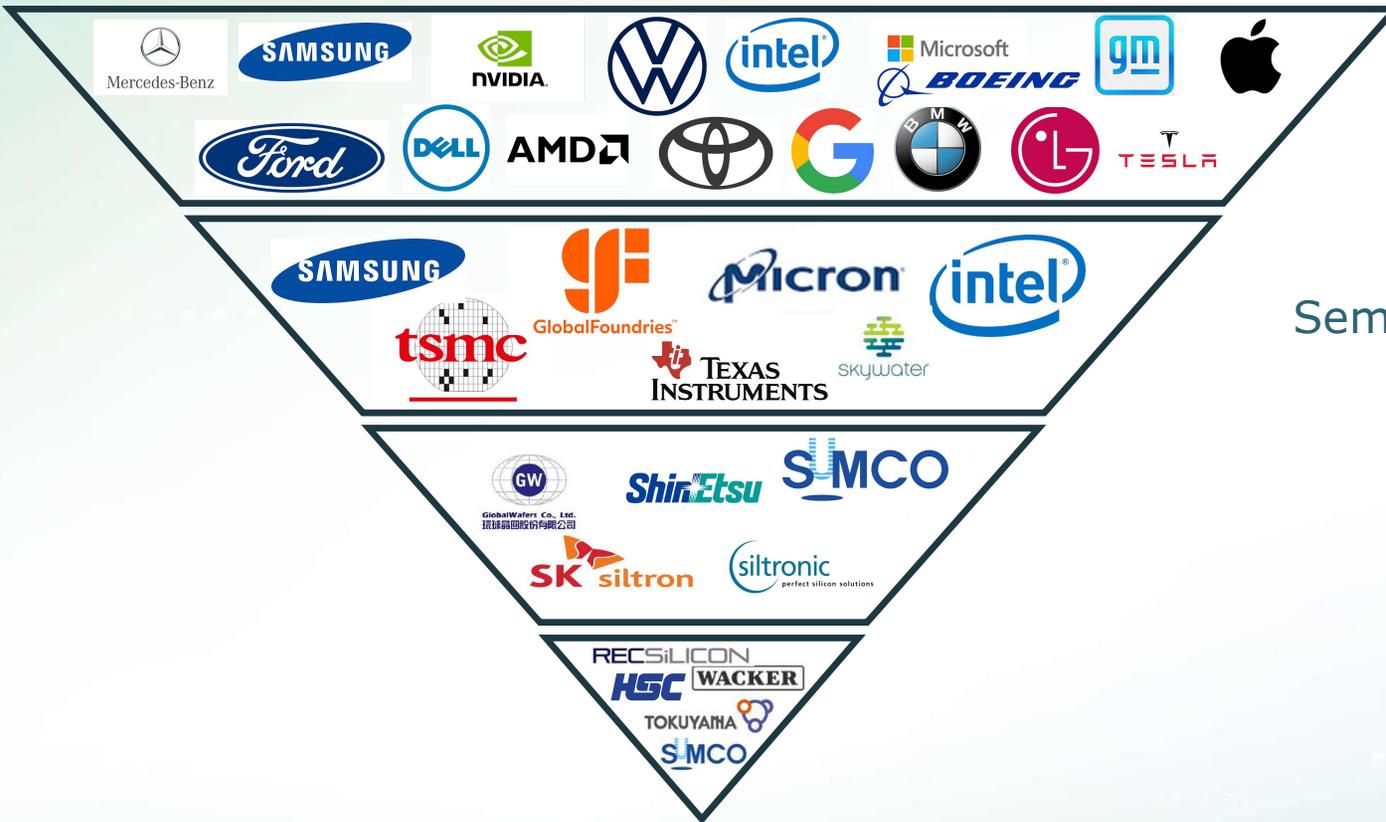


Semiconductor Value Chain



Electronics
(Thousands of end customers)

Semiconductor Chip Manufacturing
(325 fabs)

Semiconductor Wafer
(5 suppliers)

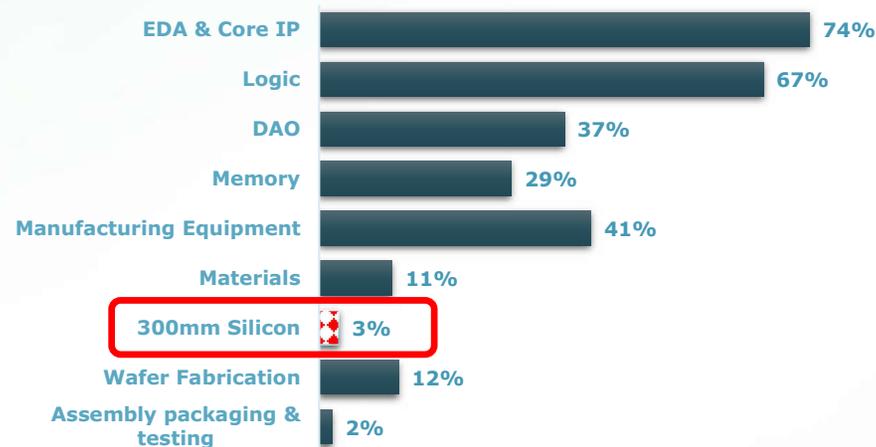
Semiconductor Polysilicon
(6 suppliers)

