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Ansys Strengthens Collaboration with TSMC on Advanced Node Processes Certification and 3D-IC Multiphysics Design Solutions

April 23, 2025

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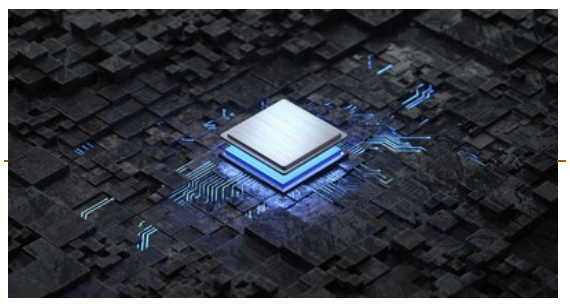
AI-based workflows aid advanced node designs, ensuring design and system technology co-optimization for HPC and AI applications

/ **Key Highlights**

- TSMC and Ansys advance AI-assisted workflows to support design optimization during technology node migration and photonic design optimization with TSMC's Compact Universal Photonic Engine (COUPE) platform
- Ansys RedHawk-SC™ and Ansys Totem™ power integrity and electromigration reliability platforms and Ansys RedHawk-SC-Electrothermal™ multiphysics platform are certified for TSMC's latest A16™ process
- Ansys HFSS-IC Pro system-on-chip (SoC) electromagnetic solution is certified for TSMC's 5nm and 3nm process

PITTSBURGH, April 23, 2025 /PRNewswire/ -- Through continued collaboration with TSMC, Ansys (NASDAQ: ANSS) today announced enhanced AI-assisted workflows for radio frequency (RF) design migration and photonic integrated circuits (PICs), and new certifications for its semiconductor solutions. Together, Ansys and TSMC facilitate optimized 3D integrated circuit (3D-IC) design and accelerate market readiness for AI and high-performance computing (HPC) chip applications. Ansys and TSMC are also extending tool certification for the newly announced N3C technology, based on available N3P design solutions.



A16 EM/IR and thermal certification

RedHawk-SC, RedHawk-SC Electrothermal, and Totem are certified for TSMC's advanced silicon process A16™ with Super Power Rail, a best-in-class backside power delivery solution for analog/block-level and SoC-level electromigration (EM) and voltage drop (IR) analysis.

To ensure reliable thermal management for the TSMC A16 process, Ansys and TSMC developed a more precise thermal analysis flow. The enhanced method leverages TSMC's thermal specifications, providing accurate temperature calculations, and enhancing performance in advanced applications. In addition, Ansys and TSMC continue collaborating on design enablement for TSMC's next-generation A14 technology.

Advanced 5nm and 3nm on-chip electromagnetic certification

To support the increasing demand for scalable electromagnetic analysis, Ansys is introducing a new HFSS-IC product family. HFSS-IC Pro, with RaptorX™ technology embedded, is certified by TSMC for its advanced 5nm and 3nm processes, meeting the rigorous accuracy requirements necessary for designing next-generation semiconductor products. The certification reinforces Ansys' role in advancing semiconductor design technologies and empowering customers to meet the demands of complex applications including AI, HPC, 5G/6G communications, and automotive electronics.

AI-assisted photonic design optimization

Ansys and TSMC continue to refine COUPE design solutions by leveraging AI capabilities in Ansys optiSLang® process integration and design optimization software. These solutions enable PIC optimization with Ansys Lumerical INTERCONNECT™ and empower optical coupling system optimization and robustness analysis with Ansys Zemax OpticStudio®.

AI-assisted optimal RF design migration

TSMC, Ansys, and Synopsys have enhanced a joint AI-assisted RF migration flow, combining Ansys HFSS-IC Pro AI technology with Synopsys Custom Compiler™ and ASO.ai™ solutions, accelerating the transition from one silicon process to another for analog and RF ICs. The flow automates device placement, routing optimization, and EM-aware tuning, while preserving design intent and performance. As the semiconductor industry moves toward more advanced nodes, RF IC migration presents significant challenges in maintaining performance, yield, and design productivity. Leveraging AI to predict and mitigate EM challenges ensures signal integrity, power efficiency, and manufacturability in advanced RF applications.

Multiphysics signoff analysis flow enablement

Ansys RedHawk-SC, RedHawk-SC Electrothermal, and Synopsys 3DIC Compiler™ are integrated into TSMC, Ansys, and Synopsys' joint multiphysics signoff analysis flow enablement platform for extraction, timing, power, EM/IR, and thermal analysis. These analyses are linked through a shared data flow, supporting thermal-aware timing analysis and voltage-aware timing analysis. This multiphysics approach can help customers accelerate the convergence of large 3D-IC designs.

"Ansys' continued collaboration with Synopsys and TSMC drives innovation in 3D-IC design and improves chip reliability for the most demanding applications," said John Lee, vice president and general manager of the semiconductor, electronics, and optics business unit at Ansys. "As chip sizes shrink and energy efficiency demands grow, Ansys continues to advance its multiphysics solutions across electromagnetics, thermal, structural integrity, and more to give our customers confidence that their design will meet specifications. The latest certifications from TSMC highlight our commitment to delivering the most advanced solutions to customers' most challenging problems."

"AI-driven solutions significantly boost productivity in designing 3D-IC components and offer seamless automation for essential tasks," said Lipen Yuan, senior director of advanced technology business development at TSMC. "Our continued collaboration with Open Innovation Platform® (OIP) partners like Ansys and Synopsys ensures optimal technical solutions that fully leverage the performance and power efficiency advantages of our cutting-edge technologies, advancing customer innovation across AI, HPC, mobile, automotive, and beyond."

/ About Ansys

Our Mission: Powering Innovation that Drives Human Advancement™

When visionary companies need to know how their world-changing ideas will perform, they close the gap between design and reality with Ansys simulation. For more than 50 years, Ansys software has enabled innovators across industries to push boundaries by using the predictive power of simulation. From sustainable transportation to advanced semiconductors, from satellite systems to life-saving medical devices, the next great leaps in human advancement will be powered by Ansys.

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/ Contacts

Media Mary Kate Joyce
724.820.4368
marykate.joyce@ansys.com
InvestorsKelsey DeBriyn
724.820.3927
kelsey.debriyn@ansys.com

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