

PrimeTime® PX

Functional Safety Manual

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SYNOPSYS®

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Document Control

Revision history

Version	Description	Date
1.0	First release of the document submitted for review.	15-Jan-2018
1.1	Added revision history, fixed template issues.	06-Feb-2018
1.2	Updated CoUs and AoUs. Updated Use Case description. Fixed boilerplate changes from general feedback.	01-Mar-2018
1.3	Updated CoUs and Use Case description.	09-Mar-2018
1.4	Slight update to Chapter 2 intro	11-Mar-2018

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This section describes the customer support that is available through the Synopsys SolvNet® customer support website or by contacting the Synopsys support center.

Accessing SolvNet

The SolvNet support site includes an electronic knowledge base of technical articles and answers to frequently asked questions about Synopsys tools. The site also gives you access to a wide range of Synopsys online services, which include downloading software, viewing documentation, and entering a call to the Support Center.

To access the SolvNet site:

1. Go to the web page at <https://solvnet.synopsys.com>.
2. If prompted, enter your user name and password. (If you do not have a Synopsys user name and password, follow the instructions to register.)

If you need help using the site, click **Help** on the menu bar.

Contacting Synopsys Support

If you have problems, questions, or suggestions, you can contact the Synopsys support center in the following ways:

- Go to the Synopsys [Global Support Centers](#) site on synopsys.com. There you can find e-mail addresses and telephone numbers for Synopsys support centers throughout the world.
- Go to either the Synopsys SolvNet site or the Synopsys Global Support Centers site and [open a case online](#) (Synopsys user name and password required).

Scope of This Document

This section describes the scope of this document and defines terms used in this document.

Using This Document

The *PrimeTime PX Functional Safety Manual* describes the proper use of the PrimeTime PX tool in safety-related applications according to the ISO 26262 standard, and is intended to confirm the compliance of the PrimeTime PX tool to the standard when used in the context of a tool chain.

The PrimeTime PX tool enables the user to accurately analyze power dissipation of cell-based designs. It is intended as an advanced solution for ASIC and structured custom circuit designers who are developing products for power-critical applications.

[Section 3](#) describes an overview of the ISO 26262-8, clause 11 and the approach adopted by Synopsys to comply with the requirements of the standard. [Section 4](#) defines the general information such as where to find the latest documentation and installation requirements regarding the use of the PrimeTime PX tool as a software tool in the development of safety-related applications. [Section 5](#) shows the high-level overview of the tool chain that this product belongs to. [Section 6](#) details the safety-related requirements for the safety-qualified use case of the PrimeTime PX tool. [Section 7](#) lists the known limitations of the use case.

Specific documentation for performing design and analysis as part of an ISO 26262 compliant flow is provided in [Section 3](#), [Section 5](#), [Section 6](#), [Appendix A](#), and [Appendix B](#) of this document, the *PrimeTime PX Functional Safety Manual*.

Terms and Definitions

Term	Definition
AoU	Assumption of Use. An action that is assumed and required to be taken by the user of a software tool.
ASIL	Automotive Safety Integrity Level. This is a risk classification scheme defined by the standard ISO 26262. The standard identifies four levels: ASIL A, ASIL B, ASIL C, and ASIL D. ASIL D dictates the highest integrity requirements on a product and ASIL A dictates the lowest.

Term	Definition
Component	A part of an electronic system that implements a function in a vehicle. See also Part 1 of the standard ISO 26262 for the definition. The standard also refers to elements and items, but for the <i>PrimeTime PX Functional Safety Manual</i> , there is no difference.
CoU	Condition of Use. A condition of the design, software tool, design environment, or situation that is assumed and required to be fulfilled by the user.
CRM	Customer Relationship Management. Internal Synopsys database that manages customer STARs.
db	A binary file format for storing library and design data.
Defect	Product nonconformance.
Error	An error is a discrepancy between the actual and the specified or theoretically correct operation of an element. The root causes of an error can be manifold. In this document, the focus is on errors that are introduced or left undetected in a design, due to the malfunction in a software tool (e.g. generation of bad logic by a logic synthesis tool, failure of a static timing analysis tool to detect a timing violation).
Fault	An abnormal condition that can cause an element or item to fail.
Fault analysis	An analysis that determines the behavior of a system when a fault is introduced.
FMEA	Failure Mode and Effects Analysis. An analysis that looks at different parts of a system, identifies ways the parts could fail, and determines the causes and effects of these potential failures.
FSDB	Fast Signal DataBase. FSDB is a binary file format that represents several simulation data formats.
PTPX	Abbreviation of the PrimeTime PX tool. Both PTPX and PrimeTime PX are interchangeably used in this document.
SAIF	Switching Annotation Interchange Format. A text syntax for passing switching information between tools.

Term	Definition
SDC	Synopsys Design Constraints. A Tcl-based syntax for describing design constraints.
Software / software tool	The PrimeTime PX tool.
Software tool criteria evaluation	Analysis according to ISO 26262 to determine the required TCL of a software tool.
Software tool qualification	Means to create evidence, that a software tool with low or medium TCL is suitable to be used in the development of safety related products according to ISO 26262.
SolvNet	Synopsys customer support site.
SPEF	Abbreviation for Standard Parasitic Exchange Format.
Standard	In this document, refers to <i>ISO 26262 Road Vehicles – Functional Safety</i> , 2011 and 2018 versions.
STAR	<p>Synopsys Technical Action Request.</p> <p>A STAR documents and tracks a product Bug or Enhancement request (called a B-STAR or an E-STAR, respectively). It is stored in the Synopsys CRM database.</p> <p>Only Synopsys employees can access the CRM database. However, limited STAR information is available from SolvNet for customers who are associated with the user site of a STAR. Customer contacts are notified automatically when a STAR is filed or when its status changes.</p>
TCL	<p>Tool confidence level, as defined by ISO 26262-8, clause 11.</p> <p>Note: The TCL of a software tool does not necessarily indicate whether the tool may malfunction or not. The TCL defines the confidence level that an error in the safety-related design, which is introduced or left undetected by the software tool, can be prevented or detected in subsequent steps of the development flow, before the erroneous safety-related design is released.</p>
TD	Tool error detection, as defined in ISO 26262-8, clause 11.
TI	Tool impact, as defined in ISO 26262-8, clause 11.

