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■ Semiconductors

INDUSTRY UPDATE

3Q23 COMPUTE, WIRELESS & POWER SEMIS PREVIEW: ANOTHER MIXED BAG; SOME POSITIVES

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THE TD COWEN INSIGHT

Divergent dynamics still prevail across the compute/wireless landscape, though broadly skew to another mixed bag quarter (outside of NVIDIA) before a potential recovery in 2024. Cloud datacenter likely to be strongest (not yet in China or Enterprise), with PCs finding a bottom while smartphone and consumer electronics remain challenging, particularly in China. Headwinds create opportunities.

*See also our team's broad-based (auto/industrial) semis preview published separately **here**.*

GenAI Continues To Dominate Narrative, Though Sentiment Seems To Have Flipped From "Wow!" To "Sustainable?" Overall AI of all stripes (GenAI in particular) continues to dominate our investor conversations, though in contrast to the last two quarters, we sense some investors have shifted from attempting to identify beneficiaries to attempting to gauge the sustainability of the torrid spending that characterizes the current environment, especially with respect to NVIDIA. We take the view that the high potential ROI on GenAI (and accelerated computing overall) should sustain the "AI spend" for the near- and medium-term; we recognize investors remain skeptical.

Intra-Quarter Thoughts Remain Topical For Many In Our Coverage: In a busy quarter, we described our thoughts on **Marvell's** mixed bag near-term juxtaposed against its long-term positive set-up (**here**); we lowered numbers on **Intel's** gross margin commentary, while noting its improved offerings in AI and progress in its roadmap (**here**); highlighted **NVIDIA's** competitive positioning following our week-long investor meetings (**here**); offered further AI-related thoughts (including **AMD** and others) post attending an industry conference (**here**); recapped a series of investor meetings with **Arteris** (**here**); and finally initiated on **Arm** at Outperform post IPO (**here**). Whew!

Despite Intel's PSG Plans, We See No Change to Competitive Environment for Top Smidcap Pick Lattice: Lattice has notably underperformed since Intel's announcement that it intended to re-IPO its Programmable Solutions Group (old Altera) and re-focus on the mid- and low-end FPGA markets, especially in the industrial end market (**here**). As we noted at the time, while the separation and potential re-IPO makes sense from a shareholder value and cash raise point of view, it is unlikely to do much to alter the competitive environment in the near term. As we have discussed at length regarding fellow FPGA designer Lattice, the industrial and automotive segments especially are highly sticky, long design cycle environments...and re-entering those markets would require significant product roadmap, sales/FAE and low-power software investments inside of PSG...all while sales are likely to decline medium-term.

Q3 Remains Mixed, But Early Signs Of Positive Setup Into 2024 For Product-Driven Stories: While this earnings season could prove choppy again, we believe semis sentiment could potentially begin to turn as investors start to look towards 2024, especially for the strong product-driven growth stories at **AMD, MPWR, LSCC, AVGO, MTSI, MRVL** (2H24) and of course **NVDA.** Stepping back, we continue to emphasize that the vast majority of these semis franchises (including beyond those listed) are high-quality, high-margin businesses and long-term secular trends remain quite positive. While certain segments such as smartphone, consumer electronics, and pockets of IoT remain weak, we get the sense investors are beginning to ready themselves to look through the near term to a potential recovery in 2024/25.

Figure 1 - TD Cowen Thoughts Into Earnings

Thoughts Into Earnings

Ticker	Key Points
AIP	■ Expect continued momentum in licensing (macro notwithstanding) especially from AI/ML ■ Look for reiteration of commentary on model flipping FCF/EPS positive exiting 2024 ■ Likely focus on competitive environment given newly-public Arm
AMBA	■ Tempered expectations following last quarter's cut to -20% Q/Q ■ Look for potential commentary on visibility to recovery in core video processing market, any progress towards a clear channel? ■ Expect additional discussion of nascent LLM inference opportunity and ADAS/AV wins (annual funnel update likely)
AMD	■ Expect reiteration of 50% H/H Data Center growth target, which is aspirational but achieveable in our view ■ Client to likely rebound as PC channel largely clear allowing return to matching sell-in to sell-through, plus seasonality ■ Focus on gross margin as Embedded expected to be down Q/Q in 4Q as well, can GM hang in?
ARM	■ Initial EPS following the IPO, look to likely hit/beat consensus from IPO model ■ Color by end market for royalty revenue? Have expectations changed from IPO? ■ State of the smartphone market, competitive dynamics across landscape? Impact from Huawei?
AVGO	■ Expect another solid quarter, with Gen AI momentum likely buffering weakness in other end markets ■ Intra-quarter commentary from Marvell on Data Infra outside the datacenter incrementally negative, but AVGO has thus far outperformed its peers ■ Expect scrutiny on the call from TPU headlines, but likely little in the way of concrete answers
CEVA	■ Weak end markets likely temper royalty expectations, with headwinds to license revenue from Intrinsix sale ■ More stability expected on the gross margin line as NRE more predictable with Intrinsix out of the model ■ Look for update regarding momentum ex-smartphone
CRDO	■ We are expecting a return to strong sequential growth as the non-Gen AI buildouts at Microsoft/Amazon return alongside Genoa ramp ■ Keeping to the cadence guided to back in February will be important given the stock's run since NVIDIA guide in May ■ Expect updates on optical ramps/engagements at hyperscaler/diversification beyond AEC
CRUS	■ Moderate expectations given lack of new content in iPhone 15 series, but expect strong seasonal quarter from launch ■ Little traction likely, but look for commentary on Android market given supply constraints may be easing--can CRUS "break the bundle" with QCOM? ■ Any update for content growth on the 2024 iPhone? SE? Progress on 22nm codec?
INTC	■ Quarter likely to come in ahead of the midpoint of guide, as management has stated, with upside from Client ■ DCAI expectations very muted (especially compared to AMD) as management sees 2 more quarters of inventory digestion likely ■ Expect commentary talking down gross margin for 2024, in line with commentary from Intel Innovation
LSCC	■ Expect another quietly clean quarter, despite bogeyman of potential competition from Intel's newly-independent PSG ■ Scrutiny likely around lead times, especially in Industrial and Auto while management likely to highlight recent Auto design win at Mazda ■ Competitive environment likely a focus for Q&A given Intel's PSG commentary on re-focusing on low- and mid-range markets
MPWR	■ We anticipate strong results in Enterprise Data as upside from NVIDIA, AMD server ramps likely to flow into the model materially ■ Auto potentially a mixed bag as strong content gains are being offset by unit cuts at customers ■ Mixed bag elsewhere, as Consumer, Comms, and Storage all facing macro headwinds juxtaposed with MPWR content gains
MRVL	■ Strong demand in Datacenter ex-Storage, but challenging conditions across effectively every other vertical ■ Our expectations for F4Q24 are modest (+4% Q/Q), with strength in Datacenter offset by weakness everywhere else ■ Storage visibility continues to be poor, with recovery not anticipated until ~middle of next year (F2025)
MTSI	■ Last quarter's ~0.9x book-to-bill likely indicates a flat Q/Q for 3Q23, with strength in Datacenter offset by weakness in Telecom and I&D ■ Weakness in Telco especially acute and does not appear to be improving near-term (see Ericsonn's neg pre) ■ Scrutiny likely around sustainability of Datacenter strength--is this an experiment or AI-driven structural growth?
NVDA	■ Expect another blow-out quarter and raised guidance on improving supply, price, and demand through the roof ■ Commentary likely to focus on echoing themes from recent investor meetings on sustainability of spend given ROI from Gen AI ■ Gross margin upside potential from increasing mix of Grace CPU-based systems, offset by pass-through margins for memory, etc
POWI	■ Recovery now underway, albeit at a relatively tepid pace as visibility remains poor especially in China ■ Channel inventory reduction likely to continue in 3Q, and sell-through continues to exceed sell-in per management ■ Potential risk from sharp decline in orders in June…recovery contingent on demand, which remains soft
QCOM	■ Retention of Apple through 2025 a positive on the margin, though we get the sense investors not willing to pay a multiple for Apple-based earnings ■ Near-term macro headwinds continue to buffett results, with F2024 commentary overall underwhelming ■ Understanding further impact from Huawei modem will be key, as it was estimated to present a ~$250M/qtr headwind
QRVO	■ Expect in-line print and in-line guide, as company has given highly detailed forward guidance as they return to matching sell-in to sell-through ■ Management remains confident a recovery in Qorvo revenue not contingent on recovery in Android end market ■ We remain cautious as visibility remains extremely poor for most in the industry
SLAB	■ Expectations are likely muted given last quarter's sharp guide down ■ Investors will look for management's visibility into the I&C segment, fearing a repeat of collapse in H&L ■ Series 2 design win momentum should be a bright spot, but translation to revenue timing remains uncertain
SWKS	■ Expect strong results in seasonally strong Apple-driven quarter, having guided above seasonality for SepQ ■ Questions likely surrounding positioning at Apple, with answers likely not forthcoming ■ Broad Markets weakness unsurprising given the macro, but will be important to show return to growth to give diversification story legs