Department of Commerce: 100-Day Supply Chain Review of Semiconductor Manufacturing and Advance Packaging:

“the United States lacks the manufacturing capacity to transform polysilicon into polished blank wafers. As most semiconductors are made of silicon, this is a key vulnerability” (pg. 46).

Silicon – A National Security Issue

Semiconductor Activity in US



Semiconductor Industry Association and GlobalWafers Internal Sources

- Wafer FABs in the US are 100% dependent on purchased silicon wafers
- Only 3% of the world's 300mm silicon and 0% advanced node silicon is in the US
- A supply chain disruption would shut down production in US FABs within weeks

Silicon Investment Risk

September 1, 2022 at 9:00 AM EDT

Micron to Invest \$15 Billion in New Idaho Fab, Bringing Leading-Edge Memory Manufacturing to the US

First new memory fab in the U.S. in 20 years will create an estimated 17,000 new American jobs

BOISE, Idaho, Sept. 01, 2022 (GLOBE NEWSWIRE) — Micron Technology, Inc. (NASDAQ: MU), one of the world's largest semiconductor companies and the only U.S.-based manufacturer of memory, today announced plans to invest approximately \$15 billion through the end of the decade to construct a new fab for leading-edge memory manufacturing in Boise, Idaho. This will be the first new memory manufacturing fab built in the U.S. in 20 years, ensuring domestic supply of leading-edge memory.



NEWS | TEXAS-LOUISIANA | TEXAS & LOUISIANA CONSTRUCTION NEWS | POWER & INDUSTRIAL

Advanced Manufacturing

Samsung Picks Texas for \$17B Semiconductor Plant

Project will support 6,500 construction jobs, Governor claims

By James Leggate

NEWS | PROJECTS | MIDWEST | MIDWEST CONSTRUCTION PROJECTS | POWER & INDUSTRIAL

Manufacturing

Intel Ohio Fab Breaks Ground, Leading Chip Plant Project Wave

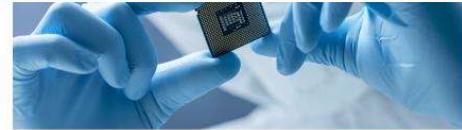
By James Leggate

Manufacturing

\$6.5B Texas Instruments Fab Could Be First of Four at Site Totaling \$30B

By James Leggate

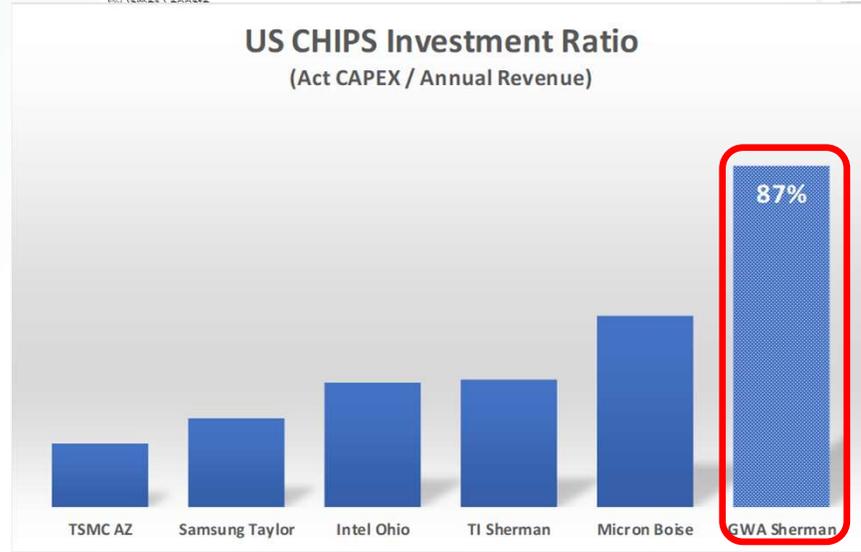
Texas Instruments has plans to build as many as four semiconductor chip fabrication plants in Sherman, Texas, at a cost totaling nearly \$30 billion. Work on the first plant broke ground last month.



