



A New Era Under Construction: Memory Business in China

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Memory Business in China: 5W1H

- Why is so much attention paid to memory?
- What is ideality and reality?
- When is the timeline?
- Where should efforts be spent?
- Who are players?
- How should China catch up?



Industry Transition in China

Opportunities in traditional industries has saturated...



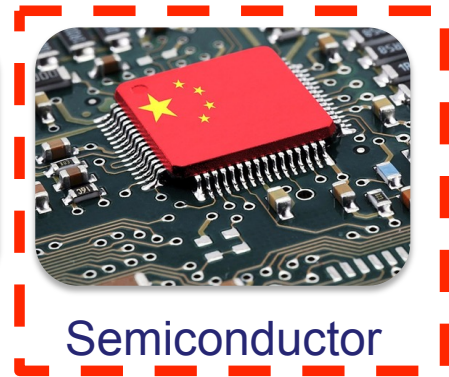
Airport



Rail System



Real Estate



Semiconductor

Last 10+ years was focus of semiconductor foundries.
Next 10+ years => memory?

Made in China 2025
(MIC2025)



Influential Tech. Players in China

Entrepreneurs, companies and innovations driving China's tech revolution.



These players have a large amount of buying power in memory product.



Memory Supply v.s. Demand in China

Domestic suppliers only able to supply a small fraction of China's IC demand

System	Device	Core IC	Self Sufficiency
Computer System	Server	MPU	0%
	PC	MPU	0%
	Industrial	MPU	2%
General Purpose System	Programmable Logic Device	FPGA/CPLD	0%
	Digital Signal Processing	DSP	0%
Mobile		Application Processor	18%
		Communication Processor	22%
		Embedded MPU	0%
		Embedded DSP	0%
Routers & Switches		Network Processor Unit	15%
Storage System	Semiconductor Memory	DRAM	0%
		NAND Flash	0%
		NOR Flash	5%
Display System	TV	Image Processor	5%
		Display Driver	0%

Memory Consumption in China ~ \$20B USD in 2016

Mainly supplied by



Status of Memory Sector in China



Irrational Expectations

Effects of government factors are over-exaggerated

Everything takes much longer time and more resource than many would think

Elevated risks of low ROI investments



Falsely Alarmed

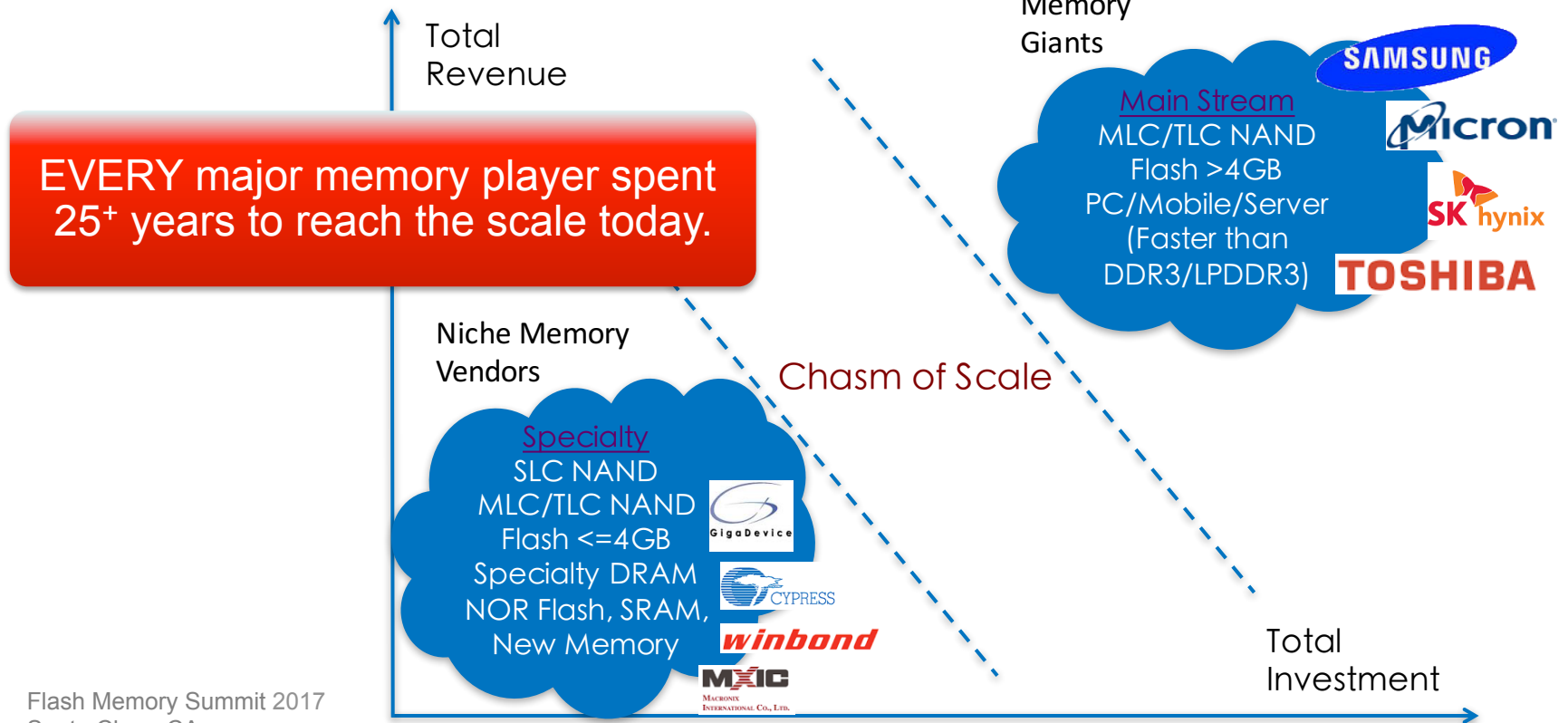
China's memory industry still supplies less than **1%** of the total world memory revenue, and does not have advanced mainstream memory technology.

