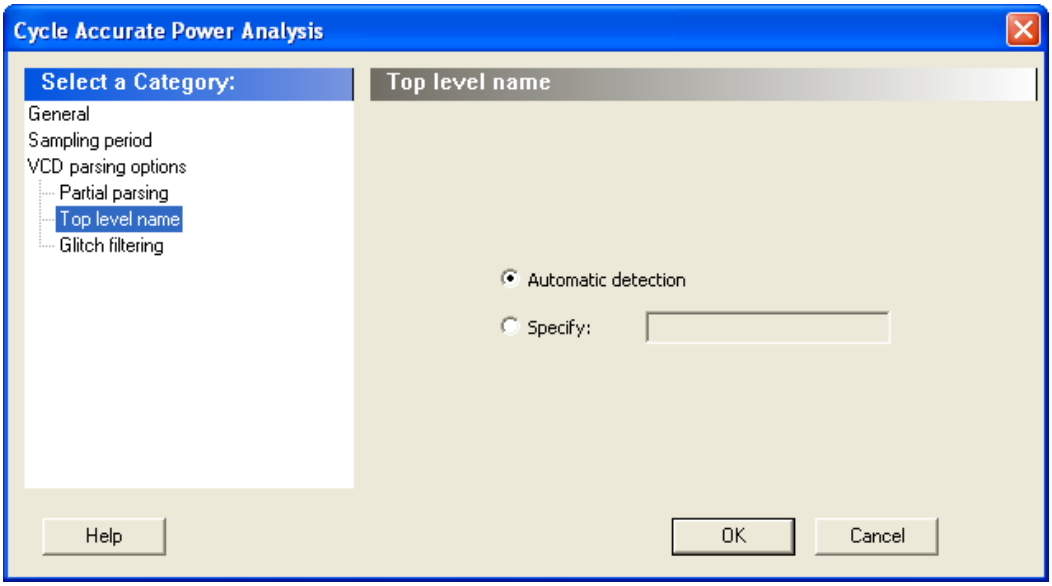


Figure 62 · SmartPower cycle-accurate Power Analysis Dialog Box – Top-Level Name

This option enables you to select how the top-level name is specified. Select **Automatic Detection** to let the VCD reader automatically detect the top-level name of the design, or select **Specify** to manually specify the top-level name.

Glitch Filtering

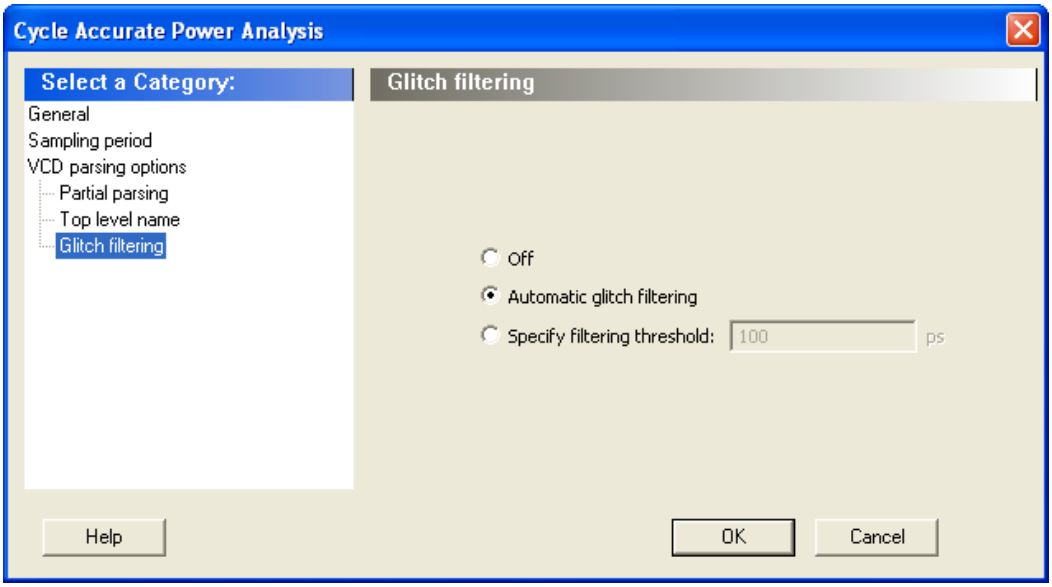


Figure 63 · SmartPower cycle-accurate Power Analysis Advanced Options Dialog Box – Glitch Filtering

This option enables you to filter out pulses of short durations by selecting **Automatic Glitch Filtering** or by entering a value in the **Specify Filtering Threshold** field. The default glitch filtering option is **Automatic Glitch Filtering**.

Cycle-Accurate Power Analysis Window

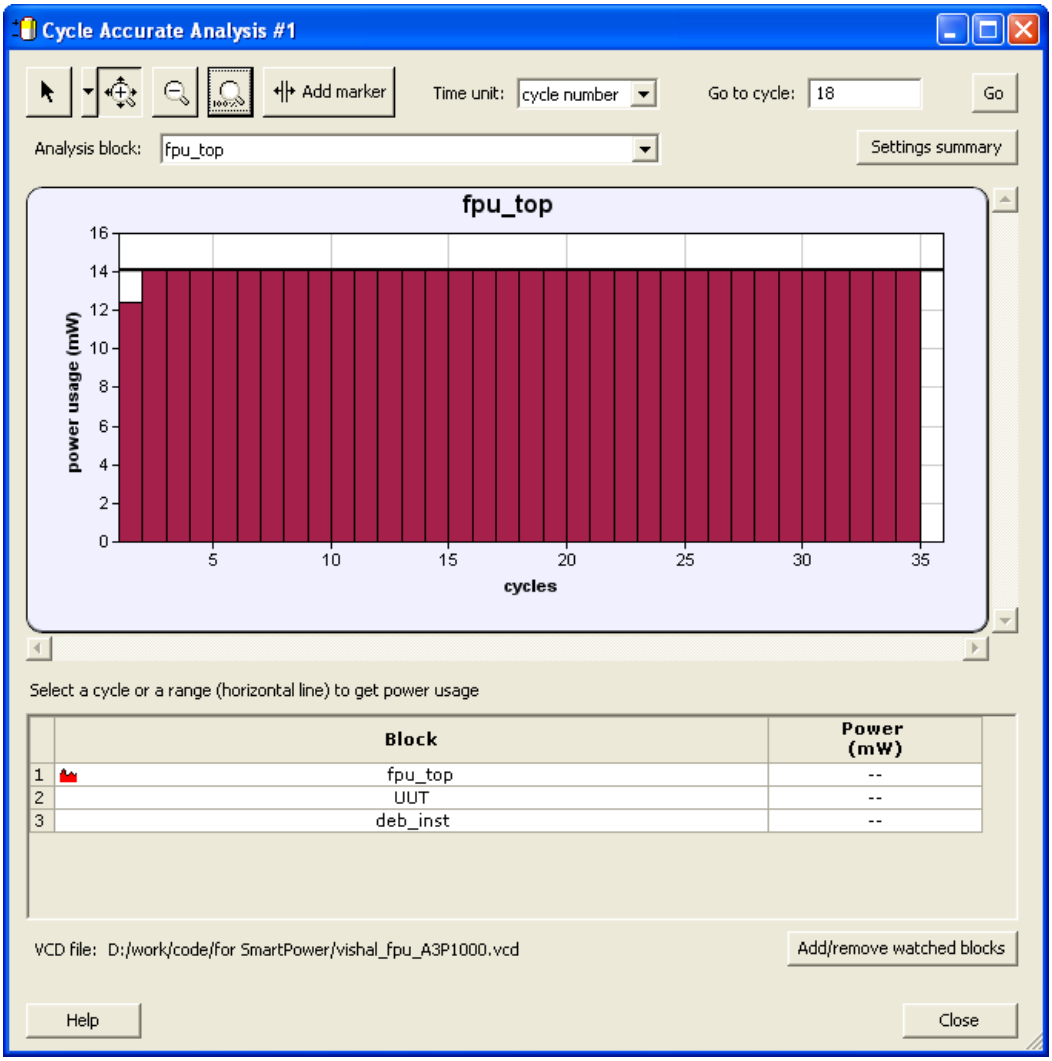


Figure 64 · cycle-accurate Power Analysis

Mouse over a cycle to obtain the cycle number, the start and end times, and the power usage for the selected cycle.

Use the  **Select** button to select a cycle in the analysis, the grid displays the block name and power usage for the watched blocks.

Us the **Add Marker** button to create cycle ranges – intervals between markers and/or the simulation ends.

To select a range, mouse over the average power usage horizontal line. This will display the average power usage for the range.

To move to the beginning or end of a range, right-click the average power usage of the range and select **Go to Beginning of Range** or **Go to End of Range**.

To move the marker to another cycle, click and drag the marker to another cycle; or from the right-click menu, select **Move marker**, and enter a time value.

To delete the marker, right-click the marker, and select **Delete marker**.

To move to the previous or next markers, right-click the marker, and select **Go to previous marker** or **Go to previous marker**.

Use the **Zoom In** button to zoom in the analysis view.

Use the **Zoom In Horizontal** button to zoom in the analysis view.

Us the **Zoom Out** button to zoom out the analysis view.

Us the **Zoom to Full View** button to zoom into full view.

To view the most power-consuming blocks for a cycle, right-click the cycle, and select **Show Most Consuming Blocks for this Cycle**. This opens the Biggest Power Contributors for Cycle window.

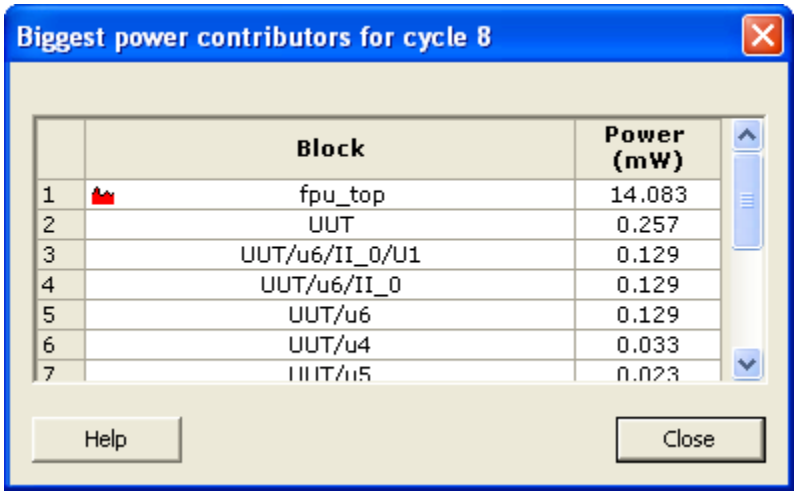


Figure 65 · Biggest Power Contributors for a Cycle Window

To view the analysis for a specific time, enter a time value in the **Go to time** box, select the time unit, and press the **Go** button.

To view the analysis for a specific block, select the block from the **Analysis Block** pull-down.

To export the cycle-accurate power analysis chart, right-click the chart, and select **Export Chart to File**.

You can modify the blocks you want to watch during analysis, by pressing the **Add/Remove Watched Blocks** button.

If the operating conditions in SmartPower have been modified, a warning appears to indicate that the settings have been changed. Click the hyperlink to regenerate the Cycle-Accurate analysis view.

Click the **View Settings Summary** button to display the cycle-accurate settings.

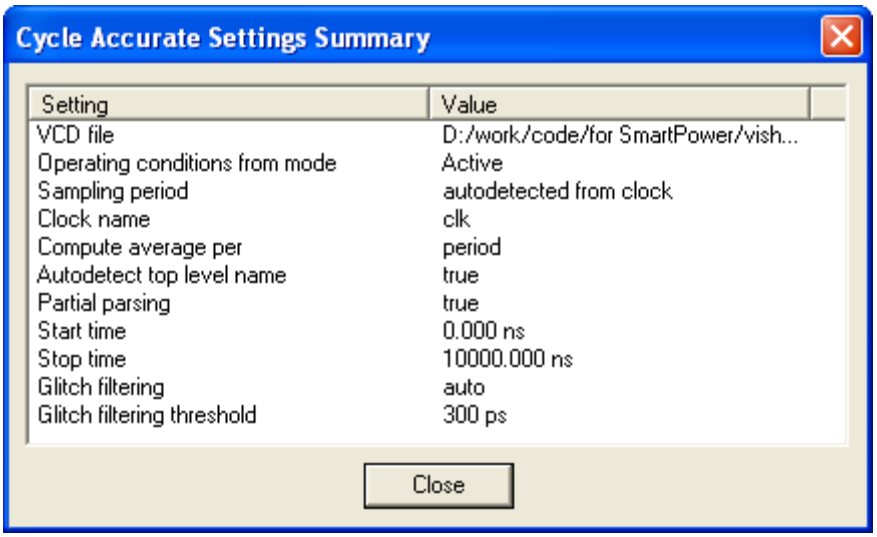


Figure 66 · Cycle-Accurate Settings Summary

Click the **Add/Remove Watched Blocks** button to display a list of watched blocks . You can add or remove watched blocks by checking or unchecking the **Watch** checkbox for that particular block(s) or by selecting blocks in the grid and using the **Check** or **Uncheck Selected Blocks** buttons. You can use the filter options to hide or display the list of blocks based on the criteria entered.

