

Virtuoso Analog Design Environment Family

Advanced design simulation for fast and accurate verification

The Cadence® Virtuoso® Analog Design Environment family of products provides a comprehensive array of capabilities for the electrical analysis and verification of analog/mixed-signal designs, including the flexibility to integrate into a variety of custom flows. The family includes Virtuoso Analog Design Environment L, Virtuoso Analog Design Environment XL, and Virtuoso Analog Design Environment GXL.

Family Overview

The Virtuoso Analog Design Environment product suite provides all the capabilities required to fully explore, analyze, and verify a design against the user’s desired goals. As the industry’s leading solution for analog simulation control and management, it allows users to flexibly select the tier that best supports their design goals as they move through the design flow. Analog Design Environment L provides a quick entry into the analysis process with easy entry and execution of simulations. Analog Design Environment XL extends the L tier capabilities, providing multiple test support, analysis over sweeps, corners, and Monte Carlo, and easy reviewing of all results directly or as a datasheet. Analog Design Environment GXL builds on the Analog Design Environment L and XL capabilities by providing targeted tools that aid with key design challenges with early parasitic analysis, design centering, and designing in multi-technologies.

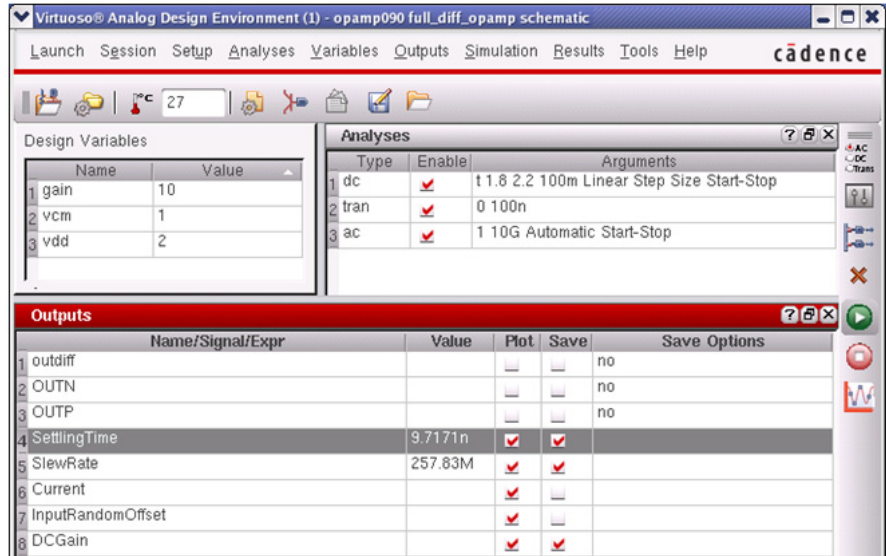
Family Benefits

- Provides built-in support for all Virtuoso simulators with integration support for third-party simulators
- Supports multiple test methodologies to fully explore and validate designs
- Accelerates design debug using a variety of built-in analysis tools
- Facilitates early correction via easy evaluation of pre- and post-layout parasitic effects
- Circuit problems are quickly detected and explored via a clear visualization cockpit
- Offers integrated documentation and fast waveform visualization across all tests
- Supports manual or automated design evaluation and sizing to target specifications
- Provides a tiered set of capabilities to support a variety of design flows and design challenges

Family Features at a Glance	ADE L	ADE XL	ADE GXL
Single-test design analysis and exploration	•	•	•
Script support through OCEAN	•	•	•
Virtuoso and third-party simulator support	•	•	•
Multi-test verification and extended analyses		•	•
Flexible corners analysis		•	•
Extended visualization speed with PSF XL		•	•
Pre- and post-layout parasitic analysis			•
Design Characterization and modeling			•
Design centering and yield optimization			•

Virtuoso Analog Design Environment L Overview

The Virtuoso Analog Design Environment L is the entry-level analog design and simulation environment for the Virtuoso custom design platform. Analog Design Environment L is the industry's leading task-based environment for simulating and analyzing full-custom, analog, and RF IC designs. It features a graphical user interface, integrated waveform display, distributed processing, and interfaces to popular third-party simulators. As part of the Analog Design Environment family, Analog Design Environment L provides the foundation to facilitate extended design analysis and validation into the Analog Design Environment XL and Analog Design Environment GXL products.



