

TestMAX FuSa

Fast Static Analysis to Improve Functional Safety

Calculating ISO 26262 functional safety metrics to identify and address hotspots early in the design cycle and guide impactful design changes

Overview

Synopsys TestMAX FuSa performs soft error analysis early in the design flow to provide guidance for design changes resulting in ISO 26262 functional safety metric improvements. Leveraging SpyGlass technology, analysis can be performed either in RTL or gate-level netlists, minimizing impact to design schedules. Transient faults caused by soft errors can cause catastrophic failures during the operation of a safety-critical electronic device. The probability that a soft error can propagate to a safety-related signal is measured by the Single Point Fault Metric (SPFM) defined by the ISO 26262 functional safety standard. Minimum required SPFM values are documented by the standard for each of the defined automotive safety levels. TestMAX FuSa uses a static analysis approach (Figure 1), to accurately estimate the SPFM for any portion of a design.

Key Benefits

- Fast analysis at the RTL or gate-level ensures minimum impact to design schedule
- No testbenches required

Key Features

- Calculates the SPFM as specified in the ISO 26262 standard
- Reports with an ordered list of registers that can be replaced to improve SPFM metrics
- Intuitive, integrated browser with cross-probing among views

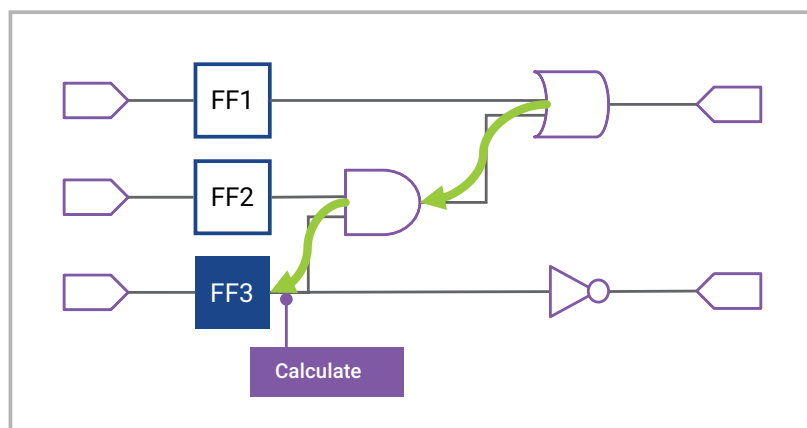


Figure 1: Static analysis approach to calculate single point fault metric

Soft-Error Propagation Analysis

TestMAX FuSa uses static analysis to estimate the probability that a soft error can reach a safety-related signal. It calculates controllability and observability of logic signals in functional mode and supports multi-time-frame analysis with user-defined parameters to control the number of propagation levels. The calculation is done with respect to any user-specified safety related registers and outputs and can be performed on any portion of the design including top level. This provides the ability to identify and efficiently address SPFM hotspots. At the lowest level, a list of the design's flip-flops is generated and ordered based on each flop's contribution to SPFM loss (Figure 2). This makes it easier to determine the minimum number of regular flops that need to be replaced with error-tolerant flops to achieve the desired SPFM value. Flop substitutions are then performed within the synthesis and place-and-route flow based on the generated minimum list. Alternatively, larger blocks of logic contributing as a whole to SPFM loss can be managed using other techniques, such as adding redundant blocks or through the addition of safety monitors.

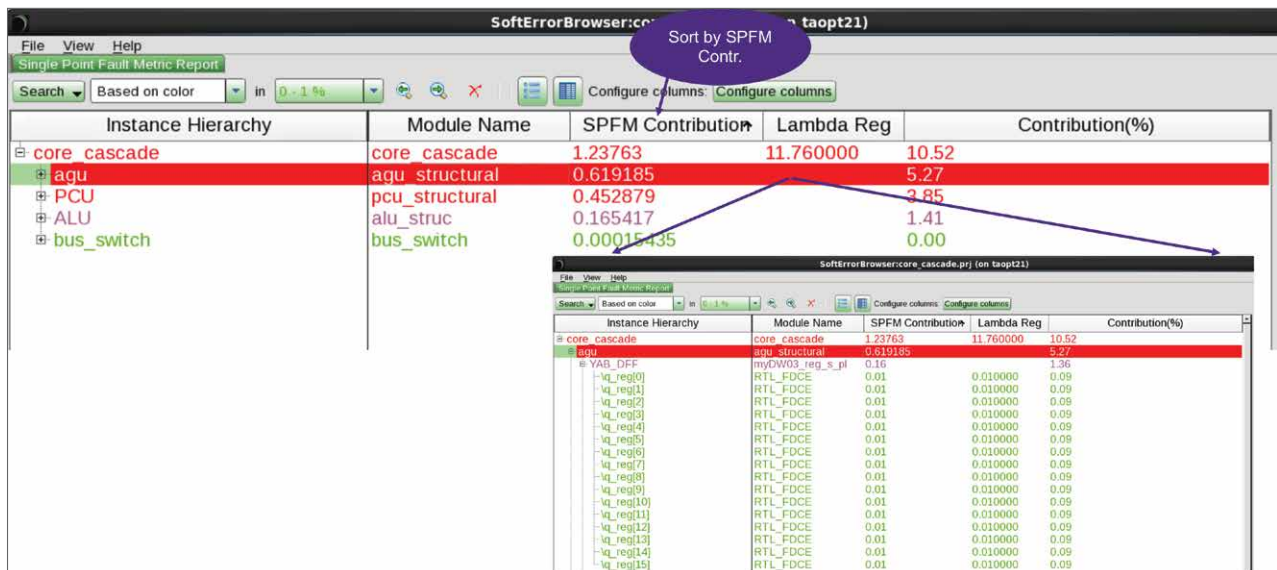


Figure 2: SPFM Browser identifies the blocks in the design with the highest probability causing functional safety failure

Design Formats

TestMAX FuSa supports the following data formats:

- Design: VHDL, Verilog (RTL or netlist), SystemVerilog
- Constraints: SDC and SpyGlass SGDC, Tcl
- Power: UPF
- Verification: VCD, FSDB

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