

**Translated
Excerpt**



This translation is a compilation of China’s semiconductor-related export controls, as of September 7, 2023. It combines translations of the semiconductor-related portions of three official Chinese government documents: (1) the Chinese Catalogue of Technologies Prohibited or Restricted from Export, published in September 2008, (2) adjustments made to the Catalogue in August 2020, and (3) additional proposed adjustments to the Catalogue released for public feedback in December 2022.

Source 1

Chinese Ministry of Commerce (MOFCOM; 商务部) and Ministry of Science and Technology (MOST; 科学技术部; 科技部), *Chinese Catalogue of Technologies Prohibited or Restricted from Export* (《中国禁止出口限制出口技术目录》), MOFCOM website, September 16, 2008, <https://perma.cc/3FU6-SP4W>.¹

Source 2

MOFCOM and MOST, “Adjustments to the *Chinese Catalogue of Technologies Prohibited or Restricted from Export* (《中国禁止出口限制出口技术目录》调整内容), website of the Central People’s Government of the People’s Republic of China (PRC), August 28, 2020, <https://perma.cc/RB27-4ZFH>.²

Source 3

MOFCOM and MOST, “*Chinese Catalogue of Technologies Prohibited or Restricted from Export (Draft for Feedback from the Public)*” (《中国禁止出口限制出口技术目录(征求公众意见版)》), MOFCOM website, December 30, 2022, <https://perma.cc/7P42-XW24>.³

Translation Date September 7, 2023	Translators Etcetera Language Group, Inc. Ben Murphy, CSET Translation Manager	Editor Ben Murphy
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[Translator’s note: The following is an excerpted translation—of the **semiconductor-related items only**—from China’s export control list, the *Chinese Catalogue of Technologies Prohibited or Restricted from Export*. Specifically:

- Entries in normal black text are from the 2008 original version of the *Catalogue*.

¹ Translator’s note: The “Source 1” hyperlink connects to a download link for the full Chinese text of the September 2008 original version of the *Catalogue*. The sourcing information for Source 1 derives from the landing page for the document: <https://perma.cc/W5GS-9SYN>.

² Translator’s note: The “Source 2” hyperlink connects to a download link for the full Chinese text of the August 2020 “Adjustments” to the *Catalogue*. The sourcing information for Source 2 derives from the landing page for the document: <https://perma.cc/PM36-8CA8>.

³ Translator’s note: The “Source 3” hyperlink connects to a download link for the full Chinese text of the December 2022 draft revised version of the *Catalogue*. The sourcing information for Source 3 derives from the landing page for the document: <https://perma.cc/R33E-NFVW>.

- Entries in **bold green** text are additions or changes to the *Catalogue* that China made official in 2020.
- Entries in *italic purple* text are proposed additions or changes to the *Catalogue* that China circulated for public feedback in December 2022. Note that these are proposed changes that are not—as of the September 7, 2023 publication of this translation—legally binding in China.

End translator’s note.]

Chinese Catalogue of [Semiconductor-Related] Technologies Prohibited or Restricted from Export

Export-Prohibited⁴ Technologies

Non-metallic mineral products

No.: 053101J⁵

⁴ Translator’s note: The *Chinese Catalogue of Technologies Prohibited or Restricted from Export* does not explain the difference between “prohibited” (禁止) and “restricted” (限制), in the context of Chinese export control policy. Presumably, “prohibited” items cannot be exported under any circumstances, and those who wish to export “restricted” items must first obtain the permission of the Chinese government.

⁵ Translator’s note: Each item in the *Chinese Catalogue of Technologies Prohibited or Restricted from Export* has a code number associated with it that consists of six digits and one letter. The 2008 version of the *Catalogue* explains the makeup of the code numbers as follows:

