

Status overview of the IHP OpenPDK Initiative: Technology - Devices - IC Designs

WOSET 2024 Extended Abstract

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Abstract: The semiconductor industry has undergone dynamic evolution and innovation for the past 75 years since the invention of the first semiconductor transistor. This rapid growth is driven by the direct and proactive contribution of the FOSS CAD/EDA to the entire technology flow: from state-of-the-art semiconductor technologies, device level compact/SPICE modeling, its Verilog-A standardization to advanced IC designs for various HiTech applications. However, the semiconductor industry also faces many challenges in maintaining the growth of its workforce with skilled technicians and engineers. To address the increasing need for well-trained workers worldwide, we must find innovative ways to attract skilled talent and strengthen the local semiconductor workforce ecosystem. The FOSS CAD/EDA tools with the recently available open access PDKs provide a new platform to connect IC design beginners, enthusiasts and experienced mentors to benefit from the collaboration opportunities enabled by the fast-growing open-source IC design movement. The collaborative development of open-source integrated circuit (IC) designs is becoming increasingly feasible due to the rapid expansion of OpenPDKs recently offered by SkyWater, GF and IHP with an open schedule of MPW Runs for FMD-QNC project in 2024-25. This paper demonstrates the FOSS CAD/EDA contribution to the SPICE/Verilog-A modeling/standardization, complete IC design flow (Xschem, Qucs-S, ngspice, Xyce, OpenVAF, OpenEMS, Magic, kLayout, OpenRoad), in addition selected, open-source examples of analog/RF and digital IC designs will be presented.

TAB: IHP schedule of MPW Runs for FMD-QNC project in 2024-25

Tape out date	22/05/24	11/11/24	22/11/24	01/03/25	09/05/25	18/07/25	15/09/25
Technology	SG13G2	SG13CMOS	SG13G2	SG13G2	SG13G2	SG13G2	SG13CMOS
Area [mm ²]	10	220	20	140	30	30	220

REF:

- [1] MOS-AK/ESSERC Workshop: "Compact Modeling Support for OpenPDK and FOSS IC Designs" in Bruges (B) September 9, 2024 <https://mos-ak.org/bruges_2024/>
- [2] Paneuropean OpenPDK Initiative (invited talk) Wladek Grabinski MOS-AK (EU)/IHP <https://www.mos-ak.org/xian_2024/>
- [3] Dr. Krzysztof Herman (IHP, Germany) Reflections on the First European Open Source PDK by IHP – experiences after one year and future activities (invited talk <<https://www.mixdes.org/>>)
- [4] Rene Scholz, Sergei Andreev, Krzysztof Herman (IHP Microelectronics), Update on IHP open source PDK initiative & how to submit free open source designs in IHP technology; FSiC, Paris (2024)
- [5] Sergei Andreev, T. Zecha, Krzysztof Herman (IHP Microelectronics), IHP open source PDK: KLayout Pycell Development status; FSiC, Paris (2024)
- [6] W. Grabinski et al., "FOSS CAD for the Compact Verilog-A Model Standardization in Open Access PDKs," 2024 8th IEEE Electron Devices Technology & Manufacturing Conference (EDTM), Bangalore, India, 2024
- [7] K. Herman et al., "On the Versatility of the IHP BiCMOS Open Source and Manufacturable PDK: A step towards the future where anybody can design and build a chip," in IEEE Solid-State Circuits Magazine, vol. 16, no. 2, pp. 30-38, Spring 2024
- [8] W. Grabinski et al. FOSS CAD/EDA tools supporting the open access PDK initiative; FOSDEM 2024; Brussels / 3 & 4 February 2024

[9] IHP OpenPDK Networking Workshop

<<https://github.com/IHP-GmbH/IHP-Open-PDK/wiki/Networking-Workshop-FMD-QNC>>