Advanced computing and semiconductor industries: A new dimension to export compliance

What your export compliance program should consider

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Introduction

On October 7, 2022, the Bureau of Industry and Security (BIS) released an interim final rule[1] implementing additional controls that restrict the export of advanced semiconductors and supercomputers, along with the equipment to manufacture them, to the People's Republic of China (PRC). Broadly, the rule amends and expands the Export Administration Regulations (EAR) by imposing the following new controls:

Creation of new controls on advanced computing integrated circuits (ICs), computer commodities that contain such ICs, and certain semiconductor manufacturing items;

Expansion of controls on transactions involving items for supercomputer[2] and advanced IC manufacturing end uses; and
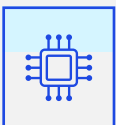
Expansion of the Entity-List Foreign Direct Product Rule and the establishment of two new Foreign Direct Product Rules.

As described in the rule itself, the rationale behind implementing the controls and restrictions follows "extensive United States government consideration of the impact of advanced computing ICs, "supercomputers," and semiconductor manufacturing equipment on enabling military modernization" by the PRC. More specifically, the rule explains that the PRC has devoted significant resources to support its defense modernization, "including the implementation of its military-civil fusion development strategy, in ways that are contrary to U.S. national security and foreign policy interests." Specific U.S. government concerns include:

Advanced semiconductors and supercomputers can be used to enhance data processing and analysis capabilities, including through artificial intelligence (AI) applications.

Among the numerous uses for these products are improved military decision-making, weapons design and surveillance (including of persecuted ethnic minorities).

Semiconductor manufacturing equipment can be used to produce ICs for commercial applications, which can be used to transform a wide range of commercial industries.

Thus, by limiting the export of advanced computing and supercomputer items to the PRC, as well as reducing the diversion risk and from non-military entities to military entities, the United States seeks to protect U.S. national security and foreign policy interests.

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[1]87 Fed. Reg. 62186 (Oct. 13, 2022). The rule will be phased in by October 21, 2022 and opens a 60-day comment period from October 13, 2022, the date of publication in the Federal Register.

[2]A definition of "supercomputer" will be added to Part 772 of the EAR: "a computing "system" having a collective maximum theoretical compute capacity of 100 or more double-precision (64-bit) petaflops or 200 or more single-precision (32-bit) petaflops within a 41,600 ft3 or smaller envelope," with two clarifying notes.

Managing the Changes

Given the sweeping nature of these new regulations, exporters must analyze how these changes impact their operations. Equally as important will be developing a risk-based strategy for on-going sales or controlled technology transfers that simultaneously mitigates compliance risk while being sustainable for the business.

Adjusting to these new regulations will be no easy task for impacted companies but a thoughtful, tailored approach will support effective review. The first step is to promptly assess product offerings and document specifications. This will require evaluating product specifications, customer information, and geographic footprints against the new regulations. For many companies, this analysis can only be completed through close engagement with the engineering or product development teams. Doing so may require training the technical teams on this new rule to provide context around the urgency of these reviews. While this review is crucial, it should also be done expeditiously to limit the likelihood of unauthorized exports.

While product assessment is occurring, the export compliance team should be reviewing its trade profile, including any export, reexport, and in-country transfer activity having a nexus with China as there may be license implications. If applicable, the export compliance team must understand how the China teams operate, and where new controls are required. Additionally, teams should work with stakeholders to evaluate data that may indicate the company has "knowledge" that the ultimate end-user is located in China and whether the intended end-use is potentially restricted pursuant to the new rules. Taking these steps requires the export compliance team to use all available resources. This may include immediate system-level changes to place holds on products that are either controlled or require additional review.

The export compliance team should fully engage with industry associations to further its understanding of the regulations. These associations provide a forum to share learnings with peer companies and offer practical advice. Similarly, the export compliance team should lean heavily on government guidance, including

Frequently Asked Questions ("FAQs"). FAQs are an important resource both for their specific guidance, but also for the window they provide into how these new regulations are applied.