Virtuoso Analog Design Environment L: Single-test Environment

Benefits

- Reduced learning curve with a simulator-independent environment
- Maximum efficiency in the script-driven mode
- Close integration with Virtuoso Schematic Editor for interactive analysis
- Easy design and test parameterization for fast circuit exploration
- Configurable window for optimum display of relevant data
- Integrated visualization cockpit for exploration of simulation results
- Extract quantifiable results with built-in calculator and extensive list of functions

Features

Easy-to-use interactive simulation environment

The interactive environment has everything users need to set-up, run, and analyze results with any integrated simulator. It offers a variety of tools for displaying and analyzing results, giving designers the flexibility to visualize and understand the many interdependencies of an analog, RF, or mixed-signal design. These tools allow users to quickly and easily pinpoint critical design parameters and their effect on circuit performance. The environment is flexible

enough to take advantage of the Virtuoso Multi-Mode Simulation technology, by making it easy to switch between different simulators without having to re-enter all measurements. The Virtuoso Analog Design Environment L has an extensive scripting language (OCEAN) built-in. OCEAN is based on the Cadence SKILL programming language for development of more complex analysis. It can be used to set up, run, and post process results in a batch-oriented methodology. Lastly, Virtuoso Analog Design Environment L includes the capability to interface with other commercially available and in-house simulators through the OASIS Integrator's Kit.

Built-in waveform display and signal analysis capabilities

The waveform display tool, coupled with an extensive waveform calculator, provides a comprehensive post-simulation analysis environment. The waveform window can handle all types of analog and mixed-signal data, including advanced displays such as noise, corner, statistical, and RF plots. Additionally, it contains a variety of changeable display attributes for the axes, waveform colors and labels so that you can make professional plots for your reports. Waveform markers and a built-in waveform calculator allow accurate measurement of

signals in a variety of different modes, including transient, AC and RF. The calculator's algebraic expressions can be composed of any combination of input or output voltages or currents.

Integral part of the Virtuoso Custom Design Platform

Virtuoso Analog Design Environment L is an integral part of the Virtuoso custom design platform. It bridges the gap between schematic design and physical layout by providing a simulation environment where the designer can compare designs in both pre- and post-extracted forms, thereby completing the Cadence IC design flow. It supports analog system to IC design methods with complete access to behavioral modeling languages for both simulation and cross-probing for waveform display. Post-simulation operating condition can be easily annotated back to the schematic with net voltages, currents, and device operating information.

Specifications

Interactive simulation environment

- Easy to learn and easy to enter data
- Easy re-use of simulation set-ups
- Clear displays of simulation information

- Cross-probing support for both schematics and layouts
- Design variable support with ability to create dependent expressions
- Auto-plotting and printing of simulation data
- Batch scripting
- Schematic annotation of node voltages and device information
- OASIS integration of a customer proprietary or third-party simulator

Waveform display

- Supports multiple y-axes, strip plots, and Smith Charts
- Built-in waveform calculator
- Independent sub-window displays
- Horizontal and vertical measurement markers
- Independent pan and zoom capability
- User-defined labels and titles
- Color and line style controls
- Signal browser
- Color-coordinated cross-probing to schematics

Distributed processing

- Distribution of multiple simulations
- Efficient use of existing computer farms
- Built-in basic load balancing or interface to other load balancing tools
- Job monitoring and controlling functions
- Graphical user interfaces for set-up and viewing status

Virtuoso Analog Design Environment XL Overview

Virtuoso Analog Design Environment XL is the advanced design and simulation environment for the Virtuoso platform. By supporting extensive exploration of multiple designs against their objective specifications, it sets the standard in thorough, fast and accurate design verification.