- The first two digits represent the last two digits of the year in which the export control was first proposed. These dates are always earlier than the dates when the export controls were codified into policy. For example, all items in the original 2008 *Catalogue* were first proposed in 2005, and thus their code numbers begin with “05.” Items from the 2020 modified version of the *Catalogue* begin with “18,” meaning they were first proposed in 2018. And the December 2022 proposed revisions begin with “21,” signifying they were first proposed in 2021.
- Digits three and four are industry classification codes from China’s Industrial Classification of National Economic Activities (国民经济行业分类). Industry code 31, for example, corresponded to the “non-metallic mineral products” industry in 2008 when the first version of the *Catalogue* was published in 2008. Since then, China has changed some of these codes. A complete list of current—as of September 7, 2023—Chinese industry classification codes is available online (in Chinese) at: <https://perma.cc/7T8C-Z3BD>.
- Digits five and six are sequential item numbers under each industry classification code. “01,” for example, is the first export control related to a particular industry. Where there are multiple export-controlled items for a given industry, subsequent items are “02,” “03,” etc.
- The final letter indicates whether the item is prohibited or merely restricted from export. Prohibited exports end with “J,” which derives from “jìnzhǐ,” the Romanized spelling of the Chinese word “prohibited” (禁止). Restricted exports end with “X,” from the Romanized spelling of the Chinese word “restricted” (限制).

Technology name: Amorphous inorganic non-metallic materials production technology

Control point: High-power, large-size neodymium glass preparation technology for laser technology

Communications equipment, computers, and other electronic equipment manufacturing

No.: 054001J

Technology name: Integrated circuit manufacturing technology

Control point (控制要点): Anti-radiation technologies and processes

(1) Manufacturing technology of devices with anti-static $\geq 2,500$ V, anti-transient dose rate (抗瞬时剂量率) $> 1 \times 10^{11}$ rad (Si)-s silicon on sapphire/complementary metal-oxide-semiconductor (SOS/CMOS)

(2) Manufacturing technology of bipolar devices with anti-static $\geq 3,000$ V and anti-transient dose rate $> 1 \times 10^{11}$ rad(Si)-s

Export-Restricted⁶ Technologies

Non-metallic mineral products

No.: 053104X [213104X]

Technology name: Artificial crystal growth and processing technology

Control points:

1. Tellurium dioxide (TeO_2) and aluminum molybdate (Al_2MoO_4)₃ single crystal growth process and substrate finishing technology
2. Production method for ultra-long (> 250 mm) lithium niobate wafers
 - (1) Technology for growing lithium niobate crystals with length > 280 mm and diameter > 40 mm
 - (2) Finishing technology for lithium niobate single-crystal wafers with a length of 250 mm or more
3. Processes for growing bismuth silicon oxide (BSO), bismuth germanium oxide (BGO) single crystals with length > 180 mm, and wafer processing technology
4. Preparation process of 75-3 water-soluble photoresist mask dry film (水

⁶ Translator's note: See footnote 4, above, as regards the difference between "export-prohibited" and "export-restricted."

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5. Processes for growing tungsten-bronze photorefractive single crystals for manufacturing self-pumped phase-conjugate mirrors (SPPCM)
6. Raw material treatment technology and growth process for potassium niobate (KNbO₃) crystals
7. Potassium titanyl phosphate (KTP) crystal growth control technology
8. Processes for growing radiation-resistant artificial crystals with the following properties
 - (1) Quality factor (Q) value $\geq 3 \times 10^6$
 - (2) Inclusion level not less than International Electrotechnical Commission (IEC) Level A
 - (3) Aluminum (Al) content ≤ 1 ppm
 - (4) Corrosion tunnel density $\leq 10/\text{cm}^2$
9. Technology for preparing rare earth-iron (Tb-Dy-Fe system) ultra-magnetostrictive single-crystal materials
 - (1) Processes of non-polluting magnetic levitation cold crucible crystal growth with the Czochralski method
 - (2) Single crystal composition and structure control technology
10. Processes for growing lithium tetraborate and lithium triborate (LBO) crystals
11. Process for growing neodymium-doped yttrium aluminum borate (NYAB) crystals
12. Process for growing strontium barium titanate (SBT) crystals
13. Process for growing beta barium borate (BBO) crystals
14. Process for growing strontium beryllium borate (SBBO) crystals
- 15. Processing technology for potassium beryllium fluoroborate (KBBF) crystal growth and prism couplers**
16. Process for growing lutetium-yttrium oxyorthosilicate (LYSO) crystals
17. Process for growing cerium-activated lanthanum bromide (LaBr₃:Ce) crystals

No.: 213106X

Technology name: Photovoltaic silicon wafer preparation technology

Control points: Large silicon wafer technology, black silicon production technology,

Communications equipment, computers, and other electronic equipment manufacturing

No.: 054001X

Technology name: Electronic device manufacturing technology

Control points:

1. Broadband miniaturized isolator manufacturing technology
 - (1) Designs and manufacturing processes of multi-octave-spanning (超倍频程) broadband (relative bandwidth $\geq 70\%$) miniaturized isolators
 - (2) Formulations and preparation processes of ferrite material with very narrow ferromagnetic resonance linewidth of $\Delta H < 2$ oersteds
 - (3) Ultra-wideband (relative bandwidth $\geq 70\%$) matching technology and wide temperature range (-55°C to $+125^{\circ}\text{C}$) compensation technology
2. Design technology and manufacturing process of broadband (2 to 8 GHz) suspended stripline frequency dividers
3. Piezoelectric gyro sensor manufacturing technology
 - (1) Support system design and manufacturing process
 - (2) Piezoelectric transducer bonding process
 - (3) Structural design, processes, and heat treatment technology of metal vibration beams (振梁)
 - (4) Structural designs and assembly technology of zero calibration (校零) systems
 - (5) Zero calibration signal processing technology
4. Surface acoustic wave (SAW) device design technology
 - (1) SAW filters (frequency > 2 GHz, out-of-band suppression (带外抑制) > 70 dB, insertion attenuation < 1.5 dB)
 - (2) SAW tap delay line (code bits [码位] > 1023 bits, operating frequency > 600 MHz)
 - (3) SAW convolver (code bits > 1023 bits, operating frequency > 600 MHz)

- (4) SAW fixed delay line (frequency > 2 GHz, delay time > 300 μ s)
 - (5) SAW dispersive delay line (frequency > 500 MHz, time-bandwidth product > 10,000, sidelobe suppression > 32 dB)
 - (6) SAW pulse compression line (sidelobe suppression > 32 dB, second-order clutter signal simulation and calculation technology, weighted compensation method for secondary lobe [副瓣] suppression, phase error compensation technology)
5. SAW device manufacturing technology
 - (1) Assembly technology
 - (2) Matching technology
 - (3) Large-area (220 mm \times 20 mm) photolithography technology
 6. Designs and manufacturing technology of standing-wave accelerator tube-based, back bombardment-resistant electron guns
 7. Designs and focusing technology of multi-beam klystrons
 8. Ion beam processing technology to improve gridded electron emission (栅网电子发射)

No.: 054002X

Technology name: Semiconductor device manufacturing technology

Control points:

1. High-power, optically controlled, bi-directional thyristor with a center-tapered groove-shaped (中心锥形槽状) photosensitive gate
 - (1) Chromium-nickel-silver (Cr-Ni-Ag) barrier metal sintering technology
 - (2) Silicon dioxide (SiO₂) and silicon nitride (Si₃N₄) insulating film gate formation process
2. Manufacturing technology of diodes with conductivity resistance < 2 Ω
3. Raw material preparation technology and epitaxial technology for monocrystalline luminescent screens

No.: 184013X

Technology name: Laser technology

Control point:

- 1. Key technology for manufacturing deep-ultraviolet (DUV) solid-state**

lasers utilizing independently developed (自主研发) KBBF single crystals

Instrumentation and cultural and office-use machinery manufacturing

No.: 054104X

Technology name: Manufacturing technology of materials testing machines and instruments

Control points:

1. Online, dynamic, and synchronized testing technology for mount (贴片) photoelasticity
2. Liquid hydrogen high-speed (> 40,000 rpm) bearing testing machine design technology
 - (1) Deformation control technology for main bearings at low temperatures (below -240 °C)
 - (2) Heat conduction and thermal isolation technology
 - (3) Loading systems

Telecommunications, Radio, Television, and Satellite Transmission Services

No.: 186004X

Technology name: Satellite applications technology

Control points: **BeiDou satellite navigation and positioning systems** involving one of the following elements

- (1) Signal formats, device structures, and manufacturing processes of inbound signal real-time capture units
- (2) Signal capture methods, circuit structures, and specialized chips (专用芯片) for outbound signal rapid capture units
- (3) Information transmission systems, modulation methods, and frame structures of the systems

Computer Services

No.: 186103X

Technology name: **Cryptographic security technology**

Control points:

1. Cryptographic chip design and actualization technology (high-speed cryptographic algorithms, parallel encryption technology, security design technology for cryptographic chips, cryptographic system-on-chip (SoC) chip design and actualization technology, actualization technology for high-speed chips based on high-speed algorithm standards)
2. Quantum cryptography (quantum cryptography actualization methods, quantum cryptography transmission technology, quantum cryptography networks, and quantum cryptography engineering actualization technology)