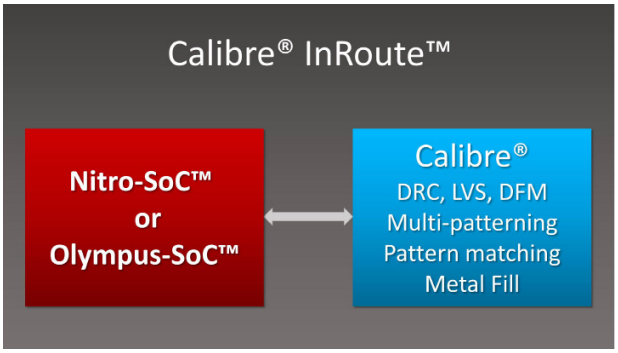
Manufacturing Signoff in Physical Design

Calibre® InRoute™

IC Design and Verification

D A T A S H E E T



The Calibre InRoute design and verification platform enables manufacturing signoff closure during physical design.

True Manufacturing Signoff in Physical Design

Calibre® InRoute™ allows Calibre, the industry leader for manufacturing signoff, and Mentor's place and route systems, Olympus-SoC and Nitro-SoC, to act as a single interactive design and manufacturing closure platform. By allowing designers to invoke Calibre facilities directly from the physical implementation environment, Calibre InRoute provides true signoff analysis and automatic fixing of DRC (design rule checking) and DFM (design for manufacturing) issues during physical implementation. Calibre InRoute reduces the number of iterations required to achieve manufacturing signoff, minimizes engineering cost and enables faster time to market.

Manufacturing Signoff Challenges at Advanced Nodes

As IC layout features get smaller, significant variations from ideal line width, thickness and shape due to manufacturing limitations have a greater effect on the yield and performance of ICs. To address these issues, design rules are becoming more numerous and complex, and additional DFM analysis is also required.

Traditional place and route tools are unable to deal with these complexities and do not have the required signoff accuracy. They are driven by design rules defined in the technology files, which could be outdated compared to signoff files, or be unable to represent the more complex layout restrictions. With the increased use of IP, there could be mismatches between the actual IP layout, represented in GDSII, and the abstracted views used during place and route. These problems result in a significant increase in the number of DRC errors found during signoff, which require multiple, sometimes non-convergent, engineering change orders (ECOs). Lack of automation to fix the problems and huge data file transfers between the implementation and signoff tool cause more delays in the ECO cycle and longer project cycle times. Finally, the DFM enhancements, including metal fill, CMP, and CAA, are now starting to affect the traditional design metrics like timing, power and signal integrity.

The design-then-verify flow that worked for older technology nodes is becoming increasingly unmanageable and unpredictable, resulting in delayed time to market and wasted engineering resources.

FEATURES:

- Native invocation of Calibre signoff engines during place and route
- Support for window or batch mode analysis and repair
- Perform automatic, timing-driven repair of DRC, CAA, CFA, CMP, and LFD violations
- GDSII abstractions on-demand
- Innovative and scalable Open Router architecture
- Easy Calibre environment setup and rule selection

BENEFITS:

- Calibre-clean physical design in Nitro-SoC and Olympus-SoC
- Eliminates iterations by enabling qualified signoff analysis and automatic fixing within the Olympus-SoC environment
- Boosts design team productivity by minimizing ECOs and eliminating huge file transfers
- Seamless adoption for Mentor's place and route users
- Built on industry-proven technologies
- Reduces time to signoff with convergent analysis, prevention, and repair of all manufacturing requirements

Mentor Graphics®

Unique Architecture of Calibre InRoute

Calibre InRoute is based on the innovative Open Router architecture that enables the digital implementation systems to natively invoke Calibre SVRF-based DRC and DFM analysis in the inner loop of the router.