Global memory sector is over-consolidated, and China could be the solution

Caused huge barrier for local companies in normal international collaborations

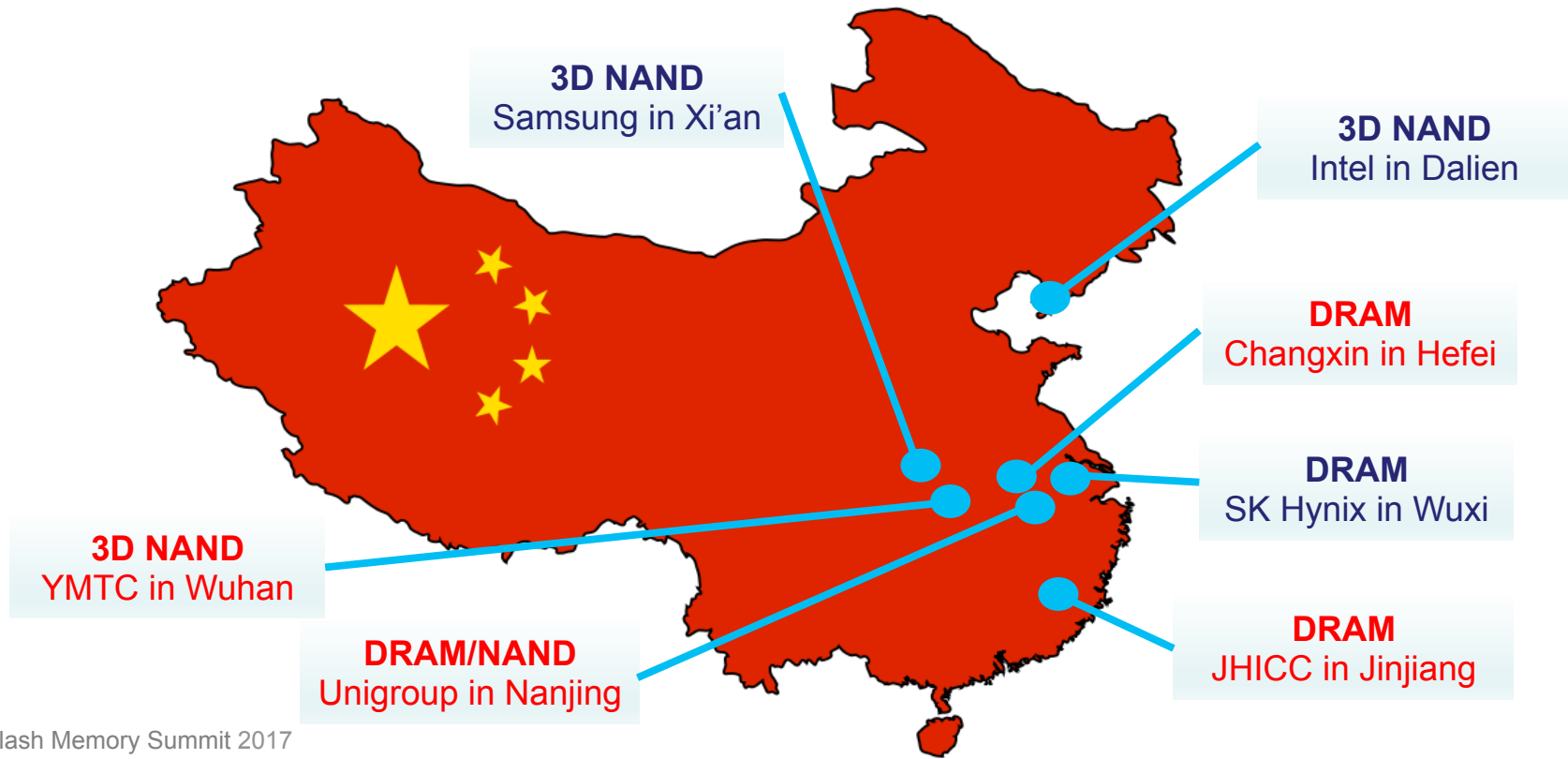


Memory Eco-System



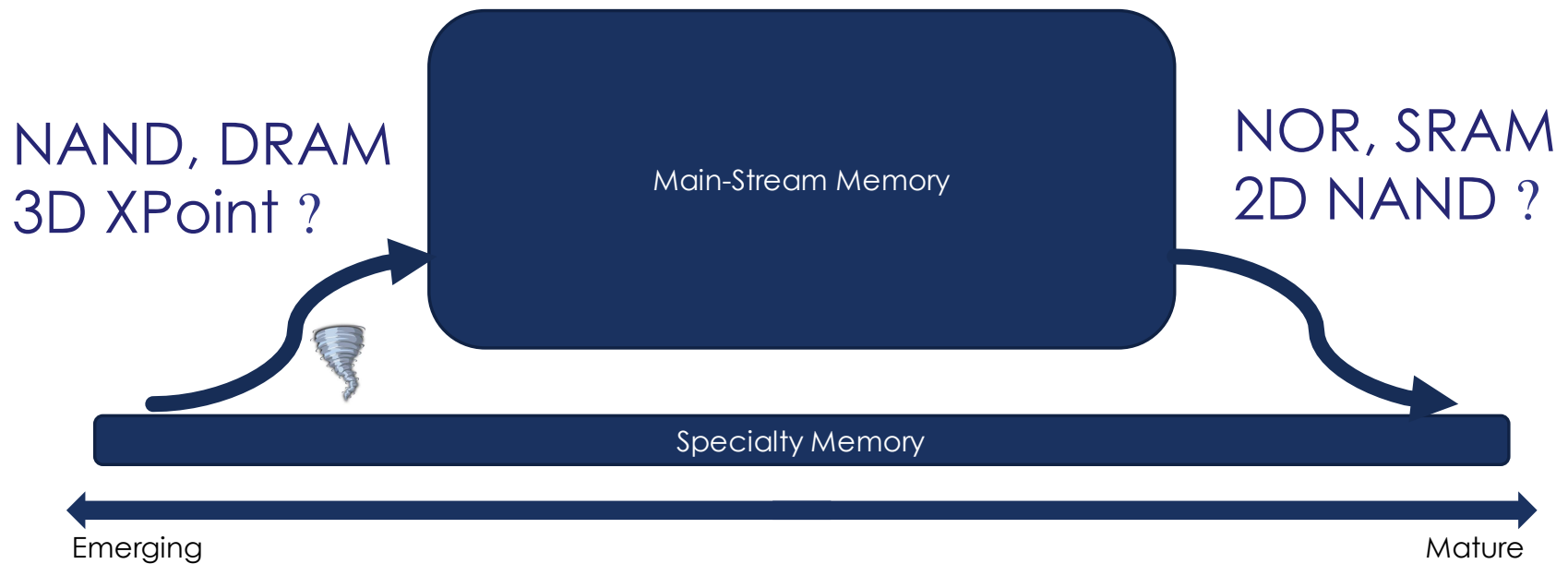
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Santa Clara, CA

“Big Memory” Players in China



Historic Trend in Memory Business

Dynamic shift from Specialty Memory to Main-Stream Memory





Specialty Memory Landscape in China

Hence, memory industry in China should start from specialty memory sectors. And it has been happening!