Benefits

- Supports high fault coverage of designs with extensive verification over process environmental and operating conditions
- Analysis support of multiple simulators across multiple tests and multiple conditions for thorough design validation, compiling results in a single easy-to-use database
- Support for corners, parametric sweeps, and Monte Carlo
- Quick color-coded feedback of all results against target specifications
- Optimum analysis throughput with simulation distribution and multi-test management across user-preferred load balancing software
- Simplifies design reviews through integral documentation, specifications, measurement results, and waveforms
- Closely integrated with Virtuoso Schematic Editor for fast test development and debug

Features

Specification-driven design

To accelerate design verification, Virtuoso Analog Design Environment XL combines specification entry and design management in a single unified cockpit. A specification consists of all required tests, all required analyses, and all

required operating conditions for validation against a measured set of goals. With Virtuoso Schematic Editor XL, development of multiple tests is easy, along with all the different conditions to validate a design’s performance against the target specification.

Each Analog Design Environment XL session can be treated as a project, providing access to all the tests, sweeps, corners, scripts, and documentation needed to completely validate a design against the designer’s intent.

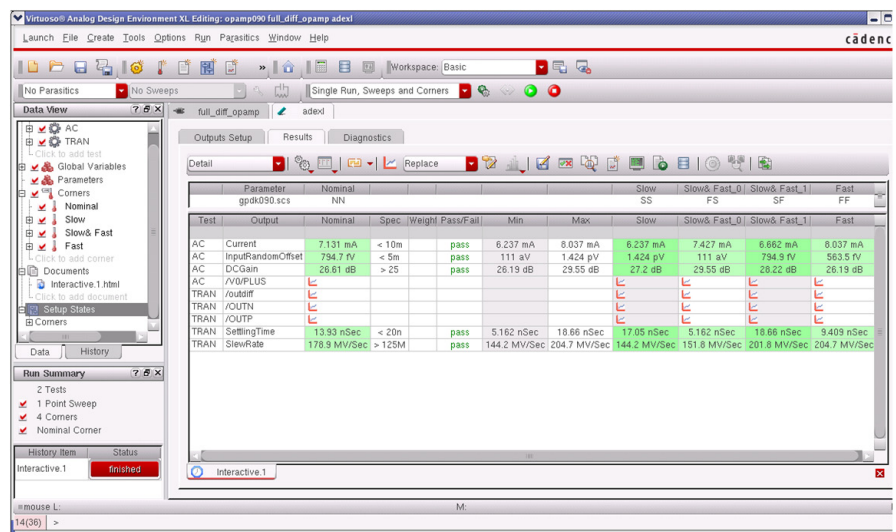
Flexible simulation management

An overview of all the tests in development is available through the test assistant, which allows easy access to add, delete and edit all required test configurations and analyses to fully validate a design. These defined tests can be further managed with test configurations that support different testing strategies at different points in the design development/validation flow.

By giving users the ability to create extensive testing, Virtuoso Analog Design Environment XL provides the ability to manage the parallelized simulations with either the internal load balancing system or with an optional third-party solution.

Visual cockpit eases design verification

An overview of all the tests, simulators used and analysis conducted (along with any defined variables and corners) is listed



Virtuoso Analog Design Environment XL: Multi-test Environment

in easy view on the Data View assistant screen. Results of the latest analysis appear in a tabular view on the right side, with color coding to show at a glance the simulation results that pass or fail against the target specification. The results can be reordered or transposed for better visualization. Users can easily explore results in more detail by right clicking on any single result or set of results that pop up in Virtuoso Visualization and Analysis XL, which is included in Analog Design Environment XL. In addition, a history of results is automatically maintained so users can quickly go back to look at previous results or even results from different test configurations.

Integral part of the Virtuoso Custom Design Platform

Virtuoso Analog Design Environment XL builds upon the features and infrastructure of Virtuoso Analog Design Environment L, providing cohesive operation for the user. As a result, Analog Design Environment XL is able to work closely with Virtuoso Schematic Editor and Virtuoso Layout Suite for a complete integrated design flow.