With the impact analysis complete, the export compliance team should alert senior stakeholders to anticipated business implications of the new regulations. Depending on the financial implications' materiality, General Counsel or C-Suite level stakeholders may need to be involved so they can make the appropriate preparations. In certain instances, disclosures to the Board may be required or incorporated into financial reporting. To support these efforts, the impact analysis should be formally documented with business impact quantified to the extent possible.

One of the more significant challenges the export compliance team will face are the controls around U.S. person "support" as certain activities are now licensable. Managing this new requirement will likely require a new process to evaluate and document U.S. person activity. Understanding individual responsibilities and analyzing them against the new U.S. person support requirements is only the starting point. Continual reevaluation and the implementation of controls to gain visibility into evolving job responsibilities requires on-going alignment with the business and dynamic controls.

Once this multi-faceted review is complete, the export compliance team and senior leaders should develop a strategy based on identified risks and supply chain needs. Knowing that there is a presumption of denial for license applications, a holistic review of the supply chain might be required to identify whether activities and services can be shifted. Further, the export compliance team should consider designing controls that identify product technical parameters, sourcing considerations and U.S. person activities so that ongoing business operations remain compliant with the new rules.

Below is a checklist of potential action items export compliance teams should consider:

☑ Review and assess current product lines;

☑ Document product specifications and classification rationales;

☑ Compare product lines and their specifications against the new controls;

☑ Identify where licenses might be required;

☑ Freeze transactions where a license might be required to allow for additional review;

☑ Brief executive management on impact;

☑ Determine strategy for applying for licenses and/or adjusting supply chain;

☑ Conduct export controls compliance training; and

☑ If licenses are granted, implement appropriate controls.

Getting ahead of these regulations will help exporters remain compliant and limit business disruption. This can be done through proactive decision-making coupled with a clear strategy for continuing business and ensuring compliance.

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Impact on the Industry

This new rule and its controls are a sea change for U.S. semiconductor export regulations, adding a bevy of new requirements and rules that exporters must comply with. To meet these obligations, companies exporting computing commodities to the PRC will need to take additional compliance measures, including reassessing if their goods fall within the newly created controls and determining whether they are being exported for the newly controlled end uses or to the newly controlled end users. For those companies that are subject to these new regulations, business operations may be dramatically impacted in response to these new requirements. The heightened license requirements mean it will generally be more difficult – if possible at all – to export such newly controlled equipment to the PRC. As such, it is important to be proactive and work with your export control compliance department or outside advisors to mitigate any risks that may arise.

Overview of the Rules

Broadly speaking, the rules fall into two groups: controls that restrict the export, reexport, and transfer (in-country) of advanced computing and supercomputer components, items that incorporate such components, and related software and technology; and controls on items used to manufacture advanced computing items.

Controls on Advanced Computing Items and Supercomputer End-Uses

Control	Impact
Addition of Advanced Computing Chips, Computing Commodities That Contain Them, and Associated Software and Technology to the Commerce Control List	• Creates 3A090 for certain high-performance ICs and 4A090 for computers, "electronic assemblies," and "components," not elsewhere specified, containing 3A090 ICs. • Controls for software and technology associated with ECCNs 3A090 and 4A090 are located in ECCNs 3D001, 3E001, 4D090, and 4E001. • 3A090/4A090 are controlled for Regional Stability (RS) reasons to China (§ 742.6(a)(6))3 and Anti-Terrorism (AT:1) reasons to Iran (§ 742.8), Syria (§ 742.9), and North Korea (§ 742.19)
License Requirements for New Advanced Computing Items	• Imposes a license requirement for transfer from the PRC to any destination of 3E001 technology for the design or development of 3A090 ICs, when the technology has been developed by any PRC-headquartered entity, is the foreign direct product of certain software subject to the EAR, and is for the production of certain advanced computing ICs and commodities.
Anti-Terrorism Controls for Lower-Level Computing ICs and Computer Commodities Containing Them	• Adds subparagraphs ECCNs 3A991.p (specified high-performance ICs) and 4A994.l (computers, "electronic assemblies," and "components," not elsewhere specified (n.e.s.), containing ICs in 3A991.p), which ECCNs are controlled for AT:1. • The associated software and technology are found at 3D991, 3E991, 4D994, and 4E992.