Term	Definition
Use case	<p>A use case is a specific way of using a software tool, that can be characterized by:</p> <ul style="list-style-type: none"> - a limited set of tool functions and features that are used; - a set of restrictions and constraints that are regarded while using the tool; and - a specific goal to be achieved or output to be generated by using the software tool <p>Use cases may be associated with different steps or phases in the design process, or they may describe alternative ways of using the tool for a specific design step.</p>
VCD	Abbreviation for Value Change Dump, a file format generated by logic simulation tools.

Confidence in the Use of Software Tools According to ISO 26262-8, Clause 11

This section provides an overview of the ISO 26262-8, clause 11. It then describes the approach adopted by Synopsys to comply with the requirements of the standard, and how this is mapped to activities performed by Synopsys and the end user of the Synopsys tools.

Overview of ISO 26262-8, Clause 11

Synopsys EDA software tools contribute significantly to the design specification, implementation, integration, verification and validation of electrical and electronic (E/E) systems and components. If these E/E systems and components are used as part of a safety-related automotive product, an error in these systems or components could have severe consequences on functional safety. Such an error may arise as a result of unforeseen operating conditions or due to a fault introduced during product development, which in turn may be caused by a software tool malfunction. ISO 26262-8, clause 11 (Confidence in the Use of Software Tools) addresses this issue and specifies requirements and methods which aim to minimize the risk of faults in the developed product due to malfunctions of a software tool affecting the product's functional safety.

According to ISO 26262, to determine the required level of confidence in a software tool that is used in the development of a safety-related automotive product, the following criteria are evaluated:

- The possibility that the malfunctioning software tool and its corresponding erroneous output can introduce or fail to detect errors in a safety-related element being developed.
- The confidence in preventing or detecting such errors in its corresponding output.

This procedure is called Software Tool Criteria Evaluation, and it must be performed for all software tools that are involved in the development of a safety-related element, resulting in a required Tool Confidence Level (TCL) for each software tool.

If the software tool criteria evaluation determines that a medium or high TCL is required, then appropriate Software Qualification methods must be applied, effectively reducing the risk of a critical software tool error. The choice of software qualification methods depends on the required TCL and the maximum ASIL of all the safety requirements allocated to the element developed using the software tool. However, if the software tool criteria evaluation determines that only a low TCL is required, then there is no need to apply such software qualification methods.

The software tool criteria evaluation and software tool qualification flow is summarized in Figure 1.

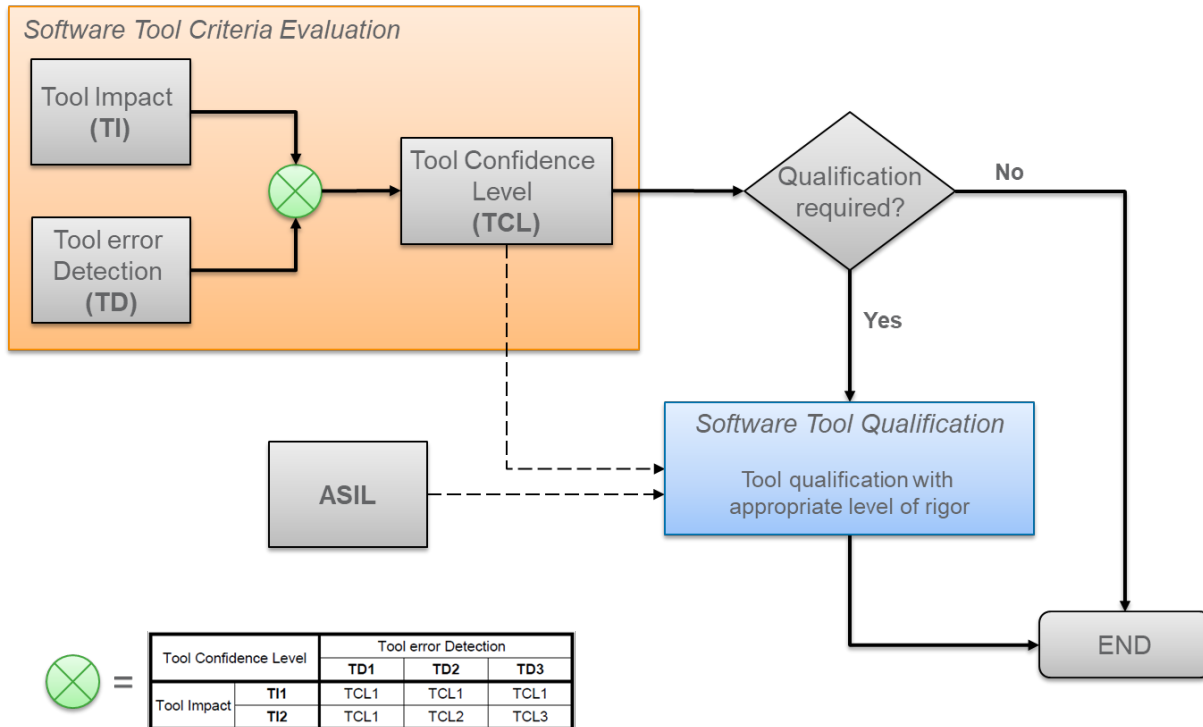


Figure 1: Software tool criteria evaluation and software tool qualification flow

Work Split between Synopsys and Tool Users

A software tool criteria evaluation must always be performed in the development environment of the final tool user, and in the context of the actual product development. It is in this context, where potential tool malfunctions, their effect on the safety-related product, and the effectiveness of prevention and detection measures must be analyzed.

