

Micron	
Ticker Site BiG	MU
Ticker BiGlobal Trade	MU
Ticker BT24	MU
Ticker BiG Power Trade	MU
P/E Ratio 2019E	7.62
P/BV Ratio	1.47
EV/EBITDA	2.12

Source: BiG Research;

Price and Performance (Values in USD)	
Price	47.19
52 week high	55.40
52 week low	28.39
YTD	48.7%
Average daily volume (un)	30,162,684
Market Capitalization (mn)	52,088
Beta	1.40
Dividend	0.00
EPS	12.27

Source: BiG Research;

Analysts Consensus (last 3 months)	
Buy	18
Hold	10
Sell	4

Source: BiG Research;

Financial Data	
Sales (USD mn)	30,391
EBITDA (USD mn)	19,753
Number of Employees	36,000
ROA	22.9%
ROE	31.5%
D/E	0.14

Source: BiG Research;

Notes:

All quotes were updated in Bloomberg at 09h46 of July 23rd, 2019.

Relevant Information:

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<https://www.big.pt/InformacaoMercado s/TradingIdeas/Index/-1>

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<https://www.big.pt/pdf/Newsletters/nld.pdf>

Micron (Ticker: MU US)

Description

Micron is a semiconductor player specialized in the manufacturing of memory and storage solutions. Their main challenge is to constantly reduce the cost of memory and increase its speed. The company wants to leverage on the new 3D XPoint technology and for that, bought recently Intel's stake in its joint venture.

Micron trades in the NYSE with a market capitalization of USD 52 bn.

Investment Case

Micron is specialized in memory chips, and despite current slowdown in demand, in the long run, memory chips demand are expected to increase as more people use more data and storage and memory processing needs increase. The company is trading at a very depressed P/E however due to the volatility of revenues and margins growth this P/E can change rapidly to a higher one. Consequently it would be prudent to wait for a more clear perspective in this segment before committing to an investment in the company.

Environmental, Social and Governance (ESG)

Environment: In 2018, the company used 5,224 mn KWh of electricity, 96 bn liters of water and approximately 6.1 mn metric tons of CO₂. In 2018 generated around 163.4 thousand tonnes of waste of which 82% was recycled.

Social: It supports multiple non-profit foundations and organizations with 100,000 hours of voluntary work in 2018 and 150,000 hours goal for 2019.

Governance: The company only has 30% of women in its employees. Training hours per employee reached 37h per year.

Relative Valuation

Name	Country	Market Cap (mn)	Currency	P/E 2019E	YTD	Div. Yield	NetDebt/ EBITDA	Margin EBITDA
CABOT MICROELECTRONICS CORP	UNITED STATES	3,346	USD	17.1	20.8%	1.4%	3.7	27.5%
TERADYNE INC	UNITED STATES	8,028	USD	19.9	49.3%	0.8%	-0.9	28.8%
AMKOR TECHNOLOGY INC	UNITED STATES	1,857	USD	96.9	18.1%	0.0%	1.1	19.1%
INFICON HOLDING AG-REG	SWITZERLAND	1,371	CHF	23.6	14.5%	3.9%	-0.7	22.3%
ENTEGRIS INC	UNITED STATES	5,247	USD	20.1	38.8%	0.7%	1.6	25.2%
ASML HOLDING NV	NETHERLANDS	88,069	EUR	33.8	50.8%	1.0%	0.3	27.0%
MKS INSTRUMENTS INC	UNITED STATES	4,515	USD	16.6	28.6%	1.0%	1.2	24.8%
KLA CORP	UNITED STATES	22,166	USD	16.4	53.3%	2.2%	0.9	38.0%
APPLIED MATERIALS INC	UNITED STATES	47,489	USD	17.1	54.9%	1.6%	0.4	27.7%
ADVANCED MICRO DEVICES	UNITED STATES	35,531	USD	51.5	78.0%	0.0%	0.3	9.7%
NVIDIA CORP	UNITED STATES	104,334	USD	32.2	28.3%	0.4%	-1.6	30.5%
INTEL CORP	UNITED STATES	229,894	USD	12.0	9.4%	2.4%	0.4	46.2%
MICRON TECHNOLOGY INC	UNITED STATES	52,088	USD	7.6	48.7%	0.0%	-0.2	60.8%
Average exc. Micron				29.8	37.06%	1.28%	0.5	27.2%

Source: BiG Research

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Analyst:
João Calado, CFA

Research:
research@big.pt

Income Statement (USD mn)	2018	2017
CNBU	15,252	8,624
MBU	6,579	4,424
SBU	5,022	4,514
EBU	3,479	2,695
Others	59	65
Revenues	30,391	20,322
Cost of goods sold	12,500	11,886
Research & Development	2,141	1,824
General and administrative	813	743
Other expenses	-57	1
Operating Expenses	15,397	14,454
EBIT	14,994	5,868
Interest expenses	687	672
EBT	14,307	5,196
Taxes	168	114
Net Income	14,138	5,090
Earnings Per Share	12.27	4.67

