

# PrimeSim Custom Fault

## Redefining analog fault simulation for functional safety and test coverage analysis

### Overview

The growth in safety critical applications combined with high analog defect rates is driving the need for rigorous verification of safety and test coverage on automotive ICs. As a result, analog fault simulation is emerging as a critical requirement for automotive SoC design verification flows. IC designers are looking for the highest simulator performance and the most efficient fault reduction to verify safety and test coverage at the sub-system and full chip level.

PrimeSim Custom Fault is the industry's leading analog fault simulation solution that delivers best-in-class performance and a differentiated feature set to make sub-system and chip-level functional safety and test coverage analysis practical. PrimeSim Custom Fault is built on industry leading PrimeSim simulation technology and Synopsys VCS® to deliver orders of magnitude higher analog and mixed-signal fault simulation performance. PrimeSim Custom Fault supports GUI and batch mode use models to enable ease of use and productivity for chip-level fault campaigns. PrimeSim Custom Fault can be reliably used to verify safety for ASIL-D applications since it is part of the ISO 26262 TCL1 certified Synopsys Custom Design tool chain.

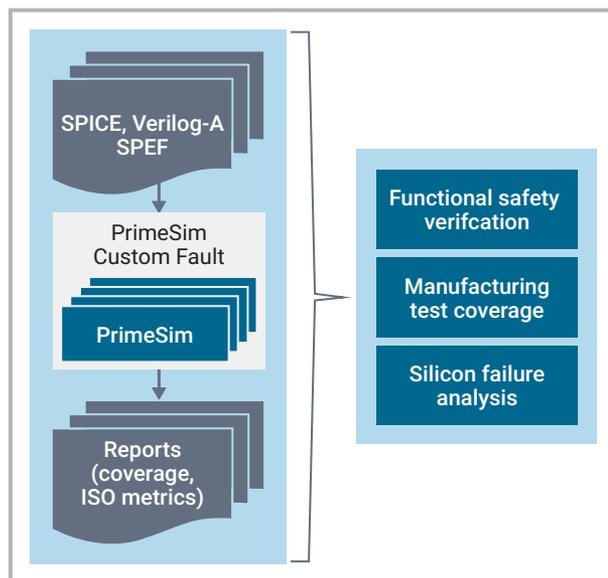


Figure 1: PrimeSim Custom Fault

Performance/Throughput	Ease of Use	Diagnostics and Reporting
Fastest SPICE and digital simulation engines	Support for GUI and batch mode use models	Weighted/un-weighted coverage summary
10-1000X fewer simulations with adaptive sampling	Non-invasive fault injection	Comprehensive fault analytics
Iterative mixed-mode simulation	Configurable fault models, design scope, and detection	Post-campaign optimal test sequence
Hierarchical fault simulation	Pre-simulation sampling error estimates	Diagnostic coverage metrics—DCrf, DCmpf, I
Incremental fault simulation for test coverage	Integration to VC FSM for chip-level FMEDA analysis	Open fault database to enable post-processing

## Breakthrough Performance and Throughput

As an integral part of the PrimeSim Family and PrimeSim Reliability Analysis solutions, PrimeSim Custom Fault combines best-in-class PrimeSim SPICE, PrimeSim Pro, and PrimeSim XA simulation technologies under a unified workflow to deliver the highest performance for transistor-level fault simulation. Furthermore, PrimeSim Custom Fault is integrated with Synopsys VCS simulator, to provide the industry's highest performance for mixed-signal fault simulation.

PrimeSim Custom Fault also features the innovative Adaptive Weighted Random Sampling (AWRS) technology that uses sampling methods to reduce the number of fault simulations by several orders of magnitude. Fault weights can be specified in GUI and batch mode use models through intuitive user interfaces. PrimeSim Custom Fault also provides pre-simulation estimates of sampling error for various sample sizes allowing users to pick the smallest sample size that meets their sampling error tolerance specifications.