Source: TD Cowen

Two-Page Summary of Our Compute, Wireless & Power Semis Preview

The Punch Line: It's going to be a mixed bag this earnings season, in our view, but we remain largely bullish on semis medium and long term. In our view, this likely creates a bit of "have" versus "have nots" post earnings as those that are benefiting from strong product cycles and relatively healthier end markets (NVDA, AMD, MPWR, LSCC) will likely respond more positively to the 'mixed bag' than those with little product tailwind or that are dependent on weaker/mixed end markets shorter term (INTC, MRVL, wireless). That's in the short term; long term, now is the time for conviction, in our view.

Stocks To Own Across Thematics:

- **Central Processing & Datacenter:** NVDA, AMD, MPWR, LSCC
- **AI and Accelerated Computing:** NVDA (Investor Meetings Recap Note **here**)
- **Wireless & Smartphone Exposed:** QCOM, SWKS, CRUS

Highlighting Key Topics Across Thematics

More Detailed CPU Discussion: Here

Sustained Cloud Datacenter CapEx Trends Despite The 1H23 Noise: Overall, we continue to see sustained investment in datacenter infrastructure benefiting both the CPU and GPU supply chain. Despite multiple hyperscalers moderating CapEx plans compared to a blow-out 2022, trends may be more modest, as these cuts have largely not included servers and data infrastructure plans. Further, we see 2024 as likely another growth year for datacenter CapEx, with the potential for enterprise spending to act as an additional accelerant. As a result, in the long term we see still resilient demand in 2H23/2024 due to the refreshed x86 computing platform launches and new NVIDIA accelerators. Alongside these launches, we believe there is sustained momentum for critical infrastructure networking IP to allow customers to capture the performance uplifts we expect from higher bandwidth demands in next-gen platforms.

There have no doubt been more challenging macroeconomic conditions in recent months, particularly in China. That said, we believe delayed platform launches and ongoing supply chain disruptions have obfuscated traditional spend patterns among HPC/Cloud vendors. This has especially impacted Intel, and we see multiple headwinds facing Intel's server business in 2H23 including: 1) Ongoing CPU digestion across server market segments; 2) Continued share-loss; and 3) PSG/Altera business experiencing a natural correction following a period of excess backlog—with an inventory recovery likely materializing exiting Q4.

For AMD, management on the prior call reiterated its expectation that the Datacenter business could grow 50% 2H23 over 1H23, though did lower its overall Y/Y growth expectations to high-single digits (%) from low double-digit (%) previously. As we describe in our separate AMD preview (here), we see this as likely the high end of expectations.

Our PC & Server Model: Here

PC Market Potentially Improving: Overall, we see an improving backdrop for PCs following efforts by both Intel and AMD to under-ship end demand in an attempt to clear excess channel inventory, though a true end market recovery remains elusive especially in China. That being said, with the channel clear we believe the processor market has likely moved past the trough's bottom with both companies forecasted to see sequential growth into 3Q—despite a still subdued economic backdrop. In terms of competitive dynamics, we model effectively flat AMD PC revenue share through 2024, though Intel may recover unit share in 2023 (see Figures 11 and 12 for our PC & Server market models).

More Detailed Accelerated Compute Discussion: Here

AI & Accelerated Computing: Generative AI The Knee In The Accelerated Computing Curve: We are of the view that accelerated computing represents a significant paradigm shift that is resulting in a transition away from general purpose and toward accelerated and specialized computing. Further, accelerated computing has enabled Generative AI (GenAI) by making deep learning and the Transformer architecture at a billion-parameter scale feasible from compute/power/cost perspectives. We believe both of these trends are fundamental, durable, and in their early innings (**here**). NVIDIA continues to be the far and away leader in accelerated computing. We believe **AMD** has a significant opportunity to participate in large language model inference, as we discussed following our recent CEO/CFO meetings (**here**), and expect **Intel** too should benefit (discussed **here**). **Monolithic Power**, **Marvell**, **Broadcom**, and others all have an opportunity as power, networking, and ASIC demands rise to meet the generative AI challenge.

Demand for generative-AI has turned into a veritable arms race for hardware acceleration across Cloud & Enterprise. Visibility of demand for NVIDIA especially now extends out multiple quarters. Management stated they had procured additional supply, and in fact they expect incremental supply each quarter through the end of next year. In our view, this should drive investor confidence that the company can sustain/extend JulQ's elevated run rate at least through F2025…with no indication that demand is abating in the near term. AMD for its part is set to launch the Instinct MI300 in 4Q2023, its newest HPC and AI accelerator, as well as the Alveo V70 FPGA-based inference accelerator for the datacenter. For **Monolithic Power Systems (MPWR),** we continue to see the company as well positioned given its core long-term vectors and content-driven growth track record with capacity expansion endeavors to support its medium-term target of $4B in revenues. These include ramps for Genoa and Sapphire Rapids from AMD and Intel in datacenter, 48V modules and accelerator attach rates at NVIDIA, and high content Auto EV opportunities in the pipeline. We believe management may aggressively prune its order book near term, but we see 2H23 numbers as potentially conservative, and believe the setup remains compelling. For more please see our recent recap of management investor meetings **here**.