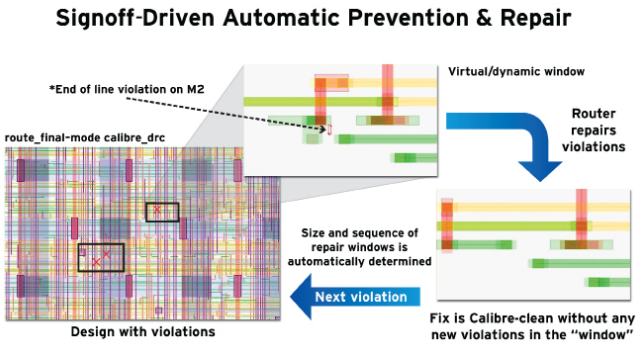
The search and repair engine and the DRC checker in Olympus-SoC and Nitro-SoC are de-coupled for easy plug and play of either their DRC engines or the Calibre DRC/DFM engines. Any violation found by the Calibre engine is automatically repaired by the router and incrementally verified with the Calibre signoff engine. This architecture also eliminates the need for any data transfer, as both engines are based on a hosted data model.

Calibre InRoute accesses the full suite of Calibre signoff capabilities—including Calibre nmDRC, Calibre LFD, Calibre CMPAnalyzer, Calibre YieldAnalyzer, and Calibre YieldEnhancer. It also includes all the features of Nitro-SoC and Olympus-SoC MCMM-based analysis and optimization that enables concurrent optimization of DFM, timing and power metrics.

Calibre Guarantee in Place and Route

Checking and fixing layout issues that relate to manufacturing is only useful if the tools have an accurate model of the target manufacturing process. Calibre InRoute uses the foundry-qualified, most accurate and up-to-date signoff design rule files (SVRF) and model-based verification, which eliminates the mismatches between signoff and implementation rules that result in surprise violations found after the layout is complete. Calibre InRoute also provides on-demand GDSII abstractions, which allows designers to find DRC problems from mismatches between IP layout views and abstracted views traditionally used in physical design.

Complete Calibre DRC and DFM rule files with extensive coverage of the most advanced processes are available at a majority of the world's semiconductor foundries, including TSMC, GLOBALFOUNDRIES, UMC, SMIC, and many others.



The Calibre InRoute platform performs signoff DRC and DFM analysis and automatic, incremental repair within the Nitro-SoC and Olympus-SoC environments for a guaranteed Calibre-clean layout.

Easy to Adopt Flow

Calibre InRoute provides a seamless design and verification environment that extends naturally from the Mentor digital implementation flow. There are no new rule languages, tools, or methodologies to learn, because Calibre InRoute looks and feels like Nitro-SoC and Olympus-SoC and uses established SVRF rule decks. Calibre checks and the corresponding search and repair can be invoked interactively, or run in batch mode. All violations found with Calibre InRoute are persistent in the digital implementation database, and can be viewed and edited through the error browsser.

The Calibre InRoute comprehensive signoff platform combines the power of Mentor's physical layout optimization, with Calibre, the industry leader in manufacturing signoff.

Calibre InRoute provides a true manufacturing signoff environment during place and route to minimize ECO iterations with a convergent prevention and repair flow. Calibre InRoute's unique scalable architecture is designed to handle all current and future DRC/DFM closure needs. Customers can benefit by faster time to market, higher engineering productivity and best quality of results.

For the latest product information, call us or visit: w w w . m e n t o r . c o m /

©2016 Mentor Graphics Corporation, all rights reserved. This document contains information that is proprietary to Mentor Graphics Corporation and may be duplicated in whole or in part by the original recipient for internal business purposes only, provided that this entire notice appears in all copies. In accepting this document, the recipient agrees to make every reasonable effort to prevent unauthorized use of this information. All trademarks mentioned in this document are the trademarks of their respective owners.

Corporate Headquarters
Mentor Graphics Corporation
8005 SW Boeckman Road
Wilsonville, OR 97070-7777
Phone: 503.685.7000
Fax: 503.685.1204

Sales and Product Information
Phone: 800.547.3000
sales_info@mentor.com

Silicon Valley
Mentor Graphics Corporation
46871 Bayside Parkway
Fremont, CA 94538 USA
Phone: 510.354.7400
Fax: 510.354.7467

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)
11F, No. 120, Section 2,
Gongdao 5th Road
HsinChu City 300,
Taiwan, ROC
Phone: 886.3.513.1000
Fax: 886.3.573.4734

Japan
Mentor Graphics Japan Co., Ltd.
Gotenyama Trust Tower
7-35, Kita-Shinagawa 4-chome
Shinagawa-Ku, Tokyo 140-0001
Japan
Phone: +81.3.5488.3033
Fax: +81.3.5488.3004

MGC 05-16 3181:092514