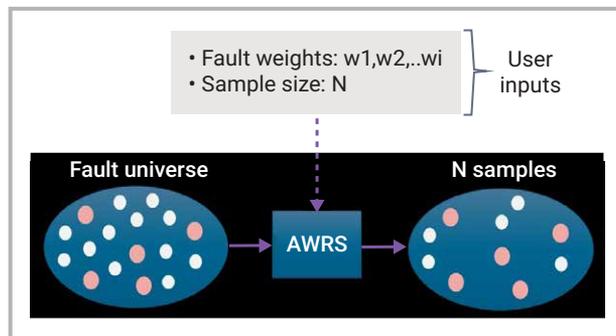


Figure 2: Adaptive weighted random sampling

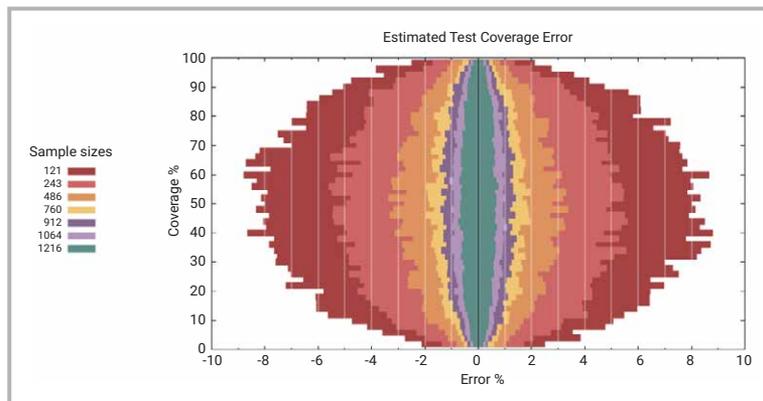


Figure 3: Pre-simulation sampling error estimates

## Differentiated for Test Coverage and Functional Safety Analysis

PrimeSim Custom Fault supports differentiated features for test coverage and functional safety analysis. Designers and test engineers can rely on iterative mixed-mode simulation and incremental fault simulation to accelerate test pattern grading. Similarly, verification engineers and safety experts can reliably generate block-/IP-level diagnostic coverage metrics and if required, re-use these metrics for SoC-level FMEA analysis using PrimeSim Custom Fault’s integration to VC Functional Safety Manager.

## Integral Part of PrimeSim Family and PrimeSim Reliability Analysis

PrimeSim Custom Fault’s unified fault simulation workflow for fault identification, fault reduction, distributed simulation, and diagnostics is enabled by the PrimeSim Family and PrimeSim Reliability Analysis solutions.

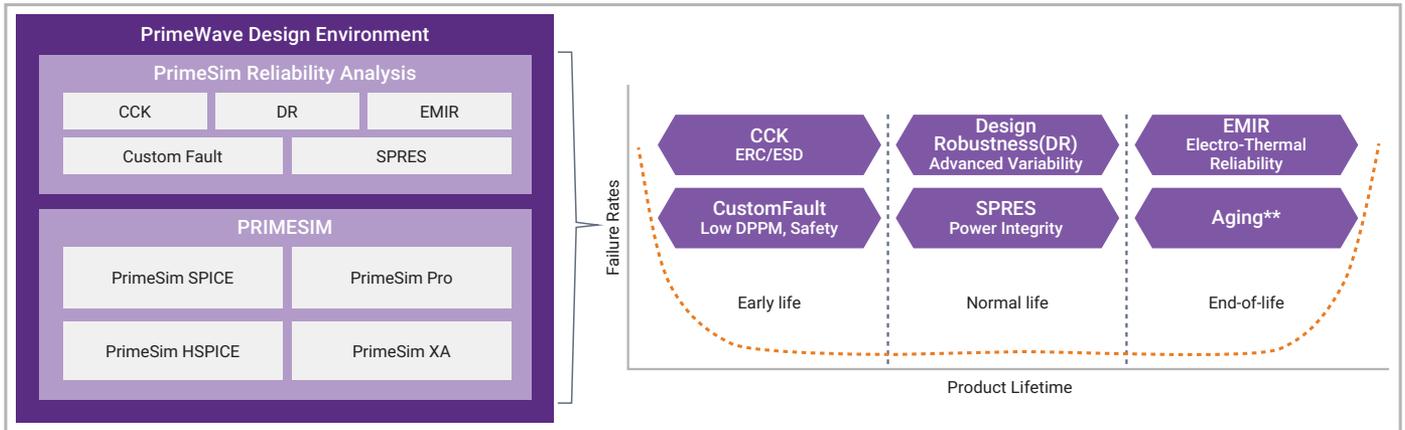


Figure 4: Full Lifecycle Reliability Verification with the PrimeSim Family and PrimeSim Reliability Analysis

The PrimeSim Family provides a unified workflow of best-in-class Synopsys simulation technologies to accelerate analysis and verification of hyper-convergent IC designs.

PrimeSim Reliability Analysis is a comprehensive solution that unifies production-proven and foundry-certified reliability analysis technologies covering Electromigration/IR drop analysis, high sigma Monte Carlo, and circuit checks to enable full-lifecycle reliability analysis.

\*\*Starting with 2024.09 release, the MOS Aging feature is available with PrimeSim simulators, such as PrimeSim XA, PrimeSim SPICE, and PrimeSim Pro