

Automobile

英伟达对华出口 GPU 计算芯片受限，世界人工智能大会上海开幕

U.S. Restricts Sales of GPU Chips to China and Russia by Nvidia, WAIC 2022 Commenced in Shanghai on Sep 1

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热点速评 Flash Analysis

(Please see APPENDIX 1 for English summary)

事件

8月31日，英伟达公告称于8月26日收到美国政府通知，对A100和H100两代GPU计算芯片，以及搭载A100、A100X、H100芯片的DGX与其他系统施加出口管制许可，并立即生效；

9月1日-3日，2022世界人工智能大会（WAIC）在上海举办，大会围绕“人类、科技、产业、城市、未来”五大元素，以元宇宙为切入点，深度演绎“智联世界，元生无界”的会议主题。

点评

高端 GPU 芯片对华出口受限。根据英伟达公告，出口管制适用于公司最前沿的 GPU 芯片产品 A100 与 H100。此外，DGX 及任何其他采用 A100 或 H100 和 A100X 的系统，以及未来能够在峰值性能和 I/O 性能达到或高于 A100 的芯片和相关系统产品，均在新的许可证要求范围之内。根据美国 SEC 文件，该出口禁令针对的地区为中国大陆、中国香港与俄罗斯。8月24日，公司曾披露 2022Q3 营业收入预计为 59 亿美元，受出口管制影响，中国地区的潜在营收损失约 4 亿美元。A100 是英伟达 2020 年 5 月 14 日发布、基于 Ampere 架构的加速计算卡，采用台积电 7nm 工艺，拥有 540 亿个晶体管，GPU 最大功率 400W，曾在 2020 年国际 AI 基准测试 MLperf 中打破 16 项 AI 性能记录；H100 于 2022 年 3 月 22 日 GTC 技术大会中发布，搭载 NVIDIA Hopper 架构，拥有 18,432 个 CUDA 内核，核心频率 1.8GHz，采用台积电 4nm 工艺。H100 的 FP16（峰值半精度）、TF32（峰值单精度）以及 FP64（峰值双精度）算力为 A100 的 3 倍，分别为 2,000 TFLOPS、1,000 TFLOPS 和 60 TFLOPS。此外，H100 还增加了对 FP8 的支持，算力达到 4,000 TFLOPS，为 A100 芯片的 6 倍。

国产 AI 算力领域自主替代重要性凸显。2022 年 7 月至今，美国先后对用于 14nm 以下先进制程芯片制造的设备 and EDA 软件实施对华出口管制，并于 8 月 10 日签署《芯片与科学法案》，从设备、芯片设计、晶圆代工、算力发展等关键环节加以限制。目前，中国大陆企业在晶圆制造方面积极扩产，设备、材料、EDA 等领域不断有技术突破，但高端芯片制造仍处于发展初期，国产化率处于较低水平，替代空间广阔。本次受限的英伟达 GPU 产品综合性能与配套的算法组件代表了行业最高水平，国内尚未有对标的硬件和系统产品实现商业化，半导体供应链自主可控迫在眉睫，国产替代重要性愈发凸显。

2022 世界人工智能大会聚焦 AI 与元宇宙相融互促。9 月 1 日，WAIC 2022 开幕。根据工信部领导致辞，我国人工智能加速发展，已形成完整的产业体系。据产业论坛中国信通院统计，2021 年全球 AI 产业规模 3,619 亿美元，中国 AI 市场规模 4,041 亿元人民币；截至 2022 年 7 月底，全球 AI 企业 23,089 家，美、中两国占全球企业 50%，当前人工智能正处于小范围验证向规模应用过渡的关键转折点，预计 5 年内在城市化、能源、医疗、制造等关键行业实现规模应用。产业论坛中，百度 CEO 李彦宏提出人工智能在商业应用方面进步最快的领域为自动驾驶，我国公众对自动驾驶接受和信任程度位于世界前列；并判断由于交通事故责任界定清晰，自动驾驶 L2 之后率先进入商用的是 L4，而不是 L3；此外，还提出对交通网络的智能化改造，可以让通行效率提升 15%-30%，对应 GDP 每年约 2.4%-4.8% 的增长。我们认为，自动驾驶技术创新与制度革新、基础设施智能化改造相辅相成，2022 年我国各类自动驾驶政策及管理条例相继出台，为商业化和规模化扩张提供了国际领先的政策环境，而通行效率的提升，有望解决对汽车限购限行问题，为后疫情时代的经济增长注入新动力。

风险

中美贸易摩擦升级，自主替代研发进度不及预期等。

APPENDIX 1

Summary

Event. On August 26, 2022, the U.S. government, or USG, informed NVIDIA Corporation that the USG has imposed a new license requirement, effective immediately, for any future export to China (including Hong Kong) and Russia of the Company's A100 and forthcoming H100 integrated circuits. DGX or any other systems which incorporate A100 or H100 integrated circuits and the A100X are also covered by the new license requirement. The Company's outlook for its third fiscal quarter provided on August 24, 2022 included approximately \$400 million in potential sales to China which may be subject to the new license requirement if customers do not want to purchase the Company's alternative product offerings or if the USG does not grant licenses in a timely manner or denies licenses to significant customers.

