

US Semiconductors

Weekly wrap: Haves (semicaps, auto, PC, EDA) & Have-Nots (telco, indus, enterprise)

Industry Overview

Cycle concerns pressure SOX, turn to Q4/CY24E recovery

SOX down 4% week-to-date, again underperforming SPX down 3%, though SOX YTD performance remains up 36% vs SPX up 14% YTD. Following earnings reports from the bulk of semis, there have been more downward than upward revisions: 1) Largest negative estimate revisions were related to optical semi vendors (telecom digestion headwinds), specifically COHR (CY23/24 sales revised down 2%/3%, EPS down 26%/27%) and LITE (CY23/24 sales revised down 8%/11%, EPS down 24%/26%); 2) Largest upwards revisions related to semicaps as market bottoms and vendors able to ship incremental content to China, highlighted by KLAC, LRCX, AMAT (CY23/24 sales revised up between 2%-4%, EPS 6%-9%); 3) Auto/industrial revisions more mixed on positive autos trends yet cautious China/near-term demand, NXPI, ON revised up (CY23/24 sales up 1%-3%, EPS 1%-7%), while TXN, MCHP revised CY23/24 sales flat to down 2%, EPS flat to down 3% (MCHP auto/industrial caution, difficult China demand negative read-through for ADI); 4) INTC saw strong upwards revisions (CY23/24 sales up 1%-2%, EPS 4%-50%) on stabilizing PC business, while AMD revised slightly down (CY23/24 sales flat to down 2%, EPS down 3%-5%) on weaker datacenter outlook. We now look forward to results from NVDA (positive), ADI (mixed, on China/industrial weakness), MRVL (inline), CRDO (inline/slightly ahead) and AVGO (inline).

NVDA: focus on sustainable growth not high n-t expectations

Our top 5 favorite AI-exposed stocks: NVDA, AVGO, MRVL, SNPS, CDNS. Maintain Buy ahead of NVDA Aug-23rd results. Bullish investor expectations (data center \$8.7bn/\$10.8bn for FQ2/FQ3, well above sell-side consensus at \$7.8bn/\$9.6bn, per Visible Alpha) so potential for stock volatility, though our discussions suggests 1) supply-constraints (packaging, memory) well recognized, and 2) Management's forward commentary around sustainability/durability of genAI cycle will be key driver of stock. Maintain Buy ahead of MRVL (Aug-24) and AVGO (Aug-31) results though expect results/guide to be more inline with growth in ~10% of sales exposed to AI potentially offset by sluggish trends in telco and enterprise. Separately, maintain Neutral on AMD as its AI potential offset by downside risk to Street's 21% YoY growth outlook for CY24E, we model 15% YoY given early-days for MI300 (where we note rising competition from NVDA's next-gen Grace Hopper and new genAI inference products) and risks to PC, game console and embedded segments. Maintain INTC Underperform on weak FCF generation and large exposure to cannibalization of traditional compute by AI accelerators where INTC has limited presence.

Solid earnings resilience in semicaps and EDA

AMAT continues to outperform its peer group, with YTD tools sales pointing to flattish growth for CY23E vs. broader WFE decline of >20% YoY. AMAT benefited from its leading DRAM portfolio and incremental shipments to China, some of which should sustain into CY24E. NAND recovery timing remains uncertain, but mgmt also pointed to continued demand for mature node and advanced packaging tools, a positive read-through for peers LRCX/KLAC/CAMT. SNPS similarly beat and raised on ongoing design

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Timestamp: 20 August 2023 12:17PM EDT

