

Taiwan's Role in Global Semiconductor Supply Chains

Semiconductors are a uniquely important strategic technology that is broadly enabling of and fundamental to nearly all modern industrial and national security activities. They are essential building blocks of other technologies (e.g., artificial intelligence, autonomous systems, 5G communications, and quantum computing). Many policymakers see U.S. strength in semiconductor technology and fabrication (manufacturing), along with secure supply chains, as vital to U.S. economic and national security interests. The CHIPS and Science Act (P.L. 117-167) appropriated \$52.7 billion in federal funding until expended and provided tax incentives to expand U.S. semiconductor production capacity.

Taiwan is a key link in U.S. and global technology supply chains, and Taiwan firms are active in all parts of the semiconductor industry: research and development (R&D); design; fabrication (fabs); materials (e.g., silicon wafers); and assembly, packaging, and testing (APT). About 90% of global advanced semiconductor chip production is based in Taiwan and produced by Taiwan's leading foundry company—Taiwan Semiconductor Manufacturing Company Ltd. (TSMC). Taiwan's second-largest chip foundry firm—United Microelectronics Corporation (UMC)—has about one-third the capacity of TSMC, and focuses on the production of mature-generation chips. U.S.-headquartered Apple Inc. and Nvidia Corporation are among TSMC's top customers. TSMC has invested in three fabs in Arizona (supported by \$6.6 billion in CHIPS and Science Act funds) and has said it will invest another \$100 billion in three new fabs, two APT facilities, and an R&D center. TSMC is reportedly considering investing in U.S.-based Intel's foundry business.

TSMC Foundries by Location



TSMC's Global Presence



Notes: TSMC operations include 4 12-inch wafer GIGAFABs® (130 nm to 7 nm process technology), Fabs 12 and 18 (3 nm process technology) and a Global R&D Center (2 nm process technology). TSMC has proposed 3 fabs (2 nm process technology) and a fourth new fab (1.4 nm process technology). UMC and U.S.-based Intel Corp. are developing 12-nanometer (nm) technology for chip production in Arizona. TSMC's investment in Germany (ESMC) is a joint venture with three Europe-based semiconductor firms. TSMC's most advanced capabilities are located in Taiwan.

Wafer size refers to the diameter of a wafer used in semiconductor fabrication. Process node describes the size of the transistor gate length as measured in billionths of a meter, or nanometers (nm). Generally, the smaller the node size, the more advanced the technology. For some types of chips, process node may not be an indication of performance. Fabrication facilities are called fabs.

Information as of March 11, 2025. Prepared by Karen Sutter, Specialist in Asian Trade and Finance; Cassandra Higgins, Geospatial Information Systems Analyst; and Juan Pablo Madrid, Visual Information Specialist.

Taiwan's Share of Global Semiconductor Industry

Taiwan Global Share (Purple) Rest of the World (Yellow)

Design (\$35.1 Billion)



Foundry (\$79.9 Billion)



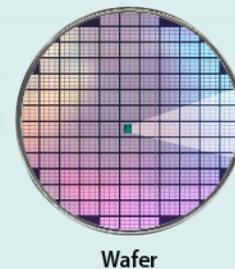
Package and Testing (\$18.7 Billion)



Source: CRS with data from the Taiwan Semiconductor Industry Association

Based on 2023 production values

The process of producing a finished semiconductor chip involves design and fabrication, followed by assembly, testing, and packaging to prepare chips for final integration into electronic devices. These stages often occur across national borders among a small number of economies that specialize in parts of the supply chain. The industry relies on suppliers of materials, chemicals, gases, and manufacturing equipment.



Semiconductors (or integrated circuits) are tiny electronic devices (based primarily on silicon or germanium) composed of billions of components that can process, store, sense, and move data or signals—essentially serving as the brains, memory, sensors, communications, and power lines of electronic devices. The many types of chips (e.g., logic, memory, analog, optoelectronics, sensors, and discretes) perform different functions and require specialized design and manufacturing processes. A wafer is a flat, thin slice of silicon material on which an integrated circuit is created.

Legend

Wafer Size (Displayed by Color)

- 12-inch
- 8-inch
- 6-inch
- Wafer size not available
- Advanced backend (AB)
- Proposed

Other Qualities (Displayed by Shape)

- HQ** Corporate headquarters (Fab 12 A / GIGAFAB® site)
- Global R&D center
- GIGAFAB® (very large, automated)
- ▲ Advanced packaging
- None



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