Specifications

Interactive simulation control

- Integrates Analog Design Environment L capabilities for single test operation
- Design exploration with sweeps, corners, and Monte Carlo analysis
- Supports matching and correlation constraints from Virtuoso Schematic Editor XL
- Incremental re-simulation
- Creation and tracking of parametric dependencies among tests for more complex analysis
- Integrated with Virtuoso Multi-Mode Simulation
- Ability to save different test configurations for different steps in the testing flow

Results analysis and visualization

- Creation of specifications directly from simulation results
- Quick overview window of test results against target specification

- Cross-probing and annotation to schematics and layout
- Calculator, OCEAN, MDL, and MATLAB measurement strategies
- Integrated Virtuoso Visualization and Analysis XL for fast waveform analysis
- Integral documentation creation and support for Text, HTML, and PDF
- History of prior results with the ability to compare any two sets of data
- Measured results are saved along with the tests as a lib/cell/view for easy design management

Distributed and batch processing

- Built-in distributed processing, with support for external load balancing software
- Parallel analysis over multiple tests and all required corners
- Batch scripting support through OCEAN XL

Virtuoso Analog Design Environment GXL Overview

Virtuoso Analog Design Environment GXL uses the same advanced design and simulation cockpit as Analog Design Environment XL and includes extended analysis capabilities for more detailed design exploration. A user can choose to launch Analog Design Environment GXL directly or just access the additional analysis capabilities from Analog Design Environment XL.

Benefits

- Extended design exploration with Sensitivity and Mismatch analysis
- Advanced optimization algorithms improve design centering and yield
- Built-in parasitic estimation flow helps to quickly identify parasitic sensitivities prior to layout
- Support for multiple technologies to facilitate multi-chip design analysis
- Model calibration and validation support for Verilog® A and Verilog AMS languages
- Generates Liberty and Wreal models from simulation results for system level simulation

Features

Extended analysis

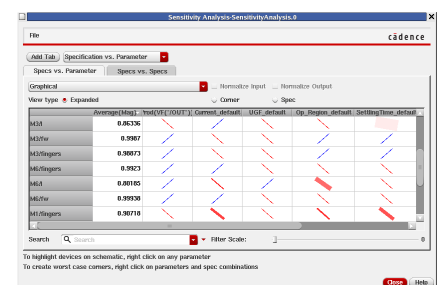
To further understand the behavior of a design, users can run Sensitivity analysis to identify weaknesses in a design to process variations and for design sizing. Built upon the statistical analysis capabilities in Analog Design Environment XL, Mismatch analysis can be used to further explore the sensitivities of a design against the mismatch over all or a selected set of devices.

Parasitic resimulation

Users can explore parasitic effects early in the design flow with the ability to assign parasitic estimates onto nets and ports of their design, without editing the schematic. An estimated View is compiled for simulation across all the tests and analysis options available in Analog Design Environment XL or GXL to identify areas to focus on in the design development. Similarly, post-layout extracted designs can also be submitted for validation against the design goals or compared against the original parasitic estimates. Parasitic effects can be easily copied from an extracted view back to an estimated view to gain full access to all the debug capabilities in Analog Design Environment.

Design centering

With the setup of tests and specifications already available in Analog Design Environment XL, users can simply add the ranges of devices they want to explore and use Analog Design Environment GXL optimization engines to find the optimum design. With an array of local and global optimization choices available, the user can control how the optimizer runs to



Sensitivity of device parameters to measured goals

center a design over nominal, all defined corners and with parasitic estimates in place.

Design for yield

Designers can use a series of both global and local optimization methods to center their design values to help maximize yield. For circuits requiring high design margins up to six-sigma, the internal design goals are tightened as it optimizes the parametric yield.

Design characterization and modeling

A number of modeling options are available. Using a template-based methodology, a user can generate all the test benches needed to explore a design and extract the parametric data needed to build a calibrated model. Model languages supported are Verilog A and Verilog AMS with full calibration, while users can also create models from parametric data in Verilog D, Liberty, and Wreal model formats.