Control	Impact
License Exception Eligibility[3]	• RPL: Servicing and Replacement of Parts and Equipment (§ 740.10) • GOV: Governments, International Organizations, International Inspections Under the Chemical Weapons Convention, and the International Space Station (§ 740.11 (b)(2)(ii)[4] • TSU: Technology and Software, Unrestricted (§ 740.13 (a) and (c))[5]
Foreign Direct Product Rule Changes	• Expands the existing Entity List Foreign Direct Product Rule (FDP) (§ 734.9(e))[6] to add a new footnote specifying the reason for application of the Entity List FDP Rule to an entity;[7] • Creates an Advanced Computing FDP Rule (§ 734.9(h)): foreign-produced direct products of U.S.-origin software or technology and 3A090 or 4A090, when intended for the PRC; • Creates a Supercomputer End Use FDP Rule (§ 734.9(i)): product scope comprises foreign-produced direct products of Category 3-5 software or technology,[8] when there is knowledge the item is destined for supercomputer end-uses in the PRC.
Supercomputer End-Use and End-User Controls	• Creates a new license requirement for exports, reexports, or transfers (in-country) when there is "knowledge"[9] that the item is intended for supercomputer end uses in the PRC (§ 744.23). • There is a presumption of denial for license applications covering items subject to this new control.
Revisions to the Entity List	• Expands the scope of licensing requirements for 28 PRC-based entities currently on the Entity List, the rule appends footnote 4 to their entry, subjecting them to the Entity List FDP Rule.

[3]This license requirement does not apply to deemed exports or deemed reexports.

RPL, GOV, and TSU license exceptions are available for 3A090 and 4A090 (and other items meeting the parameters listed in these ECCNs but found elsewhere on the CCL).

[4]Subject to the restrictions at 15 CFR § 740.11(b)(2)(ii).

[5]The only license exceptions available for exports or reexports of items controlled under the new ECCNs (3A090 and 4A090) and associated software and technology are listed in new § 740.2(a)(9) of the EAR. These exceptions will not overcome the new license requirement in this interim final rule for "supercomputer" and semiconductor manufacturing end use.

[6]See 15 CFR § 734.9(e).

[7]The footnotes are 1 (Huawei and related companies) and 4 (other entities subject to the Entity List FDP Rule).

[8]This product scope is the same as that of the Entity List FDP Rule.

[9]As defined in the EAR, "knowledge of a circumstance…includes not only positive knowledge that the circumstance exists or is substantially certain to occur, but also an awareness of a high probability of its existence or future occurrence." 15 CFR § 772.1.

Controls on Semiconductor Manufacturing Items and End-Uses

Control	Impact
Addition of Semiconductor Manufacturing Equipment, Software, and Technology to the CCL	• Adds 3B090 for specified semiconductor manufacturing equipment, which is controlled for RS reasons when destined to the PRC, and AT-controlled when destined for Iran, Syria, or North Korea. • Related software and technology at 3D001 and 3E001 are also controlled for RS reasons to PRC. • License applications for such manufacturing items destined to end users in China that are headquartered in the United States or in a Country Group A:5 or A:6 country10 will be considered on a case-by-case basis.

New End-Use Control for Items for the Development or Production of ICs at Semiconductor Manufacturing Facilities in the PRC	• Creates a new end-use control that covers the development or production of ICs at semiconductor manufacturing facilities in the PRC, when the ICs meet the following criteria (§ 744.23):
	
	  – Logic integrated circuits using a non-planar transistor architecture or with a "production" technology node of 16/14 nanometers or less;
	
	  – NOT AND (NAND) memory integrated circuits with 128 layers or more; or
	
	  – Dynamic random-access memory (DRAM) integrated circuits using a "production" technology node of 18 nanometer half-pitch or less; or
	
	  – The development or production of integrated circuits at any semiconductor fabrication facility located in the PRC, but it is unknown whether such semiconductor fabrication facility fabricates integrated circuits that meet any of the criteria above.

