FLASH NOTE – KLA-TENCOR

DECEMBER 12TH, 2019

KLA-Tencor	
Ticker Site BiG	KLAC
Ticker BiGlobal Trade	KLAC
Ticker BT24	KLAC
Ticker BiG Power Trade	KLAC
P/E Ratio 2019E	16.46
P/BV Ratio	9.59
EV/EBITDA	16.13

Source: Big Research;

Price and Performance (Values in USD)	
Price	161.74
52 week high	179.95
52 week low	80.65
YTD	80.7%
Average daily volume (un)	1,504,157
Market Capitalization (mn)	25,526
Beta	1.18
Dividend	3.00
EPS	7.53

Source: BiG Research;

Analysts Consensus (last 3 months)	
Buy	11
Hold	6
Sell	1

Source: BiG Research;

Financial Data	
Sales (USD mn)	4,569
EBITDA (USD mn)	1,623
Number of Employees	10,200
ROA	15.1%
ROE	53.3%
D/E	1.28
Dividend Yield	1.92%

Source: BiG Research;

Notes:

All quotes were updated in Bloomberg at 11h00 of December 07th, 2019.

Relevant Information:

Use the following link to view our most recent publications:
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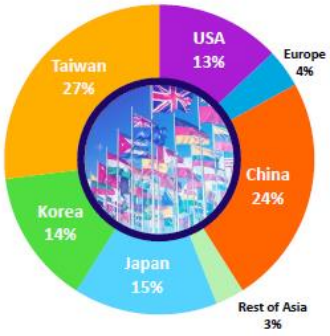
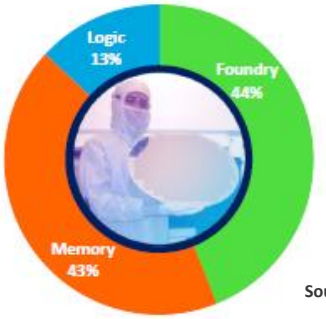
Use the following link to see our recommendation history:
https://www.big.pt/pdf/Newsletters/nld.pdf

KLA-Tencor (Ticker: KLAC US)

Description

KLA-Tencor or KLA is a California-based company within the semiconductor business that specializes in supplying equipment related to process control and yield management for the semiconductor industry and others related. This means that it is not, directly, involved in the fabrication of semiconductors but rather that it provides the equipment that enables others (such as Samsung, TSMC or Intel) to accelerate their development and production ramp cycles, to achieve higher and more stable semiconductor die yields, and to improve overall profitability by guaranteeing that the equipment and products they use is problem-free. This is called process control (which is inside the broader semiconductor equipment industry) and KLA is the major player. Its products are used by the vast majority of wafer, integrated circuits, photomask and hard disk drive manufacturers around the world. It was formed in 1997 from the merger of KLA with Tencor. It is headquartered in California and employs around 10000 people through the whole world.





Source: Company Data;

Investment Thesis

Semiconductor is one of the hype sectors because of all the talk about its growing use in data centers, in internet of things (IoT), in AI, in 5G, virtual reality, autonomous driving, robotics, etc. All these require much stronger computing and there is little doubt that semiconductors use will increase in the future. The big question is whether there are good returns on capital to be had there and, if so, which company is the best positioned to do so. KLA has the advantage of practically having a monopoly in process control which is very likely to increase in demand in the future as EUV use becomes more widespread. The company would be a strong buy, however its high price point (at a P/E of 22 for 2019) and the return YTD (of more than 80%) leaves us thinking that we can buy the company at a more attractive price (the sector is very cyclical and prone to large downturns).

Investment Points

Sector Economic Transition: The argument for KLA begins with the fact that, until now, Moore's law has held. This allowed semiconductors factories to increase their unit output by upgrading equipment (but not necessarily needing to put up new ones) as unit size became more reduced. An analogy would be like a pizza being cut into smaller slices. Equipment prices, however, did not follow this output trend and this meant that while a 180nm would not cost twice the price of a 150nm it might produce 2x more die with the same wafers. This allowed producers to keep increasing output with little increases in capex. This is what is behind the fact that the semiconductor equipment industry has lagged behind the broader sector. However, further reductions in size are exponentially more complex and this means that to get further reductions you need more and more specialized equipment. Device structures are smaller, narrower, taller and deeper, with complex shapes and new materials. Discriminating defects from benign physical variations (signal from noise) becomes incredibly difficult. The cost curve becomes exponential and the way to produce more is to either increase equipment quality (technology purchase) or to build more factories (capacity purchase). KLAC wins with both.