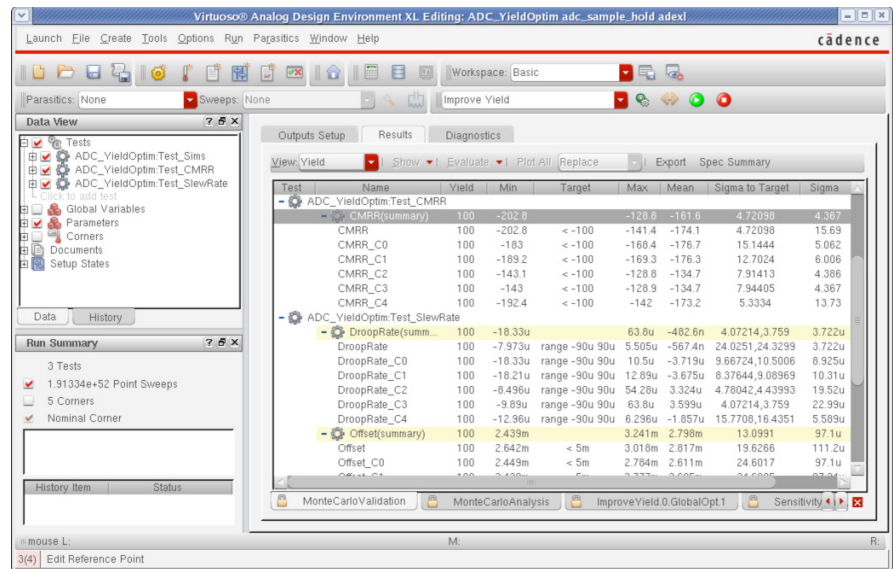
Multi-technology support

Technology support is available to aid in the design of complex multi-chip solutions, and integrate them into a single package in conjunction with the Cadence Allegro® platform.

Specifications

Extended analyses

- Inherits all features and functionality from Virtuoso Analog Design Environment XL
- Sensitivity analysis on design parameters, statistical parameters and design variables
- Mismatch analyses
- Calibrate behavioral models for more accurate system-level simulation
- Import simulation results to build Liberty models without prior knowledge of the language
- Multiple technology support with Allegro platform to enable SiP design



Virtuoso Analog Design Environment GXL: Extends analysis into parasitic and yield

Parasitic analysis

- Supports exploration of design parasitic effects before layout
- Adds R,L,C or K parasitic elements without altering the schematic
- Full simulation support of post-extracted layouts
- Compare pre- and post-layout parasitic effects

Optimization options

- Four Local and Global algorithm choices
- Optimize nominally or over corners, with or without parasitic estimates
- Run optimization with or without a starting point
- Improves design yield and design centering up to six sigma margins

Third-party support

Interface support for all commercial circuit simulators, including Synopsys Hspice, Mentor Graphics Eldo, Silvaco SmartSpice, and Agilent ADS. In addition, users can integrate their own proprietary circuit simulator.

Design inputs

- OpenAccess data objects
- Cadence proprietary languages: OCEAN and MDL
- SPICE netlists
- Circuit design language (CDL)
- SPICE
- VHDL IEEE 1076-1993
- Verilog IEEE1364
- SKILL
- PSF and PSF XL waveform formats
- SST2 waveform format
- Cadence SKILL

Design outputs

- XML database
- PSF and PSF XL
- SST2
- Comma Separate Value
- Cadence proprietary script language: OCEAN

Platform/OS

- X86 Linux
- Sun Solaris
- IBM AIX

Cadence Services and Support

- Cadence application engineers can answer your technical questions by telephone, email, or Internet—they can also provide technical assistance and custom training
- Cadence certified instructors teach more than 70 courses and bring their real-world experience into the classroom
- More than 25 Internet Learning Series (iLS) online courses allow you the flexibility of training at your own computer via the Internet
- Cadence Online Support gives you 24x7 online access to a knowledgebase of the latest solutions, technical documentation, software downloads, and more



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