In **Gaming**, conditions overall remain mixed but in a healthier position given both NVIDIA and AMD previously taking steps to clear their respective distribution channels of inventory.

- **Stocks to Own:** Given the catalysts above and significant growth potential, we believe **NVDA**, **AMD**, **MPWR**, and **LSCC** each represent compelling value.

More Detailed Smartphone & Wireless Discussion: Here

Smartphone: Headwinds Remain: As we described following recent Qualcomm management meetings (**here**), in the near-term the smartphone market continues to face what are now a well-known set of headwinds, with Qualcomm declaring it the worst handset unit correction since 2009. Demand is weak across geographies, and despite the significant cuts to build forecasts we've seen over the past year, estimates continue to come down (thus elongating the ongoing inventory correction). In fact, Qualcomm has discussed a structurally smaller market in China specifically, now modeling the China TAM as ~300M per year, down from ~500M at its (over-shipping) peak. In the long term, we continue to expect strong 5G penetration momentum globally, but near term may be weaker than many investors are anticipating as the OVX and Samsung supply chains work through a period of excess inventory. Within Wireless, we see **Qualcomm**, **Skyworks**, and **Cirrus Logic** as best positioned, while **Qorvo** continues to be most impacted by the significant inventory we are still observing in the China Android ecosystem especially.

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THEMES TO WATCH - 3Q23 EARNINGS

Theme #1. Central Processing & Logic: Headwinds Begin To Subside

Overall, we see an improving backdrop for PCs following efforts by both Intel and AMD to under-ship end demand in an attempt to clear excess channel inventory. As a result of these efforts, and despite a still subdued economic backdrop, we believe the market has moved past the trough's bottom, with both companies forecasted to see sequential growth into 3Q, although still operating in a challenged pricing environment with the market in totality on a slow path to recovery. For **Intel**, after the prior call, management highlighted they believe the inventory correction in Client is over with the company now being able to return to shipping to sell-through after four quarters of channel clearing. This is an important development given 3Q23 is typically seasonally stronger on back-to-school trends and as a result we model +12% Q/Q with another +6% Q/Q in 4Q assisted by initial Meteor Lake client CPU sales that are set to launch in December. As for **AMD**, management anticipates the segment to continue to stabilize into the seasonally stronger 2H and has guided the quarter to growth both Y/Y and double-digits (%) Q/Q as compared to our +26% Q/Q 3Q estimate (+13% Q/Q in 4Q).

In **Server**, **Intel** continues to importantly reaffirm its product roadmap timelines with the recent Intel Innovation event (recap here) highlighting commentary and demonstrations surrounding Intel 3, Intel 20A and Intel18A, as well as hinting at "Intel Next" beyond 18A. As it pertains to Datacenter specifically, Sierra Forest is set to debut in 1H24 closely followed by Granite Rapids and finally Clearwater Forest in 2025. During the Q&A portion of the event, CFO David Zinsner discussed existing dynamics in DCAI and specified expectations that Q3 will be down Q/Q versus previous commentary of the business returning to more natural demand dynamics in 2H23. Culprits include 1) Ongoing CPU digestion across server market segments; 2) Continued share-loss; and 3) PSG/Altera business experiencing a natural correction following a period of excess backlog—with an inventory recovery likely materializing exiting Q4.

Separately, on PSG, we remind investors of our view that Intel's intentions to operate the division as a separate business unit ahead of a future potential IPO is a potentially prudent move to unlock shareholder value (and raise further cash) but in our view unlikely to alter in a material way the competitive environment. A full recap of our thoughts can be found **here**.

For **AMD** in Server (see our separate note here), management on the prior call reiterated its expectation that the Datacenter business could grow 50% 2H23 over 1H23, though did lower its overall Y/Y growth expectations to high-single digits (%) from low double-digits (%) previously. In addition to strong traction in Genoa, the company further reiterated MI300 is sampling now and on track for launch and ramp in 4Q. We see this being led by Datacenter, where Genoa's performance lead over Sapphire Rapids is significant, with vertical-specific Genoa-X, Bergamo, and Siena rounding out the broadest server portfolio AMD has ever had… plus GPU, FPGA, DPU products, and eventual integrated memory-coherent ASIC chiplets. Further, AMD is likely to launch its Zen 5 Turin (ahead of Granite Rapids from Intel) and is well-positioned to make strong inroads in AI & Enterprise.

- **Positive Implications For:** AMD, NVIDIA, MPWR, LSCC

Figure 2 - PC & Server Market Estimates

PC & Server Units (M)	2016	2017	2018	2019	2020	2021	2022E	1Q23E	2Q23E	3Q23E	4Q23E	2023E	1Q24E	2Q24E	3Q24E	4Q24E	2024E
Desktop	108	102	100	101	80	86	76	15	16	18	19	68	16	17	19	19	70
Notebook	111	101	95	93	86	93	94	18	18	21	23	80	20	20	21	24	84
UltraPortables	47	56	60	63	100	127	96	19	20	23	25	88	21	22	23	27	92
Chromebooks	7	12	15	17	36	36	18	3	5	6	3	17	3	6	6	3	18
Server	11.1	11.5	13.0	12.5	12.7	12.9	13.8	2.6	3.4	3.5	4.0	13.5	2.9	3.6	3.8	4.2	14.5
System Type																	
Cloud - Public	4.8	5.7	7.8	7.2	8.2	8.3	8.7	2.0	2.3	2.5	2.4	9.1	2.2	2.5	2.7	2.5	9.8
Cloud - Private	0.9	1.2	1.3	1.6	1.6	1.7	2.0	0.3	0.5	0.4	0.6	1.8	0.3	0.5	0.5	0.7	1.9
Enterprise	5.3	4.6	3.9	3.7	2.9	2.9	3.0	0.4	0.7	0.6	1.0	2.7	0.4	0.6	0.7	1.0	2.8
CPU End Market Mix (%)																	
Cloud	39%	41%	50%	48%													
Comms/Networking	13%	15%	15%	16%													
Enterprise	48%	44%	35%	36%													
Total Units	284	282	283	287	315	355	298	58	64	70	74	266	63	67	72	78	280
Client PC Units	273	271	270	274	302	342	284	55	61	67	70	253	60	64	68	74	266
Traditional PC's	219	203	195	194	166	179	170	33	35	38	42	148	36	36	40	44	155
Growth Trend																	
Total Units - Q/Q %								-14%	11%	10%	6%		-16%	7%	7%	8%	
Total Units - Y/Y %	-5.2%	-0.5%	0.3%	1.3%	9.7%	12.7%	-16.0%	-30%	-14%	-5%	11%	-10.6%	9%	5%	3%	5%	5.1%
Client PC Units - Q/Q %								-13%	10%	10%	6%		-15%	6%	7%	8%	
Client PC Units - Y/Y %	-4.3%	-0.7%	-0.2%	1.5%	10.1%	13.1%	-16.8%	-30%	-15%	-6%	12%	-11.0%	9%	5%	3%	5%	5.0%
UltraPortables - Y/Y %	12%	19%	7%	5%	59%	27%	-24%	-26%	-17%	-8%	20%	-9%	9%	7%	2%	5%	6%
Chromebooks - Y/Y %	107%	76%	29%	14%	107%	0%	-50%	-40%	-10%	40%	15%	-3%	15%	5%	0%	0%	4%
Server Units - Y/Y %	0.1%	3.2%	13.1%	-3.1%	0.9%	2.0%	6.9%	-21%	1%	5%	6%	-2.0%	12%	4%	8%	5%	7.0%

