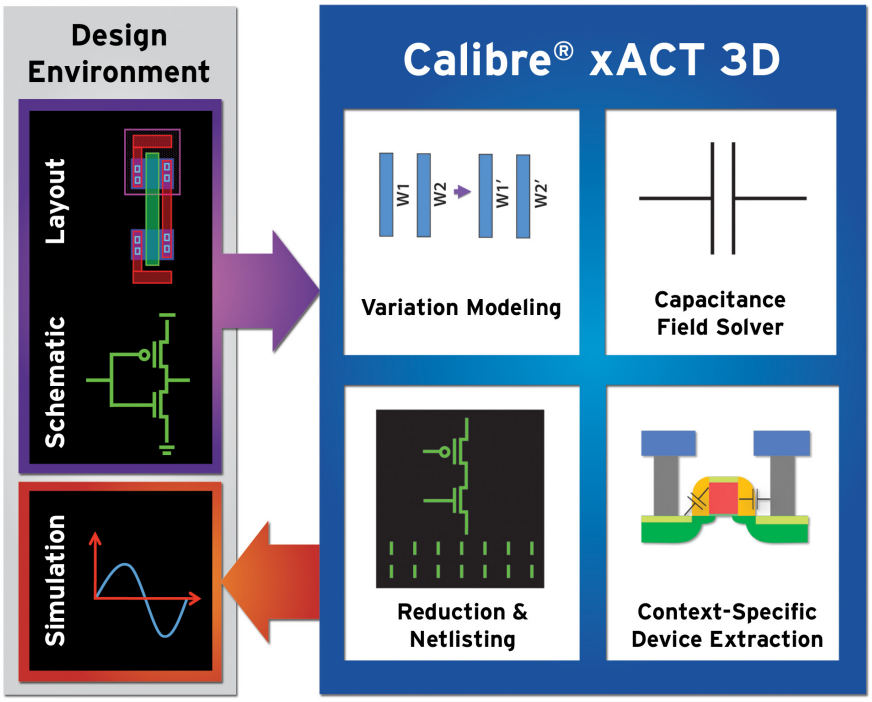
Calibre xACT 3D

3D Field Solver for Parasitic Extraction

Circuit Verification

D A T A S H E E T



Calibre xACT 3D provides a complete parasitic extraction solution with deterministic field solver accuracy, process variation modeling, electrically aware reduction, and industry-standard netlist formats, all within the design environment.

Calibre xACT 3D—The Next Generation Fast Field Solver Parasitic Extraction Solution

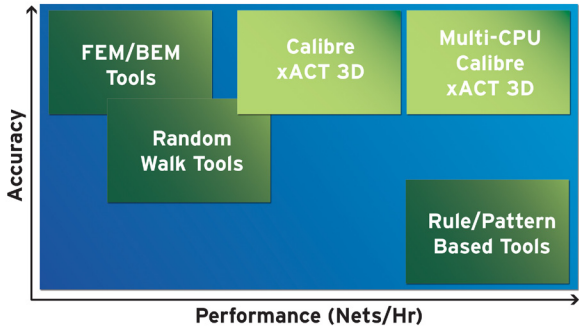
Process technology innovation is the key to success in the competitive IC design market. Cutting-edge development enables advances such as smaller geometries, increased metal stacks, new device types, and chip stacking. This new technology allows breakthroughs in IC design, but poses challenges at each stage in the design process. Success depends to a large part on a parasitic extraction tool that can model the new complex process effects with the highest accuracy. This solution needs to fit into existing design flows to speed up design cycle time and needs to be scalable for a wide range of design applications.

Calibre® xACT 3D features a field-solver modeling engine built on advanced computational electromagnetic methods to accurately calculate device and interconnect parasitics. In contrast to other field solvers that use statistical methods, the Calibre xACT 3D engine employs deterministic techniques that produce reliable results for total and coupling capacitances while providing fast and scalable performance.

Benefits

- ***Highest Extraction Accuracy***—Integrated capacitance field solver delivers reference-level accuracy with deterministic results. Calibre xACT 3D extracts complex context-sensitive device and interconnect parasitic effects needed to accurately predict circuit behavior.
- ***Reliable Results***—Calibre xACT 3D accurately handles close spacings, rotations, and symmetry without accuracy penalty or uncertainty typical of statistical field solvers, which is crucial for sensitive designs.
- ***Fast Performance***—Proprietary BEM/FEM-based field-solver technology delivers accurate results sooner. Multi-threaded and distributed processing ensures virtually unlimited design scope with fast, scalable performance comparable to rule-based extraction.
- ***Easy-to-Use***—Like all Calibre products, Calibre xACT 3D uses standard SVRF rule files and produces standard parasitic netlist formats. The graphical user interface for design environments speeds setup and debugging cycles.
- ***Zero-Risk Investment and Superior Quality***—Calibre xACT 3D is integrated with Calibre nmLVS and the Calibre Physical Verification Platform to provide trusted device recognition, connectivity extraction, and ease-of-use in existing customer sign-off flows.