Source: Company's data

Income Statement

Sales in 2018 fiscal year (ended in August 30th 2018) increased 49.5% and EBIT margin improved from 28.9% to 49.3%. Growth was mainly due to Computer & Networking business unit (+77% YoY) which represented around 50% of sales and Mobile business unit (+49% YoY). Together, these units represented in 2018, 84% of the operating income. The increase in DRAM sales (+64%) was due to pricing (+35%) and volumes (+20%). NAND products sales increased by 26%, despite declines in average selling price, as volumes increased by +40%. R&D expenses vary greatly with the number of development wafers processed, cost of advanced product dedicated to new products and process development and personnel costs. Due to co-sharing agreements with Intel, Micron received reimbursements of around USD 200 mn in 2018 which will decrease significantly in 2019 as the agreement will end. Tax expenses are very low as the company has a tax incentive agreement which had a positive effect in 2018 of USD 1.96 bn.

Free Cash Flow (USD mn)	2018	2017
Operational Cash Flow	17,400	8,153
Business Net Income	14,138	5,090
Depreciation and Amortization	4,759	3,861
Changes in Working Capital	-1,922	-1,420
Others	425	622
Investment Cash Flow	-8,216	-7,537
Capex	-8,879	-7,368
Financial investments & others	663	-169
Financial Cash Flow	-7,776	349
Debt change	-9,185	753
Share buyback	1,655	142
Dividends	0	0
Others	-246	-546
Change in free cash flow	1,408	965
FX	-37	-12
Cash at the end of period	6,587	5,216

Source: Company's data

Free Cash Flow

Micron has to invest heavily to keep up to date with the last technologic advancements, so it invests a high portion of cash flows in capex. For 2019 Micron expects to invest around USD 9 bn, but a meaningfully lower Capex in 2020. In 2018 the company paid around USD 9bn of its debt. Regarding shareholder remuneration, the company approved in May 2018 a buyback program of up to USD 10bn. During the 9 months ended in May, Micron purchased around USD 2.66bn in shares.

Balance Sheet

After paying a sizeable portion of debt in 2018, Micron has now USD 2.6bn of net cash. The company at the end of 3Q19 (fiscal) accumulated a high level of inventories (around USD 4.9bn) so capex is expected to decrease in order to help reduce inventory levels.

Balance Sheet (USD mn)	2018	2017
Assets	43,376	35,336
Cash & Equivalents	6,506	5,109
Short term investments	769	936
Receivables	5,478	3,759
Inventories	3,595	3,123
Property and equipment	23,672	19,431
Intangible Assets & Goodwill	1,559	1,615
Other Assets	1,797	1,363
Liabilities	10,112	15,845
Short term Debt	859	1,262
Long term Debt	3,777	9,872
Payables	4,611	3,664
Other liabilities	865	1,047
Total Shareowner's Equity	33,264	19,491
Total Equity and Liabilities	43,376	35,336

Source: Company's data

Third fiscal quarter earnings and guidance

In the quarter which ended on 30th May 2019, Micron had revenues of USD 4.79bn vs est. USD 4.68bn and EPS of USD 1.05 vs est. USD 0.78. These compare with revenues of USD 7.8bn in the same quarter of 2018, and EPS of USD 3.15. The company ended the quarter with a net cash position of USD 3bn.

Semiconductor industry overview by Micron: DRAM should return to healthy YoY growth in the second half of 2019. NAND demand is already increasing due to the reduction of prices in the last year. Regarding inventories, Micron still sees producers with a high level of inventory and anticipates that further cuts of capex are needed in the industry in order for supply to balance. Mobile business was impacted by US trade restrictions, but innovations as 5G and foldable phones will drive growth. Cloud DRAM shipments are recovering with decrease in inventories, while enterprise customers' inventories are still high. In the PC market, DRAM shipments are improving as shortages of CPU improved (still Micron will adjust the supply by -5%). In Automotive, despite lower sales, content per car is growing. NAND market remains oversupplied due to the rapid transition from 2D NAND to 3D NAND, so Micron will adjust supply to decrease by 10% (vs 5% previously).

Management Team

Sanjay Mehrotra (President and CEO): Sanjay was co-founder of SanDisk in 1988, and served as President and CEO until it was purchased by Western Digital in 2016. He was appointed CEO of Micron after the retirement of Mark Durcan in 2017. He has a bachelor and master degree in Electrical Engineering and Computer Sciences by University of California, and completed a Businesses' Executive Education Program in Stanford.

In 2018, Sanjay Mehrotra, received from Micron around USD 10.5mn, including salary (USD 0.6 mn), stocks and options (USD 8.8mn), bonus (USD 0.9mn) and other benefits.

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Source: Company's data

Analyst:
João Calado, CFA

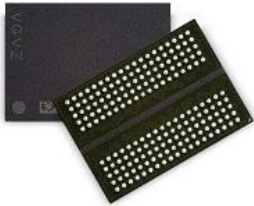
Research:
research@big.pt

▲ **Products and segments**

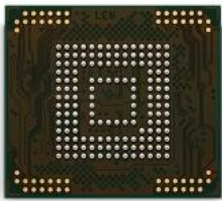
Compute and Networking Business Unit (2018 rev. USD 15.3bn, growth +77%, op. marg. 64%): This segment sells memory products to cloud server, enterprise, client, graphics and networking markets. In 2018, Micron achieved volume production of the 8Gb GDDR6 memory.