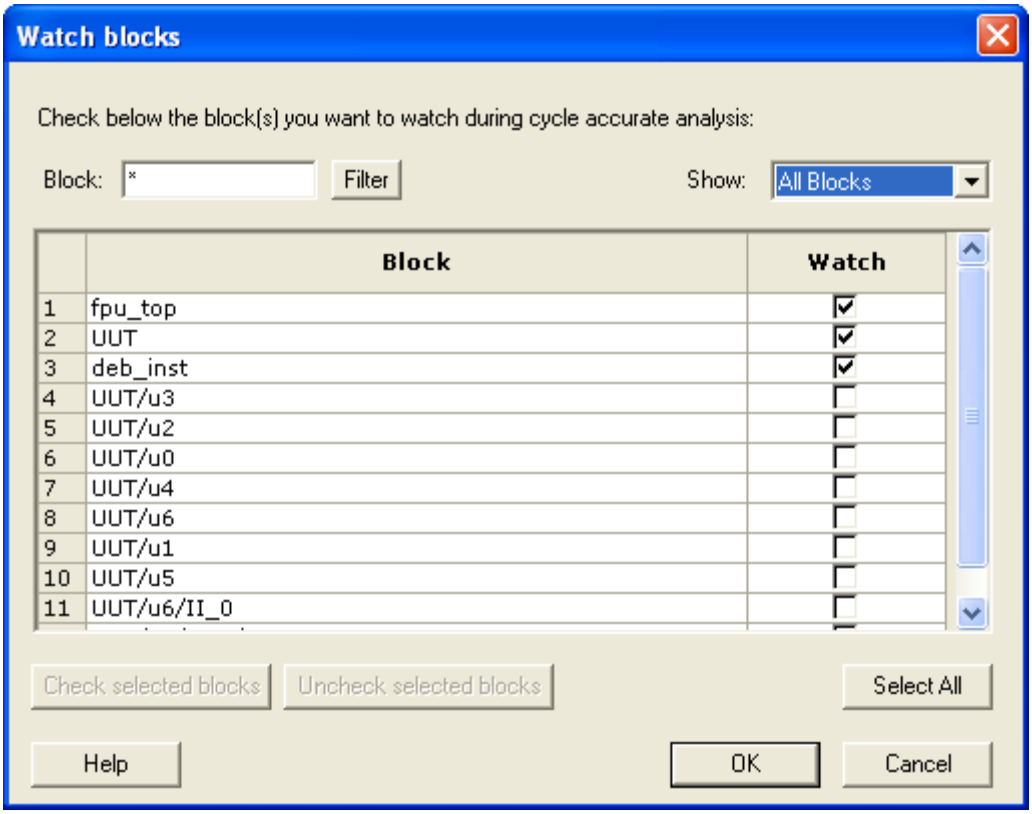


Figure 67 · Watched Blocks

Importing a VCD File

The Value Change Dump (VCD) file is a simulation file. The format of this file is specified in the IEEE 1364 standard.

You can configure the Project Manager to automatically generate VCD files using Model*Sim*.

You can also generate a VCD file with a ModelSim simulator using the following commands:

```
vcd file example.vcd
vcd add -r /testbench/<top>_0/*
run 1 us
vcd flush
```

This example creates a VCD file example.vcd, adds all signals recursively, runs the simulation for one micro second, and quits. You must quit Model*Sim* in order to get an accurate result from SmartPower.

If you have not yet completed the layout of the design, the design software guides you through place-and-route so that you can import the VCD file. In order to successfully annotate your VCD values to the design, Designer must complete place-and-route even if you generated your VCD file using timing simulation (pre-layout).

Note: SmartPower has been validated with VCD files generated by Model*Sim*. However, you may use any Verilog/VHDL simulator that offers a VCD dump feature.

Refer to the user manual of your simulation tool for more information on how to generate a VCD file.

To import a VCD file:

1. From the **Simulation** menu, select **Import VCD File**. This opens the **Import VCD Options** dialog box.

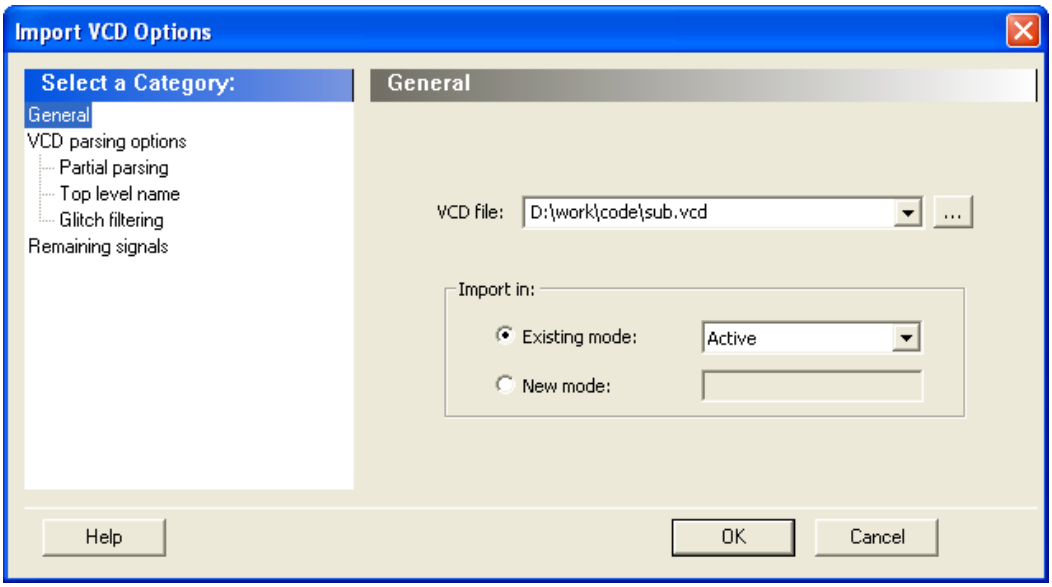


Figure 68 · Import VCD File Dialog Box

2. Select the VCD file you want to import and select a mode to import it in, or click **New Mode** and enter a mode name.
3. Select the options you want to specify:

   Partial Parsing — Specify the **Start** and **End Times** to partially parse the VCD file. This option can be used for large VCD files.

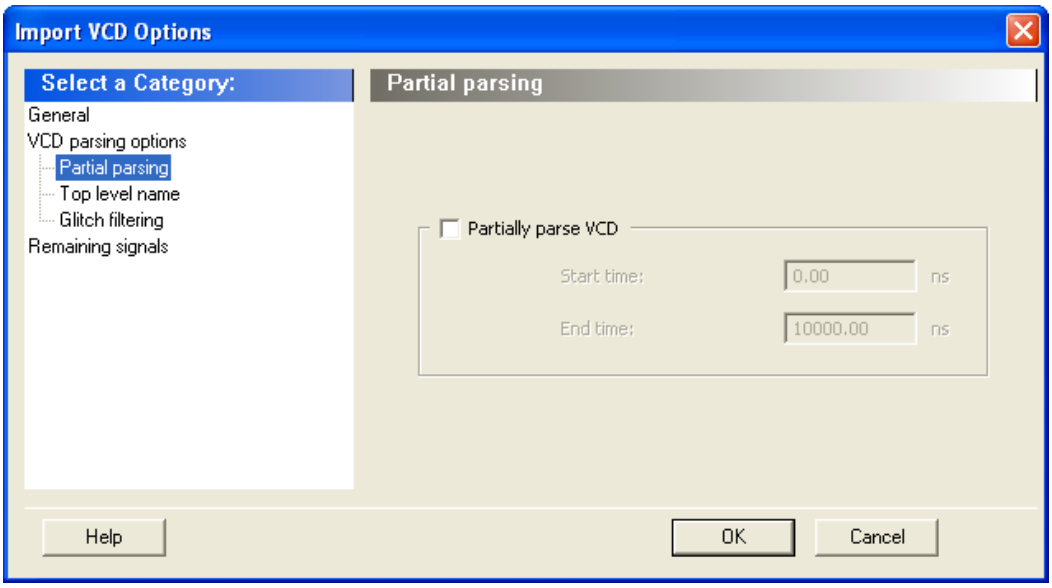


Figure 69 · Import VCD File Dialog Box — Partial Parsing

Top-Level Name — This option enables you to select how the top-level name is specified. The **Top Level Name** is the instance name of your design instantiated in the simulation testbench.
Select **Automatic Detection** to let the VCD reader automatically detect the top-level name of the design, or select **Specify** to manually specify the top-level name.

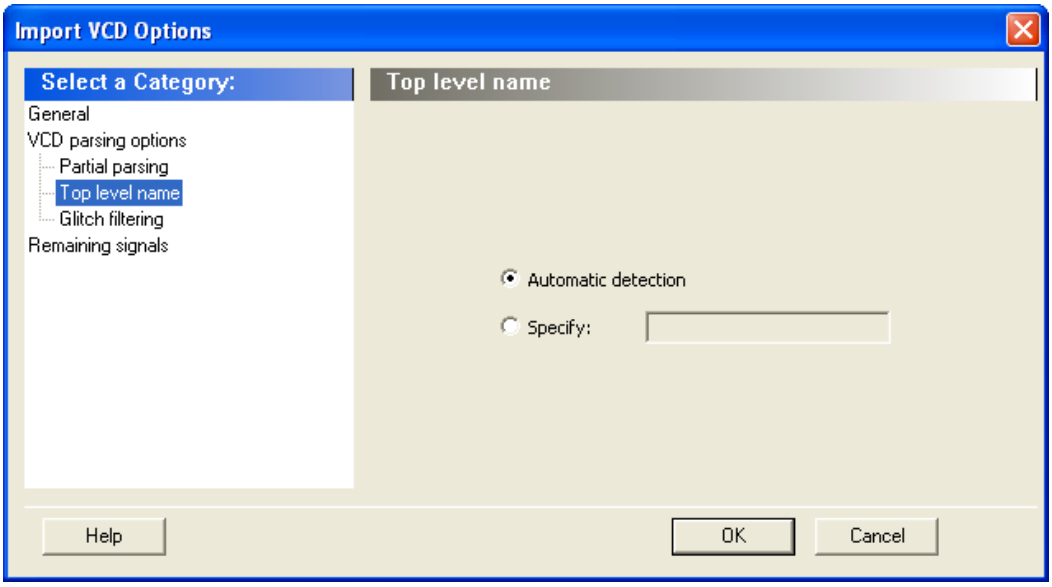


Figure 70 · Import VCD File Dialog Box — Top-Level Name

Glitch Filtering — This option enables you to filter out pulses of short durations by selecting **Automatic Glitch Filtering** or by entering a value in the **Specify Filtering Threshold** field. The default option is **Automatic Glitch Filtering**.

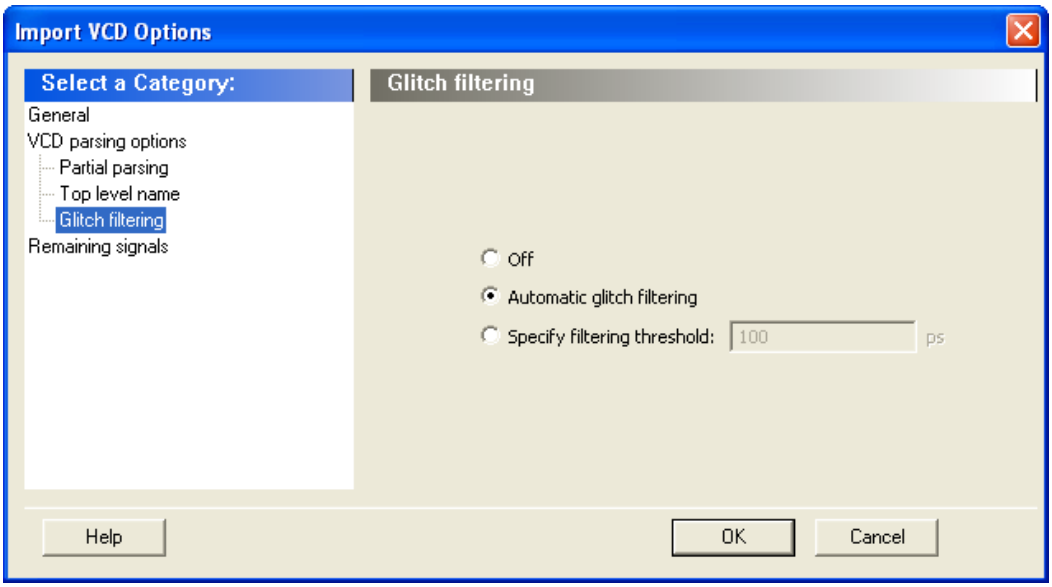


Figure 71 · Import VCD File Dialog Box — Glitch Filtering

Remaining Signals — Some signals may not be annotated by the VCD reader. This generally happens with VCD files created from a behavioral or a post-synthesis simulation. For those signals, you can either complete the annotation with the vectorless analysis or with the average values computed from the VCD file.

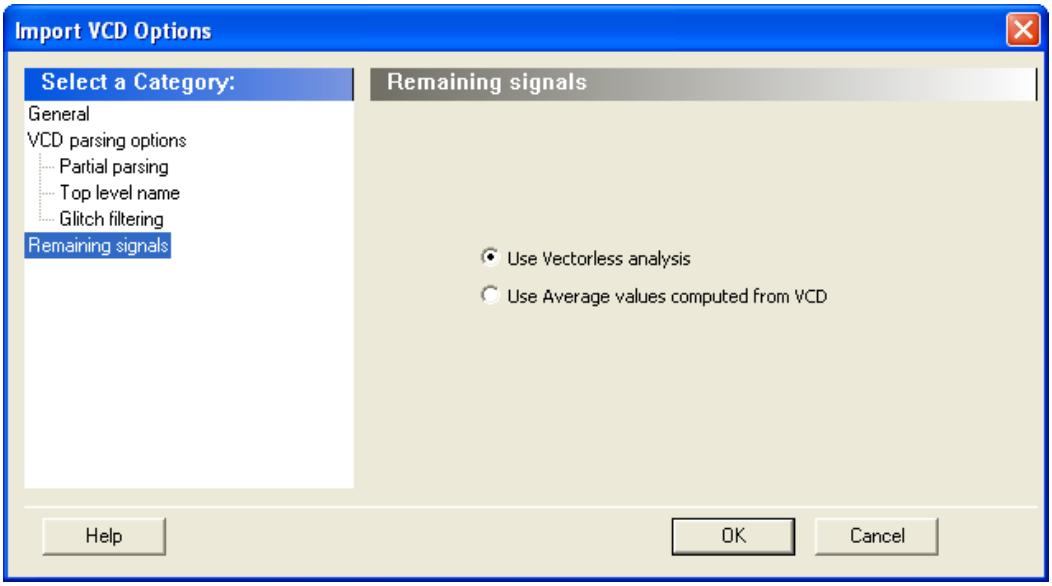


Figure 72 · Import VCD File Dialog Box — Remaining Signals

4. Click **OK**.
5. When the vcd file is successfully imported, the file appears in the Modes and Scenarios toolbar, under the imported mode. The following messages appear in the Designer Log window:

```
Info:
VCD:34 glitch(es) filtered with 1000 ps threshold
```

The message above reports the number of glitches that have been filtered by the VCD reader.

```
Info:
VCD: Annotation Statistics
Percentage of Annotated Pins:100.00 %
Percentage of Unannotated Pins:0.00 %
```

```
Percentage of Annotated Pins with Zero Frequency: 25.99 %
```

If the percentage of annotated pins is less than 50.00%, a warning message will be generated.