Mentor Graphics®



Calibre xACT 3D provides highly accurate transistor-level extraction of parasitic effects and results at speeds an order of magnitude faster than existing field solvers.

Process Modeling Accuracy with Reliable Results

Calibre xACT-3D provides highly accurate transistor-level extraction of parasitic effects, meeting the exacting requirements for performance-sensitive circuits. Even designs at larger nodes with critical cells, blocks, or nets can benefit from Calibre xACT 3D extraction. Traditional finite element/boundary element method (FEM/BEM) field solvers such as Raphael provide high accuracy, but with slow performance. Statistical field solvers that use the random-walk method are faster, but have more error.

Calibre xACT 3D uses an advanced FEM/BEM method that provides accelerated performance compared with traditional field solvers, but retains the accuracy of the FEM/BEM algorithms.

Repeatable, deterministic results are especially important for sensitive analog circuitry where capacitive coupling effects have a major impact on product performance. Examples include ADCs, DACs, high-speed designs with differential signaling, image sensors, and RF designs using MIM/MOM (metal-oxide-metal/metal-insulator-metal) capacitors.

In the die-stacking approach, TSVs (through-hole silicon vias) pass signals between dies. Capacitance-coupling effects from die-to-die must be accounted for. Only field solvers can provide the accuracy required. The close proximity of geometries exacerbates the need to model device area capacitance based on the layout context. As a consequence, more parasitic effects are moved out of the device models into the extraction domain. Calibre xACT 3D extracts device region effects including gate extension capacitance to contacts and diffusion, inter-device coupling, and local interconnect.

Process and temperature variation modeling in Calibre xACT 3D further improves extraction accuracy.

Fast, Scalable Performance

Calibre xACT 3D provides results at speeds an order of magnitude faster than existing field solvers in single-CPU comparisons. Implementation scales almost linearly with additional CPUs or cores, so multiple CPUs can be added to achieve turn-around times that were previously only available with less accurate rule-based methods.

Using Calibre xACT 3D on a multi-CPU platform allows high accuracy with a faster turn-around time, thus shortening design cycle times. To further improve efficiency, the design engineer also can select a subset of nets to be extracted and vary the accuracy of the field solver.

Calibre Design Platform and Flow Integration

Calibre xACT 3D uses Calibre LVS device extraction and connectivity data to devices for analyzing detailed parasitic effects. It includes engines for resistance and (optionally) inductance modeling, in addition to the 3D field solver for capacitance. Intelligent reduction techniques minimize the netlist size while preserving the electrical characteristics of the circuit.

For very large designs such as memories, a hierarchical parasitic netlist format feeds into hierarchical post-layout simulation to enable faster simulation performance.

Calibre xACT 3D Features

High-accuracy deterministic field-solver

Accelerated performance

Scalable multi-CPU performance

Full integration into popular design flows

Foundry rule decks

Calibre nmLVS integration

Process variation modeling

Context-sensitive device extraction

All standard netlist formats are available, such as SPICE, DSPF, SPEF, Eldo, Spectre, and CalibreView. Part of the Calibre platform, Calibre xACT 3D is completely integrated with popular design environments, verification, and simulation flows.

Platforms Supported

32- and 64-bit Linux Redhat and Sun Solaris.

Visit our website at www.mentor.com

Corporate Headquarters
Mentor Graphics Corporation
8005 S.W. Boeckman Road
Wilsonville, Oregon 97070-7777
Phone: 503-685-7000
Fax: 503-685-1204

Sales and Product Information
Phone: 800-547-3000

Silicon Valley
Mentor Graphics Corporation
1001 Ridder Park Drive
San Jose, California 95131 USA
Phone: 408-436-1500
Fax: 408-436-1501

North American Support Center
Phone: 800-547-4303

Europe
Mentor Graphics Deutschland GmbH
Arnulfstrasse 201
80634 Munich
Germany
Phone: +49.89.57096.0
Fax: +49.89.57096.400

Pacific Rim
Mentor Graphics Taiwan
Room 1001, 10F,
International Trade Building
No. 333, Section 1, Keelung Road
Taipei, Taiwan, ROC
Phone: 886-2-87252000
Fax: 886-2-27576027

Japan
Mentor Graphics Japan Co., Ltd.
Gotenyama Garden
7-35, Kita-Shinagawa 4-chome
Shinagawa-Ku, Tokyo 140 -0001
Japan
Phone: 81-3-5488-3033
Fax: 81-3-5488-3004

05-10 MGC 1028100