# Calibre nmDRC

## Your designs deserve Calibre confidence

**Benefits**

- Used by every major foundry for process development and validation

- Fast, scalable, flexible resource usage

- Direct access to Milkyway, LEF/DEF, OpenAccess, OASIS and GDSII design databases

- Calibre eqDRC provides precise characterizations and simplifies debugging of complex multi-variate design issues

- Calibre Fast XOR enables fast, accurate LVL comparisons

- Comprehensive fill support, including fill back annotation to Milkyway, LEF/DEF, OpenAccess, OASIS and GDSII design databases.

- Pattern matching support

- Double patterning layout analysis support

- Comprehensive, accurate and proven signoff physical verification for advanced technology nodes and designs at all major foundries

- Industry-leading speed minimizes runtime and resource usage

- Enhanced DRC debugging provides the fastest results with the highest accuracy

**Calibre nmDRC – right from the start**

To ensure acceptable design performance in new process technologies, foundries iteratively explore design constraints and manufacturability to define the design rules ultimately used by their customers. The physical verification tool used by every major foundry to develop these design rules is Calibre® nmDRC. What that means to you is that Calibre rule decks are proven long before you need them. When performance and time to market control potential profitability, using Calibre nmDRC for your physical verification can mean the difference between market success and failure.

Calibre nmDRC is continually evolving to meet the demands of shrinking geometries and complex manufacturing methodologies. When designers need new ways to assess the quality of their designs in light of more complex process constraints and larger process variations, Calibre nmDRC delivers the new capabilities and enhanced performance that provide comprehensive analysis capabilities while minimizing cycle time.

With Calibre nmDRC, designers can confidently manage physical verification for every design, at every node.

**Calibre nmDRC runtime and resource usage**

With increasing size and complexity of designs, and the explosion of new rule checks required for the next technology node, the need for faster turnaround-time is critical.
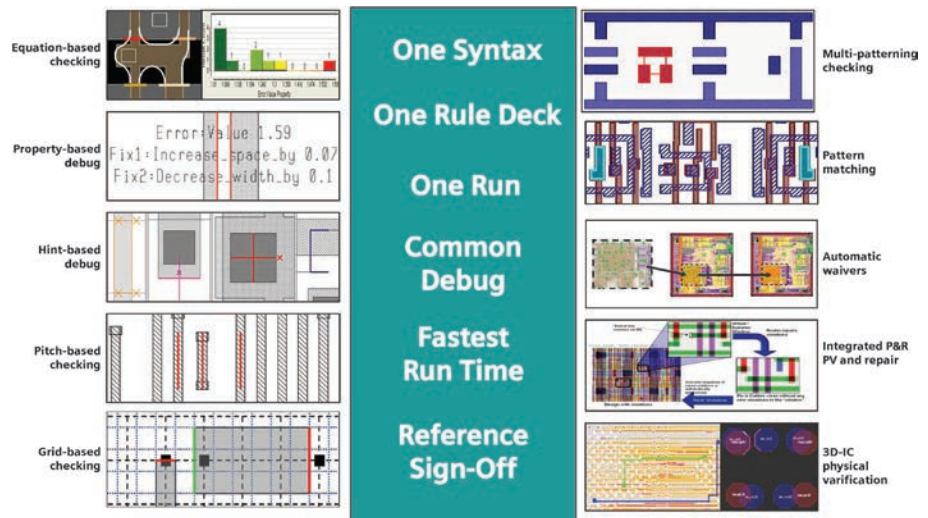


Calibre nmDRC provides fast, sophisticated, and proven technology that enables the fastest and most accurate physical verification of the most challenging designs at any node.