Source: TD Cowen

Theme #2. AI and Accelerated Computing: Gen AI the Catalyst

We are of the view that accelerated computing represents a significant paradigm shift that is resulting in a transition away from general purpose and toward accelerated and specialized computing. Further, accelerated computing has enabled Generative AI (GenAI) by making deep learning and the Transformer architecture at a billion-parameter scale feasible from compute/power/cost perspectives. We believe both of these trends are fundamental, durable, and in their early innings (here). NVIDIA continues to be far and away the leader in accelerated computing. As we described when we named NVIDIA our Best Idea for 2023 (note here), we see a strong product-driven Datacenter growth cycle in C2023/C2024 and beyond as NVIDIA ramps H100, its Grace CPU/Grace-Hopper superchip, and the associated DGX/HGX supercomputers with increasing model/data sizes in both the training and inference veins of AI computing. We highlight into the OctQ management anticipates the Data Center segment to see continued strong sequential growth with ample capacity and visibility throughout the supply chain and expects supply to increase each quarter through next year to support continued growth.

We also believe AMD has a significant opportunity to participate in large language model inference, as we discussed following our recent CEO/CFO meetings (**here**), and expect Intel too should benefit (discussed **here**). Monolithic Power, Marvell, Broadcom, and others all have an opportunity as power, networking, and ASIC demands rise to meet the generative AI challenge. Demand for generative-AI has turned into a veritable arms race for hardware acceleration across Cloud & Enterprise. Visibility of demand for NVIDIA especially now extends out multiple quarters. Management stated they had procured additional supply, and in fact they expect F2H24's supply to exceed the supply they had secured during F1H. In our view, this should drive investor confidence that the company can sustain/extend JulQ's elevated run rate at least through F2024...with no indication that demand is abating in the near term. AMD for its part is set to launch the Instinct MI300 in 2H2023, its newest HPC and AI accelerator, as well as the Alveo V70 FPGA-based inference accelerator for the datacenter.

Figure 3 – Compute Stocks Have Far Outperformed Broad-Based Names YTD…

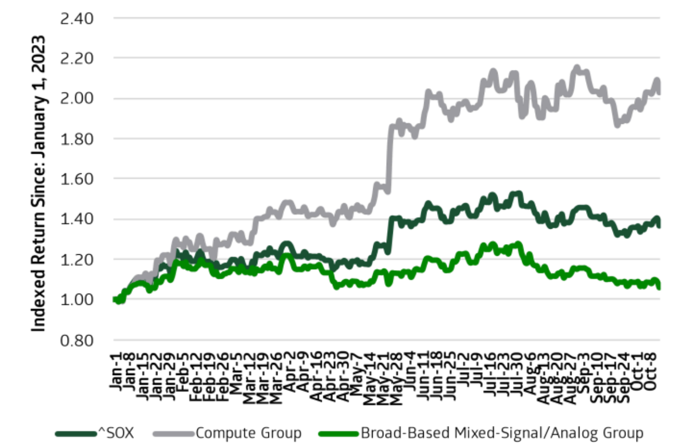
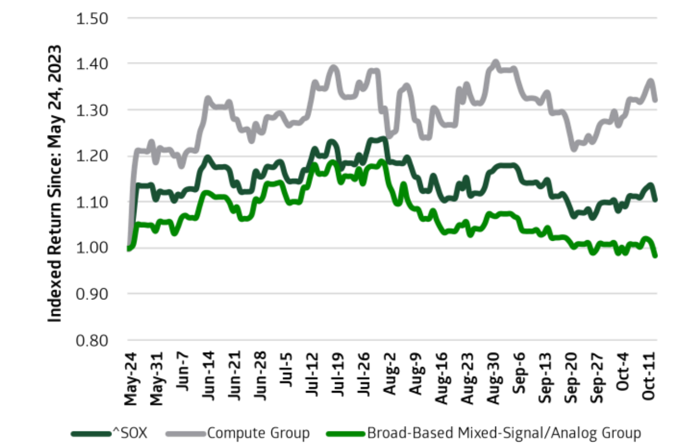


Figure 4 – …Even Moreso After NVIDIA's May Results



Source: TD Cowen
Compute companies include AMBA, AMD, AVGO, QCOM, INTC, LSCC, MPWR, MRVL, NVDA
Broad-Based companies include ADI, ALGM, CTS, DIOD, IFX, LFUS, MCHP, NXPI, ON, SLAB, STM, TXN, VSH

Figure 5 – Ex-NVDA, Compute Stocks Still Outperformed Broad-Based, Though At a Much Tighter Spread

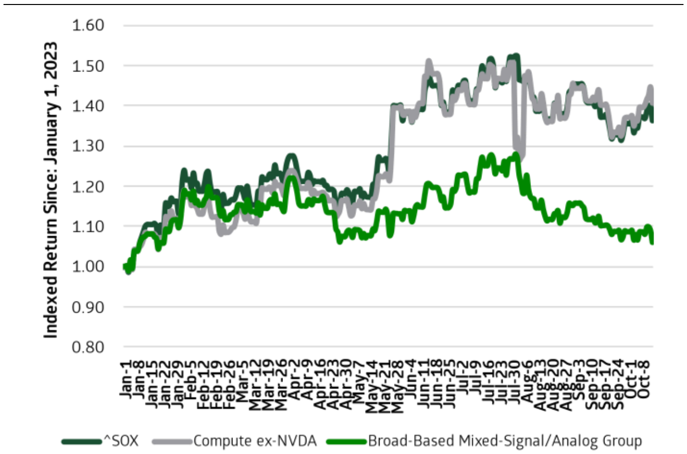
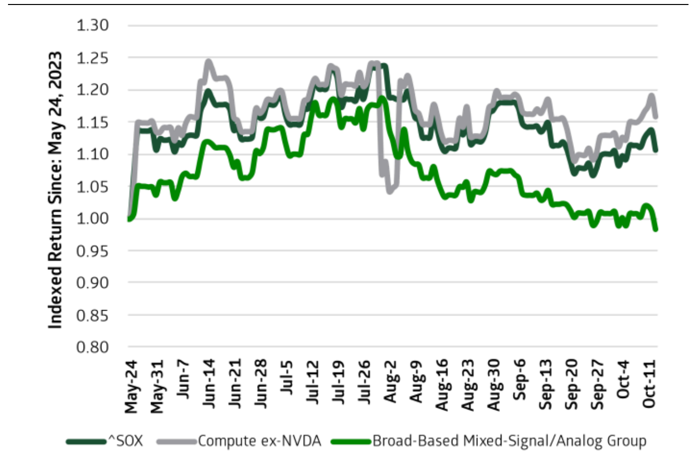