If the percentage of annotated pins is low, you may want to verify that signals at all levels of hierarchy were added recursively (for example using `vcd add –r` in Model*Sim*).

If you simulate a pre-synthesis netlist or a post-synthesis RTL netlist, it is possible to get a low percentage of annotated pins. This happens because not all logic elements are in the pre-synthesis netlist and the post-synthesis RTL netlist. For accurate power estimation, it is best to run post-layout simulation with a back-annotated netlist.

If you want to see exactly which pins are not annotated, open the SmartPower **Frequencies** tab. If your file was imported successfully, you will see a list of pins with annotated individual frequencies displayed with **VCD Import** as a source. The unannotated pins are displayed with **Default Estimation** as source. If your design has enable pins, open the SmartPower **Probabilities tab**.

After finishing the import VCD process, you can now create a custom mode based on the active mode. This custom mode will inherit all the clock and toggle frequencies of the active mode that have just been set through the VCD import. This final step is optional. It gives you the flexibility to modify the active mode frequencies while saving the VCD scenario in SmartPower. Refer to Custom operating modes for more details.

Note: If you generated the VCD file from Project Manager and if you are using Designer from Libero IDE, the list of generated VCD files appear in the unprocessed VCD file list. To import the VCD file, right-click and select Import VCD File.

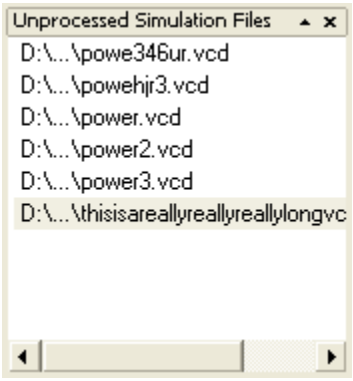


Figure 73 · Unprocessed Simulation Files

Importing a SAIF File in Designer

Use the following instructions to import a SAIF file.

To import a SAIF file:

1. From the **File** menu in **Designer**, select **Import Auxiliary Files**. Click **Add** to browse to your SAIF file and select it. When you have selected a SAIF file, click **OK** to continue.
   If you have not yet completed the layout of the design, the design software guides you through place-and-route so that you can import the SAIF file. In order to successfully annotate your SAIF values to the design, Designer must complete place-and-route even if you generated your SAIF file using timing simulation (post-layout).
   You may wish to import multiple SAIF files. If these files conflict (attempt to set a different frequency for the same net of your design, for example), the latest imported value takes precedence.
2. Specify your SAIF import options. Use the SAIF **Import Options** window to specify the instance name of your design in the simulation testbench (the instance name is the instance name of your design instantiated in the simulation testbench). **You must include the hierarchy with the instance name.** The example below shows how to identify the instance name of your design in the SAIF file. For example, the instance name of the design in the following SAIF file is “TEST_BENCH/UUT”.

```
(SAIFILE
(SAIFVERSION "1.1")
(DESIGN 2ff)
```

```
(DATE "Fri May 10 14:48:46 2002")
.....
(TIMESCALE 1ns)
(DURATION 50000)
(INSTANCE TEST_BENCH/UUT (PORT (OUT_PORT (TC 26) (IG 0) (T1 25994)
(T0 22000) (TX 2006))))
(INSTANCE TEST_BENCH/UUT/\outpad/U0/U1\ (PORT (Y (TC 26) (IG 0)
(T1 25995) (T0 22000) (TX 2005))))
(INSTANCE TEST_BENCH/UUT/\ff1/U0\ (PORT (Q (TC 27) (IG 0) (T1 26000)
(T0 22997) (TX 1003))))
(INSTANCE TEST_BENCH/UUT/\clkpad/U0/U0\ (PORT (Y (TC 99) (IG 0)
(T1 25000) (T0 24999) (TX 1))))
.....
```

Click **OK** to continue.

3. Check the **Log** window for notification that you successfully imported the SAIF file ("The Import command succeeded..."). Even if the Import command succeeds, use SmartPower to verify which pins have been affected after you import the file.
4. Verify results of the imported file in the **Frequencies** tab screen in SmartPower. To view the results of your imported SAIF file, launch SmartPower and navigate to the **Frequencies** tab screen to view pins with annotated switching activities. If your file was imported successfully, you will see a list of pins with annotated switching frequencies and specific individual frequencies.

   It may be that some pins of your design are not annotated by a SAIF import command. This sometimes happens if you simulate a pre-synthesis netlist. It is normal; not all logic elements are in the pre-synthesis netlist. Thus it is better to do a post-layout simulation with a back-annotated netlist for the most accurate power estimation.

Removing a VCD File

The Value Change Dump (VCD) file is a simulation file. The format of this file is specified in the IEEE 1364 standard.

To remove a VCD file:

- Select the VCD file from Active mode or a custom mode, right-click the VCD file, and select **Remove VCD File from <mode name> Mode**; or
- From the **Simulation** menu, choose **Remove VCD File > <file name>**

Note: Any annotation will be removed when you remove the VCD file.

See Also

Importing a VCD File

Modes and Scenarios Toolbar

Auditing Files

SmartPower checks the time stamps of the VCD file and reports any missing or out-of-date files.

Audit is performed automatically when SmartPower is launched. You can trigger file audit at any time from the **Simulation** menu, by choosing **Audit Files**. An icon displaying the file status appears in the Modes and Scenarios toolbar next to the VCD file. Mouse over the icon to obtain more information.

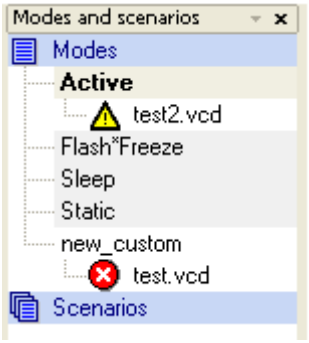


Figure 74 · Audit Files Results

Table 4 · Audit Files Icons and Descriptions

Icon	Description
⚠	Indicates that the VCD file has been modified
⊗	Indicates that the VCD file is missing

To re-import the VCD file, right-click the VCD file and select **Re-import VCD File**, this will open the **Import VCD Options** dialog box.

Calculating Power

Steps to Calculate Power

Use the steps below to calculate the power consumption of your design. The list of screens and steps appear in the order in which you should view them to analyze your power accurately.

1. Summary tab – View global power at the design level and view its impact on junction temperature.
2. Domains tab – Define clock domains and specify a clock frequency and a data frequency for each clock domain.
3. Analysis tab – View detailed hierarchical analysis of your power consumption. This step is optional. But if your power consumption exceeds your budget, this step will help you to understand where there is room for improvement.
4. Frequencies tab – Specify individual pin frequencies, this step is optional, but gives you pin-by-pin control of the frequency.
5. Probabilities tab – Specify probabilities, this step is optional. You can use the default probabilities or set your own.

Extracting Power Consumption of a Specific Clock Domain

To calculate the power consumption of a single clock domain (clock tree and data path) in a design:

1. Set SmartPower in toggle-rate mode. This is the default setting. To confirm that SmartPower is in toggle-rate mode, choose **Preferences** from **File** menu. Select the **Use Toggle Rates** check box
2. In the **Domains** tab, set all the **Clock Frequencies** to zero except for the clock domain for which you are calculating the power consumption.

The total power consumption of this clock domain is displayed in the Summary tab. This includes the contribution of the clock buffer, clock tree, and all clock input of the registers of this specific clock domain.

Note: In case you need to determine the power of the clock tree only, set the toggle rate of data on that clock domain to zero. The total power displayed is the power of that clock tree.

Advanced Analysis of I/Os

SmartPower provides an easy way of estimating the power consumption related to I/Os. You can then analyze power consumption in detail.

To display I/O power consumption:

1. In the **Summary** tab, select **By Type** from the **Breakdown** drop-down list. The grid displays the total power consumption of all I/Os in the design, as well as all other components. If you use different I/O standards, and different Vcci power rails, you can also display the power consumption for each rail by selecting **By Rail** from the **Breakdown** drop-down list. **Breakdown By Rail** shows the power consumption and current for each Vcci rail in the design.
2. In the **Analysis** tab, select the highest hierarchy level in the Hierarchy tree in the left pane. Select **By Instance** from the Breakdown drop-down list.
3. In the **Analysis** tab, unselect all categories under **Instances Contributions** except I/Os, and then click **Apply**. The table then displays a list of all I/Os in the design, along with the power contribution of each individual I/O. The columns display important I/O attributes: external port name, load, standard, drive-strength, slew, and macro.
4. In the **Probabilities** tab, you can control the output probability of each tri-state and bidirectional I/O. The probability is the percentage of time that the I/O is used as an output. The default value can be changed and a specific value can also be set for each bidirectional or tri-state I/O.

See Also

Analyze results

Analysis tab

Define Clock Domains and Set of Pins

When you run SmartPower, it researches your existing clock domains and partitions your design automatically. You may wish to review the list of clock domains in the Domains tab to ensure that all the clocks of your design are included in the list. Add or remove clocks as necessary.

To add a new clock domain:

1. Click the **Domains** tab, and click the **Add Domain** button. Select **Clock Domain** from the drop-down list. This opens the **Create Clock Domain** dialog box.

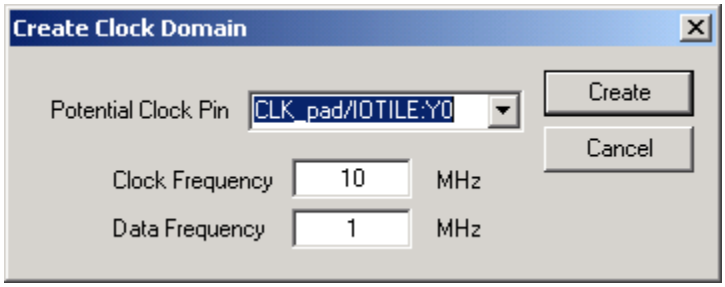


Figure 75 · Create Clock Domain Dialog Box – Toggle Rates Disabled

2. To create a new clock, select a **Potential Clock Pin**, specify a clock and data frequency, and click **Create**. The new clock domain appears in the **Domains** window. If you select an existing clock pin from the drop-down list, the lists of clock pins and data pins of this new clock domain are computed automatically based on the netlist topology.

   Note: Select Use Toggle Rates in the SmartPower Preferences to define your data frequency as a percentage of your clock frequency. If your data frequency is 20% of your clock frequency, type "20" in the Data Frequency text box.

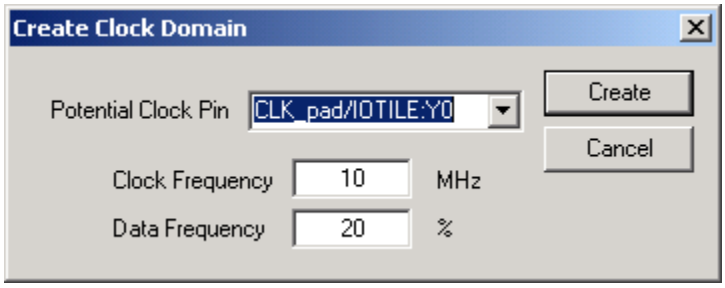


Figure 76 · Create Clock Domain Dialog Box – Toggle Rates Enabled

You may wish to create an empty clock domain and fill the lists of clock-pins and data pins manually. If so, do not select a clock pin, just type a new name for your clock domain.

Beyond the verification of the list of clock domains, you may also wish to verify that the lists of clock pins and data pins computed for each clock domain are correct.

To verify the lists of clock pins and data pins of a clock domain:

1. Click the **Domains** tab and select a specific **Domain** in the list.
2. **Display the list of clock pins or data pins of this Domain.** A drop-down list in the **Domains** tab enables you to select clock pins or data pins. SmartPower displays the list of pins corresponding to your selection below the drop-down list. You can add or remove clock pins and data pins as necessary.

3. **Remove a pin from a clock domain.** Highlight the selected pin and click the **Remove** button. The pin is removed from the clock domain and is made available in the list of pins that you can add in another clock domain.
4. Highlight the selected pin in the list of pins that are not yet in a domain and click the **Add** button to add a pin in a clock domain. This pin is added to the clock domain. It is a clock pin or a data pin, depending on the specification of the drop-down list when you click the **Add** button.

Note: You cannot add a pin that exists in another domain until you free it from its existing domain. The pin is unavailable until you remove it from that domain.

After you have verified that all the clocks of your designs are correctly identified and constructed, you must specify the correct clock and data frequency for each clock domain.

To add a new set of pins:

1. Open the **Create Clock Domain** dialog box. Click the **Domains** tab, and click the **Add Domain** button. Select **Set of Pins** from the drop-down list.

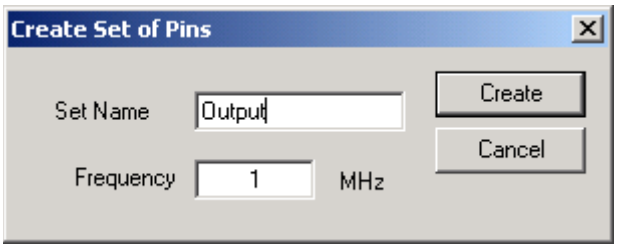


Figure 77 · Create Set of Pins Dialog Box

2. **Create a Set of Pins.** Name your new set of pins, specify a data frequency, and click **Create**. The new set of pins appears in the **Domains** window.

Specify Clock and Data Frequencies in SmartPower

To specify a clock and data frequency:

1. Click the **Domains** tab
2. select the **Clock/Data** frequency cell and type in a new value

SmartPower defaults to 0 MHz for the clock frequency. Import your clock frequency from SmartTime by using the Initialize Frequencies dialog box in SmartPower or input your target for each clock frequency in the **Domains** tab. You must also specify a data frequency (5% of your clock frequency is a typical guideline for your data frequency – this corresponds to a toggle rate of 10 %.)

Not all the pins/gates/nets of your design are associated with a specific clock. For example, the frequency of a design input port is not always correlated to a clock frequency. By extension, all pins that are upstream of the first level of sequential elements are not associated with any clock. SmartPower creates an InputSet by default that it uses to group all the pins that are controlled by design inputs (instead of sequential elements). You may wish to view and verify the InputSet to further evaluate your design.