20 August 2023

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United States
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ADI: Analog Devices
AI: Artificial Intelligence
AMAT: Applied Materials
AMD: Advanced Micro Devices
AVGO: Broadcom
CDNS: Cadence
COHR: Coherent
CRDO: Credo
EDA: electronic design automation
EPS: Earnings per share
FCF: Free Cash Flow
INTC: Intel
KLAC: KLA Corporation
LITE: Lumentum
LRCX: Lam Research
MCHP: Microchip
MRVL: Marvell
NVDA: Nvidia
NXPI: NXP Semiconductor
ON: onsemi
PC: Personal Computer
SNPS: Synopsys
SOX: Philadelphia Semiconductor Index
SPX: S&P 500 Index
TXN: Texas Instruments
WFE: Wafer fab equipment
YTD: Year to-date

momentum across semis. AI now represents ~10% (\$500mn) of TTM sales, suggesting successful monetization, and should grow over time as AI adoption increases. Overall, we highlight positive trends for semis complexity and semicaps/EDA providers.

Exhibit 1: Summary of most recent Q's earnings revisions (pre- and post-earnings)

Semiconductors saw largest upwards revisions as market bottoms

	CY23E				CY24E			
	Pre-earnings sales (\$mn)	Post-earnings sales (\$mn)	Pre-earnings EPS (\$)	Post-earnings EPS (\$)	Pre-earnings sales (\$mn)	Post-earnings sales (\$mn)	Pre-earnings EPS (\$)	Post-earnings EPS (\$)
AMAT	\$24,793	\$25,747	\$7.08	\$7.76	\$25,168	\$26,118	\$7.28	\$7.70
% change		3.8%		9.6%		3.8%		5.8%
AMD	\$23,178.4	\$22,832.4	\$2.90	\$2.75	\$27,443	\$27,504	\$4.25	\$4.14
% change		-1.5%		-5.2%		0.2%		-2.6%
CAMT	\$293.7	\$304.7	\$1.73	\$1.85	\$326	\$351	\$2.03	\$2.17
% change		3.8%		6.9%		7.7%		6.9%
CDNS	\$4,059.4	\$4,076.0	\$5.03	\$5.09	\$4,498	\$4,540	\$5.68	\$5.81
% change		0.4%		1.2%		0.9%		2.3%
COHR	\$4,756.0	\$4,648.9	\$1.96	\$1.46	\$5,201	\$5,060	\$3.21	\$2.33
% change		-2.3%		-25.5%		-2.7%		-27.4%
CREDO	\$154.0	\$159.0	-\$0.06	-\$0.05	\$264	\$266	\$0.24	\$0.27
% change		3.2%		N/A		0.8%		12.5%
CRUS	\$1,689.0	\$1,687.0	\$5.14	\$5.20	\$1,898	\$1,787	\$6.28	\$6.35
% change		-0.1%		1.2%		-5.8%		1.1%
GFS	\$7,564.2	\$7,461.3	\$2.18	\$2.07	\$8,487	\$8,272	\$2.91	\$2.67
% change		-1.4%		-5.0%		-2.5%		-8.2%
Infineon*	\$18,205.6	\$17,726.0	\$2.89	\$2.86	\$19,505	\$18,848	\$2.99	\$2.85
% change		-2.6%		-1.1%		-3.4%		-4.7%
INTC	\$51,640.3	\$52,422.5	\$0.36	\$0.54	\$58,137	\$58,672	\$1.66	\$1.72
% change		1.5%		50.0%		0.9%		3.6%
KLAC	\$9,161.0	\$9,530.0	\$19.92	\$21.78	\$9,484	\$9,865	\$21.23	\$23.08
% change		4.0%		9.3%		4.0%		8.7%
LITE	\$1,493.0	\$1,381.0	\$2.50	\$1.91	\$1,735	\$1,545	\$4.28	\$3.18
% change		-7.5%		-23.6%		-11.0%		-25.7%