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# Calibre nmDRC

**Benefits** *continued*
- Extensive innovative and sophisticated capabilities support the most complex design requirements at every node
- Earliest rule deck availability for new process technologies supports fast production of leading edge designs

Calibre nmDRC delivers the fastest runtimes in the industry, whether you're using one CPU or dozens, providing you with the flexibility you need to optimize your resource allocation and usage while achieving your desired turnaround time.
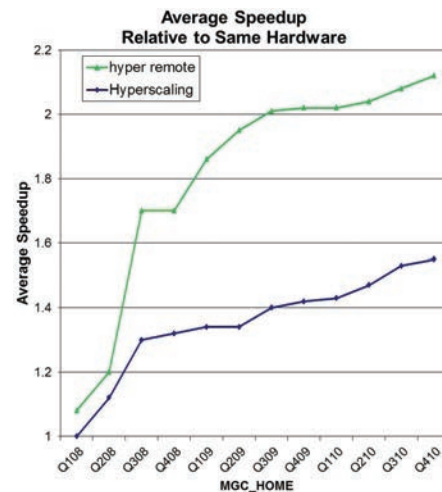


The Calibre engine is always evolving to ensure Calibre users the fastest runtimes in the industry.

Calibre nmDRC performs equally well in either shared memory or distributed processing configurations, and is completely compatible with load balancing and grid computing software. Verification jobs can be run in parallel to support multiple designers completing subsections of a design on the same hardware, then brought together for full chip verification.

**Advanced checking capabilities**
Calibre nmDRC is constantly enhanced to provide new and more comprehensive physical verification methodologies to manage today's most complex design requirements.

**Calibre SVRF/TVF**
Calibre SVRF rule decks contain robust syntax and programmable features that provide full flexibility across the complete range of physical verification coverage.

Calibre Tcl Verification Format (TVF), a subset of SVRF, is a high-level language

preprocessor that drastically reduces the number of lines of code needed to execute a DRC run. This simplifies rule scripting and maintenance, and the need to change and validate every line of code. Calibre TVF supports Boolean expressions, conditional and looping flow controls, variables for layer names, procedural encapsulation and mathematical functions in expressions.

Calibre nmDRC with SVRF/TVF is the tool/syntax combination foundries use to establish the signoff results against which all designs will be measured.

**Equation-based design rule checking**
Using Calibre eqDRC, foundries can provide designers with rule files that accurately capture and characterize complex, multi-variate design constraints that minimize the impact of process variation. Calibre eqDRC also provides property filtering, correction hints and annotated error markers to assist designers in the identification of potential issues. Debugging is faster and more productive, because Calibre eqDRC provides the designer with precisely measured metrics for each failure. Designers can use Calibre eqDRC equations to solve for multiple simultaneous variables and make reliable design tradeoffs without needing to over-constrain designs.
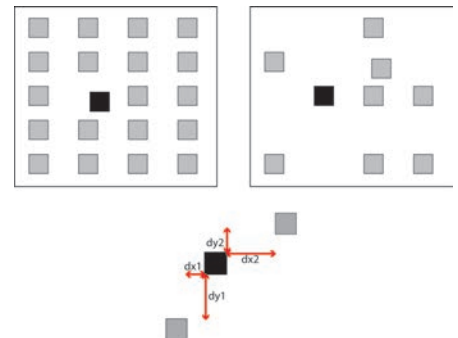


Optical grid/pitch checking uses sophisticated algorithms to assess placement for lithographic sensitivity.

**Optical grid and pitch checking**
While optical grid and pitch checking is just now becoming part of physical

verification, Calibre nmDRC has already developed the needed technology in anticipation of the checks required at 28nm and below.

## Pattern matching
Pattern matching simplifies coding for difficult-to-capture configurations. Calibre's pattern matching technology is tightly integrated with Calibre nmDRC, with one integrated rule deck enabling signoff DRC and pattern matching within all the major design creation environments.
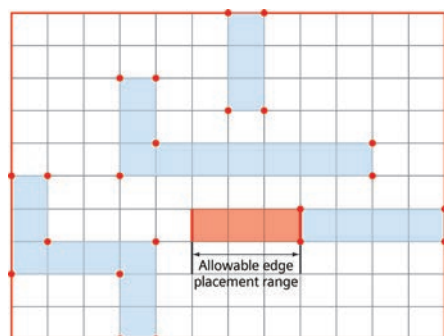


Calibre Pattern Matching helps identify complex problematic configurations during verification.