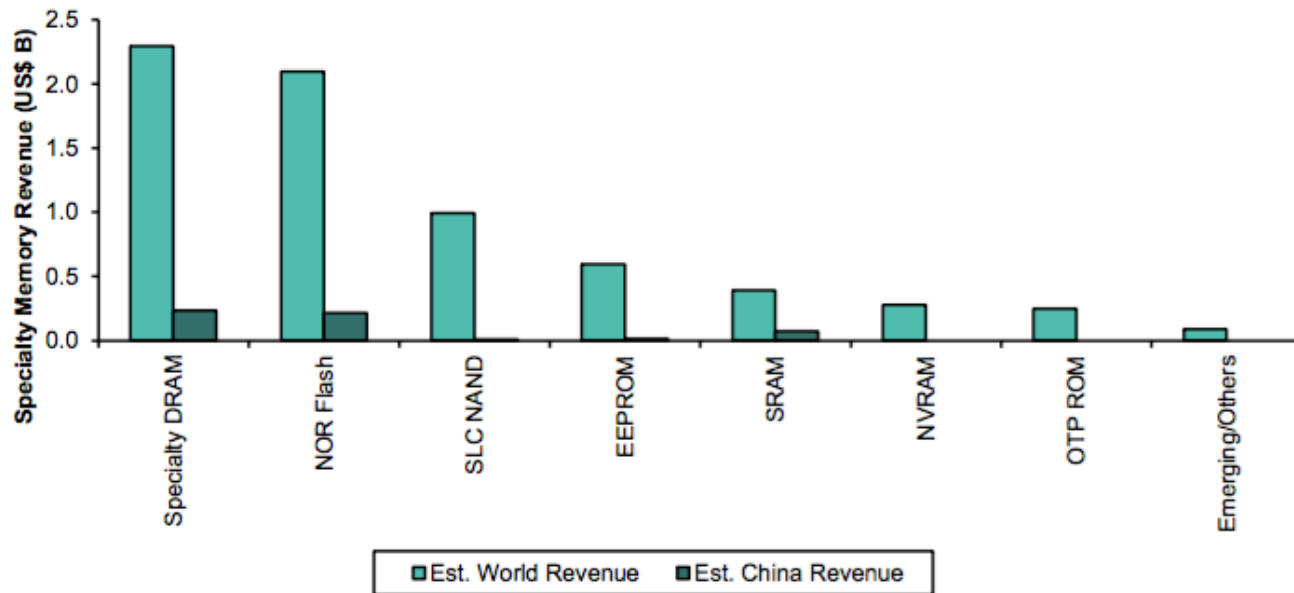
Business Model	Specialty DRAM	Specialty NAND Flash	NOR Flash	EEPROM	SRAM	NVRAM	Emerging Memory
Fabless	ISSI	GigaDevice ISSI DoSilicon	GigaDevice ISSI DoSilicon	Fudan	ISSI	NA	Ciyu HikStor Xinchu AMT
Foundry/ IDM	Jinhua	SMIC	SMIC XMC HLMC	SMIC Huahong	SMIC HLMC	NA	SMIC

Source: GD internal



Specialty Memory Market Sector

China's specialty memory industry is still at an early stage with just a tiny share of the global market.