Viewing and Verifying the InputSet in SmartPower

To verify the InputSet:

1. Click the **Domains** tab and select the domain named **InputSet** in the list.
2. Verify the list of pins of this domain. All the input ports of your design (except the clocks) belong in the **InputSet**. Also, all the pins that are between these input ports and the first level of sequential elements belong in the **InputSet**. You can add or remove pins as necessary.
3. Specify an average input frequency. SmartPower uses the same frequency for all pins of the InputSet. The default InputSet frequency is 1 MHz. Type in a new value to change it.

You may wish to split the InputSet into several sets in order to specify different frequencies. A classic example is to create a ResetSet, a reset tree with a very low frequency.

To split the InputSet into several sets:

1. Create a new set of pins: In the **Domains** tab, click the **New** button, and select **Set of Pins** from the drop-down menu. In the **Create Set Of Pins** dialog box, type a name and a frequency for the new set and click **Create**. The new set of pins appears in the **Domains** window. You can only create an empty set of pins, but it is possible to add pins to this domain later.
2. Remove a group of pins from the **InputSet**. Click the **Domains** tab and select the domain named **InputSet** in the list. Select the pins that you want to remove and click the **Remove** button.
3. Add this group of pins to the new set of pins. Click the **Domains** tab and select the newly created set of pins in the list. Highlight the pins in the list of pins that are not yet in a domain, and click the **Add** button. Repeat these three steps as necessary to create multiple input sets.

Specifying Individual Pin Frequencies

The Frequencies tab enables you to specify an average clock and data frequency for each clock domain, and also an average frequency for each set of pins. This gives you an initial estimate of the power consumption of your design. However, if this estimate is not accurate enough, you may refine it with a pin-by-pin annotation of the frequency.

To specify a frequency annotation for an individual pin:

1. Locate the pin in the **Frequencies** tab. You may need to select different clock domains from the drop-down list on the **Frequencies** tab. You can use filters to facilitate this search.
2. Select the pin(s) in the grid and click the **Set frequencies for selected pins** button, enter a new frequency value, and click **OK**. This specifies a new frequency for the selected pin(s).

Note: This annotation procedure enables you to set the frequency of an individual pin, but this does not mean that the pin is removed from its clock domain. A frequency annotation just overrides the domain level frequency.

You may wish to change or remove a frequency annotation of an individual pin. This may be useful when you import a VCD (value change-dump) file or a SAIF (Switching Activity Interchange Format) file.

To change the frequency annotation of an individual pin:

1. Locate the pin in the **Frequencies** tab**.** You may need to select different clock domains from the drop-down list on the **Frequencies** tab. You can use filters to facilitate the search.
2. Select the pin(s) in the grid and click the **Set frequency for selected pins** button, enter a new frequency value, and click **OK**. This specifies a new frequency for the selected pin(s).

To remove the frequency annotation of an individual pin:

1. Locate the pin in the **Frequencies** tab. You may need to select different clock domains from the drop-down menu on the **Frequencies** tab. You can use filters to facilitate the search.
2. Select the pin(s) in the grid and click the **Reset frequencies for selected pins** button. This removes the specified frequency from the selected pins.

Specifying Individual Pin Probabilities

The **Probabilities** tab enables you to specify the default output probability value for memory blocks, and tristate and bidirectional I/Os. In addition, you can increase the accuracy of the power estimation by annotating the probability of specific pins.

To specify or change the probability for one or multiple pins:

1. Locate the pin(s) in the **Probabilities** tab. You can use filters to facilitate this search.
2. Select the pin(s) and press the **Set probabilities for selected pins** button.
3. Enter a new probability value and press OK.

To reset the probability for one or multiple pins:

1. Locate the pin(s) in the **Probabilities** tab. You can use filters to facilitate this search.
2. Select the pin(s) and press the **Reset Probabilities for selected pins** button. This will reset the probability value.

Vectorless Estimation

The Vectorless estimation method is an accurate method of annotating individual pins with frequencies and probabilities. It uses primary inputs, clock frequencies, and nets annotated with other methods as a starting point, and uses a Monte Carlo simulation to annotate all nets in the design with frequencies and probabilities.

Vectorless estimation is available and enabled by default for SmartFusion, IGLOO, ProASIC3 and Fusion families of devices.

Vectorless estimation can be enabled from the Initialize Frequencies and Probabilities dialog box or from the VCD Import dialog box.

Changes to probabilities or frequencies in the Probabilities, Frequencies, or Domains tabs result in an out-of-date vectorless estimation. To update vectorless estimation, press the refresh vectorless  button.

Viewing Results (Design Level)

Click the Summary tab to view global power consumption at the design level. The **Summary** tab shows your design's estimated power consumption and temperature information.

The power estimation reported in the **Summary** tab is the total static and dynamic power consumption of your design. For a more detailed view of this power consumption, click the **Analysis** tab.

To estimate the junction temperature:

1. Verify your package. You cannot change your package directly in SmartPower, because it may render your place-and-route information (and thus it may severely impact the total power consumption). If you wish to choose another package, you have to do it in **Designer > Tools > Device Selection**.
2. Click the **Summary** tab, and select a **Cooling** style in the list. Thermal resistance changes automatically when you update the cooling style.
3. Specify an ambient temperature. Enter an **ambient temperature** (default value is 25ºC), and click the **Set** button.

Note: The junction temperature value changes according to the package, cooling style, and ambient temperature values you choose.

Analyzing Results

The **Analysis** tab displays the estimated power consumption of individual blocks, gates, nets, I/Os, and memory and enables you to make a hierarchical analysis of your power consumption. The **Analysis** tab may also help you to improve your power consumption by identifying the components that consume a significant amount of power.

To identify the components consuming the most power:

1. Use the **Analysis** tab to expand the design hierarchy. The **Analysis** tab enables you to expand your design hierarchy and view a complete list of the blocks in your design. In the hierarchy window, click the **+** next to your design to view the items in the hierarchy. Click the **+** next to a sub-block to view its sub-elements.

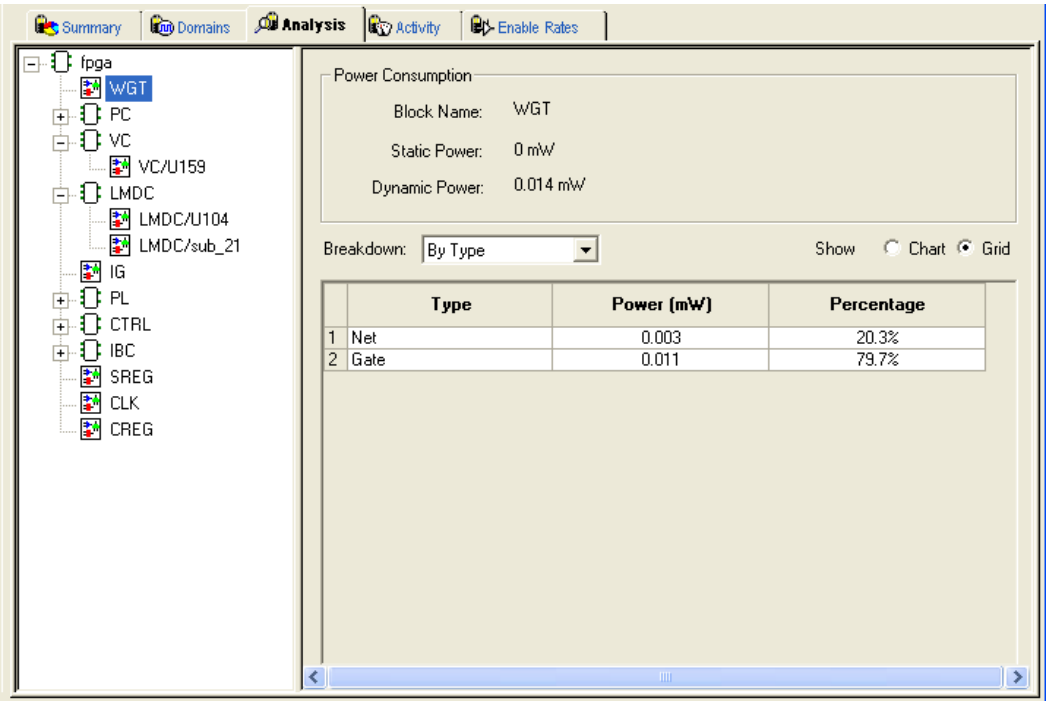


Figure 78 · Analysis Tab Dialog Box

2. Click to select a block. By default, SmartPower selects the design-level block, but you can always select another block in the hierarchical tree. The **Report** window displays the list of sub-elements of the selected block. Initially, this list includes all sub-elements. The grid in the **Analysis** window displays a breakdown of the power of the selected block by type. This breakdown provides you a good overview of which areas of your design you should optimize for power.
3. To find the components that use a significant amount of power, choose **By Instance** from the **Breakdown** drop-down list.
4. Sort and filter the sub-elements to find the component that is using the most power. The **Analysis** window displays the list of sub-elements of the selected block. By default, this list includes all sub-elements. The grid contains columns for name, type, power, driver, fanout, macro, I/O standard, output load, output drive, slew, port, domain and frequency. You may limit the list of sub-elements to a list of sub-blocks, nets, gates, I/Os, memories, or any combination of these five classes of sub-elements. You can sort the list according to any column by double-clicking the column header.

See Also

Advanced Analysis of I/Os

Analysis tab

Cross-Probing in SmartPower

SmartPower supports cross probing with the other Designer tools. You must calculate your design's power consumption before you can cross probe effectively. See the Calculating Power section for more information.

To cross probe with the SmartPower tool:

1. View the detailed results of your power analysis in the **Analysis** tab of the SmartPower tool.
2. Select **By Instance** from the **Breakdown** drop-down list.
3. Open **MultiView Navigator** in Designer.
4. Select your component.
5. Click a sub-component in the grid to highlight the corresponding component in the **ChipPlanner** or **PinEditor** tool.

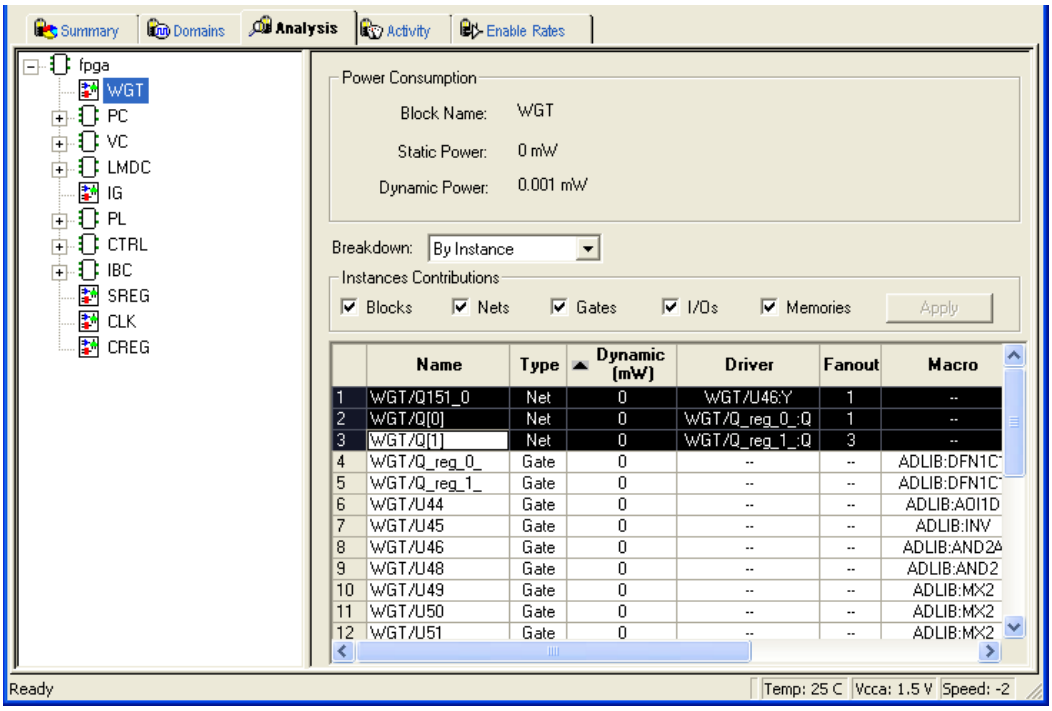


Figure 79 · Cross-Probing with SmartPower: SmartPower Analysis View

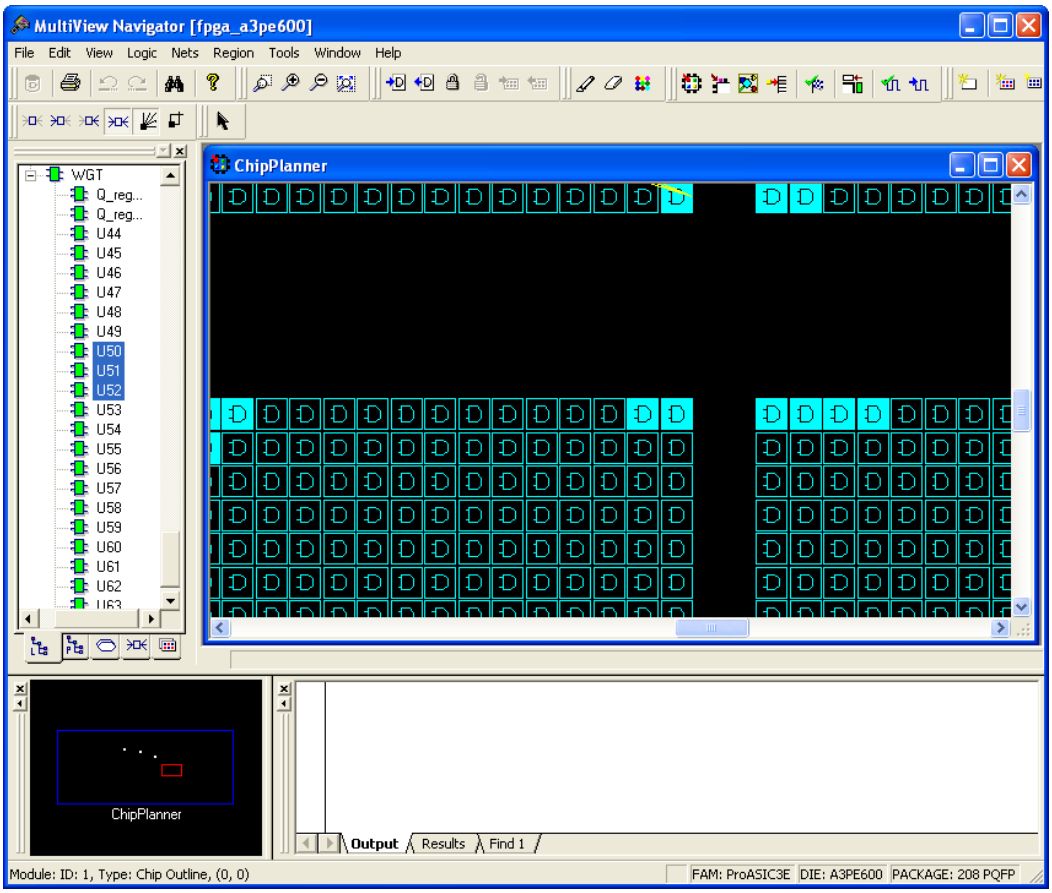


Figure 80 · Cross-Probing with SmartPower: ChipPlanner View

SmartPower Calculation Equations

SmartPower calculates the static power and the dynamic power of your design, for given operating conditions and operating modes:

Static Power: This value is a summation of the static power consumed by each element of the design. SmartPower provides a static power consumption of the array. This value is die-dependent. This value is also a function of the operating mode. For some families, SmartPower also considers a static power contribution per I/O bank. For specific I/O technologies like voltage referenced I/Os or differential I/Os, SmartPower also considers a static power contribution per I/O.

