

China Semiconductor

Domestic AI chip makers accelerating their push as Nvidia's alternatives

Reuters reported on 12 Dec that "Tencent and small chip designers in China are pitching their AI chips as alternatives to Nvidia's, hoping U.S. export restrictions will prompt clients to switch." ([link](#)) This article emerged after US Commerce Secretary Raimondo announced "strongest possible" action on Huawei's chip breakthrough. ([link](#)) As the US tightens China's access to advanced chips, we maintain our earlier view that domestic companies will look for Nvidia's alternatives at a faster-than-expected pace. And domestic AI chip makers will try to make good use of this opportunity window to accelerate chip development and launch to obtain a piece of this multi-billion dollar domestic market that is dominated by Nvidia. ([link](#)) The evidence of this trend is already visible. Per Bloomberg, Baidu ordered 1,600 Huawei's Ascend 910B chips (~US\$61.8mn), and per UDN, 360 ordered 1,000 AI chips from Huawei prior to Baidu's procurement.

■ **Implication 1: Huawei's role in offering alternatives to foreign tech's is prominent, but it's important to highlight the contribution of other smaller yet significant players in the development of home-grown solutions in China.**

- 1) Tencent is using the AI inference chip Zixiao it developed with deep learning startup Enflame, targeting Nvidia's products such as A10 and L40S. Zixiao is used internally only. The company also offers Nvidia or AMD's chips as other computing power options.
- 2) Alibaba released its self-developed Hanguang 800 AI inference chip in 2020. The computing power of a Hanguang 800 chip is equivalent to 10 GPUs. ([link](#))
- 3) Baidu has already achieved mass production and application of two generations of its Kulun general-purpose AI chips. Mass production of the first-gen Kulun AI chip was achieved in 2020 and 2021, becoming the first general-purpose AI chip in China to use GDDR6 and beating the performance of the previous generation by 2-3x. The third generation will reportedly hit the market in 2024. ([link](#))

While domestic AI makers are accelerating their product development, a challenge they all face is production capacity. They need to overcome the difficulty posed by US restrictions and find the foundry partners that can manufacture their products.

■ **Implication 2: Nvidia faces significant revenue decline in China in the upcoming year to comply with US export curbs. The company is determined to protect its substantial revenue from the China market and expand its global presence aggressively to make up for the potential revenue loss from the China market.** Nvidia CFO said "China and other affected destinations consistently contributed approximately 20-25% of data center revenue over the past few quarters". According to Reuters, the size of China AI chips market is ~US\$7bn and Nvidia owns ~90% market share. Nvidia is working closely with the US government to ensure new custom chips for the Chinese market are compliant with export curbs. In the meantime, CEO Jensen Huang paid high-profile visits to Japan, Malaysia, Singapore, and Vietnam over the past week, to strengthen relationships and foster collaboration.

- 1) Although there is a back-and-forth discussion on Nvidia's tailor-made chips for China, according to Reuters, US Commerce Secretary

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Raimondo said Nvidia "can, will and should sell AI chips to China because most AI chips will be for commercial applications," on Dec 12.

[\(link\)](#)

- 2) There is no doubt Nvidia can start shipping fully compliant tailor-made AI chips for China in 2024. One legit question is can the performance and cost of HGX H20, L20 PCIe, and L2 PCIe GPUs still win Chinese clients? Take H20 as an example: H100 is 6.68 times faster than H20 according to SemiAnalysis. Other media reports stated "H20's overall computing power is only equivalent to 20% of that of H100 and due to the addition of HBM video memory and NVLink interconnection modules, the computing power cost has increased also". [\(link/link\)](#) We believe Nvidia can leverage its strong software ecosystem to sell its tailor-made chips.
- 3) CEO Jensen Huang said he would prioritize Japan for AI chips during his visit to Japan on Dec 4. [\(link\)](#)
- 4) CEO Jensen Huang disclosed Nvidia was in talks with Singapore about potential investments and working with the city-state to help develop its large language model, Sea-lion [\(link\)](#)
- 5) Nvidia's CEO also said Malaysia can be a hub for AI 'manufacturing' [\(link\)](#) and will partner with local conglomerate YTL's utilities unit to develop AI infrastructure in a US\$4.3bn investment deal. [\(link\)](#)
- 6) Nvidia is broadening its collaborations with Vietnam's top tech firms and investing in talent development for AI and digital infrastructure. The company has already invested US\$250mn in Vietnam. [\(link\)](#)

We expect Nvidia will maintain its dominance in the AI accelerator market and collect the lion's share of the AI chip market revenue. However, it could face challenges from direct competitors like AMD and Intel, special chips designers inside Hyperscalers and Chinese chip makers. We think the current period presents an opportunity window for Chinese AI chip makers to catch up with leading names in the US. Considering the supply chain constraints and limited domestic production capacity, we think Huawei could be the biggest beneficiary.

Figure.1: Domestic AI chips achievements

Company	ASIC	Launch date	Node	INT8	FP16	Memory	Bandwidth	Power
Nvidia	A100 SXM	2021	7nm	1248TOPS	624TFLOPS	HBM2e	2039GB/s	400W
	H20	2023	-	296TFLOPS	148TFLOPS	HBM3	4000GB/s	400W
AMD	MI300A	2023	5nm+6nm	-	383TFLOPS	HBM3	3277GB/s	600W
Huawei	Ascend 910	2023	7nm	512TOPS	256TFLOPS	HBM2e	-	310W
	Ascend 910B	2023	7nm	-	-	-	-	-
Baidu	Kunlunxin Gen 2	2020	7nm	256TOPS	128TFLOPS	GDDR6	-	150-160W
Alibaba	Hanguang 800	2019	12nm	825TOPS	-	SRAM	-	276W
Tencent	Zixiao	2021	12nm	-	128TFLOPS	HBM2e	-	-
	Cloudblazer Yunsui i20	2021	12nm	256TOPS	128TFLOPS	HBM2e	819GB/s	-
Iluvatar	Tiangai 100	2021	7nm	256TOPS	128TFLOPS	HBM	1200GB/s	-
Intellifusion	Deepedge10	2023	14nm	12TOPS	2TFLOPS	DDR4	120GB/s	-
Hygon	Shensuan 1	2021	7nm	-	-	HBM2	1024GB/s	350W

Source: Company website, Cloudbin, Oceanpine, Reuters, CMBIGM

Although Huawei has not officially released details about its latest Ascend 910B chip, market analysis indicates that the Ascend 910B's performance slightly lags behind the A800 series. ([link](#))

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