Figure 6 – Stock Reactions After NVIDIA's Print Are Still Pronounced Excluding NVDA



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Compute companies include AMBA, AMD, AVGO, QCOM, INTC, LSCC, MPWR, MRVL, NVDA
Broad-Based companies include ADI, ALGM, CTS, DIOD, IFX, LFUS, MCHP, NXPI, ON, SLAB, STM, TXN, VSH

In **Gaming**, conditions overall remain mixed but in a healthier position given both NVIDIA and AMD previously taking steps to clear their respective distribution channels of inventory. We note, NVIDIA on its prior call stated that global end demand has returned to growth after last year's slowdown with results reflecting typical seasonality. Management expects the segment to grow Q/Q in the OctQ as the company sees a large upgrade opportunity given ~47% of its installed base have upgraded to RTX and just ~20% of GPUs with an RTX 3050 or higher performance. As for AMD, Gaming is expected to decline Q/Q and Y/Y and we anticipate the Gaming segment will decline Y/Y again in 2024 as Console sales decline late in the cycle and overcome a modest recovery in PC gaming sales.

- **Mixed Implications For:** AMD, NVIDIA, MPWR

Theme #3. Data Infrastructure & Networking

Within networking silicon, conditions continue to be solid with demand supported across cloud and on-prem. This is expected to be further catalyzed by generative AI that is in turn resulting in greater demand for data infrastructure investments and upgrade cycles. Furthermore, in 5G carrier networking, while commentary from OEMs points to an ongoing slowdown in North American 5G infrastructure investment in 2023 following a strong 2022, other geographies (notably India) are likely to offset this slowdown somewhat from an overall market perspective.

For **Broadcom** specifically, recent earnings (**here**) revealed ongoing stability with the company seemingly able to side-step inventory corrections across its various businesses. In Networking, results grew another +20% Y/Y on continued adoption of next generation products in both cloud and enterprise datacenters. Further, management highlighted that networking technologies directed towards Gen-AI now represent ~$1B (Google's TPU a big driver) which we note is in line with prior commentary of ~15% of Semiconductor sales. Management anticipates networking to see another +20% Y/Y in F4Q with Gen-AI related business to grow ~50% Q/Q (~2x Y/Y).

In contrast, conditions for **Marvell** continue to reflect a steadily improving environment with mild Q/Q growth expected for the balance of the fiscal year as both acute storage declines subside (though a true recovery remains uncertain in timing) and the company benefits from increased Cloud spend for both AI and non-AI deployments. We note, during our recent investor meetings (**here**) with management discussion included the opportunity in AI and accelerated computing as a multi-decade change in datacenter infrastructure, with not only processing, but also networking requiring acceleration across the datapath. Specific to AI, management emphasized that it was seeing initial demand acceleration in 800G optics, with some custom silicon programs beginning to layer into the mix beginning in 2024.

Importantly, management reiterated its prior commentary surrounding custom silicon ramps, and it continues to anticipate its cloud optimized silicon programs to ramp more meaningfully as the year progresses. This is in-line with previously revised expectations of $200M this year (pushed 2 quarters), with the lifetime revenue of these programs remaining strong and those tied to AI increasing. Separately, Storage remains weak with the company shipping ~1/3 of peak and a recovery not expected until the middle of next year. Likewise in Enterprise Networking, inventory burn at customers continues and management anticipates at least a few more quarters until stabilization. Finally, in Carrier Infrastructure, management specifically called out Wireless as a soon to be source of weakness as the initial Nokia build rolls off, with Wired share gains unable to offset for now.

For other data infrastructure companies, we anticipate near-term weakness to persist for MACOM as the rolling inventory correction finally catches up to the very diversified company's product portfolio on Telecom and Datacenter weakness offset by I&D. However, Datacenter is expected up slightly Q/Q on Datacenter strength driven by 400G and 800G optics, specifically infiniband deployments. In our view this is likely to dominate investor conversations regarding the company given attachment to AI servers, despite Datacenter comprising only ~25% of revenues.