However, the tool vendor can support the tool user by performing a software tool criteria evaluation (and, if required, a software tool qualification) on their own, based on assumed tool use cases and an assumed development environment. If the assumptions made by the tool vendor match the actual situation at the tool user, then the user can take over the evaluation (and qualification) results from the tool vendor. Besides significantly reducing the effort for the tool user, this approach can also result in a better quality for the software tool criteria evaluation and qualification, since the tool vendor typically has a more detailed understanding of the inner working and possible malfunctions of the software tool.

Synopsys has adopted exactly this approach, which is summarized in Figure 2.

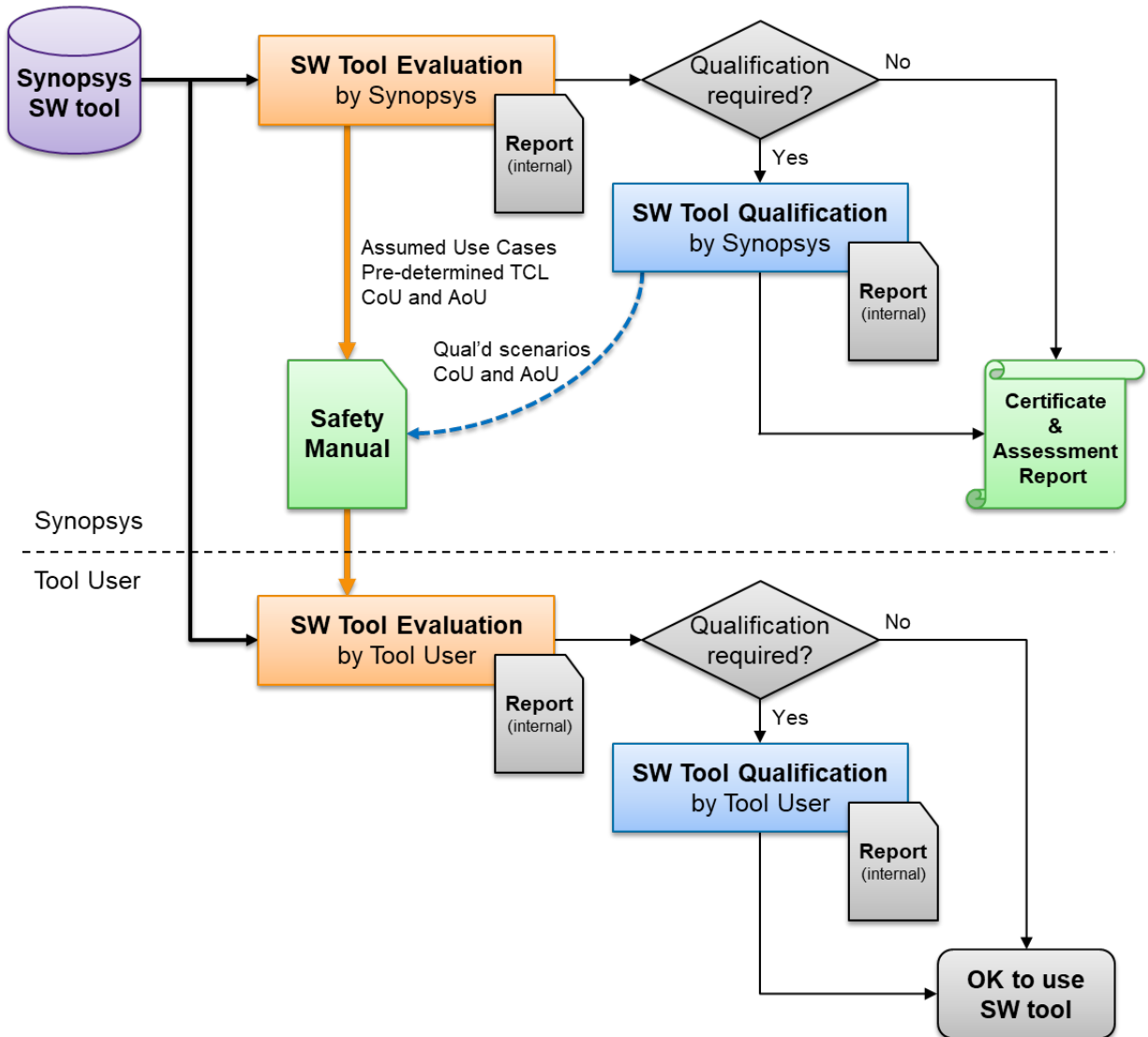


Figure 2: Work Split between Synopsys and Tool Users

Synopsys performs the following activities:

1. Software tool criteria evaluation

- Identification of possible **use cases** for the software tool, together with required **inputs** and expected **outputs**
- Specification of **conditions of use (CoU)** for each use case, related to the development environment in which the tool is assumed to be deployed, including tool usage procedures and constraints
- Analysis of potential software tool **malfunctions**, and their effect on a safety-related product that is developed with this tool
- Analysis of **prevention** and **detection measures** internal to the software tool, to avoid tool malfunctions, or to control and mitigate their effects
- Specification of **assumptions of use (AoU)**, which are additional prevention and detection measures assumed to be performed by the end user of the tool

