



DIGITAL INDUSTRIES SOFTWARE

Calibre xACT 3D

3D field solver for parasitic extraction

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

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.

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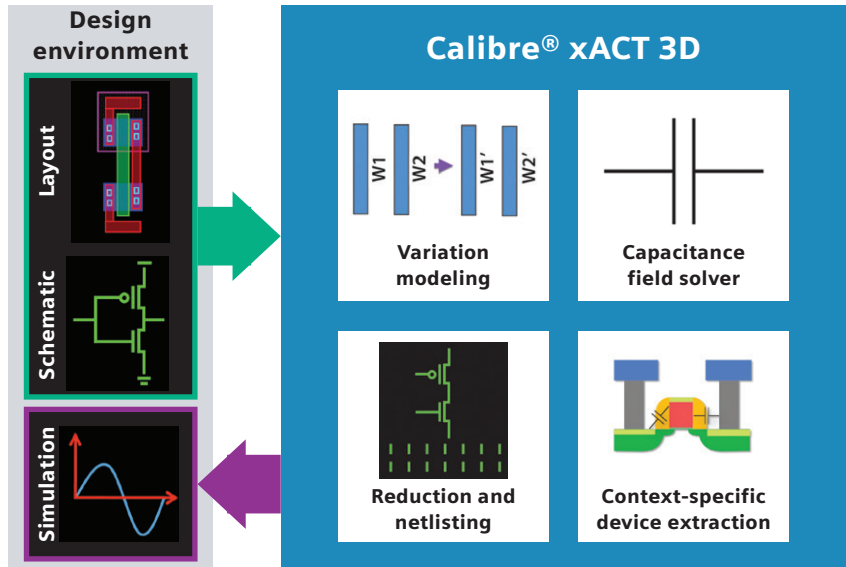
[siemens.com/eda](https://www.siemens.com/eda)

Benefits continued

- 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

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

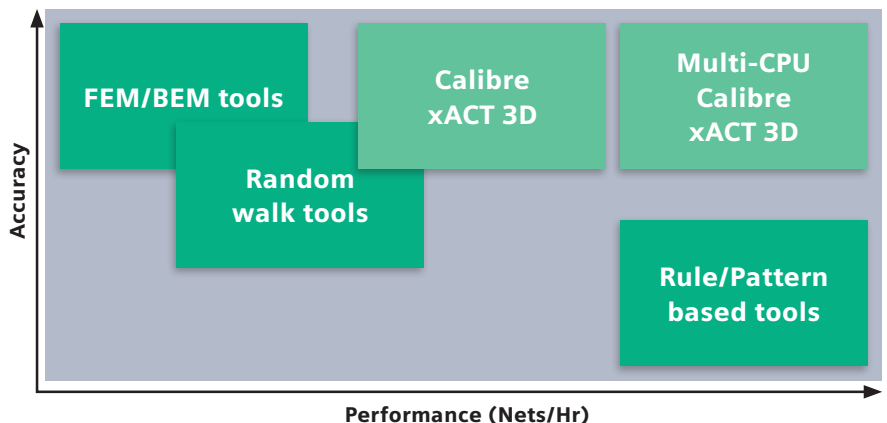


Calibre xACT 3D provides a complete parasitic extraction solution with deterministic field solver accuracy, process variation modeling, electrically aware reduction, and industry-standard netlist formats, all within the design environment.

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.



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.

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-oxidemetal/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.

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.

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