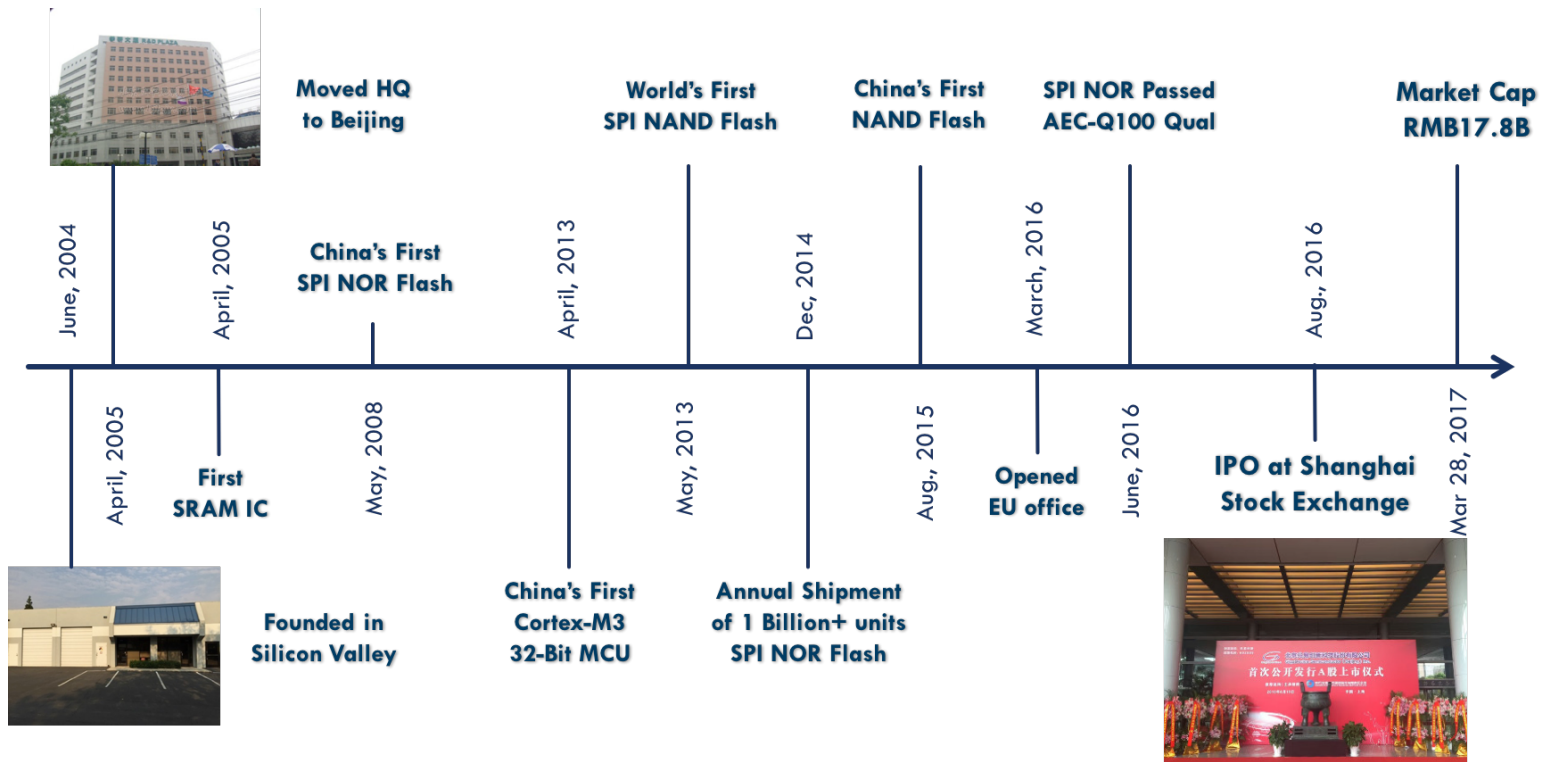
New Opportunities for China

Emerging memory technologies has been developed in China

Challenges	Opportunities
Limited market size	More suitable for small-mid sized companies
Higher development cost and risks	International technology companies are more open for collaborations with Chinese partners
Fabless model for startups	Local foundries has more leverage in technology adoption
Need help on fundamental research	Chinese research institutes and universities are very active in this area
A solution trying to find problems	China has one of the most diversified markets in the world