## Advanced fill solutions
Calibre nmDRC supports all the fill solutions required for today's complex designs, from traditional dummy fill to Calibre SmartFill, a model-based fill strategy that can not only determine the number, location and optimum shapes of the fill metal for a given design, but also provide a timing-aware fill solution based on critical net

identification. Back annotation of Calibre fill to Milkyway, LEF/DEF, OpenAccess, OASIS and GDSII design databases provides tapeout fill shapes created by Calibre during place and route to ensure accurate extraction and simulation results with optimum run-time and output file size.

## Double patterning
Calibre nmDRC provides the technology needed to not only assess layouts for double patterning decomposition feasibility, but also to identify the adjustments needed to correct non-compliant design configurations.

## Automated waiver management
Calibre Automatic Waivers can be used with Calibre nmDRC to provide automated recognition and removal of waived design rule violations during DRC. Not only does automated waiver management eliminate unnecessary time and effort in the verification flow, but it also ensures accurate processing of all waivers on every DRC run.

## Fast XOR
Calibre Fast XOR speeds up layout-vs-layout (LVL) comparisons to provide the same results as traditional XOR methodologies in significantly less time, from chip-level design iterations through final chip verification to tapeout.

## 3D-IC Physical Verification
While other tools are struggling to implement 3D-IC verification, Calibre nmDRC provides proven physical

verification now for today's emerging 3D-IC designs and tomorrow's new technologies.

### Calibre Debugging

### Direct Database Access
Calibre nmDRC is unique in that it reads all open data formats, including Milkyway, LEF/DEF, OpenAccess, OASIS and GDSII. This direct database access eliminates the need for conversion to GDS or other intermediate formats, provides immediate access to design data, and streamlines integrated Calibre verification methodologies.

The database interface automates layer mapping, back-annotates PV results and DFM optimizations into the design database, and minimizes the disk space needed to hold the GDSII data for every iteration.
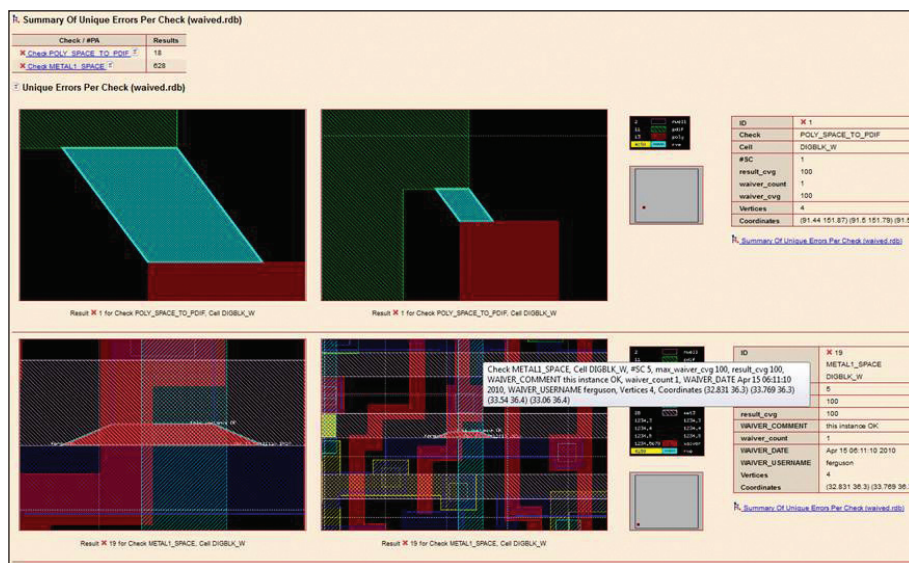
### HTML batch reports
With Calibre nmDRC's customizable HTML batch reporting, designers can streamline DRC debugging and improve communications without rule deck modifications.