Dynamic Power: This value is a summation of the dynamic power consumed by each element of the design (nets, modules, I/Os, RAMs, FIFOs, PLLs, etc.).

Operating Conditions: SmartPower calculates power consumption in Worst, Typical, or Best operating conditions. SmartPower uses the following as general guidelines:

- It applies a voltage derating to dynamic power contributions. Higher voltage typically leads to higher power consumption.
- It applies a temperature derating to static power contributions. Higher temperature typically leads to higher power consumption.
- It applies no radiation derating.

Operating Modes: SmartPower calculates power consumption in Active, Static, Flash*Freeze, Sleep, and Shutdown operating modes, when applicable for your design.

Sample Equations:

The examples below are for general evaluation purposes only. They are not a precise representation of the actual calculations, since each calculation takes into account family-specific information.

- For a **net**,

  $$P = C \cdot V^2 \cdot F$$

  where C is the total capacitive loading of the net (extracted from the routing topology), V is the net's voltage swing, and F is the average switching frequency.

  Note: For the ProASIC^{PLUS} family, SmartPower extracts the capacitive loading of a net from a Wire Load model.

- For a **module**, the power is computed using a characterized library (by family and die-size) describing a specific power model for each type of module. For example, the power model of a flip-flop is given by

  $$P = P_{CK} \cdot F_{CK} + P_{DOUT} \cdot F_{DOUT} + P_{Din} \cdot F_{Din}$$

  where F_{CK} is the average clock-input frequency for this flip-flop, F_{DOUT} is its average data-output frequency, and P_{CK}, $P_{DOUT, PDin}$ are three constants estimated by electrical simulation and silicon characterization for this flip-flop module, and FDin is its average data-input frequency.

- For an **I/O**, the formula used for computing the power consumption depends on the I/O technology and the family. For example, for a TTL output, the dynamic power is given by

  $$P = P_{INT} \cdot F + C \cdot V^2 \cdot F$$

  where C is the output load (derived from what you have set in the I/O Attribute Editor GUI, typically 35 pF for TTL), V is the output's voltage swing (3.3 V for TTL), and P_{INT} represents an internal power contribution dissipated in the pad, and F is the average switching frequency of the I/O.

- For a **complex block**, like a RAM, a FIFO, or a PLL, SmartPower uses a high-level power model that integrates design parameters.

SmartPower automatically computes all the constant parameters of these equations. However, the frequencies depend on the target frequencies of your design. Since it is impractical to enter each frequency manually, SmartPower has several flows that help you to estimate the frequencies and calculate the power consumption.

SmartPower Tcl Commands

SmartPower supports the following Tcl scripting commands:

- set_pin_enable_rate
- set_pin_probability
- smartpower_add_new_custom_mode
- smartpower_add_new_scenario
- smartpower_add_pin_in_domain
- smartpower_battery_settings
- smartpower_change_clock_statistics
- smartpower_change_setofpin_statistics
- smartpower_commit
- smartpower_create_domain
- smartpower_compute_vectorless
- smartpower_edit_custom_mode
- smartpower_edit_scenario
- smartpower_import_vcd
- smartpower_initialize_clock_with_constraints
- smartpower_init_do
- smartpower_init_set_clocks_options
- smartpower_init_set_combinational_options
- smartpower_init_set_enables_options
- smartpower_init_set_othersets_options
- smartpower_init_set_primaryinputs_options
- smartpower_init_set_registers_options
- smartpower_init_set_set_reset_options
- smartpower_init_setofpins_values
- smartpower_remove_all_annotations
- smartpower_remove_custom_mode
- smartpower_remove_domain
- smartpower_remove_file
- smartpower_remove_pin_enable_rate
- smartpower_remove_pin_frequency
- smartpower_remove_pin_of_domain
- smartpower_remove_pin_probability
- smartpower_remove_scenario
- smartpower_restore
- smartpower_set_cooling
- smartpower_set_mode_for_analysis
- smartpower_set_mode_for_pdpr
- smartpower_set_operating_condition
- smartpower_set_pin_probability
- smartpower_set_pin_frequency

- smartpower_set_preferences
- smartpower_set_scenario_for_analysis
- smartpower_set_temperature_opcond
- smartpower_set_thermalmode
- smartpower_set_voltage_opcond
- smartpower_temperature_opcond_set_design_wide
- smartpower_temperature_opcond_set_mode_specific
- smartpower_voltage_opcond_set_design_wide
- smartpower_voltage_opcond_set_mode_specific

smartpower_add_new_custom_mode

Tcl command; creates a new custom mode.

```
smartpower_add_new_custom_mode -name {mode_name} -base_mode {base_mode} -description
{mode_description}
```

Arguments

`-name {mode_name}`

Specifies the name of the new custom mode.

`-base_mode {base_mode}`

Specifies the name of the base mode used to create the new custom mode. It must be one of the following: Active, Standby, or Flash*Freeze.

`-description {mode_description}`

Specifies the description of the new custom mode.

Supported Families

See the Tcl Commands and Supported Families table for the list of families that support this command.

Examples

This example creates a new custom mode "Cust_1" based on the Active mode:

```
smartpower_add_new_custom_mode -name {Cust_1} -base_mode {Active} -description
{frequency 10 MHz}
```

See Also

smartpower_remove_custom_mode

Designer Tcl Command Reference

smartpower_add_new_scenario

Tcl command; creates a new scenario.

```
smartpower_add_new_scenario -name {value} -description {value} -mode {value}
```

Arguments

`-name {value}`

Specifies the name of the new scenario.

`-description {value}`

Specifies the description of the new scenario.

`-mode {<operating mode>:<duration>}+`

Specifies the mode(s) and duration(s) for the specified scenario.

Supported Families

See the Tcl Commands and Supported Families table for a list of supported families.

Examples

This example creates a new scenario called myscenario:

```
smartpower_add_new_scenario -name "MyScenario" -mode "Custom_1:50.00"
"Custom_2:25.00" -mode "Active:25.00"
```

See Also

Tcl documentation conventions

Designer Tcl Command Reference

smartpower_add_pin_in_domain

Tcl command; 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

See the Tcl Commands and Supported Families table for a list of supported families.

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.

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

Tcl documentation conventions

Designer Tcl Command Reference

`smartpower_remove_pin_of_domain`

smartpower_battery_settings

This SmartPower Tcl command sets the battery capacity in SmartPower. The battery capacity is used to compute the battery life of your design.

```
smartpower_battery_settings -capacity {decimal value}
```

Parameters

`-capacity {decimal value}`

Value must be a positive decimal.

This parameter is mandatory.

Exceptions

None

Returns

This command does not return a value.

Supported Families

See the Tcl Commands and Supported Families table for the list of families that support this command.

Usage

This section parameters for the command, their types, and the values they can be set to.

smartpower_battery_settings	Type	Value	Description
capacity	Decimal	Positive decimal	Specify the battery capacity in mA*Hours

Example

This example sets the battery capacity to 1800 mA * Hours.

```
smartpower_battery_settings –capacity {1800}
```

smartpower_change_clock_statistics

Tcl command; changes the default frequencies and probabilities for a specific domain.

```
smartpower_change_clock_statistics -domain_name {value} -clocks_freq {value} -
clocks_proba {value} -registers_freq {value} -registers_proba {value} -set_reset_freq
{value} -set_reset_proba {value} -primaryinputs_freq {value} -primaryinputs_proba {value} -
combinational_freq {value} -combinational_proba {value}
```

Arguments

`-domain_name{value}`

Specifies the domain name in which to initialize frequencies and probabilities.

`-clocks_freq {value}`

Specifies the user input frequency in Hz, KHz, or MHz for all clocks.

`-clocks_proba {value}`

Specifies the user input probability in % for all clocks.

`-registers_freq {value}`

Specifies the user input frequency (in Hz, KHz, or MHz) or the toggle rate (in %). If the unit is not provided and toggle rate is active, the value is handled as a toggle rate; if toggle rate is not active, the value is handled as a frequency.

`-registers_proba {value}`

Specifies the user input probability in % for all registers.

`-set_reset_freq {value}`

Specifies the user input frequency (in Hz, KHz, or MHz) or the toggle rate (in %). If the unit is not provided and toggle rate is active, the value is handled as a toggle rate; if toggle rate is not active, the value is handled as a frequency.

`-set_reset_proba {value}`

Specifies the user input probability in % for all set/reset nets.

`-primaryinputs_freq {value}`

Specifies the user input frequency (in Hz, KHz, or MHz) or the toggle rate (in %). If the unit is not provided and toggle rate is active, the value is handled as a toggle rate; if toggle rate is not active, the value is handled as a frequency.

`-primaryinputs_proba {value}`

Specifies the user input probability in % for all primary inputs.

`-combinational_freq {value}`

Specifies the user input frequency (in Hz, KHz, or MHz) or the toggle rate (in %). If the unit is not provided and toggle rate is active, the value is handled as a toggle rate; if toggle rate is not active, the value is handled as a frequency.

`-combinational_proba {value}`

Specifies the user input probability in % for all combinational combinational output.

Supported Families

See the Tcl Commands and Supported Families table for the list of families that support this command.

Notes

This command is associated with the functionality of Initialize frequencies and probabilities dialog box.

Examples

The following example initializes all clocks withs:

```
smartpower_change_clock_statistics -domain_name {my_domain} -clocks_freq {10 MHz} -
clocks_proba {20} -registers_freq {10 MHz} -registers_proba {20} -set_reset_freq {10
MHz} -set_reset_proba {20} -primaryinputs_freq {10 MHz} -primaryinputs_proba {20} -
combinational_freq {10 MHz} -combinational_proba {20}
```

See Also

Tcl documentation conventions

Designer Tcl Command Reference

smartpower_change_setofpin_statistics

Tcl command; changes the default frequencies and probabilities for a specific set.

```
smartpower_change_setofpin_statistics -domain_name {value} -data_freq {value} -
data_proba {value}
```

Arguments

`-domain_name{value}`

Specifies the domain name in which to initialize data frequencies and probabilities.

`-data_freq {value}`

Specifies the user input data frequency in Hz, KHz, or MHz for all sets of pins.

`-data_proba {value}`

Specifies the user input data probability in % for all sets of pins.

Supported Families

See the Tcl Commands and Supported Families table for the list of families that support this command.

Notes

This command is associated with the functionality of Initialize frequencies and probabilities dialog box.

Examples

The following example initializes all clocks withs:

```
smartpower_change_setofpin_statistics -domain_name {my_domain} -data_freq {10 MHz} -
data_proba {20}
```

See Also

Tcl documentation conventions

Designer Tcl Command Reference

smartpower_commit

Tcl command; saves the changes to the design (.adb) file.

```
smartpower_commit
```

Arguments

None

Supported Families

See the Tcl Commands and Supported Families table for the list of families that support this command.

Examples

```
smartpower_commit
```

See Also

Tcl documentation conventions
Designer Tcl Command Reference
smartpower_restore

smartpower_compute_vectorless

This Tcl command executes a vectorless analysis of the current operating mode.

Arguments

None

Supported Families

See the Tcl Commands and Supported Families table for the list of families that support this command.

Example

```
smartpower_compute_vectorless
```

See Also

Tcl Command Documentation Conventions
Designer Tcl Command Reference

smartpower_create_domain

Tcl command; 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

See the Tcl Commands and Supported Families table for the list of families that support this command.

Notes

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

The domain `type` must be either clock or set.

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

Tcl documentation conventions

Designer Tcl Command Reference

`smartpower_remove_domain`

smartpower_edit_custom_mode

Tcl command; edits a custom mode.

```
smartpower_edit_custom_mode -name {old_mode_name} new_name {new_mode_name} -description
{mode_description}
```

Arguments

`-name {old_mode_name}`

Specifies the name of the custom mode you want to edit.

`-new_name {new_mode_name}`

Specifies the new name of the custom mode.

`-description {mode_description}`

Specifies the description of the new custom mode.

Supported Families

See the Tcl Commands and Supported Families table for the list of families that support this command.

Examples

This example edits custom mode "Cust_1" and renames it "Cust_2":

```
smartpower_edit_custom_mode -name {Cust_1} -new_name {Cust_2} -description {frequency 10
MHz}
```

See Also

Tcl documentation conventions

Designer Tcl Command Reference

`smartpower_remove_custom_mode`

`smartpower_add_custom_mode`

smartpower_edit_scenario

Tcl command; edits a scenario.

```
smartpower_edit_scenario -name {value} -description {value} -mode {value} -new_name {value}
```

Arguments

`-name {value}`

Specifies the name of the scenario.

`-description {value}`

Specifies the description of the scenario.

`-mode {<operating mode>:<duration>}`

Specifies the mode(s) and duration(s) for the specified scenario.

`-new_name {value}`

Specifies the new name for the scenario

Supported Families

See the Tcl Commands and Supported Families table for the list of families that support this command.