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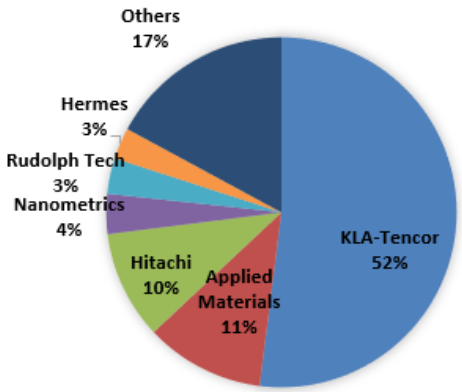
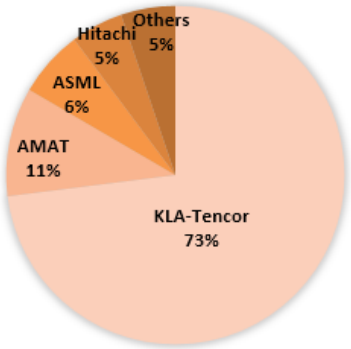
Process equipment share (2018):



Source: theinformationetwork; BiG Research

Market share in the metrology and wafer inspection segment (2019):



Source: theinformationetwork; BiG Research

Wafer Fabrication Equipment (WFE) Monopoly: The WFE market is now primarily concentrated into the hands of just a few companies: Applied Materials, ASML, KLA-Tencor, Lam Research, Tokyo Electron, Screen Semiconductor and Hitachi High Tech. These are divided into 4 main areas of equipment: deposition which is dominated by Applied Materials (~50%), lithography dominated by ASML (~75%), etch (material removing) by Lam Research (~57%) and process control where KLA-Tencor is king with a ~52% share which it has maintained for over 20 years (the other competitors are primarily AMAT, Hitachi and Lasertec) and which has not been in decline in recent years. These are very difficult markets to enter due to all the technological and capital barriers. Overall, KLA has 13% of the total semiconductor equipment market in 2019. Inside the process control market, the 3 major segments are metrology, wafer defect inspection and mask inspection. KLA has a 73% market share in metrology and wafer defect inspection while in mask inspection and others the market is much more competitive and its share is significantly lower. *(at the end of this note is a list of the product the company offers).

Demand for Extreme Ultraviolet (EUV) mask inspection: As semi companies move from 10nm to 7nm and to 5nm, they can choose between staying with DUV (deep UV) lithography, and utilizing multiple patterning techniques, or moving to EUV lithography and avoiding the costly multiple patterning. Both DUV and EUV lithography systems are made by ASML. For KLAC, it does not matter what lithography system the customer is using. It sells metrology/inspection for either methodology. As long as semiconductor producers move to smaller nodes, more sophisticated equipment is required (DUV will require more and more layers to improve) while EUV may have fewer need for layers (and, from there, less process control needs) but there is an increase in the level of process control intensity in the mask shop (to make sure its high quality) and in print check and this means that the equipment sold ends up being more expensive (the overall transition from DUV to EUV is positive for KLA). LRCX and AMAT do not have this advantage as the multiple patterning process required with DUV requires deposition and etch equipment while that need is eliminated with EUV. Therefore, as long as EUV is continuously adopted, its shipments should continue to be strong.

Provider of both optical and e-beam wafer inspection: In what comes to patterned wafer inspection, KLA's flagship was its Gen-5 and Voyager platforms which used an optical system to evaluate the wafer for defects. ASML, on the other hand, offered an e-beam platform which competed directly with it (and which was already representing close to 20% of the patterned wafer inspection segment). In the last Investor Day, however, KLA announced that it was also offering an e-beam system (its first since a few years back) that can also have connectivity with the optical system. This means that the company is now offering both solutions for inspection and is, therefore, less at risk of losing market share.

High-aspect ratio structures in NAND flash memory and continued scaling in DRAM: KLA has technology (CD SAXS) that uses X-ray to inspect the memory structure and can be a solution to the needs in memory (similar to logic) of higher speed, higher density and lower bit costs and the overall growth in demand for efficient memory. This is a longer-term prospect than logic (since efficiency is, for now, less important in memory than in logic) but the development of these technologies will also require the scaling to smaller cell designs. This dimension shrink has already driven the introduction of multiple patterning technology (similarly to logic) but it will also, eventually, require the need of transitioning to EUV lithography in high volume manufacturing.

