SkyWater Open Source PDK

Overview

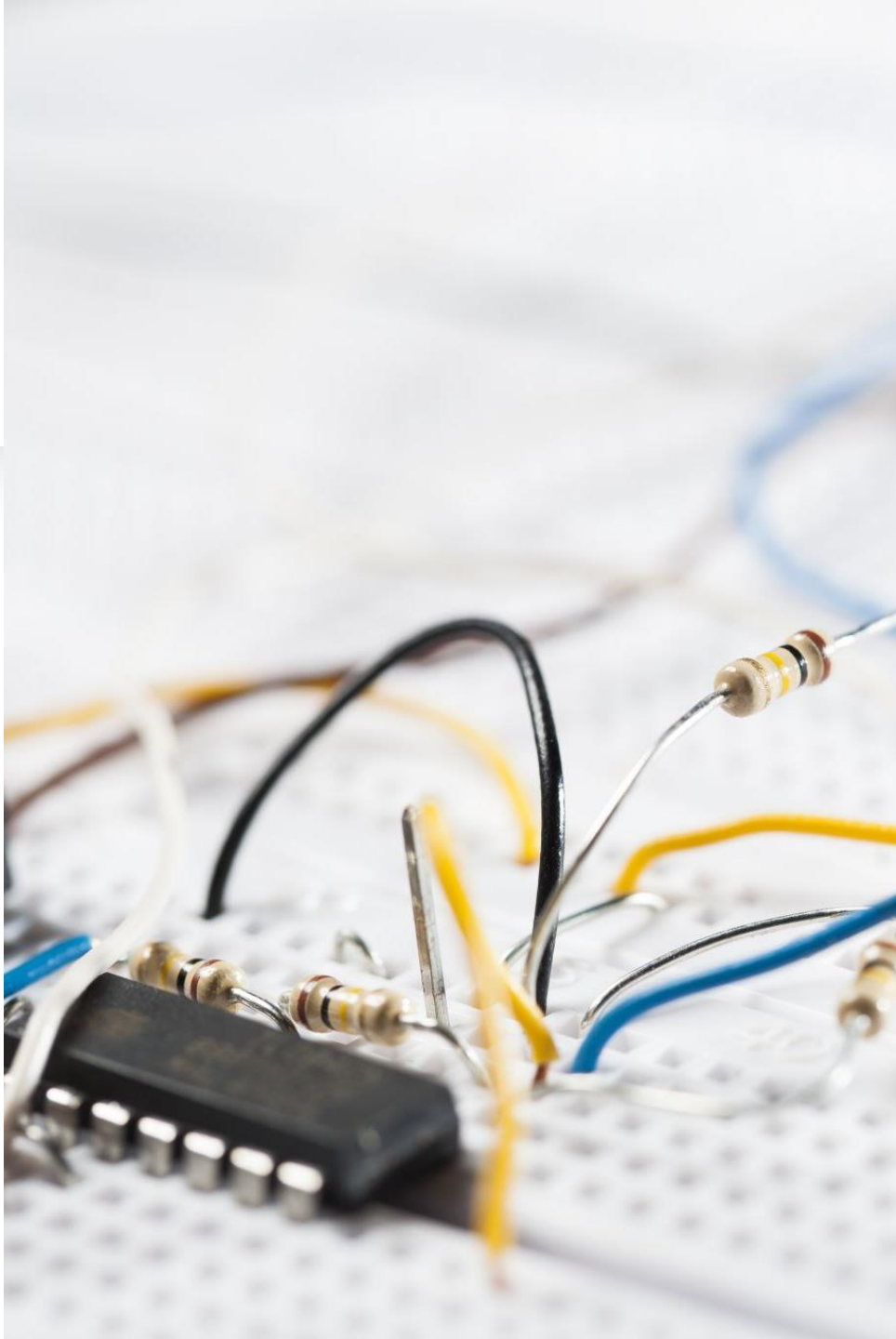
- **SkyWater Technology**
  - A trusted U.S. semiconductor foundry
  - Provides the **SKY130** mixed-signal CMOS process
  - Supports open-source PDK access for all designers
- **Google**
  - Sponsors fabrication costs for selected open-source designs
  - Drives accessibility and democratization of hardware innovation
- **Efabless**
  - Hosts the **crowdsourced design platform**
  - Manages submissions, tooling, and community support