Examples

This example edits the name of myscenario to finalscenario:

```
smartpower_edit_scenario -name myscenario -new_name finalscenario
```

See Also

Tcl documentation conventions

Designer Tcl Command Reference

smartpower_import_vcd

This SmartPower Tcl command imports into SmartPower a VCD file generated by a simulation tool. SmartPower extracts the frequency and probability information from the VCD.

```
import_vcd -file "VCD file" [-opmode "mode name"] [-with_vectorless "TRUE | FALSE"] [-
partial_parse\ "TRUE | FALSE"] [-start_time "decimal value"] [-end_time "decimal value"]
\
[-auto_detect_top_level_name "TRUE | FALSE"] [-top_level_name "top level name"] [-
glitch_filtering\ "false | auto | true"] [-glitch_threshold "integer value"] [-stop_time
"decimal value"]
```

Parameters

`-file "VCD file"`

Value must be a file path. This parameter is mandatory.

`[-opmode "mode name"]`

Value must be a string. This parameter is optional.

`[-with_vectorless "TRUE | FALSE"]`

Value must be a boolean. This parameter is optional.

`[-partial_parse "TRUE | FALSE"]`

Value must be a boolean. This parameter is optional.

`[-start_time "decimal value"]`

Value must be a positive decimal. This parameter is optional.

`[-end_time "decimal value"]`

Value must be a positive decimal. This parameter is optional.

```
[-auto_detect_top_level_name "TRUE | FALSE"]
```

Value must be a boolean. This parameter is optional.

```
[-top_level_name "top level name"]
```

Value must be a string. This parameter is optional.

```
[-glitch_filtering "false | auto | true"]
```

Value must be one of false | auto | true. This parameter is optional.

```
[-glitch_threshold "integer value"]
```

Value must be a positive integer. This parameter is optional.

Exceptions

None

Returns

This command does not return a value.

Usage

This section lists all the parameters for the command, their types, and the values they can be set to. The default value is always listed first.

smartpower_import_vcd	Type	Values	Description
file	String	Path to a VCD file	Path to a VCD file.
opmode	String	Operating mode name “Active” by default	Operating mode in which the VCD will be imported. If the mode doesn’t exist, it will be created.
with_vectorless	Boolean	TRUE|FALSE	Specify the method to set the frequency and probability information for signals not annotated by the VCD TRUE: use the vectorless analysis FALSE: use average value computed from the VCD.
partial_parse	Boolean	FALSE|TRUE	Enable partial parsing of the VCD. Start time and end time need to be specified when TRUE.
start_time	Decimal value	positive decimal nanoseconds (ns)	Specify the starting timestamp of the VCD extraction in ns. It must be lower than the specified end_time. It must be lower than the last timestamp in the VCD file.

smartpower_import_vcd	Type	Values	Description
end_time	Decimal value	positive decimal nanoseconds (ns)	Specify the end timestamp of the VCD extraction in ns. It must be higher than the specified start_time.
auto_detect_top_level_name	Boolean	TRUE|FALSE	Enable the auto detection of the top level name in the VCD file. Top_level_name needs to be specified when FALSE .
top_level_name	Boolean	Full hierarchical name	Specify the full hierarchical name of the instance of the design in the VCD file.
glitch_filtering	Boolean	Auto|FALSE|TRUE	AUTO: Enable glitch filtering with predefined thereshold based on the family TRUE: Enable glitch filtering, glitch_threshold must be specified FALSE: Disable glitch filtering.
glitch_threshold	Integer	Positive integer	Specify the threshold in ps below which glitches are filtered out.

Supported Families

See the Tcl Commands and Supported Families table for the list of families that support this command.

Examples

The Tcl command below imports the power.vcd file generated by the simulator into SmartPower:

```
smartpower_import_vcd –file “../../simulation/power.vcd”
```

The Tcl command below extracts information between 1ms and 2ms in the simulation, and stores the information into a custom mode:

```
smartpower_import_vcd –file “../../simulation/power.vcd” –partial_parse TRUE –start_time
1000000 –end_time 2000000 –opmode “power_1ms_to_2ms”
```

smartpower_init_do

Tcl command; initializes the frequencies and probabilities for clocks, registers, set/reset nets, primary inputs, combinational outputs, enables and other sets of pins, and selects a mode for initialization.

```
smartpower_init_do -with {value} -opmode {value} -clocks {value} -registers {value} -
set_reset {value} -primaryinputs {value} -combinational {value} -enables {value} -othersets
{value}
```

Arguments

`-with{value}`

This sets the option of initializing frequencies and probabilities with vectorless analysis or with fixed values. The following table shows the acceptable values for this argument:

Value	Description
vectorless	Initializes frequencies and probabilities with vectorless analysis
fixed	Initializes frequencies and probabilities with fixed values

`-opmode {value}`

Optional; specifies the mode in which to initialize frequencies and probabilities. The value must be Active or Flash*Freeze.

`-clocks {value}`

This sets the option of initializing frequencies and probabilities for all clocks. The following table shows the acceptable values for this argument:

Value	Description
true	Initializes frequencies and probabilities for all clocks
false	Does not initialize frequencies and probabilities for all clocks

`-registers {value}`

This sets the option of initializing frequencies and probabilities for all registers. The following table shows the acceptable values for this argument:

Value	Description
true	Initializes frequencies and probabilities for all registers
false	Does not initialize frequencies and probabilities for all registers

`-set_reset {value}`

This sets the option of initializing frequencies and probabilities for all set/reset nets. The following table shows the acceptable values for this argument:

Value	Description
true	Initializes frequencies and probabilities for all set/reset nets
false	Does not initialize frequencies and probabilities for all set/reset nets

`-primaryinputs{value}`

This sets the option of initializing frequencies and probabilities for all primary inputs. The following table shows the acceptable values for this argument:

Value	Description
true	Initializes frequencies and probabilities for all primary inputs
false	Does not initialize frequencies and probabilities for all primary inputs

`-combinational {value}`

This sets the option of initializing frequencies and probabilities for all combinational outputs. The following table shows the acceptable values for this argument:

Value	Description
true	Initializes frequencies and probabilities for all combinational outputs
false	Does not initialize frequencies and probabilities for all combinational outputs

`-enables {value}`

This sets the option of initializing frequencies and probabilities for all enable sets of pins. The following table shows the acceptable values for this argument:

Value	Description
true	Initializes frequencies and probabilities for all enable sets of pins
false	Does not initialize frequencies and probabilities for all enable sets of pins

`-othersets {value}`

This sets the option of initializing frequencies and probabilities for all other sets of pins. The following table shows the acceptable values for this argument:

Value	Description
true	Initializes frequencies and probabilities for all other sets of pins
false	Does not initialize frequencies and probabilities for all other sets of pins

Supported Families

See the Tcl Commands and Supported Families table for the list of families that support this command.

Notes

This command is associated with the functionality of Initialize frequencies and probabilities dialog box.

Examples

The following example initializes all clocks with:

```
smartpower_init_do -with {vectorless} -opmode {my_mode} -clocks {true} -registers {true}
-asynchronous {true} -primaryinputs {true} -combinational {true} -enables {true} -
othersets {true}
```

See Also

Tcl documentation conventions

Designer Tcl Command Reference

smartpower_init_set_clocks_options

Tcl command; initializes the clock frequency options of all clock domains.

```
smartpower_init_set_clocks_options -with_clock_constraints {value} -
with_default_values {value} -freq {value} -duty_cycle {value}
```

Arguments

`-with_clock_constraints {value}`

This sets the option of initializing the clock frequencies with frequency constraints from SmartTime. The following table shows the acceptable values for this argument:

Value	Description
true	Sets initialize clock frequencies with clock constraints ON
false	Sets initialize clock frequencies with clock constraints OFF

`-with_default_values {value}`

This sets the option of initializing the clock frequencies with a user input default value. The following table shows the acceptable values for this argument:

Value	Description
true	Sets initialize clock frequencies with default values ON
false	Sets initialize clock frequencies with default values OFF

`-freq {value}`

Specifies the user input frequency in Hz, KHz, or MHz.

`-duty_cycle {value}`

Specifies the user input duty cycles in %.

Supported Families

See the Tcl Commands and Supported Families table for the list of families that support this command.

Notes

This command is associated with the functionality of Initialize frequencies and probabilities dialog box.

Examples

The following example initializes all clocks after executing `smartpower_init_do` with `-clocks {true}`:

```
smartpower_init_set_clocks_options -with_clock_constraints {true} -with_default_values
{true} -freq {10 MHz} -duty_cycle {20}
```

See Also

Tcl documentation conventions

Designer Tcl Command Reference

smartpower_init_set_combinational_options

Tcl commands; initializes the frequency and probability of all combinational outputs.

```
smartpower_init_set_combinational_options -freq {value} -proba {value}
```

Arguments

`-freq {value}`

Specifies the user input frequency (in Hz, KHz, or MHz) or the toggle rate (in %). If the unit is not provided and toggle rate is active, the value is handled as a toggle rate; if toggle rate is not active, the value is handled as a frequency.

`-proba {value}`

Specifies the user input probability in %.

Supported Families

See the Tcl Commands and Supported Families table for the list of families that support this command.

Notes

This command is associated with the functionality of Initialize frequencies and probabilities dialog box.

Examples

The following example initializes all combinational signals after executing `smartpower_init_do` with `-combinational {true}`:

```
smartpower_init_set_combinational_options -freq {10 MHz} -proba {20}
```

See Also

Tcl documentation conventions

Designer Tcl Command Reference

smartpower_init_set_enables_options

Tcl command; initializes the clock frequency of all enable clocks with the initialization options.

```
smartpower_init_set_enables_options -freq {value} -proba {value}
```

Arguments

`-freq {value}`

Specifies the user input frequency (in Hz, KHz, or MHz).

`-proba {value}`

Specifies the user input probability in %.

Supported Families

See the Tcl Commands and Supported Families table for the list of families that support this command.

Notes

This command is associated with the functionality of Initialize frequencies and probabilities dialog box.

Examples

The following example initializes all clocks after executing smartpower_init_do with -enables {true}:

```
smartpower_init_set_enables_options -freq {10 MHz} -proba {20}
```

See Also

Tcl documentation conventions

Designer Tcl Command Reference

smartpower_init_set_othersets_options

Tcl command; initializes the frequency and probability of all other sets.

```
smartpower_init_set_othersets_options [-freq "decimal value [ unit { Hz | KHz | MHz } ]"]
[-proba "decimal value"]
[-with "vectorless | default"]
[-input_freq "decimal value [ unit { Hz | KHz | MHz } ]"]
[-input_proba "decimal value"]
```

Arguments

-freq "*decimal value* [unit {Hz | KHz| MHz}"

Specifies the default frequency and units.

-proba {*decimal value*}

Specifies the default probability.

-with "*vectorless | default*"

Specifies vectorless or default analysis.

-input_freq "*decimal value* [unit {Hz | KHz| MHz}"

Specifies the input frequency and units.

-input_proba {*decimal value*}

Specifies the input probability.

Supported Families

See the Tcl Commands and Supported Families table for the list of families that support this command.

Notes

This command is associated with the functionality of Initialize Frequencies and Probabilities dialog box.

Examples

The following example initializes all other sets after executing smartpower_init_do with -othersets {true}:

```
smartpower_init_set_othersets_options -freq {10 MHz} -proba {20} [-with default]
```

See Also

Tcl documentation conventions

Designer Tcl Command Reference

smartpower_init_set_primaryinputs_options

Tcl command; initializes the frequency and probability of all primary inputs.

```
smartpower_init_set_primaryinputs_options -freq {value} -proba {value}
```

Arguments

`-freq {value}`

Specifies the user input frequency (in Hz, KHz, or MHz) or the toggle rate (in %). If the unit is not provided and toggle rate is active, the value is handled as a toggle rate; if toggle rate is not active, the value is handled as a frequency.

`-proba {value}`

Specifies the user input probability in %.

Supported Families

See the Tcl Commands and Supported Families table for the list of families that support this command.

Notes

This command is associated with the functionality of Initialize frequencies and probabilities dialog box.

Examples

The following example initializes all primary inputs after executing `smartpower_init_do` with `-primaryinputs {true}`:

```
smartpower_init_set_primaryinputs_options -freq {10 MHz} -proba {20}
```

See Also

Tcl documentation conventions

Designer Tcl Command Reference

smartpower_init_set_registers_options

Tcl command; initializes the frequency and probability of all register outputs.

```
smartpower_init_set_registers_options -freq {value} -proba {value}
```

Arguments

`-freq {value}`

Specifies the user input frequency (in Hz, KHz, or MHz) or the toggle rate (in %). If the unit is not provided and toggle rate is active, the value is handled as a toggle rate; if toggle rate is not active, the value is handled as a frequency.

`-proba {value}`

Specifies the user input probability in %.

Supported Families

See the Tcl Commands and Supported Families table for the list of families that support this command.

Notes

This command is associated with the functionality of Initialize frequencies and probabilities dialog box.

Exceptions

None

Examples

The following example initializes all register outputs after executing `smartpower_init_do` with `-registers {true}`:

```
smartpower_init_set_registers_options -freq {10 MHz} -proba {20}
```

See Also

Tcl documentation conventions

Designer Tcl Command Reference

smartpower_init_setofpins_values

Tcl command; initializes the frequency and probability of all sets of pins.

```
smartpower_init_setofpins_values -domain_name {name} -freq {value} -proba {value}
```

Arguments

`-domain_name{name}`

Specifies the set of pins that will be initialized. The following table shows the acceptable values for this argument:

Value	Description
IOsEnableSet	Specifies that the IOsEnableSet set of pins will be initialized
MemoriesEnableSet	Specifies that the MemoriesEnableSet set of pins will be initialized

`-freq {value}`

Specifies the user input frequency in Hz, MHz, or KHz.

`-proba {value}`

Specifies the user input probability in %.

Supported Families

See the Tcl Commands and Supported Families table for the list of families that support this command.

Notes

This command is associated with the functionality of Initialize frequencies and probabilities dialog box.

Examples

The following example initializes all primary inputs after executing `smartpower_init_do` with `-othersets {true}`:

```
smartpower_init_setofpins_values -domain_name {IOsEnableSet} -freq {10 MHz} -proba {20}
```

See Also

Tcl documentation conventions

Designer Tcl Command Reference

smartpower_remove_all_annotations

Tcl command; removes all initialization annotations for the specified mode.

```
smartpower_remove_all_annotations -opmode {value}
```

Arguments

`-opmode {value}`

Removes all initialization annotations for the specified mode, where value must be Active or Flash*Freeze.