- Estimation of the **Tool Impact (TI)** for each malfunction, and the probability of **Tool error Detection (TD)** by the prevention and detection mechanisms (including assumptions of use)
- Determination of the required **Tool Confidence Level (TCL)** for each software tool malfunction, based on TI and TD
- Determination of the maximum TCL from all software tool malfunctions related to a use case. This is called the **pre-determined TCL** for the software tool use case
- Summary of the results in a software tool criteria evaluation report

2. Software tool qualification

- If the pre-determined TCL indicates that a medium (TCL2) or high (TCL3) tool confidence level is required for the software tool, then Synopsys may decide to perform a software tool qualification
- The specific methods applied for tool qualification can vary for different tools and use cases, and they may include an evaluation of the software tool development process, the validation of the complete software tool, the validation of critical tool malfunctions with insufficient prevention and detection measures, or other methods
- Summary of the qualification methods, procedures and results in a software tool qualification report

3. Safety manual for the software tool

- The *PrimeTime PX Functional Safety Manual* (this document) is an important deliverable to the tool users, as it includes all end user-relevant information from the Synopsys software tool criteria evaluation and qualification
- Software tool criteria evaluation related information, documented in [Section 6](#), includes:
 - Description of software tool use cases
 - Description of the required inputs and expected outputs for each use case
 - Specification of conditions of use (CoU – conditions of the design, software tool, design environment, or situation that are assumed and required to be fulfilled by the user) for each use case
 - Specification of assumptions of use (AoU – actions that are assumed and required to be taken by the user of a software tool) for each use case
 - Pre-determined TCL for each use case
- Software tool qualification related information (not required for the PrimeTime PX tool and therefore not included in this safety manual)
 - Description of the scope of the software tool qualification, including malfunctions and scenarios covered by the qualification
 - Specification of additional conditions of use (CoU) derived from the software tool qualification
 - Specification of additional assumptions of use (AoU) derived from the software tool qualification
- Other information included in this safety manual
 - General information about the software tool needed by the tool user (see [Appendix A](#))
 - Known limitations of the software tool, related to the described use case as documented in [Section 7](#)

4. Certification and assessment report

- Synopsys may decide to perform a functional safety assessment, to confirm the correctness, completeness and ISO 26262 conformance of the performed software tool criteria evaluation and qualification
- Synopsys may also decide to achieve certification from an accredited third-party certification body, in addition to the functional safety assessment
- The results of these activities are summarized in a functional safety assessment report and a certificate which can be viewed at [exida Certificate for ISO 26262 Compliance](#)

If the tool user wants to benefit from the work done by Synopsys, then according to the Figure 2 above, the user shall perform the following activities for each software tool:

1. Software tool criteria evaluation

- Review and verify that the software tool criteria evaluation (and qualification) performed by Synopsys, as documented in the tool's Functional Safety Manual, matches the actual situation of the user's product development process
 - Verify whether the actual use case(s) of the software tool match those evaluated by Synopsys
 - Verify whether the actual inputs and outputs are identical to or a sub-set of those as evaluated by Synopsys
 - Verify that all conditions of use (CoU) specified by Synopsys are met, or whether the development process can be adjusted to meet these CoU(s)
 - Verify that all assumptions of use (AoU) specified by Synopsys are met, or whether the development process can be adjusted to meet these AoU(s)
 - Verify that the pre-determined Tool Confidence Level (TCL) for the relevant use case(s) are TCL1, *or*
 - Verify that Synopsys has successfully performed an additional software tool qualification for all TCL2 and TCL3 scenarios to conclude that the tool is suitable to be used for the development of a safety-related element of the same or higher ASIL than required by the user
- If all the verification steps described above are successful, then the results of the Synopsys software tool criteria evaluation (and qualification) are applicable to the tool user, which means:
 - The required TCL pre-determined by Synopsys can be taken over by the tool user for actual product development
 - If the pre-determined TCL is TCL1, then the tool can be used without the need to perform any additional software tool qualification
 - If the pre-determined TCL is TCL2 or TCL3, then the software tool qualification performed by Synopsys is sufficient, and the tool can be used without the need for further software tool qualification by the end user
- All of the steps above must be documented in a software tool criteria evaluation report, including evidence for the successful conclusion of all verification steps, which may include reference to the Synopsys Functional Safety Manual, and optionally, to the Synopsys certification and assessment report

2. Software tool qualification

- If any of the verification steps described above as part of the tool user's software tool criteria evaluation fails (e.g. different use case, CoU or AoU cannot be met, pre-determined TCL is not TCL1 and Synopsys has not performed a software tool qualification), then the user must perform his/her own software tool qualification
- The specific methods applied for tool qualification are decided and planned by the tool user -- Synopsys does not recommend any specific methods or procedures
- The summary of the qualification methods, procedures and results shall be documented in a software tool qualification report

PrimeTime PX Description

This section provides a general description regarding the use of the PrimeTime PX tool as a software tool in the development of safety-related applications and describes where to get the latest product documentation and the runtime environment required to use the PrimeTime PX tool.

Coverage

The *PrimeTime PX Functional Safety Manual* is intended to be used starting with the version 2017.12 and later versions of the PrimeTime PX tool per the use case presented in this document. In general, unless otherwise noted, the failure modes and detection mechanisms noted in the use case presented in [Section 6](#) are tool version independent.

Compliance with ISO 26262

The PrimeTime PX tool can be used in the development of safety-related elements according to ISO 26262, with allocated safety requirements up to a maximum Automotive Safety Integrity Level D (ASIL D), if the tool is used in the context of a tool chain and in compliance with this document, the *PrimeTime PX Functional Safety Manual*.