US-Based Foundry

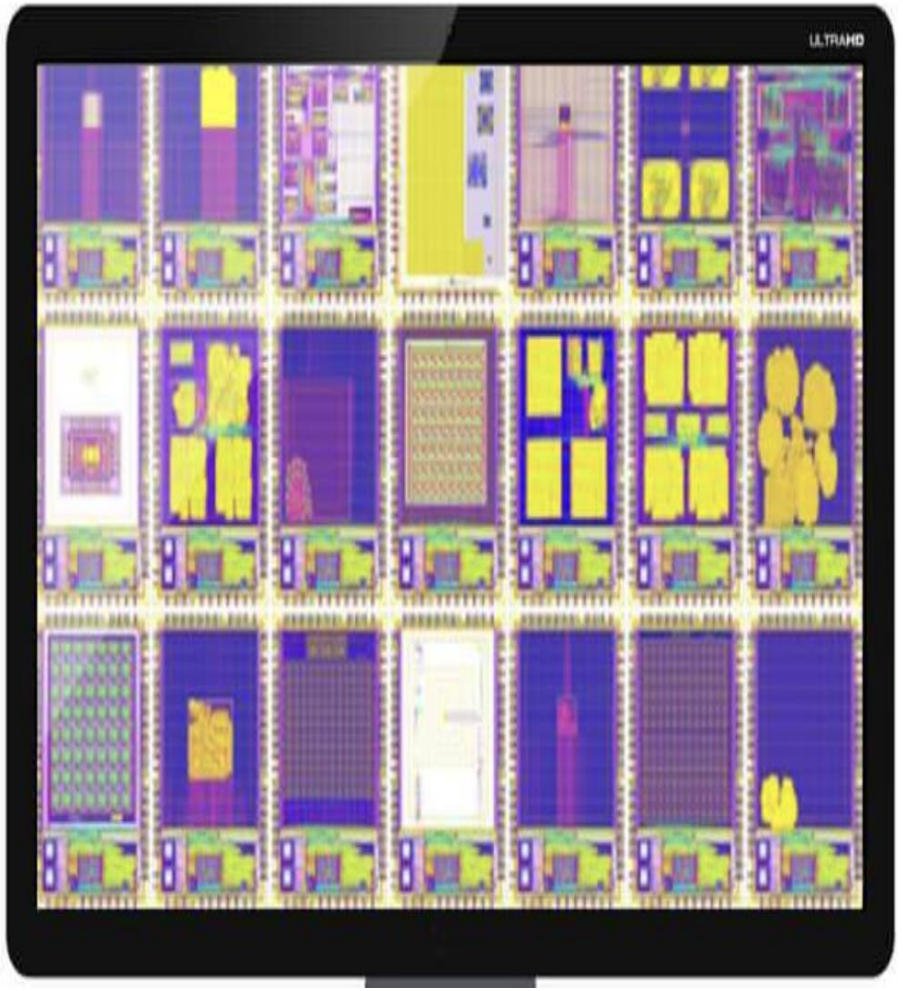
- **Status:** Solely U.S.-based and owned; DoD-accredited "Trusted Foundry."
- **History:** * **1980s:** Established by Control Data Corporation.
  - **1991:** Acquired by Cypress Semiconductor.
  - **2017:** Spun off as SkyWater Technology.
  - **2022**: US DoD sanctioned $27 million for open source design for its 90 nm process offering
  - January 26, 2026, IonQ that it is acquiring SkyWater Technology for approximately $1.8 billion.
- **Markets:** Aerospace, Defense, Automotive, IoT, and Medical.

Mature Technology for Modern Innovation

- **Heritage:** Originally developed by Cypress Semiconductor; now a general industry offering via SkyWater.
- **Process Specs:** 180nm-130nm hybrid technology
- **Why 130nm?**
  - Mature and stable.
  - Ideal for research and small microcontrollers.
  - Widely used in mixed-signal embedded designs (IoT).



skywater + Google + efabless.com



•First open source foundry PDK enables full manufacturing chain for open hardware

•**Goal:** To provide a fully open-source Process Design Kit (PDK) for manufacturable designs. – Experimental runs are in progress.

•**Key Node:** Targeting the **SKY130** process (130nm technology).

•**Future Outlook:** Success in SKY130 may pave the way for more advanced open-source nodes.

https://www.skywatertechnology.com/technology-and-design-enablement/mpw-programs/

PDK

- **Voltage:** Internal 1.8V with 5.0V I/Os (operable at 2.5V).
- **Interconnects:** 1 level of local interconnect + 5 levels of metal.
- **Standard Features:**
  - Inductor-capable.
  - High sheet rho poly resistors.
  - Optional MiM (Metal-insulator-Metal) capacitors.
  - SONOS shrunken cell support.
- **High Voltage:** Supports 10V regulated supply and HV extended-drain NMOS/PMOS.

what's in the toolkit?

HOW (TOOLS + LICENSE)

Languages / HDLs / Models:

- SPICE models
- Verilog / Verilog-A
- Python scripts
- LEF/DEF, GDS, Liberty (.lib)

The PDK integrates with or supports:

- Magic (DRC/LVS)
- KLayout
- OpenLane (RTL-to-GDSII)
- OpenROAD (flow automation)
- ngspice / Xyce simulators

Getting started

Getting the PDK data by cloning the repo (expect a large download, ~7GB).

```
# Expect a large download! ~7GB at time of writing.
SUBMODULE_VERSION=latest make submodules -j3 || make submodules -j1

# Regenerate liberty files
make timing
```

Then pick a flow/tool: use the PDK with open or commercial EDA flows (docs mention Magic/KLayout and various design flows).

Beyond Standard Functionality

- **Flexibility:** Includes many "optional" features as standard to provide designers with a wide range of choices.
- **Advanced Customization:** For needs beyond the PDK, SkyWater offers integration of specialized materials:
  - Carbon Nanotubes
  - Photonic and MEMS devices
  - Superconducting and 3D ICs
  - Materials like Nb, Ge, and V2O5.
  - https://www.skywatertechnology.com/technology-and-design-enablement/mpw-programs/