Supported Families

See the Tcl Commands and Supported Families table for the list of families that support this command.

Notes

This command is associated with the functionality of Initialize frequencies and probabilities dialog box.

Examples

The following example initializes all clocks with opmode Acitve:

```
smartpower_remove_all_annotations -opmode {Active}
```

See Also

Tcl documentation conventions

Designer Tcl Command Reference

smartpower_remove_custom_mode

Tcl command; removes a custom mode.

```
smartpower_remove_custom_mode -name {deleted_mode_name}
```

Arguments

`-name {deleted_mode_name}`

Specifies the name of the custom mode you want to delete.

Supported Families

See the Tcl Commands and Supported Families table for the list of families that support this command.

Examples

This example delets custom mode "Cust_1":

```
smartpower_delete_custom_mode -name {Cust_1}
```

See Also

Tcl documentation conventions

Designer Tcl Command Reference

sp_add_custom_mode

sp_edit_custom_mode

smartpower_remove_domain

Tcl command; removes an existing clock or set domain.

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

Arguments

`-domain_type {value}`

This 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}`

This specifies the name of the domain to remove

Supported Families

See the Tcl Commands and Supported Families table for the list of families that support this command.

Notes

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

The domain type must be either clock or set.

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

Tcl documentation conventions

Designer Tcl Command Reference

`smartpower_create_domain`

smartpower_remove_file

Tcl command; removes a VCD file from the specified mode or all operating mode. Frequency and probability information of signals annotated by the VCD are set back to the default value..

```
remove_file
-file {value} \
-format {value} \
-opmode {value} \
```

Arguments

`-file {value}`

Specifies the file to be removed. This is mandatory.

`-format VCD`

Specifies that the type to be removed is a VCD file. This is mandatory.

`[-opmode {value}]`

Specifies the operating mode. This is optional. The following table shows the acceptable values for this argument:

Value	Description
Active	The operating mode is set to active
Standby	The operating mode is set to static
Flash*Freeze	The operating mode is set to Flash*Freeze

Supported Families

See the Tcl Commands and Supported Families table for the list of families that support this command.

Examples

This example removes the file test.vcd from the Active mode.

```
smartpower_remove_file -file "test.vcd" -format VCD -opmode "Active"
```

This example removes the VCD file power1.vcd from all operating modes:

```
smartpower_remove_file –file “power1.vcd” –format VCD
```

See Also

Tcl documentation conventions

Designer Tcl Command Reference

smartpower_remove_pin_enable_rate

This command was obsoleted in SmartPower v8.5. Update your script to use `smartpower_remove_pin_probability` to remove the pin probability.

Note: The information below is obsolete and should only be used as reference when executing previously-created scripts. Update your scripts to use `smartpower_remove_pin_probability`.

Removes the probability value associated with a specific pin. This pin will have a default probability based on the domain set it belongs to.

```
smartpower_remove_pin_enable_rate –pin_name {pin_name}
```

Arguments

`-pin_name {pin_name}`

Specifies the name of the pin with the probability to remove. This pin must be the direct driver of an enable pin.

Supported Families

SmartFusion, IGLOO, ProASIC3, Fusion

Exceptions

None

Examples

The following example removes the probability of the pin driving the enable pin of a bidirectional I/O:

```
Smartpower_remove_pin_enable_rate –pin_name mybibuf/U0/U1:EOUT
```

smartpower_remove_pin_frequency

Tcl command; 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

See the Tcl Commands and Supported Families table for the list of families that support this command.

Notes

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

Examples

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

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

See Also

Tcl documentation conventions

Designer Tcl Command Reference

smartpower_set_pin_frequency

smartpower_remove_pin_of_domain

Tcl command; 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 pinto 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

See the Tcl Commands and Supported Families table for the list of families that support this command.

Notes

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

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

Examples

The following example removes the clock pin named "XCMP3/UO/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

Tcl documentation conventions

Designer Tcl Command Reference

smartpower_add_pin_in_domain

smartpower_remove_pin_probability

Tcl command; removes the probability value associated with a specific pin. This pin will have a default probability based on the domain set it belongs to.

```
smartpower_remove_pin_probability –pin_name {pin_name}
```

Arguments

`-pin_name {pin_name}`

Specifies the name of the pin with the probability to remove. This pin must be the direct driver of an enable pin.

Supported Families

See the Tcl Commands and Supported Families table for the list of families that support this command.

Examples

The following example removes the probability of the pin driving the enable pin of a bidirectional I/O:

```
Smartpower_remove_pin_probability –pin_name mybibuf/U0/U1:EOUT
```

See Also

Tcl documentation conventions
Designer Tcl Command Reference
smartpower_set_pin_probability

smartpower_remove_scenario

Tcl command; removes a scenario from the current design.

```
smartpower_remove_scenario -name {value}
```

Arguments

-name {*value*}
Specifies the name of the scenario.

Supported Families

See the Tcl Commands and Supported Families table for the list of families that support this command.

Examples

This example removes a scenario from the current design:

```
smartpower_remove_scenario -name myscenario
```

See Also

Tcl documentation conventions
Designer Tcl Command Reference

smartpower_restore

Tcl command; restores all power information previously committed in SmartPower.

```
smartpower_restore
```

Arguments

None

Supported Families

See the Tcl Commands and Supported Families table for the list of families that support this command.

Examples

```
smartpower_restore
```

See Also

Tcl documentation conventions
Designer Tcl Command Reference
smartpower_commit

smartpower_set_mode_for_analysis

Tcl command; sets the mode for cycle-accurate power analysis.

```
smartpower_set_mode_for_analysis -mode {value}
```

Arguments

`-mode {value}`

Specifies the mode for cycle-accurate power analysis.

Value	Description
Active	The operating mode is set to Active
Standby	The operating mode is set to Standby
Flash*Freeze	The operating mode is set to Flash*Freeze

Supported Families

See the Tcl Commands and Supported Families table for the list of families that support this command.

Examples

The following example sets the mode for analysis to active:

```
smartpower_set_mode_for_analysis -mode {active}
```

See Also

Tcl documentation conventions

Designer Tcl Command Reference

smartpower_set_mode_for_pdpr

This SmartPower Tcl command sets the operating mode used by the Power Driven Place and Route (PDPR) tool during power optimization.

```
smartpower_set_mode_for_pdpr -opmode { value}
```

Parameters

`-opmode {value}`

Value must be a valid operating mode.

This parameter is mandatory.

Sets the operating mode for your power driven place and route.

Exceptions

None

Supported Families

See the Tcl Commands and Supported Families table for the list of families that support this command.

Return Value

This command does not return a value.

Examples

This example sets the Active mode as the operating mode for Power Driven Place and Route.

```
set_mode_for_pdpr -opmode "Active"
```

This example creates a custom mode and set it to be used by Power Driven Place and Route (PDPR).

```
smartpower_add_new_custom_mode –name “MyCustomMode” \
–description “for PDPR” –base_mode “Active”
smartpower_set_mode_for_pdpr –opmode “MyCustomMode
```

See Also

Tcl Command Documentation Conventions

smartpower_set_operating_condition

Tcl command; sets the operating conditions used in SmartPower to one of the pre-defined types.

```
smartpower_set_operating_condition -opcond {value}
```

Arguments

`-opcond {value}`

Specifies the value of the operating condition. The following table shows the acceptable values for this argument:

Value	Description
best	Sets the operating conditions to best
typical	Sets the operating conditions to typical
worst	Sets the operating conditions to worst

Supported Families

See the Tcl Commands and Supported Families table for the list of families that support this command.

Examples

This example sets the operating conditions to best:

```
smartpower_set_operating_condition -opcond {best}
```

See Also

Tcl documentation conventions

Designer Tcl Command Reference

smartpower_set_operating_conditions

Tcl command; sets the operating conditions used in SmartPower.

```
smartpower_set_operating_conditions "still_air | 1.0_mps | 2.5_mps | custom" -heatsink
"None | custom | 10mm_Low_Profile | 15mm_Medium_Profile | 20mm_High_Profile" -boardmodel
"None_Conservative | JEDEC_2s2p" [-teta_ja "decimal value"] [-teta_sa "decimal value"]
```

Arguments

`-still_air {value}`

Specifies the value for the still air operating condition. The following table shows the acceptable values for this argument:

Value	Description
1.0_mps	Sets the operating conditions to best
2.5_mps	Sets the operating conditions to typical
custom	Sets the operating conditions to worst

`-heatsink {value}`

Specifies the value of the operating condition. The following table shows the acceptable values for this argument:

Value	Description
none	No heat sink
custom	Sets a custom heat sink size
10mm_Low_Profile	10 mm heat sink
15mm_Low_Profile	15 mm heat sink
20mm_High_Profile	20 mm heat sink

`-boardmodel {value}`

Specifies your board model. The following table shows the acceptable values for this argument:

Value	Description
None_Conservative	No board model, conservative routing
JEDEC_2s2p	JEDEC 2s2p board model

`-teta_ja {decimal_value}`

Optional; sets your teta ja value; must be a positive decimal

`-teta_sa {decimal_value}`

Optional; sets your teta sa value; must be a positive decimal.

Supported Families

See the Tcl Commands and Supported Families table for the list of families that support this command.

Examples

This example sets the operating conditions to best:

```
set_operating_conditions -airflow "still_air" -heatsink "None" -boardmodel
"None_Conservative "
```

See Also

Tcl documentation conventions

Designer Tcl Command Reference

smartpower_set_pin_frequency

Tcl command; 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

See the Tcl Commands and Supported Families table for the list of families that support this command.

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.

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

Tcl documentation conventions

Designer Tcl Command Reference

`smartpower_remove_pin_frequency`

smartpower_set_pin_probability

Enables you to set the probability value of a pin driving an enable pin. For I/Os, if you do not use this command, the probability of the IOEnableSet is used. For memories, if you do not use this command, the probability of the MemoriesEnableSet is used.

```
smartpower_set_pin_probability -pin_name {pin_name} –pin_enable_rate {value}
```

Arguments

`-pin_name {pin_name}`

Specifies the name of a pin for which the probability will be set. This pin must be the direct driver of an enable pin.

`-pin_proba {value}`

Specifies the value of the pin probability as a percentage, which can be any positive decimal between 0 and 100, inclusive.

Supported Families

SmartFusion, IGLOO, ProASIC3, Fusion

Notes

- None

Exceptions

- None

Examples

The following example sets the probability of the pin driving the enable pin of a bidirectional I/O

```
smartpower_set_pin_probability -pin_name mybibuf/U0/U1:EOUT   \
–pin_proba 50.4
```

See Also

smartpower_remove_pin_probability

smartpower_set_process

Tcl command; sets the process used in SmartPower to one of the pre-defined types.

```
smartpower_set_process -process {value}
```

Arguments

`-process {value}`

Specifies the value of the operating condition. The following table shows the acceptable values for this argument:

Value	Description
Typical	Sets the process for SmartPower to typical
Maximum	Sets the process for SmartPower to maximum

Supported Families

See the Tcl Commands and Supported Families table for the list of families that support this command.

Examples

This example sets the operating conditions to typical:

```
smartpower_set_process -process {Typical}
```

See Also

Tcl documentation conventions

smartpower_set_scenario_for_analysis

Tcl command; sets the scenario for cycle-accurate power analysis.

```
smartpower_set_scenario_for_analysis -scenario{value}
```

Arguments

`-scenario {value}`

Specifies the mode for cycle-accurate power analysis.

Supported Families

See the Tcl Commands and Supported Families table for the list of families that support this command.

Examples

The following example sets the scenario for analysis to my_scenario:

```
smartpower_set_scenario_for_analysis -scenario {my_scenario}
```

See Also

Tcl documentation conventions

Designer Tcl Command Reference

smartpower_set_temperature_opcond

Tcl command; sets the temperature in the operating conditions to one of the pre-defined types.

```
smartpower_set_temperature_opcond -use{value}
```

Arguments

`-use{value}`

Specifies the temperature in the operating conditions. The following table shows the acceptable values for this argument:

Value	Description
oprange	Sets the temperature in the operating conditions as specified in your Project Settings.
design	Sets the temperature in the operating conditions as specified in the SmartPower design-wide operating range. Applies to SmartPower only.
mode	Sets the temperature in the operating conditions as specified in the SmartPower mode-specific operating range. Applies to SmartPower only.

Supported Families

See the Tcl Commands and Supported Families table for the list of families that support this command.

Examples

This example sets the temperature in the operating conditions as specified in the custom mode-settings:

```
smartpower_set_temperature_opcond -use{mode}
```

See Also

Tcl documentation conventions

Designer Tcl Command Reference

smartpower_set_voltage_opcond

Tcl command; sets the voltage in the operating conditions.

```
smartpower_set_voltage_opcond -voltage{value} -use{value}
```

Arguments

`-voltage{value}`

Specifies the voltage supply in the operating conditions. The following table shows the acceptable values for this argument:

Value	Description
VDD	Sets the voltage operating conditions for VDD
VDDI 2.5	Sets the voltage operating conditions fo r VDDI 2.5
VPP	Sets the voltage operating conditions for VPP

`-use{value}`

Specifies the voltage in the operating conditions for each voltage supply. The following table shows the acceptable values for this argument:

Value	Description
oprange	Sets the voltage in the operating conditions as specified in your Project Settings.
design	Sets the voltage in the operating conditions as specified in the SmartPower design-wide operating range. Applies to SmartPower only.
mode	Sets the voltage in the operating conditions as specified in the SmartPower mode-specific operating range. Applies to SmartPower only.

Supported Families

See the Tcl Commands and Supported Families table for the list of families that support this command.

Examples

This example sets the VCCA as specified in the SmartPower mode-specific settings:

```
smartpower_set_voltage_opcond -voltage{vcca} -use{mode}
```

See Also

Tcl documentation conventions

Designer Tcl Command Reference

smartpower_temperature_opcond_set_design_wide

Tcl command; sets the temperature for SmartPower design-wide operating conditions.

```
smartpower_temperature_opcond_set_design_wide -best{value} -typical{value} -worst{value} -
thermal_mode{value}
```

Arguments

`-best{value}`

Specifies the best temperature (in degrees Celsius) used for design-wide operating conditions.

`-typical{value}`

Specifies the typical temperature (in degrees Celsius) used for design-wide operating conditions.