See the [exida Certificate for ISO 26262 Compliance](#) of Synopsys PrimeTime PX when used in a tool chain flow.

Product Documentation and Support

Comprehensive documentation for using the PrimeTime PX tool is provided on SolvNet. The latest documentation for the PrimeTime PX tool can be accessed at [PrimeTime Suite Online Help](#) on SolvNet.

Specific documentation for performing design and analysis as part of an ISO 26262 compliant flow is provided in [Section 3](#), [Section 5](#), [Section 6](#) and [Appendix A](#) of this document, the *PrimeTime PX Functional Safety Manual*.

Synopsys provides online customer support for the PrimeTime PX tool. See [Section 1](#) for more information.

Installation and Supported Platforms

The installation of the PrimeTime PX tool must follow the guidelines in the *Synopsys® Installation Guide* as well as the specific *PrimeTime PX Installation Notes* document.

Users are required to download the tool executable and INSTALL_README from the SolvNet site at <https://solvnet.synopsys.com/DownloadCenter/dc/product.jsp>.

Supported platforms and operating systems requirements:

- For installation instructions, see the *Synopsys® Installation Guide* at <https://www.synopsys.com/install>.
- For the latest supported binary-compatible hardware platform or operating system, including required operating system patches, see <https://www.synopsys.com/qsc>.
- If updates (including security patches) to computing environments (including operating systems) are backward compatible with previous versions of the computing environment used to test the PrimeTime PX tool, the results of the testing performed by Synopsys using such previous versions are applicable.

Additional information:

- For information about the compute platforms roadmap, go to <https://www.synopsys.com/support/licensing-installation-computeplatforms/computeplatforms/compute-platforms-roadmap.html>.
- For platform notices, go to <https://www.synopsys.com/support/licensing-installation-computeplatforms/compute-platforms/platform-notice.html>.
- For information regarding the license key retrieval process, go to <https://solvnet.synopsys.com/smartkeys/smartkeys.cgi>.

User Competence

To properly use the PrimeTime PX tool, a user must have a good understanding and working knowledge of the following:

- Electrical engineering and circuit design
- The ISO 26262 standard
- Documentation of the PrimeTime PX tool, such as the *PrimeTime PX User Guide*, at [PrimeTime Suite Online Help](#) on SolvNet
- This Functional Safety Manual
- The published list of safety-related defects for the PrimeTime PX tool available at PrimeTime PX Safety-Related Issues Master List at <https://solvnet.synopsys.com/retrieve/2810577.html>.
- Applicability of the PrimeTime PX tool in the overall tool chain

Managing Known Safety-Related Defects

Synopsys maintains current information for every reported defect through STARs. The PrimeTime PX team evaluates each reported issue for potential impact on functional safety.

A list of all known safety-related defects for each release of the PrimeTime PX tool is available in a SolvNet knowledge base article and is referenced from the *PrimeTime PX Release Notes* document.

PrimeTime PX users must assess, as part of their own software tool criteria evaluation, the potential impact of the known safety-related defects in their design and must ensure mitigation of any relevant safety-related defects.

Managing New Releases

Synopsys can release new versions of the PrimeTime PX tool at any time to extend its functionality or to fix defects. When a new version is available, notification is posted on the SolvNet site. A subscription service is available for users to be notified of any new product releases.

When installing a new version of the PrimeTime PX tool, users must evaluate the impact of any known safety-related defects in their design by checking the accompanying *PrimeTime PX Release Notes* for the following:

- Any changes that apply to safety-related use cases
- List of known safety-related defects in the new version of the PrimeTime PX tool

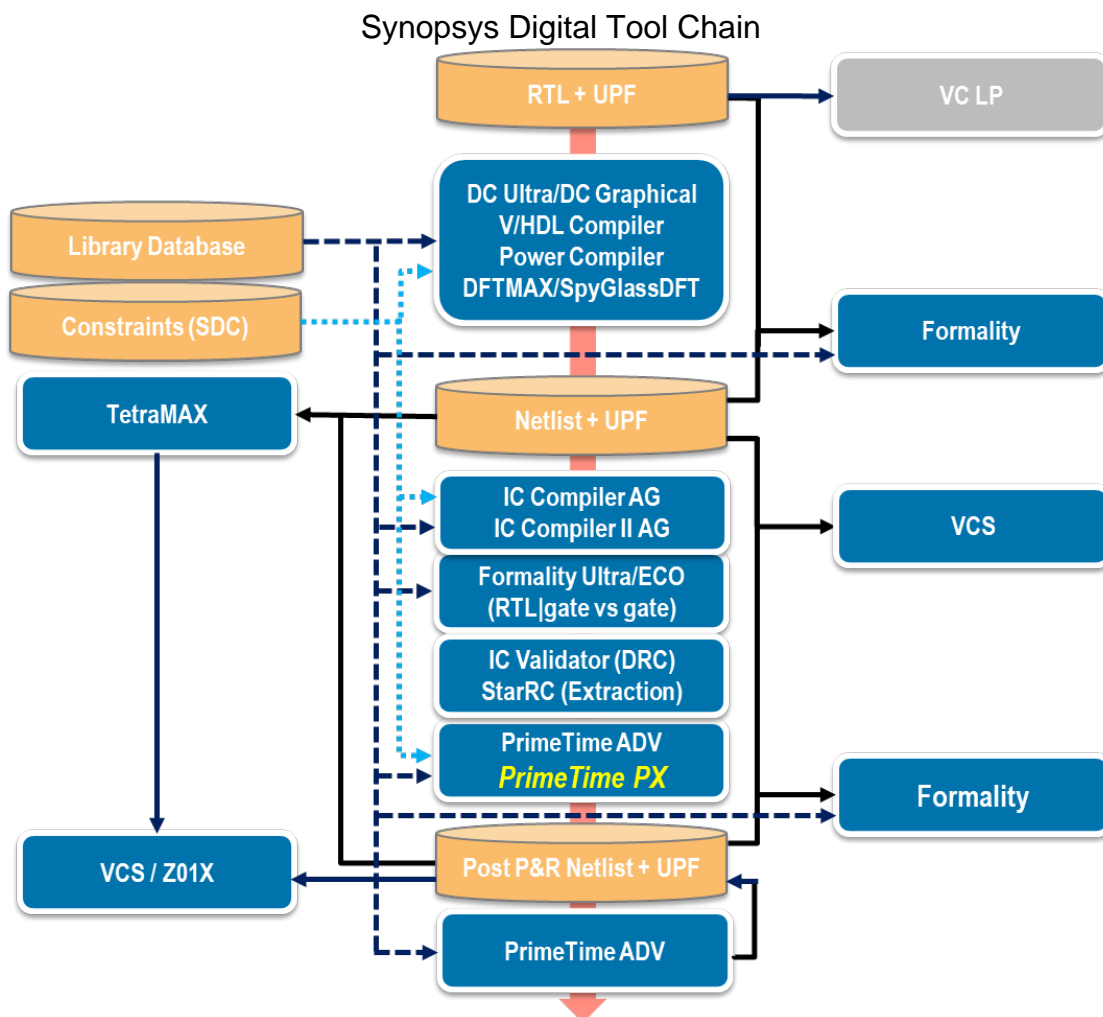
In addition, users must refer to the latest version of this document, the *PrimeTime PX Functional Safety Manual*, available with the product release contents.