MAY 19, 2020

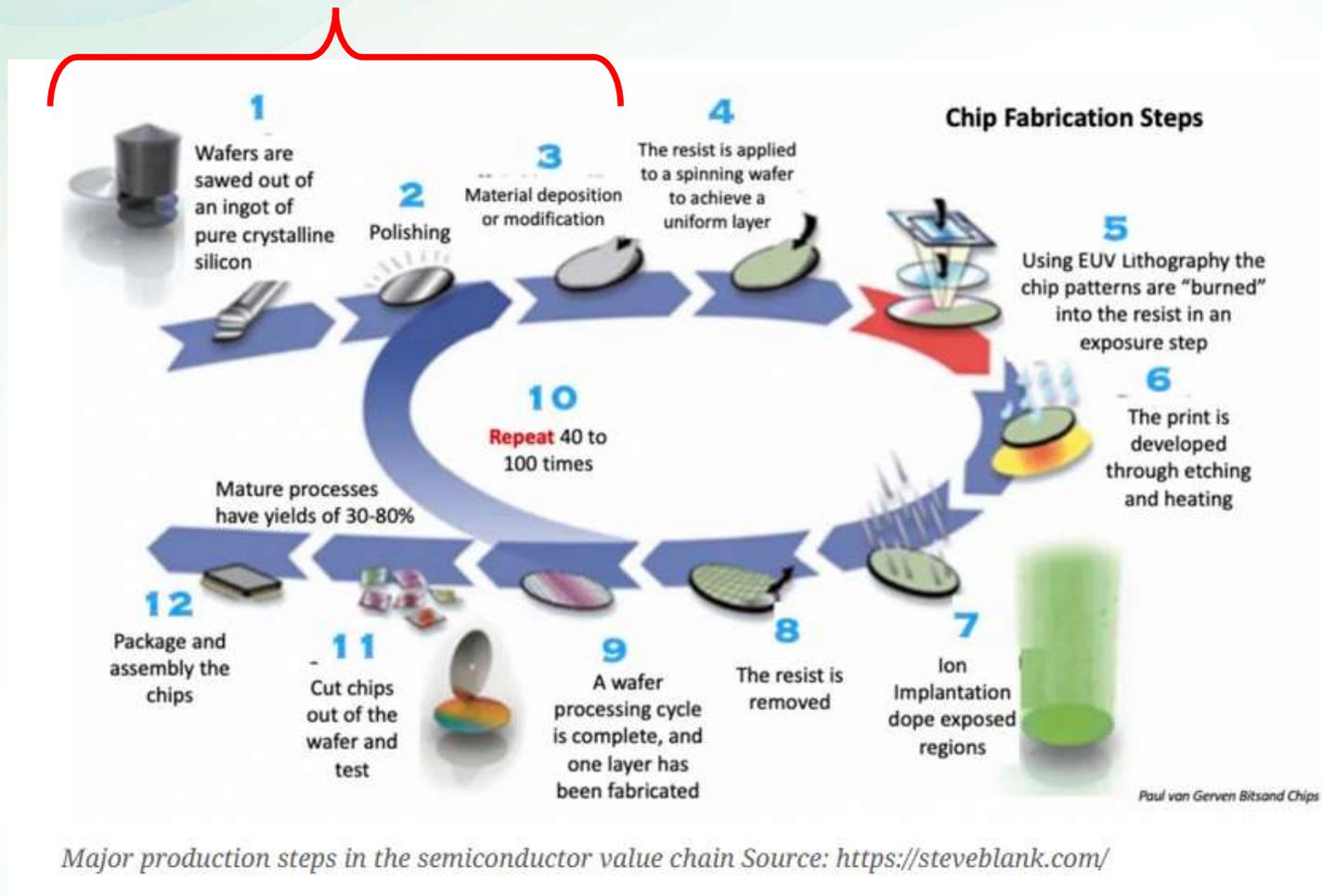
AZ Business Magazine

TSMC brings 1,600 jobs to Arizona with new \$12B factory



- US expansion announcements are dominated by multi-billion dollar FABs
- For actual investment committed now (Act CAPEX), GWC's initial \$2B of \$3.5B project is by far a higher ratio...and higher risk
- Silicon manufacturers CAPEX includes the same clean rooms, automation, advanced metrology, cleaning, packaging, etc. as FABs, but generate only a fraction of the revenue and margin

Silicon in the Chip Process



Major production steps in the semiconductor value chain Source: <https://steveblank.com/>

What is a Semiconductor?

