

The AI chip supply chain in brief

The fifteen stages that turn sand and software into an AI accelerator: who leads each one, how concentrated it is, and where China and the United States stand.

Updated 19 October 2026 · chipsupplychain.org · Every figure is cited in the chapter each section links to.

Concentration counts the firms that credibly supply a stage: Extreme, High, Moderate or Low.
Substitutability rates how hard it would be for a well-funded state or firm to build an alternative: Easy, Moderate, Hard or Very hard.

#	STAGE	WHO LEADS	CONCENTRATION	SUBSTITUTABILITY
01	Chip Design, EDA and IP	Synopsys US, Cadence US	Extreme	Hard
02	Silicon and Wafers	Shin-Etsu Handotai JP, SUMCO JP	High	Moderate
03	Chemicals, Gases and Photoresist	JSR JP, Tokyo Ohka Kogyo JP	High	Moderate
04	Lithography	ASML NL, Nikon JP	Extreme	Very hard
05	Photomasks and Pellicles	AGC JP, Hoya JP	Extreme	Hard
06	Deposition and Etch	Applied Materials US, Lam Research US	High	Moderate
07	Metrology and Inspection	KLA US, Applied Materials US	High	Moderate
08	Transistors and the Front End	TSMC TW, Intel US	Extreme	Hard
09	Foundries and Fabs	TSMC TW, Intel Foundry US	Extreme	Hard
10	Memory and HBM	SK hynix KR, Samsung KR	Extreme	Hard
11	Advanced Packaging	TSMC TW, Intel US	Extreme	Moderate
12	Substrates and PCBs	Ajinomoto JP, Nitto Boseki JP	Extreme	Hard
13	Test and Assembly	Advantest JP, Teradyne US	High	Moderate
14	Systems and Networking	Nvidia US, Broadcom US	High	Moderate
15	Data Centers and Power	GE Vernova US, Hitachi Energy CH	High	Moderate

Across the chain

Two chapters look across all fifteen stages, at what a chip costs and at the contest over who controls them.

16 The Economics of AI Chips

Epoch AI estimated in December 2025 that Nvidia's B200 AI chip cost about \$6,400 to build, mostly for memory and packaging. Its processor silicon cost about \$900.
Reports in March 2024 put the B200's selling price at \$30,000 to \$40,000 per chip. Epoch AI notes that most Blackwell revenue comes from servers and rack-scale systems, which may carry lower margins. It says Nvidia's Blackwell margin may therefore be lower than the gap between cost and price suggests.
Sources: chipsupplychain.org/component-costs/

17 Who Controls the Chain

Since 2018 the United States has used export controls to limit China's access to advanced chips and chipmaking tools, and China has been building its own.
Japan and the Netherlands have aligned their own export controls with the American rules on chipmaking equipment. Chinese toolmakers supplied 35 percent of China's own chipmaking equipment market in 2025, up from 10 to 15 percent before 2022. When the United States licensed sales of Nvidia's H200 chip in February 2026, China restricted them.
Sources: chipsupplychain.org/geopolitics/

The fifteen stages

In the order a chip is made.

01 Chip Design, EDA and IP

Extreme concentration · Hard to substitute

Synopsys, Cadence and Siemens EDA sell the software used to design every leading-edge AI accelerator. In 2025 they took over 85 percent of an \$18 billion market, licensed blocks included.

- **Synopsys** United States. 90%+ of the timing-signoff market
- **Cadence** United States. 55%+ of the hardware emulator market

CHINA China designs its own AI accelerators, but Huawei's best, the Ascend 950, delivers about half the computing performance of Nvidia's H100 from 2022, on Epoch AI's estimate. CSET found in 2021, from 2019 data, that Chinese design software largely did not support processes at 14 nm and below.

UNITED STATES The United States has the two largest design-software vendors and the leading custom-chip design houses.

Sources: chipsupplychain.org/design-and-eda/

02 Silicon and Wafers

High concentration · Moderate to substitute

Firms based in Japan, Taiwan, Germany and South Korea make most 300 mm wafers used for advanced chips. China makes most polysilicon, almost all of it for solar cells.