The 5th World Artificial Intelligence Conference themed "Intelligent Connectivity, Infinite Multiverse" is taking place in Shanghai from Sep 1 to 3.

Comment. A100 is a high-end computing chip based on the Ampere architecture released by NVIDIA on May 14, 2020, using TSMC's 7nm process with 54 billion transistors and a maximum GPU power of 400W, which broke 16 AI performance records in 2020 MLperf; H100 was released at the GTC Technology Conference on March 22, 2022. The H100 has three times the arithmetic power of the A100, with 2,000 TFLOPS, 1,000 TFLOPS, and 60 TFLOPS, respectively, and is equipped with the NVIDIA Hopper architecture with 18,432 CUDA cores at 1.8 GHz and TSMC's 4nm process.

At present, domestic companies in wafer manufacturing have been actively expanding production. Technical breakthroughs in equipment, materials, EDA and other fields have rapidly progressed. However high-end chip manufacturing is still in the early stages of development, the localization rate is at a relatively low level with a vast market for domestic substitution. The comprehensive performance of the restricted NVIDIA GPU products and supporting algorithm components represent the highest level of the industry, and there is no domestic counterpart hardware and system products. Hence the importance of local supply chain is increasingly prominent.

The World Artificial Intelligence Conference 2022 focuses on AI commercialization and metaverse integration. According to the opening speech from the Ministry of Industry and Information Technology, China's AI has accelerated its development and has formed a complete industrial system. The global AI market size in 2021 was \$361.9 billion, and the China AI market size is RMB 404.1 billion; as of the end of July 2022, there are 23,089 AI enterprises worldwide, among which the U.S. and China account for 50%. Today, AI is at a key turning point in the transition from small-scale validation to large-scale application, and is expected to be used within five years in key industries such as urbanization, energy, medical, and manufacturing within 5 years. In the industry forum, Baidu CEO Robin Li proposed that the fastest progressing area of AI in commercial applications is autonomous driving, and that China's public acceptance and trust in autonomous driving is at the forefront of the world; and judged that due to the clear definition of accident responsibility, the first to enter commercial use after autonomous driving L2 is L4 instead of L3; in addition, he stated that the intelligent transformation of the transportation network can improve the efficiency of traffic by 15%-30%, corresponding to an annual GDP growth of about 2.4%-4.8%. We believe that autonomous driving technology innovation is complemented by institutional innovation and intelligent transformation of infrastructure. In 2022, various types of autonomous driving policies and management regulations have been introduced in China, providing an international leading policy environment for commercialization and scaling, while the improvement of traffic efficiency is expected to solve the problem of restriction on car purchases and traffic restrictions, injecting new momentum for economic growth in the post-epidemic era.

Risks. China-US relations worsen, progress of technological development in AI is less than expected.

附录 APPENDIX

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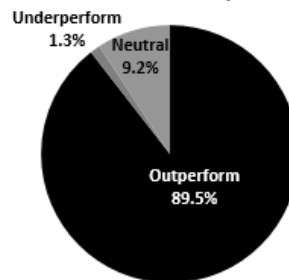
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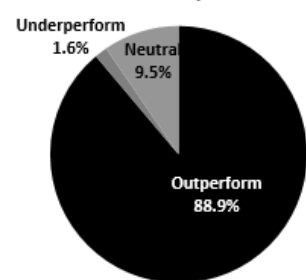
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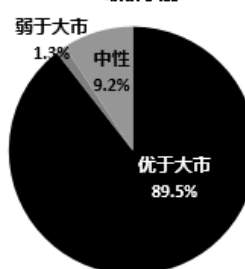
Most Recent Full Quarter



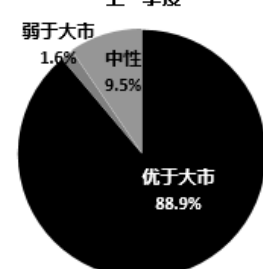
Prior Full Quarter



最新季度



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