Britannica
semiconductor
 electronics

Print Cite Share Feedback

Written and fact-checked by The Editors of Encyclopaedia Britannica
 Last Updated: Article History

Summary
 Read a brief summary of this topic

semiconductor, any of a class of crystalline solids intermediate in electrical conductivity between a conductor and an insulator. Semiconductors are employed in the manufacture of various kinds of electronic devices, including diodes, transistors, and integrated circuits. Such devices have found wide application because of their compactness, reliability, power efficiency, and low cost. As discrete components, they have found use in power devices, optical sensors, and light emitters, including solid-state lasers. They have a wide range of current- and voltage-handling capabilities and, more important, lend themselves to integration into complex but readily manufacturable microelectronic circuits. They are, and will be in the foreseeable future, the key elements for the majority of electronic systems, serving communications, signal processing, computing, and control applications in both the consumer and industrial markets.

Key People: Duncan Haldane • Walter H. Brattain • Yves-André Rocard

Related Topics: silicon • germanium • avalanche effect • Gunn effect • p-n junction

See all related content

NIST NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY
 U.S. DEPARTMENT OF COMMERCE

SEMICONDUCTORS

Overview

Semiconductors—materials such as silicon with tunable electrical conductivity—are the base for most electronics, enabling construction of complex integrated circuits, or chips, that power advanced technologies for healthcare, communications, computing, and transportation, among other applications. Demand for chips is already high, and that demand is growing because of uses in emerging technologies such as artificial intelligence, the internet of things and quantum computing.

With the current definition, manufacturers of the semiconductor are not considered semiconductor manufacturers

Cambridge Dictionary

Meaning of semiconductor in English

semiconductor

noun [C]
 US /sem.i.kən'dak.tə/ UK /sem.i.kən'dak.tə/

a material, such as silicon, that allows electricity to move through it more easily when its temperature increases, or an electronic device made from this material:

• Semiconductors are used for making integrated circuits and computers.

IRS Notice of Proposed Rulemaking



[4830-0

This document is scheduled to be published in the Federal Register on 03/23/2023 and available online at [federalregister.gov/d/2023-05871](https://www.federalregister.gov/d/2023-05871), and on [govinfo.gov](https://www.govinfo.gov)

DEPARTMENT OF THE TREASURY

Internal Revenue Service

26 CFR Part 1

[REG-120653-22]

RIN 1545-BQ54

Advanced Manufacturing Investment Credit

AGENCY: Internal Revenue Service (IRS), Treasury.

ACTION: Notice of proposed rulemaking.

The Treasury Department and the IRS specifically request comments on the scope of the definition in proposed §1.48-2(k) of the term “semiconductor.” Specifically, comments are requested as to whether this term, for purposes of the section 48D credit, should include semiconductive substances—materials with electronic properties controllable by the addition of, typically small, quantities of specific elements or dopants—on which an electronic device or system is manufactured, such as, but not limited to polysilicon and compound semiconductor wafers. If so, commenters are requested to explain in detail what principle, standard, or parameters could be incorporated in a definition of the term “semiconductor” so as to prevent extending the

- The IRS acknowledged the proposed definition of “semiconductor” may be too limited in scope
- The notice of proposed rulemaking has opened the opportunity to clarify this definition

Proposed Definition

Proposed revisions to Prop. Treas. Reg. § 1.48D-2(k):

(k) (1) Semiconductor means, consistent with 15 CFR 231.117, an integrated electronic device or system manufactured using a substance described in clause (ii) of this subparagraph (1) as a substrate and most commonly using processes such as, but not limited to, lithography, deposition, and etching. Such substances described in clause (ii) of this subparagraph (1) include, but are not limited to, polysilicon with a purity of at least 99.999999999% by weight, and wafers for use in a semiconductor device or system. Such devices and systems described in subparagraph (1) include, but are not limited to, analog and digital electronics, power electronics, and photonics, for memory, processing, sensing, actuation, and communications applications; or (ii) a substance, system or device that is either (i) a mono or polycrystalline solid substance (such as polysilicon, ingot / boule, or wafer) most commonly comprising one or more elements from group III/IV/V of the periodic table (A) that is sufficiently pure to be suitable for use as a substrate in an electronic system or device described in subparagraph (1), (B) that has an average resistivity between 0.0008 and 100,000 Ohm-cm at room temperature, and (C) the electronic properties of which are controllable by the addition of, typically small, quantities of specific elements or dopants.

(2) Materials and supplies used in the production of systems or devices described in clause (ii) of subparagraph (k)(1) of this section, but not meeting the definition of clause (i) of subparagraph (k)(1) of this section, are not included in the definition of a semiconductor. Such excluded materials include, but are not limited to, photomasks, photoresists, wet processing chemicals, gases used to protect wafers from atmospheric exposure or in chemical vapor deposition, dopants, etchants, and chemical mechanical planarization slurries.

- GWC has aligned with Wacker Chemie, Hemlock Semiconductor, SK Siltron CSS, SUMCO, and ShinEtsu America on proposed wording for consideration