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Income Statement (USD mn.)	2017	2018	2019
Revenues	3,480	4,037	4,569
COGS	1,284	1,442	1,744
SG&A	379	432	511
R&D	523	608	708
EBIT	1,294	1,555	1,606
Net Interest	103	81	93
Taxes	250	212	131
Others	14	459	206
Net Income	926	802	1,175

Source: Company Data

Balance Sheet (USD mn.)	2017	2018	2019
Cash & Equivalents	3,017	2,880	1,739
Receivables	571	652	990
Inventories	733	932	1,263
Intangible Assets	368	374	3,773
Property Plant & Equipment	284	286	449
Other Assets	559	495	795
Total Assets	5,532	5,619	9,009
Short term Debt	250	0	250
Long term Debt	2,680	2,237	3,173
Payables	147	169	202
Others	1,128	1,592	2,705
Total Liabilities	4,206	3,999	6,331
Total Equity	1326	1621	2678

Source: Company Data

Free Cash Flow (USD mn.)	2017	2018	2019
Operational Cash Flow	1080	1229	1153
Net Income	926	802	1175
D&A	58	63	233
Change in WC	46	300	-354
Others	50	64	98
Investment Cash Flow	-561	292	-1181
Capex & Intangibles	-39	-67	-130
Others	-522	359	-1,050
Financial Cash Flow	-473	-1270	-360
Proceeds from short-term debt	0.0	248.7	-2.5
Proceeds from long-term debt	-130.0	-946.3	1186.3
Proceeds from Equity (buybacks)	-25.0	-203.2	-1050.9
Dividends	-344.0	-402.1	-472.3
Others	26	33	(21)
Change in free cash flow	45	251	-388

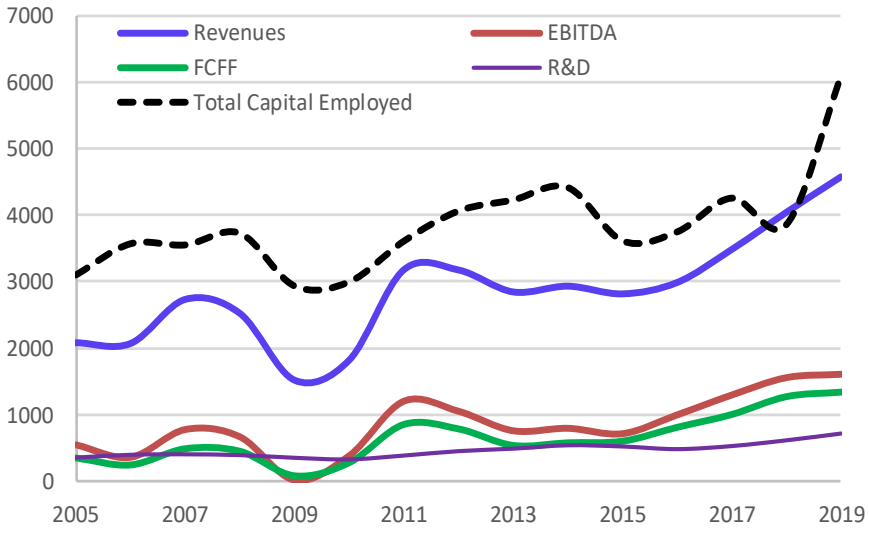
Source: Company Data

Financial performance and guidance

During the first 3 quarters of 2019 the company managed to grow its revenues by 18.4% (when compared to 2018) going from USD 3.2B in revenue to USD 3.8B. In the latest quarter (3rd of 2019) its revenue grew 12.3% QoQ and 30% YoY. Growth in revenue has come from the acquisition of Orbotech (which was completed in February 2019 and is already included in the 2019 statements) but it has also come from an increase in core products. It has come, primarily, from increased mask inspection purchases (from its Teron system products) and purchases of its optical wafer inspection platforms which are associated with the flagship Gen5 and Voyager optical inspection platforms (they expect Gen5 shipments to double in 2019 vs. the last year) and the launch of the new e-beam inspection platform. The company has been riding the wave of increased infrastructure investments in EUV technologies. 2019 was a particularly good year because there was penetration to practically all of their clients in the area of defect discovery and R&D applications. However, they expect 2020 to also be good from the start of introduction of their EUV technologies into the production use cases (not just in defect discovery and R&D) and the broadening of the use of these technologies in the industry (as most of the investment has come from the leader TSMC).

Cash flow for the quarter (the company's latest fiscal quarter was Q1 2020) came in at a record USD 496 million for operational cash flow and USD 464 million for free cash flow. The company increased dividend by 30% and repurchased USD 228 million in shares. Overall, it has grown revenues at an average rate of 8% per year, since 2010, while maintaining gross margins of around 60% and operating margins of above 30%.

The company sees an industry decline in capital equipment spending by memory customers (which leads to an expected overall capex decline of 15% for the industry in 2019) but an increase in spending in foundry and logic for leading edge clients that want to accelerate the ramp-up of 7 and 5 nm nodes. This is what drove the 2019 growth in revenue and the company still believes that the demand will remain strong for 2020. However, since it believes that logic/foundry capex will remain flat for 2020 while there may be a recovery in memory spending, its more likely that the company will grow more in line with the broader semiconductor equipment market.