LRCX	\$13,773.0	\$14,104.0	\$23.81	\$25.85	\$15,144	\$15,499	\$28.51	\$30.08
% change		2.4%		8.6%		2.3%		5.5%
MCHP	\$8,034.0	\$8,034.0	\$5.67	\$5.67	\$8,812	\$8,640	\$6.26	\$6.09
% change		0.0%		0.0%		-2.0%		-2.7%
MRVL	\$5,566.5	\$5,514.4	\$1.55	\$1.53	\$6,525	\$6,477	\$2.34	\$2.33
% change		-0.9%		-1.3%		-0.7%		-0.4%
MTSI	\$619.0	\$624.0	\$2.44	\$2.47	\$691	\$701	\$2.82	\$2.93
% change		0.8%		1.2%		1.4%		3.9%
MU	\$15,730.4	\$15,452.0	-\$4.50	-\$4.56	\$21,276	\$20,105	\$0.66	-\$1.00
% change		-1.8%		N/A		-5.5%		N/A
NVMI	\$505.4	\$505.0	\$4.53	\$4.47	\$585	\$583	\$5.07	\$5.13
% change		-0.1%		-1.4%		-0.3%		1.2%
NVTS	\$76.4	\$76.6	-\$0.26	-\$0.23	\$148	\$146	-\$0.19	-\$0.12
% change		0.3%		N/A		-1.8%		N/A
NXPI	\$13,004.5	\$13,236.0	\$13.47	\$13.90	\$13,724	\$13,920	\$14.74	\$14.87
% change		1.8%		3.2%		1.4%		0.9%
ON	\$8,134.5	\$8,381.0	\$4.88	\$5.22	\$8,774	\$8,963	\$5.38	\$5.70
% change		3.0%		7.0%		2.2%		6.0%
QRVO	\$3,203.0	\$3,277.0	\$3.59	\$3.98	\$4,068	\$4,069	\$7.01	\$7.10
% change		2.3%		10.9%		0.0%		1.3%
Renesas*	\$10,453.5	\$10,199.0	\$1.53	\$1.55	\$11,198	\$10,987	\$1.72	\$1.71
% change		-2.4%		1.4%		-1.9%		-0.7%
SNPS	\$5,813.0	\$5,824.0	\$10.83	\$11.06	\$6,530	\$6,547	\$12.33	\$12.59
% change		0.2%		2.1%		0.3%		2.1%
STM*	\$17,371.7	\$17,418.0	\$4.26	\$4.31	\$18,006	\$18,026	\$4.30	\$4.36
% change		0.3%		1.2%		0.1%		1.4%
SWKS	\$4,772.0	\$4,733.0	\$8.12	\$8.15	\$5,130	\$5,092	\$9.29	\$9.37
% change		-0.8%		0.4%		-0.7%		0.9%
TER	\$2,712.2	\$2,682.0	\$2.82	\$2.84	\$3,303	\$3,248	\$4.61	\$4.53
% change		-1.1%		0.8%		-1.7%		-1.8%
TXN	\$17,943.5	\$18,004.0	\$7.50	\$7.41	\$19,300	\$19,278	\$8.09	\$7.92
% change		0.3%		-1.2%		-0.1%		-2.1%
VLN	\$85.4	\$84.0	-\$0.20	-\$0.18	\$134	\$106	\$0.06	-\$0.01
% change		-1.7%		N/A		-20.8%		N/A
WOLF	\$939.0	\$943.0	-\$0.88	-\$1.75	\$1,263	\$1,252	-\$0.04	-\$1.36
% change		0.4%		N/A		-0.9%		N/A

Source: BofA Global Research, Bloomberg, company reports

BofA GLOBAL RESEARCH



Exhibit 2: Stocks mentioned

Prices and ratings for stocks mentioned in this report

BofA Ticker	Bloomberg ticker	Company name	Price	Rating
AMD	AMD US	Advanced Micro	US\$ 105.45	C-2-9
AMAT	AMAT US	Applied Materials	US\$ 142.66	B-1-7
AVGO	AVGO US	Broadcom	US\$ 825.84	B-1-7
CDNS	CDNS US	Cadence	US\$ 220.55	B-1-9
CAMT	CAMT US	Camtek	US\$ 46.06	C-1-9
INTC	INTC US	Intel	US\$ 32.75	B-3-8
KLAC	KLAC US	KLA Corp	US\$ 477.96	B-1-7
LRCX	LRCX US	Lam Research	US\$ 652.94	C-1-7
MRVL	MRVL US	Marvell	US\$ 57.59	B-1-7
NVDA	NVDA US	NVIDIA	US\$ 432.99	C-1-7
SNPS	SNPS US	Synopsys	US\$ 426.02	B-1-9