- **Shin-Etsu Handotai** Japan. Its parent's electronics materials segment, wafers included, had ¥1,015.7bn of sales in the year to March 2026
- **SUMCO** Japan. ¥409.7bn of 2025 net sales, but an ¥11.8bn loss

CHINA China made about 93 percent of the world's polysilicon in 2023. Chinese firms held under 1 percent of the 300 mm wafer market as of 2019.

UNITED STATES No major US-headquartered firm makes wafers. GlobalWafers of Taiwan won CHIPS awards of up to \$406 million for wafer plants in Texas and Missouri.

Sources: chipsupplychain.org/silicon-and-wafers/

03 Chemicals, Gases and Photoresist

High concentration · Moderate to substitute

Japanese companies held 78 percent of world photoresist sales in 2023. Supply of chip chemicals, gases and metals has been disrupted three times since 2019.

- **JSR** Japan. A vehicle of the state-backed Japan Investment Corporation bought 84.36% of JSR in April 2024
- **Tokyo Ohka Kogyo** Japan. Resist maker with ¥139,668m of sales in the first half of fiscal 2026

CHINA In March 2026 the Chinese resist maker Hubei Dinglong said China had yet to reach large-scale production of advanced resist for 248 nm, 193 nm or extreme-ultraviolet printing. Since August 2023 China has required licenses to export gallium and germanium.

UNITED STATES In photoresist, American companies ranked a distant second to Japanese companies by sales in 2023. In 2021 JSR of Japan agreed to buy Inpria, an Oregon maker of resist for extreme ultraviolet.

Sources: chipsupplychain.org/chemicals-gases-and-photoresist/

04 Lithography

Extreme concentration · Very hard to substitute

ASML, a Dutch firm, is the only maker of extreme ultraviolet scanners, the machines that print the finest layers of a chip. It sold 48 of them in 2025.

- **ASML** Netherlands. 100% of EUV (extreme ultraviolet) and above 80% of DUV (deep ultraviolet)
- **Nikon** Japan. 22 new chip lithography systems in the year to March 2026

CHINA In September 2025 CSIS judged that EUV remained firmly out of reach for China despite massive state investment. SMEE, the older Chinese supplier, has its largest share in i-line scanners, the coarsest kind, and even there holds about 4 percent of the world market.

UNITED STATES No American firm makes scanners. But the US government limits who may buy them, through rules on the American-made parts inside each machine and through its entity list of firms that may not be supplied.

Sources: chipsupplychain.org/lithography/

05 Photomasks and Pellicles

Extreme concentration · Hard to substitute

Only three firms in the world make the blank plates for the masks used to print the finest layers of leading-edge chips. Japan's AGC and Hoya are two of them.

- **AGC** Japan. Ranks itself No.2 worldwide in EUV mask blanks on its own fiscal 2026 estimates
- **Hoya** Japan. Says its share of mask blanks is exceptionally high

CHINA SMIC runs two mask shops of its own in Shanghai. No Chinese firm appears in CSET's 2025 market shares for electron-beam mask writers, the machines that draw the pattern onto a mask.

UNITED STATES Photronics calls itself one of the world's leading photomask makers, and KLA makes mask inspection tools.

Sources: chipsupplychain.org/photomasks-and-pellicles/

06 Deposition and Etch

High concentration · Moderate to substitute

Deposition and etch tools build a chip layer by layer. They are among the chipmaking tools where Chinese toolmakers gained the most share from 2019 to 2024.

- **Applied Materials** United States. \$28.4B revenue, fiscal 2025; leader in physical and chemical vapor deposition
- **Lam Research** United States. \$23.2B revenue, fiscal 2026; leader in conductor etch

CHINA Chinese toolmakers held 12.4 percent of dry etch in 2025, according to CSET's analysis of TechInsights data. CSET's earlier analysis had them under 1 percent of atomic layer deposition in 2024.

UNITED STATES The US government lists some dry etch, atomic layer deposition and deep-hole deposition tools as controlled exports. Its December 2024 foreign direct product rule reaches some tools built outside the United States.