5 Synopsys Digital Tool Chain

This section provides an overview of where the PrimeTime PX is used in the tool chain.

The ISO 26262 standard provides a methodology and requirements for software tool criteria evaluation and qualification (see ISO 26262-8, clause 11). It applies to software tools used for the development of safety-related designs where it is essential that the tool operates correctly without introducing or failing to detect errors in the safety-related design.

The suitability of a software tool to be used in the development of a safety-related design is determined in the software tool criteria evaluation, which results in a Tool Confidence Level (TCL): a level of confidence that the software tool does not introduce or fail to detect an error in the design without being noticed, and mitigated before the design is released as a safety-related product. This evaluation is best performed in the context of the overall software tool chain and development flow, in which the individual software tool is used. The following high-level diagram reflects the tool chain for which the PrimeTime PX tool is applicable.



6 Use Case

This section describes the safety-qualified use case of the PrimeTime PX tool. Users should also perform TCL determination based on their specific Use Case.

The PrimeTime PX tool is an add-on feature to the PrimeTime tool that accurately analyzes power dissipation of cell-based designs. It is intended as an advanced solution for ASIC and structured custom circuit designers who are developing products for power-critical applications.

The user interface supports variables, commands, and command options for performing power analysis. Provide the switching activity information in the SAIF, VCD, or FSDB file format. Irrespective of the mode you select and the options you choose, power analysis is performed when you run the `update_power` command.

The PrimeTime PX tool builds a detailed power profile of the design based on the circuit connectivity, the switching activity, the net capacitance, and the cell-level power behavior data in the Synopsys database format (.db) library. The library can be a nonlinear power model (such as, NLPM) library. It calculates the power behavior for a circuit at the cell level and reports the power consumption at the chip, block, and cell levels. When power analysis is complete, you can view design data and analysis results in the graphical form, including histograms and waveforms.

Figure 4 illustrates the steps in a typical power analysis in the PrimeTime PX tool.