Source: BofA Global Research

BofA GLOBAL RESEARCH

Price objective basis & risk

Advanced Micro Devices, Inc (AMD)

Our \$132 PO is based on 36x our 2024E non-GAAP EPS, which is towards the middle of AMD's historical 17x-64x range.

Downside risks: 1) M&A integration risks, 2) Strong competition from larger names, 3) Lumpy nature of consumer and enterprise spending that could create delays in acceptance and success of new products, 4) High reliance on one outsourced manufacturing partner, 5) Maturity of current game console cycle.

Applied Materials, Inc. (AMAT)

Our PO of \$175 is based on 22x our CY24E P/E estimate, in line with mid-cycle average and at normal 2 turn discount to more profitable semicap peers.

Downside risks to our PO are: slower-than-expected capital spending cycle, delay in memory capacity adds, market share loss in deposition, implant, thermal, CMP, etch, or process control segments, merger & integrations risk, and macro headwinds.

Broadcom Inc (AVGO)

Our \$1050 price objective for Broadcom is based on 23x CY24E EV/FCF, within its long-term 10x-30x range, given double-digit EPS growth and best-in-semis profitability, FCF generation, and returns.

Downside risks to our price objective are 1) semiconductor cycle risks, including sensitivity to US/China trade relations, 2) high exposure to Apple with potential design out risks, 3) competitive risks in networking, smartphone, storage, enterprise software markets, 4) frequent acquirer of assets, which increases financial and integration risks, and 5) recent strategy towards moving into non-core software businesses creates execution risks.

Cadence (CDNS)

Our \$285 PO is based on 48x FY24E P/E, within its historical 22x-52x trading range and justified in our view given the strategic importance of EDA in an increasingly fragmented global electronics supply chain.

Downside risks are: (1) Share loss in existing markets to primary competitors, (2) a broader economic downturn dampens semis R&D spending and corresponding spend on EDA tools and services, (3) escalation of US-China trade war limits CDNS' ability to sell

to key customers, (4) semiconductor industry consolidation accelerates which could diminish customer spending power, (5) venture into adjacent system analysis market fails to meaningfully accelerate revenue growth and incremental investments suppress margin expansion.

Camtek (CAMT)

We assign a \$55 PO which is based on 22x our non-GAAP CY24E EPS adjusted for net cash. This is well within Camtek's long-term 8x-40x range and in-line with other semicap peers which we think is fair given similar growth prospects.

Upside risks: (1) accelerated share gains vs. key competitor, Onto Innovations. (2) stronger than expected electronics demand that would tighten up semiconductor capacity further, driving increased semiconductor equipment sales. (3) potential as a target of industry consolidation.

Downside risks: (1) Slower than expected capital spending cycle. (2) heightened competition with larger players like KLA Corp. (3) historically cyclical nature of semiconductor capital spending, particularly on packaging equipment. (4) further restrictions on companies in China/Asia given high relative exposure.

Intel (INTC)

Our \$32 price objective is based on 20x our 2024E pf-EPS ex-stock comp expense, at the low end of compute peers (15x-40x), which we view as appropriate given manufacturing uncertainties and risks of new foundry strategy.

Upside risks to our price objective are 1) clarity or breakthrough on yields for 7nm process technology, 2) new products allowing Intel to limit share loss, 3) improving product mix which can drive upside to gross margins, 4) manufacturing slip up at key foundry competitors.