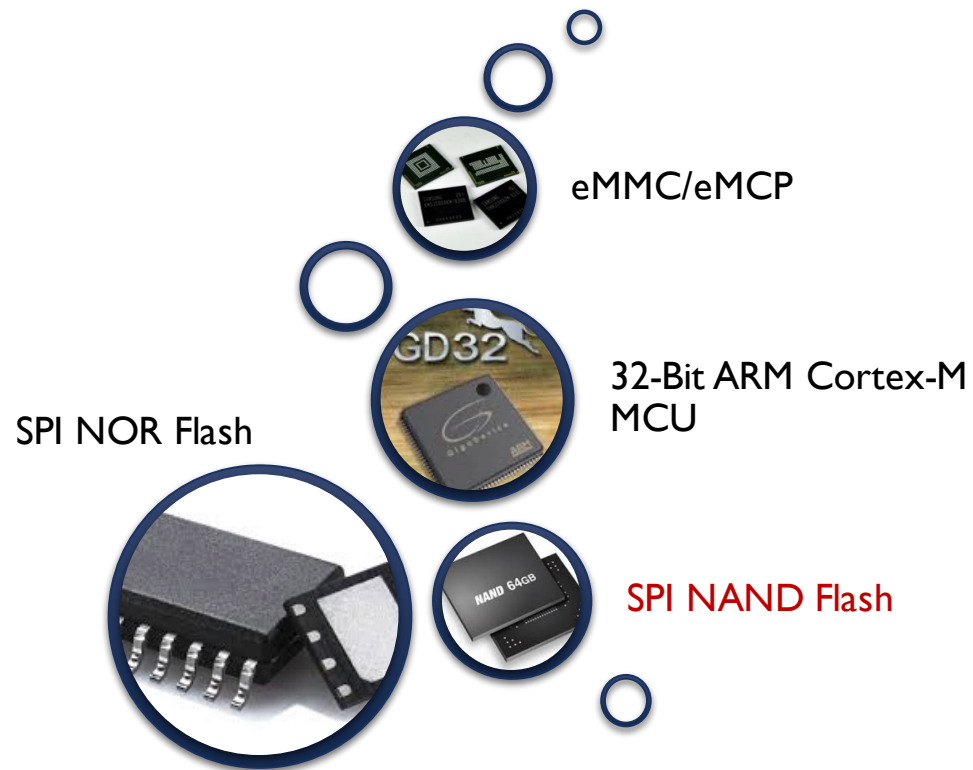


GigaDevice Semiconductor Inc.



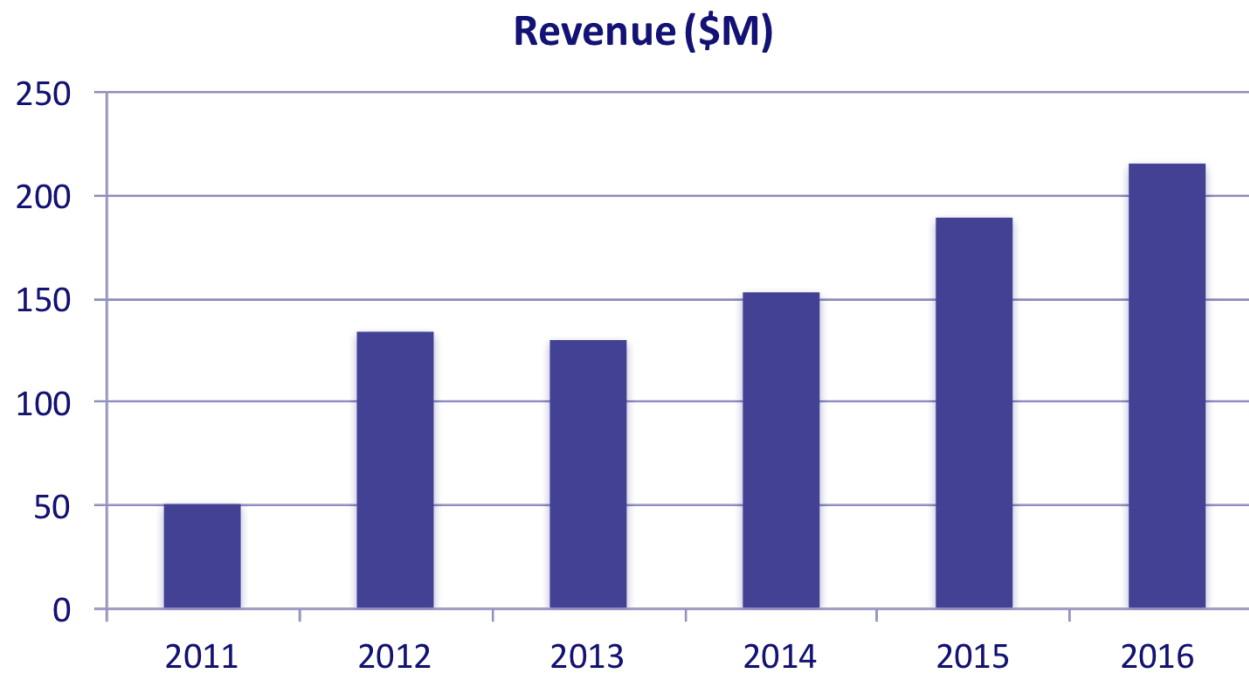
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GigaDevice Product Portfolios





GigaDevice Revenue Growth





Summary

1. Domestic supply-demand imbalance and industry transition are the main driving forces for the memory business in China. Chinese brand-names become increasingly influential customers in the growth of global memory market.
2. Historically, it follows the prescribed order and take more than 20 years to become a valid player in memory eco-system. Chinese vendors need to cross the chasm of scale, under significant risks in ROI and R&D.
3. Specialty memory market can serve as an incubator of future main-stream memory. China has developed an eco-system for specialty memory. However, it is still at an early stage of development.
4. There are plenty of room for product innovations in specialty memory as well as emerging memory. GigaDevice is committed to become one of the world leaders in the specialty memory market



Thank you