Adds License Requirement for "Support" for Development or Production of ICs in PRC	• Revises § 744.6 to inform U.S. persons that "support" for the development or production in the PRC of specified ICs implicates general prohibitions in the EAR, and therefore requires a license. • "Support" includes shipment, transmission, or transfer (in-country) to or within the PRC; facilitation of such shipment, transmission, or transfer; or servicing of items subject to the EAR, as well as any item not subject to the EAR, to or within the PRC when such activity would assist the development/ production of ICs meeting certain parameters on the CCL.

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[10]The BIS Country Chart can be found here. Country Groups A:5 and A:6 are countries that are allied with or generally non-hostile toward the United States, but are not necessarily part of other multilateral export control regimes.

Appendix

3A090 includes the following items:

a. Integrated circuits that have or are programmable to have an aggregate bidirectional transfer rate over all inputs and outputs of 600 Gbyte/s or more to or from integrated circuits other than volatile memories, and any of the following:

a.1. One or more digital processor units executing machine instructions having a bit length per operation multiplied by processing performance measured in TOPS, aggregated over all processor units, of 4800 or more;

a.2. One or more digital 'primitive computational units,' excluding those units contributing to the execution of machine instructions relevant to the calculation of TOPS for 3A090.a.1, having a bit length per operation multiplied by processing performance measured in TOPS, aggregated over all computational units, of 4800 or more;

a.3. One or more analog, multi-value, or multi-level 'primitive computational units' having a processing performance measured in TOPS multiplied by 8, aggregated over all computational units, of 4800 or more; or

a.4. Any combination of digital processor units and 'primitive computational units' whose calculations according to 3A090.a.1, 3A090.a.2, and 3A090.a.3 sum to 4800 or more.

Note:

Integrated circuits specified by 3A090.a include graphical processing units (GPUs), tensor processing units (TPUs), neural processors, in-memory processors, vision processors, text processors, co-processors/accelerators, adaptive processors, field-programmable logic devices (FPLDs), and application-specific integrated circuits (ASICs). Examples of integrated circuits are in the Note to 3A001.a.

Technical Note:

1. A 'primitive computational unit' is defined as containing zero or more modifiable weights, receiving one or more inputs, and producing one or more outputs. A computational unit is said to perform 2N-1 operations whenever an output is updated based on N inputs, where each modifiable weight contained in the processing element counts as an input. Each input, weight, and output might be an analog signal level or a scalar digital value represented using one or more bits. Such units include:

- Artificial neurons

- Multiply accumulate (MAC) units

- Floating-point units (FPUs)

- Analog multiplier units

- Processing units using memristors, spintronics, or magnonics

- Processing units using photonics or non-linear optics

- Processing units using analog or multi-level nonvolatile weights

- Processing units using multi-level memory or analog memory

- Multi-value units

- Spiking units

2. Operations relevant to the calculation of TOPS for 3A090.a include both scalar operations and the scalar constituents of composite operations such as vector operations, matrix operations, and tensor operations. Scalar operations include integer operations, floating-point operations (often measured by FLOPS), fixed-point operations, bit-manipulation operations, and/or bitwise operations.

3. TOPS is Tera Operations Per Second or 1012 Operations per Second.

4. The rate of TOPS is to be calculated at its maximum value theoretically possible when all processing elements are operating simultaneously. The rate of TOPS and aggregate bidirectional transfer rate is assumed to be the highest value the manufacturer claims in a manual or brochure for the integrated circuit. For example, the threshold of 4800 bits x TOPS can be met with 600 tera integer operations at 8 bits or 300 tera FLOPS at 16 bits. The bit length of an operation is equal to the highest bit length of any input or output of that operation. Additionally, if an item specified by this entry is designed for operations that achieve different bits x TOPS value, the highest bits x TOPS value should be used for the purposes of 3A090.a.

5. For integrated circuits specified by 3A090.a that provide processing of both sparse and dense matrices, the TOPS values are the values for processing of dense matrices (e.g., without sparsity).

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