STRENGTHENING U.S. LEADERSHIP IN CHIP DESIGN

Semiconductor design is key to driving innovation, but challenges to U.S. leadership from global competitors require policies to incentivize the U.S. chip design ecosystem

Chip design is a key activity behind the function and value of a semiconductor device. The design process consists of defining the product requirements for the chip's architecture and system, as well as the physical layout of the chip's individual circuits, which ultimately enable semiconductors to receive, transmit, process, and store ever-increasing amounts of data for today's digital world. Chip design is a highly complex, interdisciplinary process that involves years of R&D, hundreds of millions of dollars of investment, and thousands of engineers.

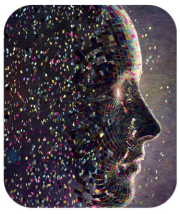
There are three main types of companies engaged in chip design:

1) **Fabless firms** that focus on chip design and partner with a foundry for fabrication
2) **Integrated device manufacturers** that both design and manufacture their own chips
3) **Original equipment manufacturers** that design chips for their own end products, such as smartphones, cars, and data centers, and outsource fabrication.

An integral part of chip design are companies that develop the IP "building blocks" and electronic design automation (EDA) software and hardware used for complex modeling needed in chip design.

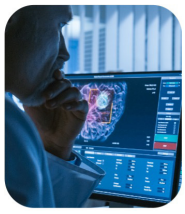
WHY IS U.S. CHIP DESIGN LEADERSHIP IMPORTANT?

The U.S. cannot have technology leadership without design leadership. Advances in chip design have led to breakthroughs in semiconductor-enabled technologies that have been a driving force behind 21st century U.S. technology leadership. This leadership provides the U.S. with the technological edge to be the "first mover" on new innovations in countless industries and to secure the economic and security benefits resulting from this leadership. Global reliance on U.S.-designed chips is an important strategic advantage that must be maintained.


AI


Energy


Defense


Healthcare


Agriculture


5G/6G


Transportation

Other Key Advantages from U.S. Chip Design Leadership

Cycles of Innovation. Advances in design and design tools in turn drive innovation in chip manufacturing processes and equipment. Importantly, American design leadership ensures software, services, and products are based on U.S.-originated semiconductor technologies.

Security and Control of IP. Sophisticated design techniques lower the risk of malicious tampering and supply chain interdiction—for example, by protecting critical design information and enabling traceability and control of design IP.

Influence in Setting Standards. U.S. chip design leadership enables U.S. companies to lead the technology standards (e.g., standards for interoperability in Wi-Fi, Bluetooth, and 5G wireless technologies) that set the technical "rules" for entire industries.

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WHAT ARE THE CHALLENGES TO U.S. DESIGN LEADERSHIP?

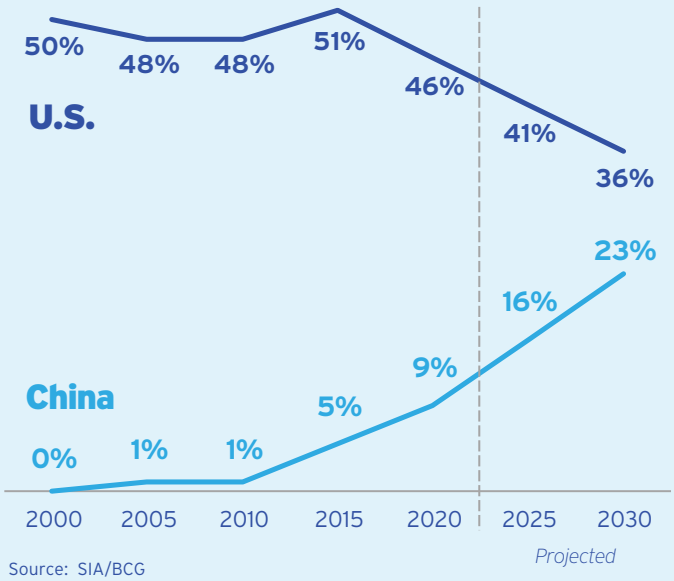
1) **Foreign Competition in Design.** U.S. companies hold half of global chip revenue, but foreign competitors are challenging this leadership through substantial government incentives for chip design, including billions of dollars in subsidies for (China, Japan, Europe) and tax credits of up to 25% (Taiwan) and 50% (India, Korea). These policies are having an effect, as the U.S. is on pace to lose a sizable share of its lead to China by 2030.

2) **Rising Cost of Innovation.** The design costs for a leading-edge, 3nm chip can exceed $1 billion, and these costs are rising exponentially with each generation of technology.

3) **Access to Design Talent.** Restrictions on high-skilled immigration, combined with a limited domestic design workforce pipeline, poses risk for long-term growth of the U.S. design industry.

If the U.S. fails to take steps to improve its competitive position in design, U.S. leadership in semiconductor technology is at risk.

U.S. Global Chip Revenue Market Share Projected to Fall to 36% by 2030; China Market Share Expected to Jump to 23%



Source: SIA/BCG

POLICIES FOR 21ST CENTURY U.S. DESIGN LEADERSHIP

1) Enact an Investment Tax Credit for Chip Design. To level the playing field with the substantial incentives offered overseas, Congress should enact a meaningful tax credit or other direct incentives for expenditures in chip design in the U.S.

2) Restore Full Deductibility of R&D Expenditures and Strengthen the R&D Tax Credit. The R&D tax credit in America is weaker than the incentives offered by our global competitors (ITIF 2020). As a first step to strengthen the R&D credit, Congress must restore the full deductibility of research expenditures and rescind the requirement, effective since the beginning of 2022, to amortize these expenditures over 5 years.

3) Ensure Access to Foreign Talent. To address the shortage of highly educated scientists and engineers needed for chip design, the U.S. needs to enact sensible reforms to our high-skilled immigration system to ensure access to the best and brightest scientists and engineers from around the world, including by providing foreign graduates of U.S. universities the opportunity to stay and work in the U.S. and enabling current skilled foreign professionals the ability to work permanently in the U.S.

4) Increase Investment in Research and STEM Education. To drive innovations in chip design and develop the pipeline of talent needed for U.S. leadership, Congress should fund federal science agencies at the authorized levels set forth in the CHIPS and Science Act, as well as design-related programs at the Department of Defense. The U.S. must also invest in STEM education and increase awareness and enrollment in semiconductor-related fields, including women and underrepresented minorities, and build the pipeline of talent, from K to PhD, to train the next generation of innovators.

The CHIPS Act made vital investments in semiconductor manufacturing and research. Now is the time to take action to maintain U.S. leadership in chip design.

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