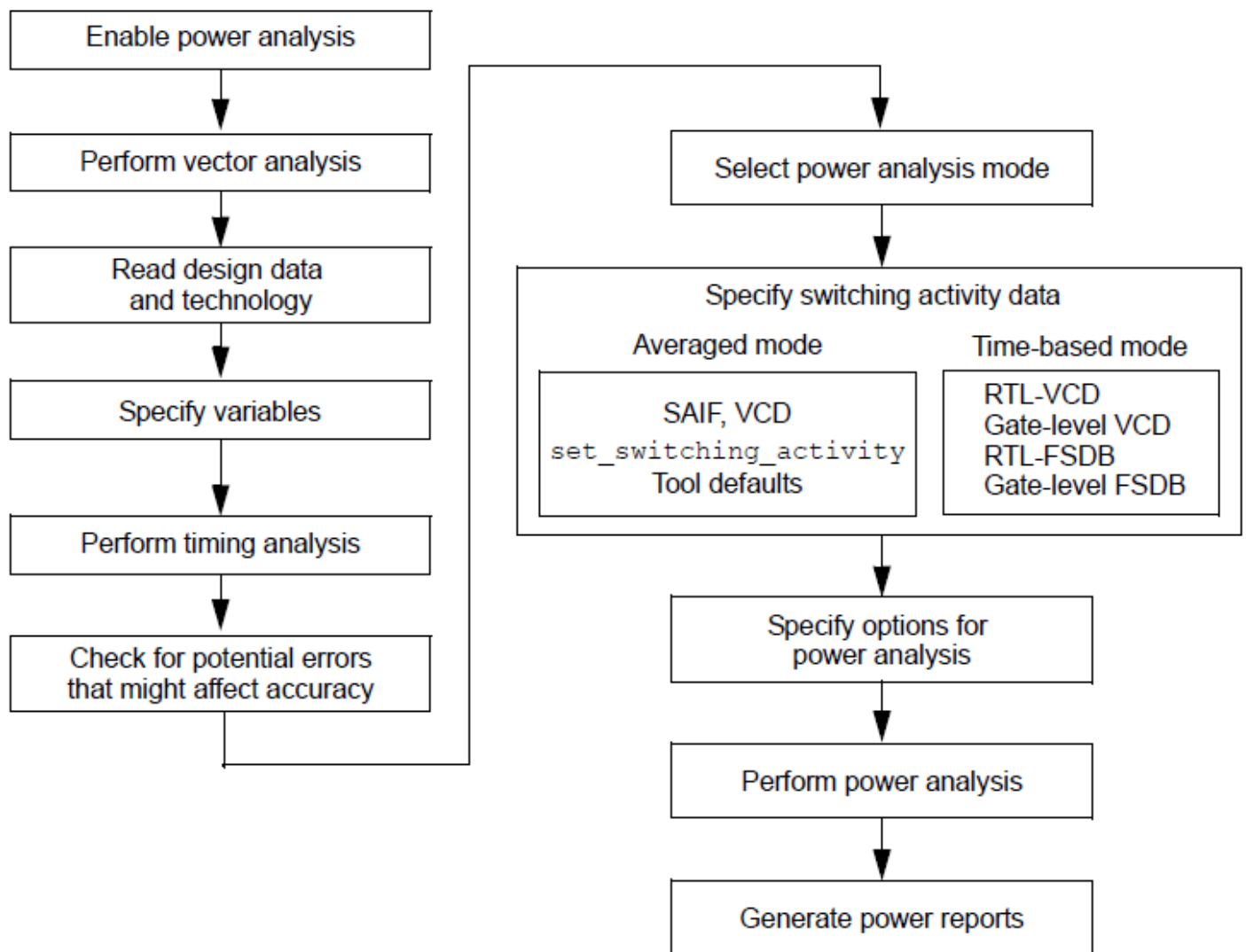


Figure 3: A Typical Power Analysis Flow in the PrimeTime PX Tool

Use Case 1: Power Analysis in Power-Critical Safety Applications

In this use case, the goal is to use PrimeTime PX to perform comprehensive power analysis (both averaged power and peak power) and generate detailed power reports on gate-level designs for power-critical safety-related applications.

Note: Typically, power consumption is not a safety-related requirement for the design of an IC. In this case, any potential PrimeTime PX software tool malfunction cannot introduce or fail to detect an error in the IC design, and thereby lead to the violation of a safety requirement. According to ISO 26262-8, clause 11.4.5.2, such software tool malfunctions would be rated as T11, which automatically leads to a TCL1. However, the following use case assumes that power consumption is indeed a safety-related requirement, and provides appropriate conditions and assumptions of use. The user should evaluate whether power consumption is also a safety-related requirement in their IC design, and whether therefore these conditions and assumptions of use are applicable and must be fulfilled.

In this use case, the PrimeTime PX tool uses and generates the following main inputs and outputs.

- Inputs:
 - Gate-level netlist (.v)
 - Logic library (.db, .lib)
 - Timing constraints (.sdc)
 - Parasitics (SPEF or GPD)
 - Toggle information (.saif, .vcd, or .fsdb)
 - Tcl scripts for configuration and execution
- Expected outputs:
 - Power reports (ASCII)
 - Log files (ASCII)
 - Power waveforms (FSDB)

For this use case of the PrimeTime PX tool, the following conditions of use (constraints for the design and design environment, recommended procedures for the tool usage, etc.) shall be met:

- CoU-PTPX-001: User shall review all error and warning messages and take appropriate action.
- CoU-PTPX-002: User shall follow the power analysis scripts available from the Synopsys SolvNet Methodology Retrieval System or use equivalent scripts.
- CoU-PTPX-003: User shall run static timing analysis with a tool such as the PrimeTime tool and confirm a timing and ERC clean design prior to running the PrimeTime PX tool.

- CoU-PTPX-004: For the final run, Tcl script-based batch mode execution shall be used, without interactive command line entry or GUI manual command entry. Tcl scripts and log files shall be retained as design signoff records.

For this use case of the PrimeTime PX tool, the following assumptions of use (required actions to be taken by the tool user to prevent or detect design errors due to possible tool malfunctions) shall be met:

- AoU-PTPX-001: User shall review the log files and power reports for expected execution steps and expected results, and respond appropriately to all warning and error messages.
- AoU-PTPX-002: User shall review the log files and power reports to confirm usage of the expected toggle information, timing constraints, and back-annotated parasitics. Default toggling, default timing, and wire load models should not be used.
- AoU-PTPX-003: User shall review the log file to confirm complete parasitic back-annotation of the design.
- AoU-PTPX-004: User shall check that all outputs are generated with an up-to-date timestamp.
- AoU-PTPX-005: User shall review the power analysis results and power waveform output files (where applicable) for completeness and reasonable content.
- AoU-PTPX-006: User shall compare the power reported by the PrimeTime PX tool in averaged mode against power reported by the physical implementation tool (such as IC Compiler or IC Compiler II). Any significant discrepancy shall be reviewed and based on user judgement, shall be run in a SPICE tool (such as HSPICE).
- AoU-PTPX-007: When using a new library for the first time, user shall verify PrimeTime PX averaged power and peak power results for a selection of typical cells using a SPICE simulator such as the HSPICE tool.

All analyzed failure modes and the corresponding prevention, detection and mitigation measures (including conditions and assumptions of use listed above) are independent of the exact PrimeTime PX tool version.