Sources: chipsupplychain.org/deposition-and-etch/

07 Metrology and Inspection

High concentration · Moderate to substitute

KLA, an American firm, held 56.8 percent of the market for tools that measure and inspect wafers in 2025 by CSET's count, about five times its nearest rival.

- **KLA** United States. 56.8% of process control tools in 2025 by CSET's count, about 5 times Applied Materials
- **Applied Materials** United States. 11.2% of process control tools in 2025

CHINA Chinese makers are still small in metrology and inspection, but one of them is growing fast. Skyverse, a Shenzhen maker of inspection and metrology tools, reported 2.05 billion yuan of revenue in 2025, about \$285 million and up 48.75 percent on 2024.

UNITED STATES KLA is the largest maker of metrology and inspection tools in the world. Citing Gartner, KLA puts its 2024 share at 56.5 percent, or 6.5 times its nearest rival.

Sources: chipsupplychain.org/metrology-and-inspection/

08 Transistors and the Front End

Extreme concentration · Hard to substitute

Only TSMC, Intel and Samsung make 2 nm-class transistors in volume. TSMC plans its A14 process for 2028, with more than 20 percent higher logic density than N2.

- **TSMC** Taiwan. N2 in volume production since 4Q25, TSMC's first nanosheet node
- **Intel** United States. 18A in high-volume manufacturing

CHINA SMIC ships a process it calls N+3, measured at 113.4 million transistors per square millimeter. It prints its tightest layers in several passes because it cannot buy an extreme-ultraviolet scanner.

UNITED STATES Intel runs the only American-owned line that makes the newest transistors. Its 18A process brought gate-all-around transistors and backside power to market together.

Sources: chipsupplychain.org/transistors-and-front-end/

09 Foundries and Fabs

Extreme concentration · Hard to substitute

TSMC's six largest plants are all in Taiwan. In 2025 they could make more than 13 million wafers a year, out of more than 17 million for the whole company.

- **TSMC** Taiwan. 77% of wafer revenue from 7 nm and below, 2Q26
- **Intel Foundry** United States. \$5.8bn segment revenue, only \$293m of it from outside customers, 2Q26

CHINA Georgetown University's CSET reported in June 2024 that Huawei's Ascend 910B AI chip is believed to be made on SMIC's 7 nm-class N+2 process. But SemiAnalysis judged in April 2025 that most 910B and 910C chips were made at TSMC.

UNITED STATES Intel says it is the only chipmaker that develops and manufactures leading-edge logic chips in the United States. The US government bought a passive 9.9 percent stake in Intel in August 2025, and Intel Foundry lost \$2.089 billion in the second quarter of 2026.

Sources: chipsupplychain.org/foundries-and-fabs/

10 Memory and HBM

Extreme concentration · Hard to substitute

SK hynix, Samsung and Micron make nearly all high bandwidth memory (HBM), the stacked memory beside AI chips. SK hynix took 63.2 percent of HBM revenue in 2025.

- **SK hynix** South Korea. 63.2% of HBM revenue in 2025
- **Samsung** South Korea. 19.3% of HBM revenue in 2025

CHINA The Institute for Progress estimated in October 2025 that China would make virtually no HBM that year. Huawei said in September 2025 that its Ascend 950 chips would use two HBM designs of its own, without saying who would manufacture the memory.

UNITED STATES Micron is the only American HBM maker. License Exception HBM lets exporters headquartered in the United States or a Country Group A:5 ally ship HBM below 3.3 GB per second per square millimeter without a license.

Sources: chipsupplychain.org/memory-and-hbm/

11 Advanced Packaging

Extreme concentration · Moderate to substitute

Epoch AI estimates that in 2025 Nvidia, Google, AMD and Amazon used around 90 percent of the capacity for CoWoS, TSMC's packaging for AI chips.

- **TSMC** Taiwan. CoWoS packaging used by Nvidia, Google, AMD and Amazon
- **Intel** United States. Foveros 3D packaging in volume at Rio Rancho, New Mexico; EMIB 2.5D bridges

CHINA Between 2019 and 2024, Chinese firms gained 5 percentage points of share in test tools and 4 points in fabrication tools built for advanced packaging. But they lost share in bonding and other conventional assembly and packaging tools.