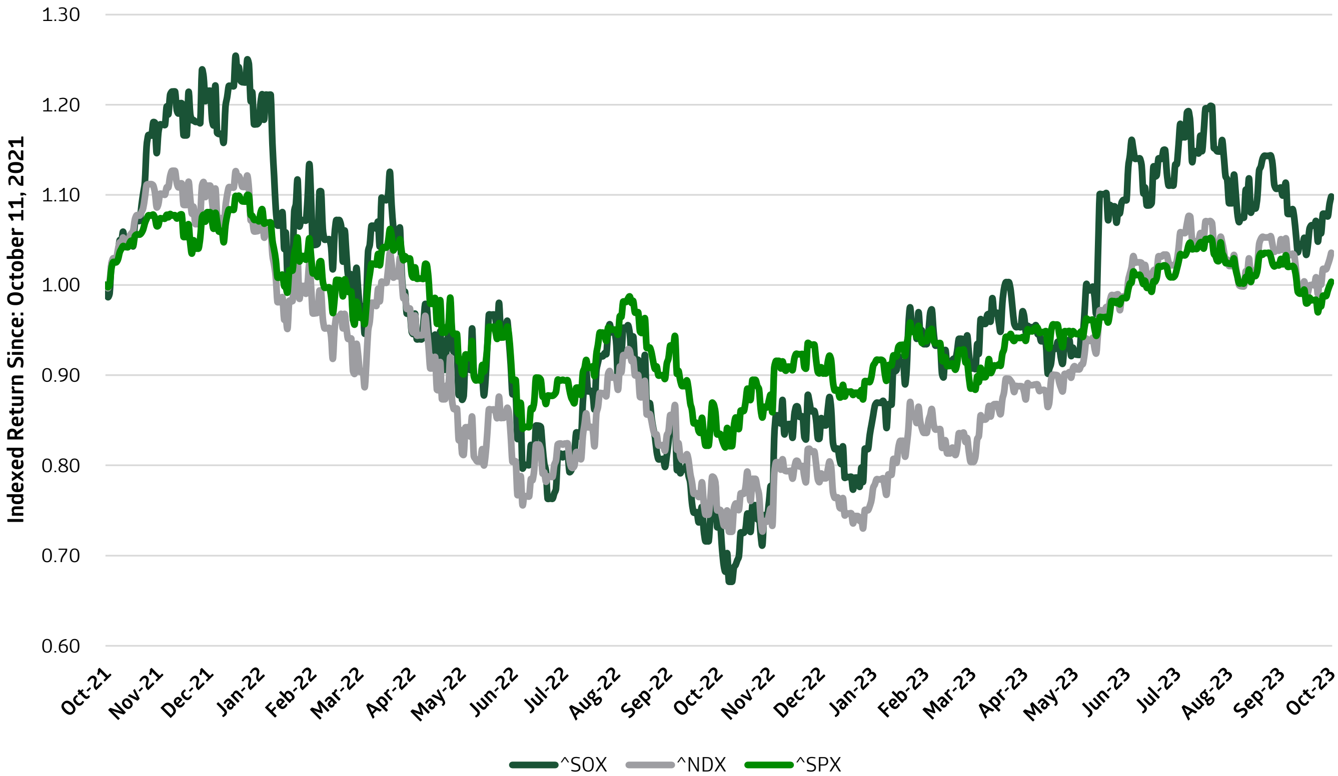
Theme #4. Wireless & Smartphone

Conditions in Smartphone continue to reflect trends via decelerating consumer demand combined with elevated component and finished goods inventories at OEMs. Additionally, a lackluster post COVID recovery in China has remained a headwind. As a result, discussed in detail within our updated Smartphone Industry recap (here), we believe smartphone demand will result in a CY23 unit decline of -5% Y/Y before a gradual +3% Y/Y recovery in FY24. Our latest field work suggests Samsung C2Q and C3Q builds were trimmed once again due to slower demand and inventory workdown. These cuts were partly offset by higher Huawei forecasts as it seeks to procure more chipsets for C2H. The latest China smartphone sales data indicates the market YTD is flat, while Apple may have gained meaningful share as China's economy reopened. More specifically related to Apple (covered by Krish Sankar), we believe CY23 iPhone demand could trend in line with the broader premium mobile segment (35-40% of total smartphone units) and decline low to mid-single % due to macro. Our checks on C2H23 iPhone 15 builds continue to suggest 90-95M or on par with the iPhone 14's C2H22 builds. We model CY23 shipments of 225M (-3% Y/Y). Finally, soft smartphone demand trends continue to persist and as a result we anticipate little investor credit until signs of elevated distribution and channel inventory are resolved – although we admit to having limited insight for when (or if) such time may occur and embed appropriate conservatism into our company specific outlooks.

For **Qualcomm**, similar to last quarter, the company continues to be hindered by a lack of visibility into end demand with the current environment as previously described by management as the "worst handset correction since 2009"). Into SeptQ, management anticipates a slight Q/Q increase with results reflecting muted seasonality primarily due to the timing of purchases from Apple with a new hardware agreement to supply 5G modems now confirmed to the 2024 and 2025 models (**here**); 2) Android handset revenues are expected to be flat; 3) IoT down mid-single digits (%); and 4) low-double-digit growth in Automotive. Management provided further color on F1Q24 (DecQ), with the caveat that revenue growth will largely depend on the macroeconomic environment, global handset units, and China recovery. Currently, management forecasts Q/Q growth in DecQ going into the holiday season, driven by seasonal growth in QTL and Apple modem sales for its phone launch. That being said, to these cross-currents we add the complete removal of Huawei from QCT (due to their pivot to their own 5G product manufactured at SMIC), which we estimate presents a ~$250M (average) headwind per quarter. On the whole, and as described by management at our recent CEO investor dinner (**here**), we see opportunity beyond current cyclical smartphone headwinds for durable long-term growth in Auto, IoT and AI inference in handsets.

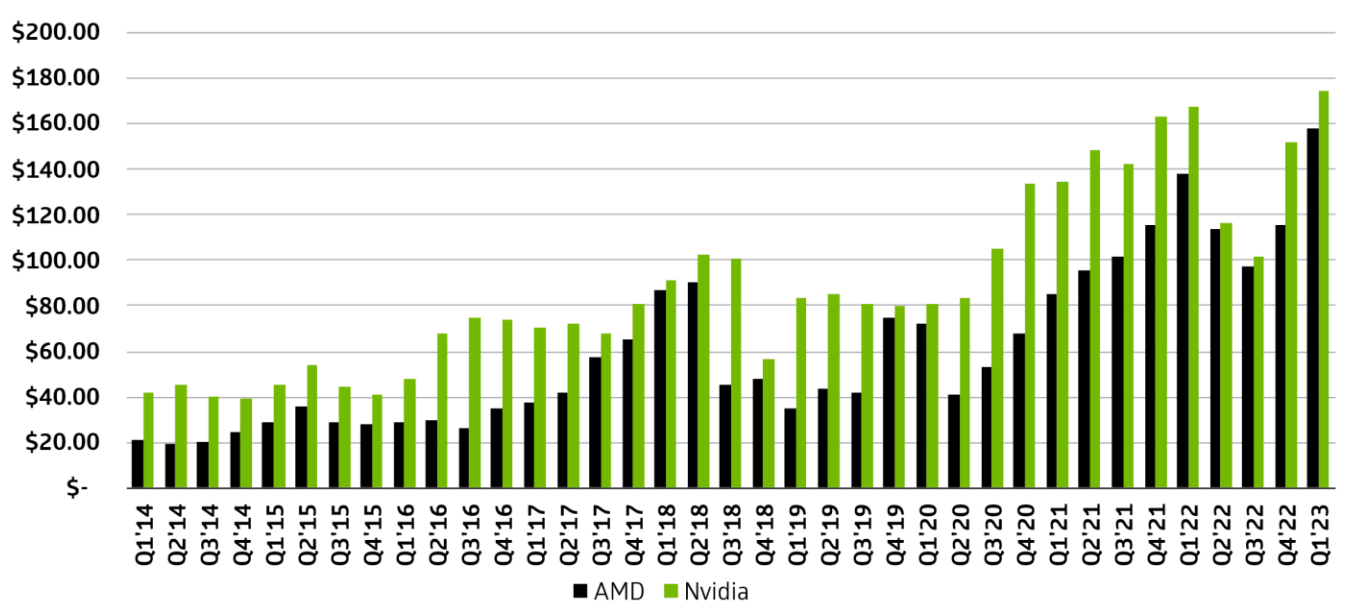
Qorvo (QRVO) and Skyworks (SWKS): For Qorvo, the ongoing inventory correction across the Android ecosystem persists with the company proactively under-shipping end demand in an effort to clear channel inventory. Importantly, the company believes MarQ represented the bottom for China-based Android revenue. For the SepQ, the company expects strong sequential growth as it supports Apple product ramp. As for Skyworks, Mobile results in the last print came in slightly worse than seasonal as the Android ecosystem continues to go through inventory digestion. However, sequentially, management anticipates Q/Q growth led by Mobile which we see as indicative of its still strong position at Apple. This is largely consistent with near-peer Qorvo's Apple-related commentary, and illustrates the extent to which both companies can continue to grow content at Apple (and elsewhere such as Samsung), as the complexity of such 5G features as carrier aggregation and expanded spectrum demand ever-greater RFFE content—albeit at a more incremental pace than the original 4G-to-5G step-function transition.