Downside risks to our price objective are 1) weaker-than-expected trends in a mature PC market, which is largest revenue generator for Intel, 2) further delays in 7nm process technology and roadmap, 3) accelerated share loss to AMD, 4) more competition in profitable data center market.

KLA Corporation (KLAC)

We assign a \$600 PO based on 25x CY24E P/E, at higher end KLAC's historical range of 10x-26x. KLAC's leading profit margin and less cyclical topline supports a slightly higher multiple vs. semicap peers, in our view.

Downside risks to our PO are the cyclical nature of the semiconductor capital spending and its impact on earnings, competitive price and market share issues, particularly against Applied Materials, ability to get new products and technologies into the market in a timely manner.

Lam Research Corp. (LRCX)

We assign a \$740 PO based on 24x cash adjusted CY24E PE, at a normal 1-2 turn discount to more profitable semicap peers

Upside risks to our PO are: stronger-than-expected electronics demand that would tighten up semiconductor capacity, driving increased semiconductor equipment sales and/or increasing market share.

Downside risks are slower than expected capital spending cycle, delay in memory capacity adds, market share loss in etch or clean segments, merger & integrations risk, and macro headwinds.

Marvell Technology Group Ltd. (MRVL)

Our \$80 PO is based on a 38x FY25E/CY24E pf-EPS, which is well-supported by the 15-20% longer-term compounded annual EPS growth potential, and within the normal 1x-2x range for high growth semi peers.

Downside risks: 1) Integration risks in recent deals, 2) Financial risks related to going to net debt from net cash position, and in achieving expected cost synergies in a timely manner, and 3) Cyclical industry risks including potential slowdown in legacy hard disk drive, infrastructure spending, and storage assets, 4) Competitive risks against larger well resourced rivals.

NVIDIA Corporation (NVDA)

Our \$550 PO is based on 50x CY24E PE ex cash, within NVDA's historical 26x-69x forward year PE range, justified given stronger growth opportunities ahead as gaming cycle troughs and data center demand potentially faces strong, long-term demand dynamics.

Risks to our price objective are: 1) weakness in consumer driven gaming market, 2) Competition with Intel, AMD, Broadcom, Marvell, internal cloud projects and other private companies in accelerated computing markets, 3) Potential restrictions from US Government on shipments of advanced AI technologies to overseas customers, 4) Lumpy and unpredictable sales in new enterprise, data center, and autos markets, 5) Potential for decelerating capital returns, 6) potential for autos slowdown until advanced driver assist systems becomes more meaningful, and 7) elevated opex growth.

Synopsys (SNPS)

Our \$510 PO is based on 41x 2024E P/E, in line with the company's historical trading range (19x-49x).

Downside risks are: (1) Variability in IP/hardware sales creates issues in timing of revenue recognition, (2) competitors develop unique software capabilities displacing SNPS at core customers, (3) heightened geopolitical tensions lead to further restrictions on supplying firms in China with EDA technology.

Upside risks are: (1) Share gains in existing markets vs primary competitors, (2) increased government investment in semiconductor R&D and development as nations develop internal ecosystems, (3) material M&A that enables consistent margin expansion or further accelerates sales CAGR, (4) faster than expected cost improvements driving higher operating margin.

Analyst Certification

I, Vivek Arya, hereby certify that the views expressed in this research report accurately reflect my personal views about the subject securities and issuers. I also certify that no part of my compensation was, is, or will be, directly or indirectly, related to the specific recommendations or view expressed in this research report.

Special Disclosures

BofA Securities is currently acting as financial advisor to Intel Corp in connection with its proposed sale of a minority stake in IMS Nanofabrication GmbH to Bain Capital Special Situations (Bain Capital LP), which was announced on June 21, 2023.

BofA Securities is currently acting as a financial advisor to Broadcom Inc in connection with its proposed acquisition of VMware Inc, which was announced on May 26, 2022. The proposed transaction is subject to approval by shareholders of VMware Inc. This research report is not intended to provide voting advice, serve as

an endorsement of the proposed transaction, or result in the procurement, withholding or revocation of a proxy.