UNITED STATES Intel opened Fab 9 in Rio Rancho, New Mexico, in January 2024 to make its Foveros 3D packages in volume. Amkor is building a \$7B packaging and test plant in Peoria, Arizona, and expects production to start in early 2028.

Sources: chipsupplychain.org/advanced-packaging/

12 Substrates and PCBs

Extreme concentration · Hard to substitute

Ajinomoto, a Japanese food company, told investors in June 2026 that it holds over 95 percent of the market for the insulating film inside high-end chip packages.

- **Ajinomoto** Japan. Told investors that its build-up film has held over 95% of its market since launch
- **Nitto Boseki** Japan. Claims an overwhelming advantage in low thermal expansion glass

CHINA TTM, an American circuit board maker, says its circuit board competitors are mostly based in China and Taiwan. Nitto Boseki, a Japanese glass fiber maker, says Chinese and Taiwanese companies are aggressively catching up with it in the special glass sector.

UNITED STATES The White House's 2021 supply chain review listed no American firm among the key substrate makers. The Commerce Department has made a final award of up to \$75 million to Absolics, a subsidiary of Korea's SKC, for a glass substrate plant in Covington, Georgia.

Sources: chipsupplychain.org/substrates-and-pcb/

13 Test and Assembly

High concentration · Moderate to substitute

Testing finds bad chips before they go into an expensive package. Japan's Advantest took about 65 percent of 2025 spending on chip testers, by its own estimate.

- **Advantest** Japan. About 65% of the tester market in 2025, by its own estimate
- **Teradyne** United States. Second in testers, with \$2.52bn of semiconductor test revenue in 2025, service included

CHINA CSET at Georgetown finds that between 2019 and 2024 Chinese toolmakers gained share in test tools and 4 percentage points in fabrication tools built for advanced packaging. But they lost share in bonding and other conventional assembly and packaging tools.

UNITED STATES American firms such as Teradyne and FormFactor are strong in test machines and probe cards. Amkor is building a \$7 billion packaging and test campus in Arizona and has a long-term deal to run packaging and test there for TSMC.

Sources: chipsupplychain.org/test-and-assembly/

14 Systems and Networking

High concentration · Moderate to substitute

AI chips are wired together 72 to a rack and run as one computer. Many firms can assemble the racks, but few can make the lasers for the optical links between them.

- **Nvidia** United States. NVLink and NVSwitch for links inside a rack; InfiniBand and Spectrum-X Ethernet between racks
- **Broadcom** United States. Tomahawk switch chips sold to any buyer, and custom AI accelerators

CHINA Chinese firms such as InnoLight assemble high-speed optical modules in volume, at sites including Suzhou and Thailand. In February 2025 China put indium under new export restrictions and began requiring export permits for indium phosphide substrates, the wafers the lasers are grown on.

UNITED STATES American firms make the switch chips, the links that join accelerators inside a rack, and the lasers. Nvidia said in August 2026 that Wistron's new plant in Fort Worth, Texas, was producing its GB300 superchips and that Foxconn was building a factory in Houston.

Sources: chipsupplychain.org/systems-and-networking/

15 Data Centers and Power

High concentration · Moderate to substitute

By mid-2026, Texas had requests to connect about 474 GW of new demand, mostly data centers, but only about 205 GW had the engineering studies to plan for it. The large transformers that connect such sites to the grid commonly took three years to arrive in 2024.

- **GE Vernova** United States. Gas equipment, transformers and switchgear, including through Prolec GE
- **Hitachi Energy** Switzerland. Power transformers and switchgear

CHINA China used 25 percent of the world's data center electricity in 2024, second to the United States, by the International Energy Agency's estimate. Data centers made up around 3 percent of the growth in China's electricity demand from 2022 to 2024.

UNITED STATES The United States has the demand and the money but cannot shorten the wait for equipment. Constellation expects to restart the Crane nuclear plant for Microsoft in 2027.

Sources: chipsupplychain.org/data-centers-and-power/