`-worst{value}`

Specifies the worst temperature (in degrees Celsius) used for design-wide operating conditions.

`-thermal_mode{value}`

Specifies the mode in which the junction temperature is computed. The following table shows the acceptable values for this argument:

Value	Description
ambient	The junction temperature will be iteratively computed with total static power
opcond	The junction temperature will be given as one of the operating condition range values specified in the device selection

Supported Families

See the Tcl Commands and Supported Families table for the list of families that support this command.

Examples

This example sets the temperature for design-wide operating conditions to Best 20, Typical 30, and Worst 60:

```
smartpower_temperature_opcond_set_design_wide -best{20} -typical{30} -worst{60}
```

See Also

Tcl documentation conventions

Designer Tcl Command Reference

smartpower_temperature_opcond_set_mode_specific

Tcl command; sets the temperature for SmartPower mode-specific operating conditions.

```
smartpower_temperature_opcond_set_mode_specific -opmode{value} -thermal_mode{value} -
best{value} -typical{value} -worst{value} -thermal_mode{value}
```

Arguments

`-opmode {value}`

Specifies the operating mode. The following table shows the acceptable values for this argument:

Value	Description
Active	The operating mode is set to Active
Standby	The operating mode is set to Standby
Flash*Freeze	The operating mode is set to Flash*Freeze

`-thermal_mode{value}`

Specifies the mode in which the junction temperature is computed. The following table shows the acceptable values for this argument:

Value	Description
ambient	The junction temperature will be iteratively computed with total static power
opcond	The junction temperature will be given as one of the operating condition range values specified in the device selection

`-best{value}`

Specifies the best temperature (in degrees Celsius) for the selected mode.

`-typical{value}`

Specifies the typical temperature (in degrees Celsius) for the selected mode.

`-worst{value}`

Specifies the worst temperature (in degrees Celsius) for the selected mode.

Supported Families

See the Tcl Commands and Supported Families table for the list of families that support this command.

Examples

This example sets the temperature for mode-specific operating conditions for mode1:

```
smartpower_temperature_opcond_set_mode_specific -mode{mode1} -best{20} -typical{30} -worst{60}
```

See Also

Tcl documentation conventions

Designer Tcl Command Reference

smartpower_voltage_opcond_set_design_wide

Tcl command; sets the voltage settings for SmartPower design-wide operating conditions.

```
smartpower_voltage_opcond_set_design_wide -voltage{value} -best{value} -typical{value} -worst{value}
```

Arguments

`-voltage{value}`

Specifies the voltage supply in the operating conditions. The following table shows the acceptable values for this argument:

Value	Description
VDD	Sets the voltage operating conditions for VDD
VDDI 2.5	Sets the voltage operating conditions for VDDI 2.5
VPP	Sets the voltage operating conditions for VPP
VCCA	Sets the voltage operating conditions for VCCA
VCCI 3.3	Sets the voltage operating conditions for VCCI 3.3
VCCI 2.5	Sets the voltage operating conditions for VCCI 2.5
VCCI 1.8	Sets the voltage operating conditions for VCCI 1.8
VCCI 1.5	Sets the voltage operating conditions for VCCI 1.5
VCC33A	Sets the voltage operating conditions for VCC33A
VCCDA	Sets the voltage operating conditions for VCCDA

`-best{value}`

Specifies the best voltage used for design-wide operating conditions.

`-typical{value}`

Specifies the typical voltage used for design-wide operating conditions.

`-worst{value}`

Specifies the worst voltage used for design-wide operating conditions.

Supported Families

See the Tcl Commands and Supported Families table for the list of families that support this command.

Examples

This example sets VCCA for design-wide to best 20, typical 30 and worst 40:

```
smartpower_voltage_opcond_set_design_wide -voltage{VCCA} -best{20} -typical{30} -
worst{40}
```

See Also

Tcl documentation conventions

Designer Tcl Command Reference

smartpower_voltage_opcond_set_mode_specific

Tcl command; sets the voltage settings for SmartPower mode-specific use operating conditions.

```
smartpower_voltage_opcond_set_mode_specific -opmode{value} -voltage{value} -best{value} -
typical{value} -worst{value}
```

Arguments

`-opmode {value}`

Use this option to specify the mode from which the operating conditions are extracted to generate the report.

Value	Description
Active	The operating mode is set to Active
Standby	The operating mode is set to Standby
Flash*Freeze	The operating mode is set to Flash*Freeze

`-voltage{value}`

Specifies the voltage in the operating conditions. The following table shows the acceptable values for this argument:

Value	Description
VDD	Sets the voltage operating conditions for VDD
VDDI 2.5	Sets the voltage operating conditions for VDDI 2.5
VPP	Sets the voltage operating conditions for VPP
VCCA	Sets the voltage operating conditions for VCCA
VCCI 3.3	Sets the voltage operating conditions for VCCI 3.3
VCCI 2.5	Sets the voltage operating conditions for VCCI 2.5
VCCI 1.8	Sets the voltage operating conditions for VCCI 1.8
VCCI 1.5	Sets the voltage operating conditions for VCCI 1.5
VCC33A	Sets the voltage operating conditions for VCC33A
VCCDA	Sets the voltage operating conditions for VCCDA

`-best{value}`

Specifies the best voltage used for mode-specific operating conditions.

`-typical{value}`

Specifies the typical voltage used for mode-specific operating conditions.

`-worst{value}`

Specifies the worst voltage used for mode-specific operating conditions.

Supported Families

See the Tcl Commands and Supported Families table for the list of families that support this command.

Examples

This example sets the voltage for the static mode and sets best to 20, typical to 30 and worst to 40:

```
smartpower_voltage_opcond_set_mode_specific -opmode{active} -voltage{VCCA} -best{20} -
typical{30} -worst{40}
```

See Also

Tcl documentation conventions

Designer Tcl Command Reference

SmartPower Obsolete TCL Commands

smartpower_initialize_allclocks

This command was obsoleted in SmartPower v8.5. Update your script to use:

smartpower_init_set_clocks_options to initialize the clock frequency options of all clock domains.

smartpower_init_set_registers_options to initialize the frequency and probability of all register outputs.

smartpower_init_set_set_reset_options to initialize the frequency and probability of all set/reset nets.

smartpower_init_set_primaryinputs_options to initialize the frequency and probability of all primary inputs.

smartpower_init_set_combinational_options to initialize the frequency and probability of all combinational outputs.

smartpower_init_do to initialize the frequencies and probabilities for clocks, register outputs, set/reset nets, primary inputs, combinational outputs, enables and other sets of pins, and selects a mode for initialization.

Note: The information below is obsolete and should only be used as reference. Update your scripts to use the TCL commands above.

Initializes the clock frequency and the data frequency of all clock domains with the initialization options.

```
smartpower_initialize_allclocks -with_clock_constraints {value} -with_clock_freq {value} -
clock_freq {value} -with_data_freq {value} -data_freq {value}
```

Arguments

`-with_clock_constraints {value}`

This sets the option of initializing the clock frequencies of all clock domains with frequency constraints from SmartTime. The following table shows the acceptable values for this argument:

Value	Description
true	Sets initialize clock frequencies with clock constraints ON
false	Sets initialize clock frequencies with clock constraints OFF

`-with_clock_freq {value}`

This sets the option of initializing the clock frequencies with a user input frequency. The following table shows the acceptable values for this argument:

Value	Description
true	Sets initialize clock frequencies with fixed frequency ON
false	Sets initialize clock frequencies with fixed frequency OFF

`-clock_freq {value}`

Specifies the user input clock frequency in MHz.

`-with_data_freq {value}`

Sets the option of initializing the data frequencies of all clock domains with a user input toggle rate or a user input frequency. The following table shows the acceptable values for this argument:

Value	Description
true	Sets initialize data frequencies with fixed frequency ON

Value	Description
false	Sets initialize data frequencies with fixed frequency OFF

`-data_freq {value}`

Specifies the user input toggle rate or data frequency. If the value is a percentage number such as 20.0 %, it will be interpreted as a toggle rate. If the value is a decimal number in MHz such as 100.0 MHz, it will be interpreted as a fixed frequency value.

Supported Families

SmartFusion, IGLOO, ProASIC3, Fusion

Notes

- This command is associated with the functionality of Initialize with SmartTime dialog box.

Exceptions

- None

Examples

The following example initializes all clocks with clock constraints from SmartTime:

```
smartpower_initialize_allclocks -with_clock_constraints {true}
```

smartpower_remove_pin_enable_rate

This command was obsoleted in SmartPower v8.5. Update your script to use `smartpower_remove_pin_probability` to remove the pin probability.

Note: The information below is obsolete and should only be used as reference when executing previously-created scripts. Update your scripts to use `smartpower_remove_pin_probability`.

Removes the probability value associated with a specific pin. This pin will have a default probability based on the domain set it belongs to.

```
smartpower_remove_pin_enable_rate –pin_name {pin_name}
```

Arguments

`-pin_name {pin_name}`

Specifies the name of the pin with the probability to remove. This pin must be the direct driver of an enable pin.

Supported Families

SmartFusion, IGLOO, ProASIC3, Fusion

Exceptions

None

Examples

The following example removes the probability of the pin driving the enable pin of a bidirectional I/O:

```
Smartpower_remove_pin_enable_rate –pin_name mybibuf/U0/U1:EOUT
```

smartpower_set_default_enable_rate

This command was obsoleted in SmartPower v8.5. Update your script to use `smartpower_change_setofpin_statistics` to set the frequency and probability of the specified domain.

Note: The information below is obsolete and should only be used as reference when executing previously-created scripts. Update your scripts to use `smartpower_change_setofpin_statistics`.

Sets the enable-rate of one of the enable set domains: IOEnableSet or MemoriesEnableSet.

```
smartpower_set_default_enable_rate –domain_name {name} pin_enable_rate {value}
```

Arguments

`–domain_name {name}`

Specifies the name of the domain value of which you want to apply the enable rate value. The domain_name can be IOsEnableSet or MemoriesEnableSet.

`-pin_enable_rate {value}`

Specifies the value of the pin enable rate as a percentage, which can be any positive decimal between 0 and 100, inclusive.

Supported Families

SmartFusion, IGLOO, ProASIC3 and Fusion

Notes

- None

Exceptions

- None

Examples

The following example sets the enable rate for all the pins belonging to the domain set IOsEnableSet:

```
smartpower_set_default_enable_rate -domain_name IOsEnableSet –pin_enable_rate 52.2
```

smartpower_set_domain_frequency

This command was obsoleted in SmartPower v8.5. Update your script to use:

smartpower_change_setofpin_statistics to change the frequencies and probabilities for all sets of pins in a specific domain

smartpower_change_clock_statistics to change the frequencies and probabilities for all clocks in a specific domain

Note: The information below is obsolete and should only be used as reference when executing previously-created scripts. Update your scripts to use the TCL commands above.

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

SmartFusion, IGLOO, ProASIC3, Fusion

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}
```

smartpower_set_pin_enable_rate

This command was obsoleted in SmartPower v8.5. Update your script to use `smartpower_set_pin_probability` to set the pin probability.

Note: The information below is obsolete and should only be used as reference when executing previously-created scripts. Update your scripts to use smartpower_set_pin_probability.

Enables you to set the probability value of a pin driving an enable pin. For I/Os, if you do not use this command, the probability of the IOEnableSet is used. For memories, if you do not use this command, the probability of the MemoriesEnableSet is used.

```
smartpower_set_pin_enable_rate -pin_name {pin_name} –pin_enable_rate {value}
```

Arguments

`-pin_name {pin_name}`

Specifies the name of a pin for which the probability will be set. This pin must be the direct driver of an enable pin.

`-pin_enable_rate {value}`

Specifies the value of the pin probability as a percentage, which can be any positive decimal between 0 and 100, inclusive.

Supported Families

SmartFusion, IGLOO, ProASIC3, Fusion

Exceptions

None

Examples

The following example sets the probability of the pin driving the enable pin of a bidirectional I/O

```
smartpower_set_pin_enable_rate -pin_name mybibuf/U0/U1:EOUT   \
–pin_enable_rate 50.4
```

Data Change History - SmartPower

The data change history report lists power data updates up to the current release that may impact the power consumption of the design.

Product Support

Microsemi SoC Products Group backs its products with various support services, including Customer Service, Customer Technical Support Center, a website, electronic mail, and worldwide sales offices. This appendix contains information about contacting Microsemi SoC Products Group and using these support services.

Customer Service

Contact Customer Service for non-technical product support, such as product pricing, product upgrades, update information, order status, and authorization.

From North America, call **800.262.1060**
From the rest of the world, call **650.318.4460**
Fax, from anywhere in the world **650. 318.8044**

Customer Technical Support Center

Microsemi SoC Products Group staffs its Customer Technical Support Center with highly skilled engineers who can help answer your hardware, software, and design questions about Microsemi SoC Products. The Customer Technical Support Center spends a great deal of time creating application notes, answers to common design cycle questions, documentation of known issues and various FAQs. So, before you contact us, please visit our online resources. It is very likely we have already answered your questions.

Technical Support

For Microsemi SoC Products Support, visit http://www.microsemi.com/products/fpga-soc/design-support/fpga-soc-support.

Website

You can browse a variety of technical and non-technical information on the Microsemi SoC Products Group home page, at http://www.microsemi.com/soc/.

Contacting the Customer Technical Support Center

Highly skilled engineers staff the Technical Support Center. The Technical Support Center can be contacted by email or through the Microsemi SoC Products Group website.

Email

You can communicate your technical questions to our email address and receive answers back by email, fax, or phone. Also, if you have design problems, you can email your design files to receive assistance. We constantly monitor the email account throughout the day. When sending your request to us, please be sure to include your full name, company name, and your contact information for efficient processing of your request.

The technical support email address is soc_tech@microsemi.com.

My Cases

Microsemi SoC Products Group customers may submit and track technical cases online by going to My Cases.

Outside the U.S.

Customers needing assistance outside the US time zones can either contact technical support via email (soc_tech@microsemi.com) or contact a local sales office. Visit About Us for sales office listings and corporate contacts.

ITAR Technical Support

For technical support on RH and RT FPGAs that are regulated by International Traffic in Arms Regulations (ITAR), contact us via soc_tech@microsemi.com. Alternatively, within My Cases, select **Yes** in the ITAR drop-down list. For a complete list of ITAR-regulated Microsemi FPGAs, visit the ITAR web page.