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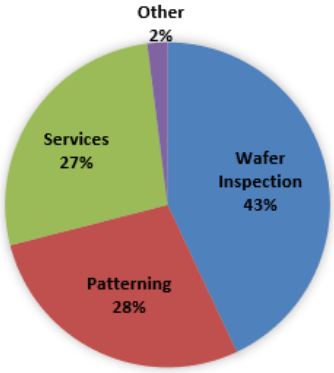
Revenue (2018) by segment:



Source: Company Data;

Surfscan Defect Inspection System:

Source: Company Data;

Archer Optical Metrology System:

Source: Company Data;

Segments and Products

KLA's business is primarily in the design, manufacturing and the marketing of process control and yield management solutions for the semiconductor and related industries with a portfolio of inspection, metrology and data analytics products, and related service, software and other offerings. Until recently, the company only had one operating segment due to similarities and common objectives of the different products.

Semiconductor Process Control (Wafer Inspection): As the name inspection suggests, products in this segment are focused on guaranteeing that the wafers used in production are defect free. Patterned and unpatterned wafer inspector products find particles, pattern defects and or electrical issues on the surface of the wafer and allow engineers to detect and monitor critical yield deviations. Defect review systems can then capture high resolution images of the defects detected by inspection tools and help the chipmakers to identify and resolve the issues. Metrology, which is included in this segment, is focused on verifying that the design and the physical properties of the wafers under production match the requirements at every step of the fabrication sequence. There are 400 to 600 steps in the overall manufacturing process of semiconductor wafers (which takes one to two months) so if any defects occur early in the process, all the work will be wasted. Finally, KLA also provides in place monitoring of the production process environment. Products such as SensArray allow the producer to control thermal uniformity, profile temperature and light intensity, under real production conditions.

Patterning: KLA's patterning simulation systems allows the researchers to evaluate advanced patterning technologies, such as EUV lithography, without having to take the time and expense of printing test wafers and prototypes. The major product KLA offers here is PROLITH which is a computer software that models and simulates the lithography result with different variables. This way, it can prevent defects from being printed on actual production wafers.

Services: A significant portion of KLA's revenue comes from providing long-term performance and maintenance contracts of the products it sells to its clients. This means that, typically, once KLA sells a wafer inspection system it also gains a contract for any necessary repairs or reviews of the system. Since these tools are very complex its difficult to have anyone but the original producer to repair them. KLA can also work with clients to provide upgrades and enhancements of already installed systems as well as training for any employees of the client. This segment currently represents USD 1.3B in revenue and is expected to grow at a 9% to 11% CAGR until 2023.

PCB, Display, Component Inspection: A segment which was incorporated with the acquisition of Orbotech. PCB stands for Printed Circuit Board which is the board that connects the different electrical components or chips. KLA offers a range of services (such as optical inspection or UV laser drilling) aimed at helping PCB manufacturers evaluate and improve the quality of their builds. The same is true for producers of displays (for TVs or mobile devices) and other components.

Specialty Semi Process: this segment develops and sells deposition and etching process tools which are used by a broad range of specialty customers such as manufacturers of microelectromechanical systems, radio communication chips and power semiconductors for automotive and industrial applications (such as LED lights).

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Risks

Sector Uncertainty and high price point: The market is not unaware of the economic and technological changes within the sector and is pricing the company as a high growth investment, however the industry is extremely complicated to fully understand and prone to uncertainty in what concerns technological developments. There is no certainty as to whether there will be a robust need for this high-quality production control equipment in the future or if there is to be a significant growth in the demand for semiconductors. And, even if there is, the producers may be able to simply increase the number of "fabs" with cheap equipment or keep using older models. There may also be lower than expected growth rates which make investment recovery difficult.

In-house built semiconductors: Some companies such as Apple or Amazon are moving more towards building their own semiconductors and integrating the entire chain and no longer depending on any middleman be it fabs or producers such as Intel or Qualcomm. While these companies will, probably, still require process control equipment, their customer power is larger and the dynamics of the industry may change in unexpected ways.

Economic Cycle: As any capital-intensive business, there are inherent investment and recuperation cycles (often aligned with the broader macroeconomic cycle). An investor must be resilient to what can be significant drops in share price in periods of market depression. The value of the company is very dependent on what are the capex levels of the broader semiconductor industry and some major producers. Revenue can decrease significantly in downturns. In 2008, revenue decreased 40% YoY.