Figure 7 – 2 Year Return SOXX Versus NASDAQ Versus S&P 500



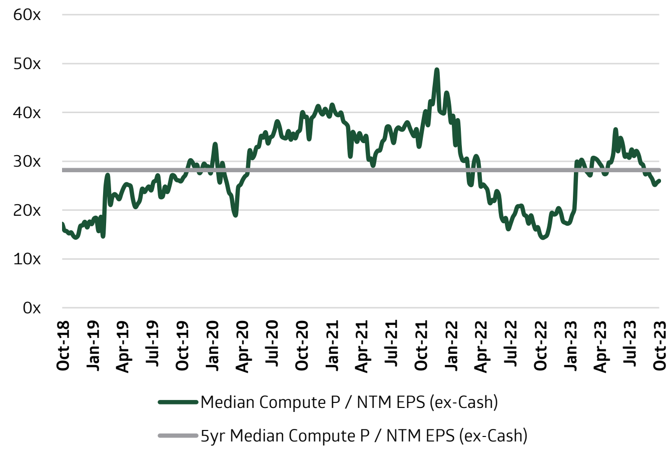
Source: Thomson Reuters Priced as of 10/13/2023

Figure 8 – Discrete GPU Blended ASP Estimates



Source: TD Cowen, Company Data, John Peddie Research

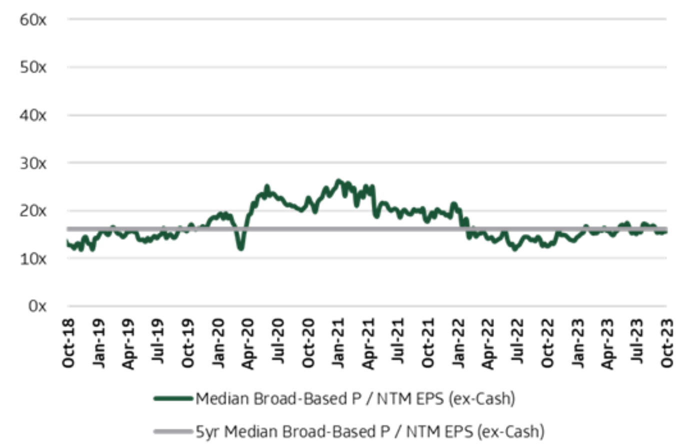
Figure 9 – Compute P / NTM E (ex-Cash) Over Time



Source: Thomson Reuters Eikon, TD Cowen

Companies include AMBA, AMD, AVGO, QCOM, INTC, LSCC, MPWR, MRVL, NVDA

Figure 10 – Broad-Based P / NTM E (ex-Cash) Over Time



Source: Thomson Reuters Eikon, TD Cowen

Companies include ADI, ALGM, CTS, DIOD, IFX, LFUS, MCHP, NXPI, ON, SLAB, STM, TXN, VSH

Figure 11 – Broad-Based P / NTM E (ex-Cash) Premium (Discount) to Compute Over Time (%)

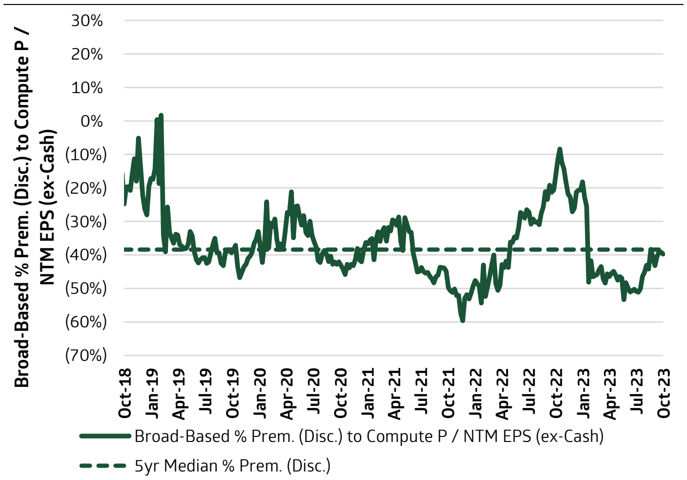
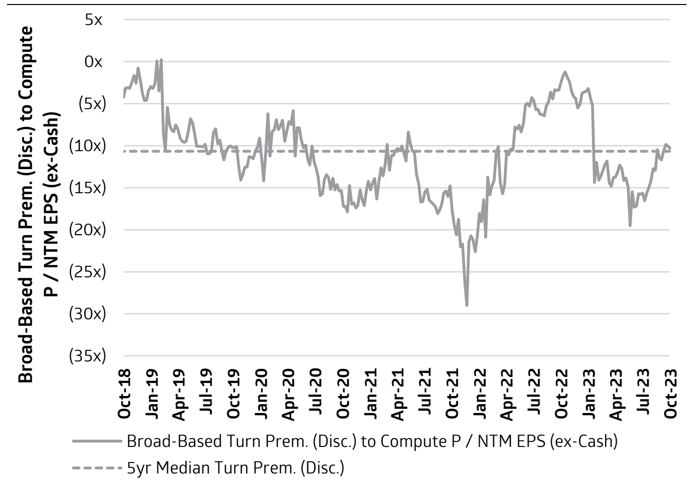


Figure 12 – Broad-Based P / NTM E (ex-Cash) Premium (Discount) to Compute Over Time (Turns)