US - Semiconductors and Semiconductor Capital Equipment Coverage Cluster

Investment rating	Company	BofA Ticker	Bloomberg symbol	Analyst
BUY				
	Analog Devices Inc.	ADI	ADI US	Vivek Anya
	Applied Materials, Inc.	AMAT	AMAT US	Vivek Anya
	Broadcom Inc	AVGO	AVGO US	Vivek Anya
	Cadence	CDNS	CDNS US	Vivek Anya
	Camtek	CAMT	CAMT US	Vivek Anya
	GlobalFoundries	GFS	GFS US	Vivek Anya
	KLA Corporation	KLAC	KLAC US	Vivek Anya
	Lam Research Corp.	LRCX	LRCX US	Vivek Anya
	Marvell Technology Group Ltd.	MRVL	MRVL US	Vivek Anya
	Microchip	MCHP	MCHP US	Vivek Anya
	Nova	NVMI	NVMI US	Vivek Anya
	NVIDIA Corporation	NVDA	NVDA US	Vivek Anya
	NXP Semiconductors NV	NXPI	NXPI US	Vivek Anya
	onsemi	ON	ON US	Vivek Anya
	Synopsys	SNPS	SNPS US	Vivek Anya
	Valens Semiconductor	VLN	VLN US	Vivek Anya
NEUTRAL				
	Advanced Micro Devices, Inc	AMD	AMD US	Vivek Anya
	Coherent Corp	COHR	COHR US	Vivek Anya
	M/A-Com	MTSI	MTSI US	Vivek Anya
	Micron Technology, Inc	MU	MU US	Vivek Anya
	Navitas Semiconductor	NVTS	NVTS US	Blake Friedman
	Teradyne	TER	TER US	Vivek Anya
	Texas Instruments Inc.	TXN	TXN US	Vivek Anya
UNDERPERFORM				
	Ambarella	AMBA	AMBA US	Vivek Anya
	Cirrus Logic	CRUS	CRUS US	Vivek Anya
	Credo Technology	CRDO	CRDO US	Vivek Anya
	Intel	INTC	INTC US	Vivek Anya
	Lumentum Holdings	LITE	LITE US	Vivek Anya
	Qorvo Inc.	QRVO	QRVO US	Vivek Anya
	Skyworks Solutions, Inc.	SWKS	SWKS US	Vivek Anya
	Wolfspeed Inc	WOLF	WOLF US	Vivek Anya

Disclosures

Important Disclosures

Equity Investment Rating Distribution: Technology Group (as of 30 Jun 2023)

Coverage Universe	Count	Percent	Inv. Banking Relationships ^{R1}	Count	Percent
Buy	212	53.13%	Buy	103	48.58%
Hold	89	22.31%	Hold	45	50.56%
Sell	98	24.56%	Sell	30	30.61%

Equity Investment Rating Distribution: Global Group (as of 30 Jun 2023)

Coverage Universe	Count	Percent	Inv. Banking Relationships ^{R1}	Count	Percent
Buy	1877	53.28%	Buy	1040	55.41%
Hold	815	23.13%	Hold	464	56.93%
Sell	831	23.59%	Sell	385	46.33%

^{R1} Issuers that were investment banking clients of BofA Securities or one of its affiliates within the past 12 months. For purposes of this Investment Rating Distribution, the coverage universe includes only stocks. A stock rated Neutral is included as a Hold, and a stock rated Underperform is included as a Sell.

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Investment rating	Total return expectation (within 12-month period of date of initial rating)	Ratings dispersion guidelines for coverage cluster ^{R2}
Buy	≥ 10%	≤ 70%
Neutral	≥ 0%	≤ 30%
Underperform	N/A	≥ 20%

^{R2} Ratings dispersions may vary from time to time where BofA Global Research believes it better reflects the investment prospects of stocks in a Coverage Cluster.

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