Consumer Power: Large concentration of revenue on few customers (such as Samsung, TSMC or Micron) is an obvious risk. There is some ability of customers to compress margins since the company has to strike large deals and producers are always looking to cut corners. Customers have the ability to refuse or cancel orders as well as delay or ask for updates to the models. Furthermore, once built, the productors are very costumer-specific so there may not be an ability to replace. In the first 9 months, one major customer accounted for 17% of KLA's revenues and a second for 12%.

Wafers can further increase in size (and have done so in the past): One way to improve output is not just to reduce the size of the nodes but it is also to increase the sizes of the wafers so as to increase the output per wafer. In the past, wafers used to be 100mm but they have increased in size until the current standard of 300mm and can go up to 450mm. The option of 450mm is, currently, not very popular and is practically dead. Mostly, because adapting systems to handle a 450mm wafer proved to be to much stress on the systems and reduced, significantly, the quality of the die on the edge of the wafer. Furthermore, the lithography (which is, currently, one of the major costs) is solely focused on 300mm and adaptations were too costly.

Introduction of integrated products by larger competitors: A significant risk is for competitors of KLA such as ASML, for example, to offer integrated system that include lithography as well as process control and metrology mechanisms in a bundle. This would be very difficult of KLA to fight as it is extremely focused on its niche of process control and has no other segments to offer.

Memory producers rely less on process control systems: The growth of revenue in KLA has been driven, mostly, by the increase in logic and foundry capex. The memory market has been in a significant downturn, however there is expectation of some recovery for the next years. The problem here is that memory producers use less of process control systems and there is the possibility of the capex for logic/foundry being at peak especially since in the second half of 2019 they were at the highest level in 20 years.

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Risk of market splitting between leading edge manufacturers and other manufacturers that just churn out older generation models for simpler tasks: This is a significant risk for KLA as its growth rate is very dependent on the widespread adoption of leading edge fabs and production cycles (which is where it can sell the more expensive process control products with fatter margins). However, there exists the likelihood of producers choosing to build few leading edge fabs (that focus on the top of the line semiconductors) and having the remainder focus on cheaper semiconductors for the lower intensity tasks and reusing older models.

Company debt table summary:

Maturity	Eff. Interest	Principal
2019	3.38%	250,000
2021	4.13%	500,000
2024	4.68%	1,250,000
2034	5.67%	250,000
2029	4.16%	800,000
2049	5.05%	400,000
Total	**4.50%**	**3,450,000**

Source: Company Data; BiG Research

Debt structure and other balance sheet considerations

The company has a total long-term debt of USD 3.1B and short-term debt of USD 250m. As of the latest filing, it was in compliance of all its covenants associated with its notes. All of its major notes have a fixed-rate form of interest and are issued in USD. The company has, presently, a rating of BBB by Standard & Poor's. In terms of cash and equivalents, most of the company's liquidity is either in money market funds, corporate debt securities or US treasuries. The total current cash and equivalent amount is USD 1.16 billion.

In November 2017, to replace an older outstanding agreement, the company entered into a revolving credit facility which provides for the ability to borrow up to a USD 1 billion until the date of November 2023. These will bear interest at LIBOR plus a spread of 1% to 1.75%.

The company has no significant off-balance sheet facilities. Its current working capital is USD 2.8B and it has USD 3.8B in intangibles of which is goodwill.

Stock Options, Restricted stock and stock repurchase

The company has, currently, 158.6 million shares outstanding and 160.1 million diluted shares outstanding. Contrary to some tech companies, KLA does not issue a significant amount of stock options. However, it does have an outstanding equity incentive plan that can attribute a maximum of up to a further 11.6 million shares. The attribution of these shares is mostly dependent on internal objectives of its employees and management. During the latest fiscal year, it granted 2.4 million shares.

During 2019, the board approved a share repurchase program that was designed to offset the dilution from equity incentive plans and the issuance of shares from the Orbotech acquisition. As of September 2019, a further USD 1.63B was authorized to be used for repurchasing of stocks.

Rick Wallace (CEO of KLA):

Management and board

Rick Wallace is the CEO of KLA and has been working at the company for 33 years. He began his work, at the company, as an applications engineer in 1988. He has a bachelors in electrical engineering and masters in engineering management. He was paid around USD 12 million in 2018 in total compensation.

Edward Barnholt (Chairman of KLA):

Edward Barnholt is the chairman of the board of directors. He joined Hewlett-Packard in 1966 where he served in numerous executive positions and later transitioned to CEO of Agilent Technologies from 1999 to 2005. Since 2006, he has served as chairman of the board of KLA. He is also on the board of Adobe Systems and eBay.

