

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

OUTPERFORM
(Maintain)

China Semi Sector

Lily Yang, Ph.D

(852) 3916 3716

lilyyang@cmbi.com.hk

Kevin Zhang

(852) 3761 8727

kevinzhang@cmbi.com.hk

Related Reports

1. "Hardware – Optical transceivers : Investors expect spectacular results in the AI infrastructure arms race" – 14 Aug 2023 ([link](#))
2. "Hardware – Optical transceivers: Implications from Coherent 2Q23 results and guidance" – 18 Aug 2023 ([link](#))
3. "Investors focusing on 800G transceivers ramp-up after 1H23 results" – 28 Aug 2023 ([link](#))
4. Thematic investment and megatrend: Riding the AI wave into the next phase – 17 Oct 2023 ([link](#))
5. Quick note on newly announced restrictions on advanced AI chips - 18 Oct 2023 ([link](#))
6. Technology (Hardware/Semi) – Hyperscalers to deploy more custom AI chips to optimize & integrate AI infrastructure for maximized performance – 17 Nov 2023 ([link](#))
7. Technology (Hardware/Semi): AI supply chain will continue riding the tailwind as Nvidia confirmed growth of data center into 2025 – 23 Nov 2023 ([link](#))

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	3277TB/s	600W
Huawei	Ascend 910	2023	7nm	512TOPS	256TFOPS	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	2TFOPS	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](#))

Disclosures & Disclaimers

Analyst Certification

The research analyst who is primary responsible for the content of this research report, in whole or in part, certifies that with respect to the securities or issuer that the analyst covered in this report: (1) all of the views expressed accurately reflect his or her personal views about the subject securities or issuer; and (2) no part of his or her compensation was, is, or will be, directly or indirectly, related to the specific views expressed by that analyst in this report.

Besides, the analyst confirms that neither the analyst nor his/her associates (as defined in the code of conduct issued by The Hong Kong Securities and Futures Commission) (1) have dealt in or traded in the stock(s) covered in this research report within 30 calendar days prior to the date of issue of this report; (2) will deal in or trade in the stock(s) covered in this research report 3 business days after the date of issue of this report; (3) serve as an officer of any of the Hong Kong listed companies covered in this report; and (4) have any financial interests in the Hong Kong listed companies covered in this report.

CMBIGM or its affiliate(s) have investment banking relationship with the issuers covered in this report in preceding 12 months.

CMBIGM Ratings

BUY	: Stock with potential return of over 15% over next 12 months
HOLD	: Stock with potential return of +15% to -10% over next 12 months
SELL	: Stock with potential loss of over 10% over next 12 months
NOT RATED	: Stock is not rated by CMBIGM
OUTPERFORM	: Industry expected to outperform the relevant broad market benchmark over next 12 months
MARKET-PERFORM	: Industry expected to perform in-line with the relevant broad market benchmark over next 12 months
UNDERPERFORM	: Industry expected to underperform the relevant broad market benchmark over next 12 months

CMB International Global Markets Limited

Address: 45/F, Champion Tower, 3 Garden Road, Hong Kong, Tel: (852) 3900 0888 Fax: (852) 3900 0800

CMB International Global Markets Limited ("CMBIGM") is a wholly owned subsidiary of CMB International Capital Corporation Limited (a wholly owned subsidiary of China Merchants Bank)

Important Disclosures

There are risks involved in transacting in any securities. The information contained in this report may not be suitable for the purposes of all investors. CMBIGM does not provide individually tailored investment advice. This report has been prepared without regard to the individual investment objectives, financial position or special requirements. Past performance has no indication of future performance, and actual events may differ materially from that which is contained in the report. The value of, and returns from, any investments are uncertain and are not guaranteed and may fluctuate as a result of their dependence on the performance of underlying assets or other variable market factors. CMBIGM recommends that investors should independently evaluate particular investments and strategies, and encourages investors to consult with a professional financial advisor in order to make their own investment decisions.