A software tool criteria evaluation performed by Synopsys according to ISO 26262-8, clause 11, which assumes the fulfillment of all conditions of use (CoU) and assumptions of use (AoU) as described above, results in a required tool confidence level:

TCL1 for PrimeTime PX Use Case 1 – Averaged Power Analysis in Power-Critical Safety Applications

In this case, no further activities for software tool qualification are required.

Limitations of Use Case

This section describes all known limitations of the use case mentioned in the previous section.

All known safety-related issues for the PrimeTime PX tool are listed in the PrimeTime PX Safety-Related Issues Master List available on SolvNet.

Appendix A

Software Tool Information

This section provides general information about the PrimeTime PX software tool, which is needed by the tool user for performing his/her software tool criteria evaluation.

The following information about PrimeTime PX is required according to ISO 26262-8, for the planning of the usage of a software tool (clause 11.4.4) and the preparation of the own software tool criteria evaluation (clause 11.4.5).

Please note that some of the information below provided by Synopsys simply needs to be confirmed by the tool user and can be used without modification. Other information must be completed or updated by the tool user to reflect his/her actual situation.

Required Info	Tool Information	Reference / Comment
Tool vendor	Synopsys, Inc.	ISO 26262-8, 11.4.4.1.a
Tool name and version	PrimeTime PX	ISO 26262-8, 11.4.4.1.a To determine tool version, use: <code>report_version - options</code>
Tool use cases		ISO 26262-8, 11.4.4.1.c ISO 26262-8, 11.4.5.1.a To be completed by the tool user. Align with / verify against use case described in Section 6 of this document.
Tool inputs and expected outputs		ISO 26262-8, 11.4.5.1.b To be completed by the tool user. Align with / verify against inputs and outputs described in Section 6 of this document.
Tool configuration and constraints		ISO 26262-8, 11.4.4.1.b ISO 26262-8, 11.4.5.1.c To be completed by the tool user. Align with / verify against CoU for the use case described in Section 6 of this document.

Required Info	Tool Information	Reference / Comment
Tool environment (OS)	Refer to the PrimeTime Installation Notes at https://solvnet.synopsys.com/DownloadCenter . Click the PrimeTime Suite tool name, the release number, and then "View installation guide" for tool version-specific OS support.	ISO 26262-8, 11.4.4.1.d To be completed by the tool user. Align with / verify against the OS version evaluated by Synopsys. To determine the Linux version, use: <code>uname -osr</code>
Tool environment (CAD tool chain)		ISO 26262-8, 11.4.4.1.d To be completed by the tool user. To determine name and version of your tool chain, please consult your CAD department.
Maximum ASIL	ASIL D	ISO 26262-8, 11.4.4.1.e
Tool qualification methods	Not applicable	ISO 26262-8, 11.4.4.1.f Software tool qualification is not required for PrimeTime PX
User manual and other usage guide documents	See Product Documentation and Support in Section 4 of this document.	ISO 26262-8, 11.4.4.2.a – d Tool user to include a link to these documents (Synopsys SolvNet or local copy), and to add any additional company-internal tool usage guidelines.
Known software tool malfunctions, and appropriate work arounds ...	For limitations, refer to Section 7 of this document. For the Safety-Related Issues Master List, see link in Section 4 of this document.	ISO 26262-8, 11.4.4.2.e Tool user to include a link to these documents (Synopsys SolvNet or local copy), and to add any additional company-internal work around descriptions.
Measures for the detection of tool malfunctions ...		ISO 26262-8, 11.4.4.2.f To be completed by the tool user. Align with / verify against AoU for the use case described in Section 6 of this document.

Appendix B

Complete List of CoU and AoU IDs

The complete list of Conditions of Use (CoU) for PrimeTime PX is in the table below. CoU defines a condition of the design, software tool, design environment, or situation that is assumed and required to be fulfilled by the user.

ID	Description
CoU-PTPX-001	User shall review all error and warning messages and take appropriate action.
CoU-PTPX-002	User shall follow the power analysis scripts available from the Synopsys SolvNet Methodology Retrieval System or use equivalent scripts.
CoU-PTPX-003	User shall run static timing analysis with a tool such as the PrimeTime tool and confirm a timing and ERC clean design prior to running the PrimeTime PX tool.
CoU-PTPX-004	For the final run, Tcl script-based batch mode execution shall be used, without interactive command line entry or GUI manual command entry. Tcl scripts and log files shall be retained as design signoff records.

The complete list of Assumptions of Use (AoU) for PrimeTime PX is in the table below. AoU defines an action that is assumed and required to be taken by the user of a software tool.

ID	Description
AoU-PTPX-001	User shall review the log files and power reports for expected execution steps and expected results, and respond appropriately to all warning and error messages.
AoU-PTPX-002	User shall review the log files and power reports to confirm usage of the expected toggle information, timing constraints, and back-annotated parasitics. Default toggling, default timing, and wire load models should not be used.
AoU-PTPX-003	User shall review the log file to confirm complete parasitic back-annotation of the design.
AoU-PTPX-004	User shall check that all outputs are generated with an up-to-date timestamp.
AoU-PTPX-005	User shall review the power analysis results and power waveform output files (where applicable) for completeness and reasonable content.

ID	Description
AoU-PTPX-006	User shall compare the power reported by the PrimeTime PX tool in averaged mode against power reported by the physical implementation tool (such as IC Compiler or IC Compiler II). Any significant discrepancy shall be reviewed and based on user judgement, shall be run in a SPICE tool (such as HSPICE).
AoU-PTPX-007	When using a new library for the first time, user shall verify PrimeTime PX averaged power and peak power results for a selection of typical cells using a SPICE simulator such as the HSPICE tool.