For executives, compensation is approximately 75% based on performance factors and 25% on fixed terms. The performance targets are primarily based on share price and operational margin. Most compensation is in the form of vested share grants.

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Relative Valuation

Name	Country	Market Cap (in USD)	Dividend Yield	Repurchase Yield	YTD	Organic Growth 1Y	Operational Margin	Profit Margin
LAM RESEARCH CORP	US	38937	2%	3%	97%	-13%	25%	22%
TERADYNE INC	US	10683	1%	3%	103%	-2%	23%	23%
ENTEGRIS INC	US	6361	1%	1%	69%	15%	14%	18%
CABOT MICROELECTRONICS	US	3752	1%	0%	35%	76%	11%	4%
STMICROELECTRONICS NV	SZ	23148	1%	0%	88%	16%	12%	10%
INFINEON TECHNOLOGIES	GE	27699	1%	-5%	15%	6%	14%	11%
HITACHI LTD	JN	37571	2%	0%	44%	1%	5%	2%
TAIWAN SEMICONDUCTOR	TA	285156	3%	0%	49%	6%	34%	32%
ASML HOLDING NV	NE	118811	1%	0%	84%	22%	21%	21%
APPLIED MATERIALS INC	US	52271	1%	2%	73%	-15%	23%	19%
KLA CORP	US	25776	2%	1%	83%	13%	28%	23%
Average exc. KLAC		60,439	1%	0%	66%	11%	18%	16%

Name	ROA	Net Debt/ EBITDA	P/E next year	EV/EBITDA	FCFE/P	CFO-exWC/ Price	CFO-Capex/ Price	Rating
LAM RESEARCH CORP	18%	-0.4	14.56	11.91	6%	6%	7%	BBB+
TERADYNE INC	17%	-0.9	20.07	14.33	4%	6%	4%	NR
ENTEGRIS INC	12%	1.9	20.04	18.64	8%	7%	3%	BB+
CABOT MICROELECTRONICS	3%	3.7	15.00	20.81	29%	6%	3%	BB
STMICROELECTRONICS NV	8%	-0.1	19.03	8.02	4%	n.a.	3%	BBB
INFINEON TECHNOLOGIES	7%	-1.0	19.84	8.70	1%	8%	1%	BBB *-
HITACHI LTD	2%	0.3	8.47	6.27	7%	19%	6%	A
TAIWAN SEMICONDUCTOR	16%	-0.7	20.46	10.18	2%	7%	2%	AA-
ASML HOLDING NV	11%	0.4	29.34	35.37	1%	3%	1%	n.a.
APPLIED MATERIALS INC	15%	0.5	12.97	14.32	5%	6%	5%	A-
KLA CORP	15%	1.1	14.9	16.1	9%	6%	4%	BBB
Average exc. KLAC	11%	0.4	18.0	14.9	7%	8%	4%	-

Source: Bloomberg; BiG Research

M&A

Orbotech (bought in February 2019 for USD 3.26 billion): Orbotech is an Israeli company founded in 1981 which has 3000 employees and 50 offices around the world and which is focused on supplying yield-enhancing products for manufacturers of printed circuit boards, flat panel displays, advanced packaging as well as other semiconductor areas. The company was bought in its entirety and merged into KLA which paid for using USD 1.9B in cash and with USD 1.32B in KLA common stock.

Qoniac (bought for undisclosed amount in 2019): Qoniac is a small German company focused on providing process optimization for lithography and patterning.

Microsense (bought for undisclosed amount in 2019): Company focused on precision measurement products.

Nanomechanics (bought for undisclosed amount in 2018): Company focused on nanoindentation or the testing of material hardness at extremely small scale.

Lam Research (proposed buying KLA-Tencor for USD 11 billion in 2015): Lam Research proposed a merger to KLA-Tencor at a price of 13x EBITDA. The deal, however, fell through as regulators felt it monopolized the semiconductor equipment industry too much and it would harm competition.

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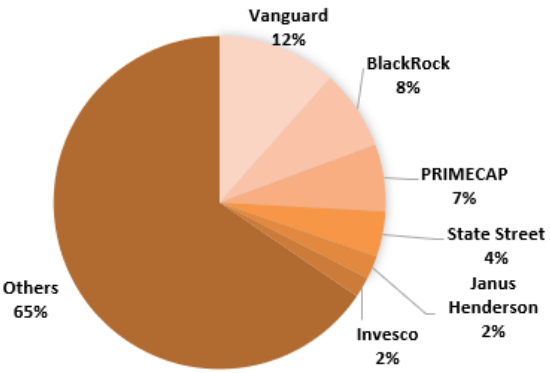
Others

Major shareholders of KLA-Tencor stock:



Source: Company Data; BiG Research

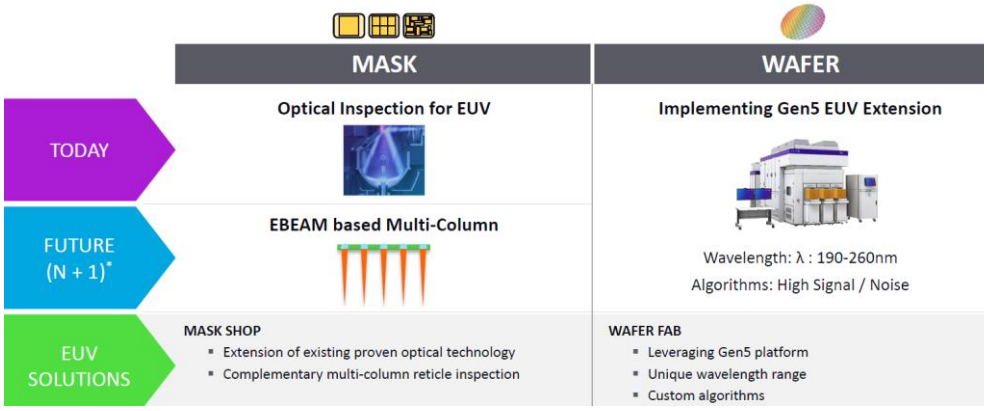
Calendar

Q2 2020 earnings: 23rd January 2020

Graph

Source: BiGlobal Trade

EUV solutions for the different market segments:



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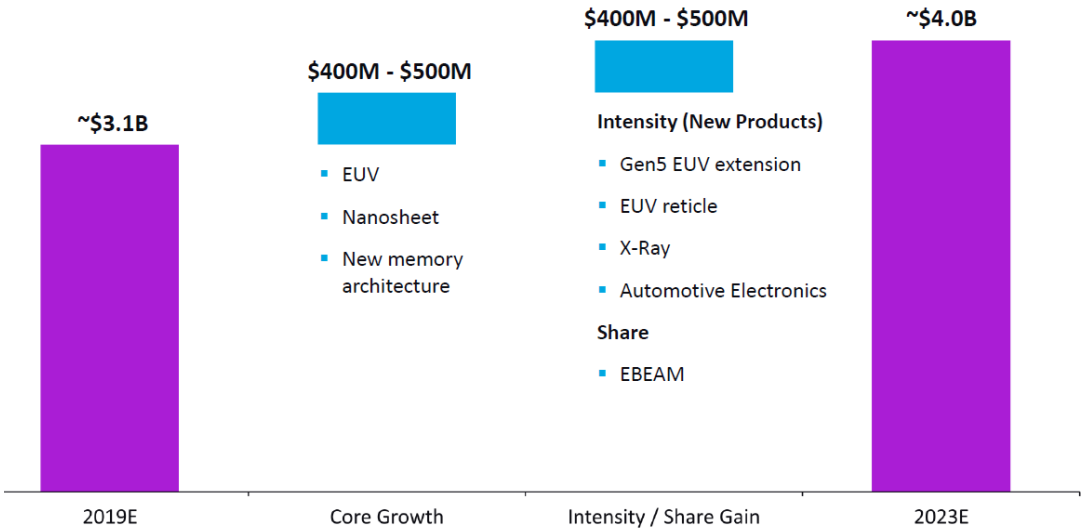
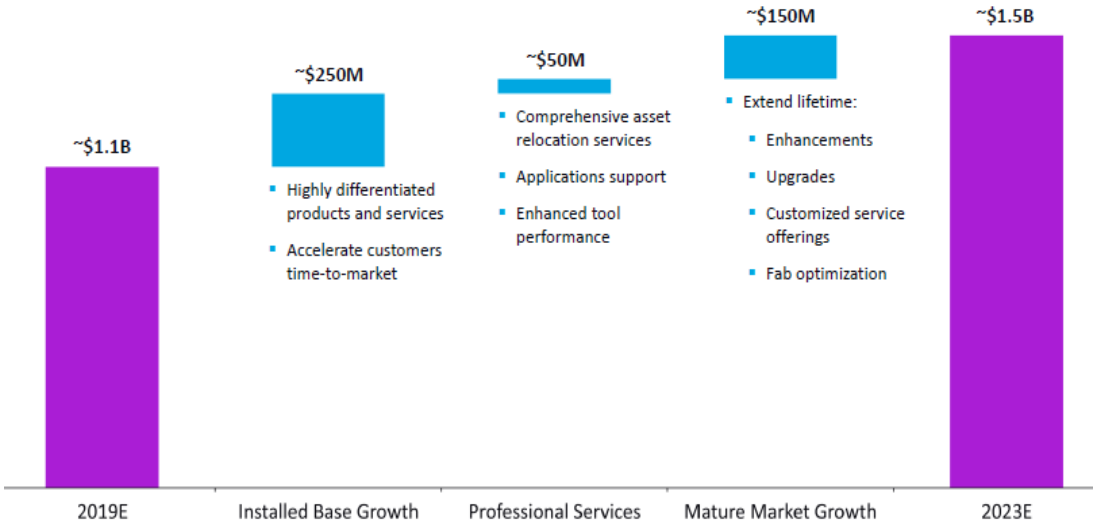
KLA's semi process control expansion projections until 2023:



Source: Company Data

KLA's services expansion projections until 2023:



Source: Company Data

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Product Table

MARKETS	APPLICATIONS	PRODUCTS
Chip and Wafer Manufacturing		
Defect Inspection/ Review	Patterned Wafer	3900 Series, 2930 Series, 2920 Series· Puma™ 9980 Series, Puma™ 9850 Series, Puma™ 9650 Series, Voyager™ 1015 Series
	High Productivity and All Surface	CIRCL™ with 8 Series, CV350i, BDR300™ and Micro300 modules 8 Series
	Unpatterned Wafer/Surface	Surfscan® SP7 Series, Surfscan® SP5 Series, Surfscan® SP3 Series
	Electron-beam Review	eDR7200™ Series
	Data Analytics	Klarity® product family 5D Analyzer® RDC FabVision® ProDATA™
Metrology	Overlay	Archer™ Series ATL™ Series
	Optical CD and Shape	SpectraShape™ product family
	Film Thickness/Index	SpectraFilm™ product family Aleris® product family
	Wafer Geometry and Topography	WaferSight™ Series
	Edge Bead Removal	CIRCL™
	Ion Implant and Anneal	Therma-Probe® 680xp
	Resistivity	RS product family
	Surface Metrology	HRP®-Series P-Series
	Data Analytics	5D Analyzer®
In Situ Process Management	Lithography, Plasma Etch, Deposition, CMP, Ion Implant, Wet Processing	SensArray® product family
In Situ Data Analytics	Lithography, Plasma Etch, Deposition, CMP, Ion Implant, Wet Processing	SensArray® PlasmaSuite, LithoSuite, Thermal MAP
Patterning Simulation	Lithography Simulation	PROLITH™

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MARKETS AND APPLICATIONS	PRODUCTS
Reticle Manufacturing and Quality Control	
Defect Inspection (mask shop)	Teron™ 600 Series, TeraScan™ 500XR
Defect Inspection (wafer fab)	Teron™ SL650 Series, X5.3™
Defect Inspection (mask blanks)	FlashScan®
Pattern Placement Metrology	LMS IPRO Series
Data Analytics	RDC, Klarity® Defect
Packaging Manufacturing	
Wafer-Level Packaging Inspection | Metrology	CIRCL™-AP 8 Series-AP WI-2280 Zeta-5xx/6xx
Component Inspection | Metrology	ICOS® T890, ICOS® T3 and T7 Series
Data Analytics	Klarity® Defect
Compound Semiconductor | HDD Manufacturing	
LED, Photonics, RF Communications	8-Series, WI-2280, Candela® 8720, Zeta-388, MicroXAM Series, P-Series, HRP®-Series
Power Devices	8 Series, WI-2280, Candela® CS920, MicroXAM Series, P-Series, HRP®-Series
MEMS	8 Series, P-Series, HRP®-Series, MicroXAM Series, Zeta-20, Zeta-300, Zeta-388, Nano Indenter G200
CPV Solar	ZetaScan Series, Zeta-20, Zeta-300
Display	ZetaScan Series, SensArray® Process Probe 2070, Zeta-300, P-17 OF, Nano Indenter G200
Data Storage Media/Head Manufacturing	8 Series, Candela® 71xx, Candela® 63xx, HRP®-Series, P-Series, Zeta-20, MicroXAM Series
Data Analytics	Klarity® Defect
General Purpose/Lab Applications	
Surface Metrology: Stylus Profiling	P-Series Alpha-Step® product family HRP®-Series
Surface Metrology: Optical Profiling	MicroXAM Series
Nanomechanical Testers	Nano Indenter® G200 T150 UTM
Process Chamber Conditions	SensArray® product family

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  - Accumulate, expected absolute return between +5% and +15%;
  - Keep/Neutral, expected absolute return between -5% and +5%;
  - Reduce, expected absolute return between -5% and -15%;
  - Sell, expected absolute return below -15%;

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