DDR4 SDRAM; Source: Company's data.



Graphics Memory; Source: Company's data.



3D NAND; Source: Company's data.



SATA SSD; Source: Company's data.

- **Cloud:** In 2018 datacenters were the fastest growing market with increases in DRAM content per server. This market has been driven in part by AI and AR to store and access data in the cloud. Both of these need increasing quantities of DRAM. Micron expects to continue to grow in 1Xnm portfolio and continue increase in 2nd generation 1Xnm 8Gb DDR4 products.
- **Enterprise:** Similar to cloud, the AI trend has been demanding more DRAM. In 2018, Micron qualified its 32GB non volatile module at key OEMs and begun shipping in volume its 128GB TSV RDIMMS.
- **Client:** Significant sales of 1Xnm technology.
- **Graphics:** Micron's GDDR5/5x DRAM graphics products are used in VR, AR, and crypto-mining technology. In 2018 achieved volume production of the 8GB GDDR6 DRAM.
- **Networking:** This market is characterized by long life cycle products. A majority of products sold are the 30nm and 25nm series DRAM technology. In 2018 Micron accelerated the shift from DDR3 to 4Gb DDR4 DRAM into emerging 5G applications.

Mobile Business Unit (2018 rev. USD 6.6bn, growth +49%, op. marg. 46%): This segment sells memory products to smartphones and mobile devices market. It includes products such as discrete DRAM, discrete NAND and managed NAND. MBU managed NAND includes eMMC and universal flash storage. It also includes eMCP solutions with LPDRAM. In 2018 Micron announced a new 64 layer, second generation 3D NAND storage which support high speed UFS 2.1 standard and eMMC 5.1 standard. It also achieved product qualification of its 1Xnm LPDDR4 DRAM with major smartphones OEMs.

Storage Business Unit (2018 rev. USD 5bn, growth +11%, op. marg. 19%): This is the segment responsible to sell SSDs and component solutions to enterprise, cloud, client and consumer storage markets. Includes the 3D XPoint memory and NAND products sold to Intel at approximately cost price under a long term supply agreement. In 2018 delivered the first commercially available QLC 3D NAND technology, which achieves 1 Tb density per die.

Embedded Business Unit (2018 rev. USD 3.5bn, growth +29%, op. marg. 42%): This segment sells memory and storage products into automotive, industrial and consumer markets.

▲ **M&A**

Acquisition of Intel's stake in IM Flash Technologies joint venture: In the mid 2000s, Micron did a deal with Intel to produce flash memory for Apple products, creating IM Flash Technologies joint venture. However in the end of 2018, Micron announced the intention to exercise an option to buy out its IM FT partner, Intel (49% stake), for USD 1.4 bn. The CEO, Sanjay, says the deal will enable Micron to accelerate R&D and optimize manufacturing of the new 3D XPoint technology. Micron will still sell 3D XPoint memory wafers to Intel for a year after close date, which is still not set. The deal is set to be completed by October 31st of 2019.

Acquisition of Inotera: At the end of 2016, Micron completed the acquisition of the remaining stake of Inotera (66%) for a value of USD 4bn. The 33% initial stake was acquired in 2008 and is being disputed in court (see in Risks segment below).

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Risks

Changes in industry difficult to predict: The semiconductors industry is changing constantly due to the development of new technologies and shift in consumer trends. Consequently it is difficult to accurately predict these patterns and may lead to a decrease in sales if the company products fail to address the industry needs.

Trade Wars: Around 88% of its sales are outside of US, so an escalation of trade wars and tariffs may impact directly sales and margins of the company.

Huawei ban list: The ban imposed by US on sales of products of US companies to Huawei could impact revenues of Micron, as Huawei represents around 13% of sales. Notwithstanding, the company said in 3Q18 conference call that there was still no impact and did not expect a major impact in next quarter as through the analysis of the list of products, Micron concluded that certain products could still be sold. However it also stated that if the ban would continue into 2020 could affect more severely their sales.

China litigation: Micron was accused in China courts of patent infringements. The outcome is still not certain and the company is unable to provide an estimation of possible costs or damages.

Pending litigation related to purchase of Inotera shares: The director of Qimonda insolvency proceedings filed a suit against the company, requesting the transfer of the 18% share of Inotera that Micron purchased in 2008 to the Qimonda Estate. The Court issued interlocutory judgements ordering the transfer to the Qimonda estate, the Inotera shares still owned by Micron and the payment of a compensation for any shares previously sold to 3rd parties. The company appealed this decision.

Rating		
Agency	Rating	Outlook
S&P	BB+	POS
Moody's	Baa3	STABLE
Fitch	BBB-	STABLE

Source: BiG Research

Graph

1D EQ MU:xnas



Source: BiGlobal Trade (partner Saxo Bank); BiG Research

Calendar

September 19th, 2019: 3Q19 earnings

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