- 100 percent batch operation, with no display required
- Pre-screen DRC report using sorts and filtering to focus on selected issues
- Group results by user-defined properties, cells and checks
- Use webpage forms to create approval processes for errors and waivers
- Use snapshots, customized text, layer palette and layer properties to provide rule explanations
- Provide colormaps and histograms for further data analysis when needed
- Reproduce easily in Calibre RVE and layout tools
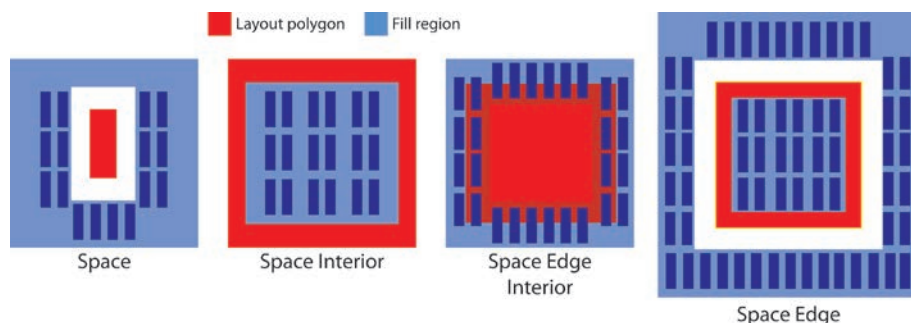


Calibre nmDRC supports the use of Calibre SmartFill techniques, such as the creation of active circuit fill cells.

Calibre HTML batch reporting enables diverse teams to quickly obtain the information they need using a variety of tools.

## Design Integration

Calibre's integration strategy allows Calibre nmDRC to be easily integrated into any design layout environment, either custom or place and route, using Calibre Interactive and Calibre RVE to provide invocation, results highlighting, design analysis and back annotation of Calibre physical verification results and DFM optimizations.

A direct integration of Calibre physical verification within the design layout environment is also available for both place and route and custom design tools. Within the Calibre platform, Calibre InRoute offers direct access to Calibre nmDRC from Olympus-SoC, enabling automated fixes for identified violations. In custom design, Calibre RealTime supports direct use of Calibre nmDRC during design layout, using an OpenAccess integration strategy.

## Calibre Commitment to Innovation

Calibre leads the way for one powerful reason – our constant and ongoing commitment to innovation. We know that when you're ready to move to the next node, your tools need to be ready as well. You need the confidence that comes from knowing we've been working far in advance to identify the challenges and develop effective, proven solutions. Our reputation depends on it, and we depend on our reputation. At every node, Calibre has provided, and will continue to provide, pioneering technologies and tools that ensure you can continue to deliver your products on time with the quality you need.

## The Calibre nm Platform

The Calibre nm platform, the industry's leading physical verification platform, is known for delivering best-in-class performance, accuracy and reliability. A powerful hierarchical engine is at the heart of the Calibre tool suite, providing solutions for physical verification, parasitic extraction, resolution enhancement, mask data prep, litho-friendly design and design for manufacturing.

Complete Calibre rule files and extensive coverage of Calibre processes for DRC and DFM are available at all semiconductor foundries.
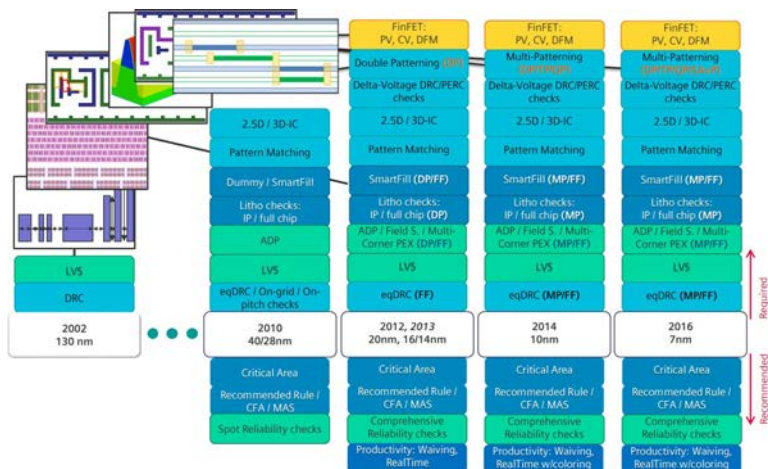


Calibre's innovative and comprehensive verification technologies lead the industry, making it the right choice for your physical verification requirements now and in the future.

**Siemens Digital Industries Software**
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