This report or any information contained herein, have been prepared by the CMBIGM, solely for the purpose of supplying information to the clients of CMBIGM or its affiliate(s) to whom it is distributed. This report is not and should not be construed as an offer or solicitation to buy or sell any security or any interest in securities or enter into any transaction. Neither CMBIGM nor any of its affiliates, shareholders, agents, consultants, directors, officers or employees shall be liable for any loss, damage or expense whatsoever, whether direct or consequential, incurred in relying on the information contained in this report. Anyone making use of the information contained in this report does so entirely at their own risk.

The information and contents contained in this report are based on the analyses and interpretations of information believed to be publicly available and reliable. CMBIGM has exerted every effort in its capacity to ensure, but not to guarantee, their accuracy, completeness, timeliness or correctness. CMBIGM provides the information, advices and forecasts on an "AS IS" basis. The information and contents are subject to change without notice. CMBIGM may issue other publications having information and/or conclusions different from this report. These publications reflect different assumption, point-of-view and analytical methods when compiling. CMBIGM may make investment decisions or take proprietary positions that are inconsistent with the recommendations or views in this report.

CMBIGM may have a position, make markets or act as principal or engage in transactions in securities of companies referred to in this report for itself and/or on behalf of its clients from time to time. Investors should assume that CMBIGM does or seeks to have investment banking or other business relationships with the companies in this report. As a result, recipients should be aware that CMBIGM may have a conflict of interest that could affect the objectivity of this report and CMBIGM will not assume any responsibility in respect thereof. This report is for the use of intended recipients only and this publication, may not be reproduced, reprinted, sold, redistributed or published in whole or in part for any purpose without prior written consent of CMBIGM.

Additional information on recommended securities is available upon request.

For recipients of this document in the United Kingdom

This report has been provided only to persons (I) falling within Article 19(5) of the Financial Services and Markets Act 2000 (Financial Promotion) Order 2005 (as amended from time to time) ("The Order") or (II) are persons falling within Article 49(2) (a) to (d) ("High Net Worth Companies, Unincorporated Associations, etc.") of the Order, and may not be provided to any other person without the prior written consent of CMBIGM.

For recipients of this document in the United States

CMBIGM is not a registered broker-dealer in the United States. As a result, CMBIGM is not subject to U.S. rules regarding the preparation of research reports and the independence of research analysts. The research analyst who is primary responsible for the content of this research report is not registered or qualified as a research analyst with the Financial Industry Regulatory Authority ("FINRA"). The analyst is not subject to applicable restrictions under FINRA Rules intended to ensure that the analyst is not affected by potential conflicts of interest that could bear upon the reliability of the research report. This report is intended for distribution in the United States solely to "major US institutional investors", as defined in Rule 15a-6 under the US Securities Exchange Act of 1934, as amended, and may not be furnished to any other person in the United States. Each major US institutional investor that receives a copy of this report by its acceptance hereof represents and agrees that it shall not distribute or provide this report to any other person. Any U.S. recipient of this report wishing to effect any transaction to buy or sell securities based on the information provided in this report should do so only through a U.S.-registered broker-dealer.

For recipients of this document in Singapore

This report is distributed in Singapore by CMBI (Singapore) Pte. Limited (CMBISG) (Company Regn. No. 201731928D), an Exempt Financial Adviser as defined in the Financial Advisers Act (Cap. 110) of Singapore and regulated by the Monetary Authority of Singapore. CMBISG may distribute reports produced by its respective foreign entities, affiliates or other foreign research houses pursuant to an arrangement under Regulation 32C of the Financial Advisers Regulations. Where the report is distributed in Singapore to a person who is not an Accredited Investor, Expert Investor or an Institutional Investor, as defined in the Securities and Futures Act (Cap. 289) of Singapore, CMBISG accepts legal responsibility for the contents of the report to such persons only to the extent required by law. Singapore recipients should contact CMBISG at +65 6350 4400 for matters arising from, or in connection with the report.