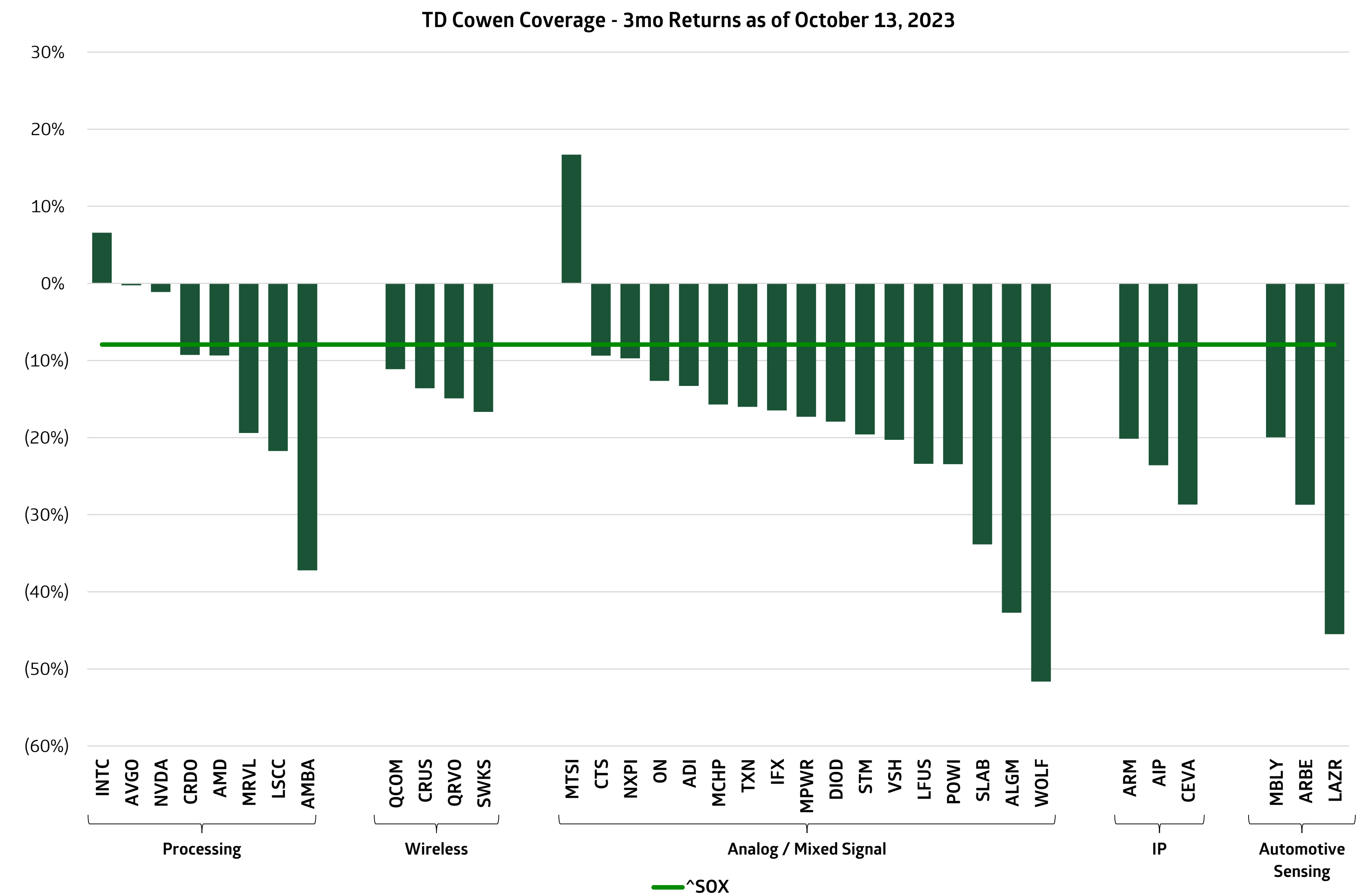


Source: TD Cowen

Compute companies include AMBA, AMD, AVGO, QCOM, INTC, LSCC, MPWR, MRVL, NVDA

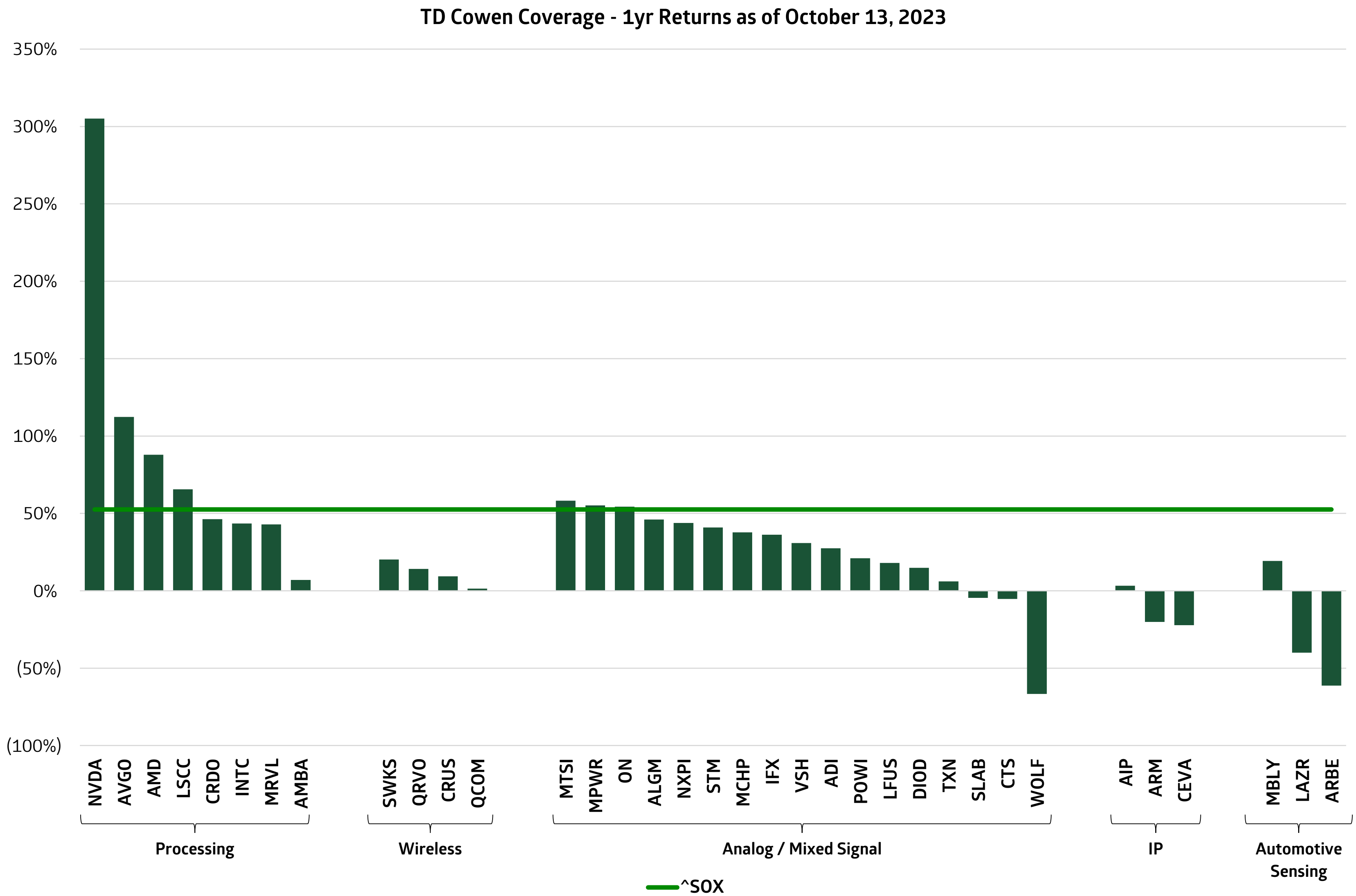
Broad-Based companies include ADI, ALGM, CTS, DIOD, IFX, LFUS, MCHP, NXPI, ON, SLAB, STM, TXN, VSH

Figure 13 – Semiconductor Stock Returns Over Time by Subsector – 3mo Returns



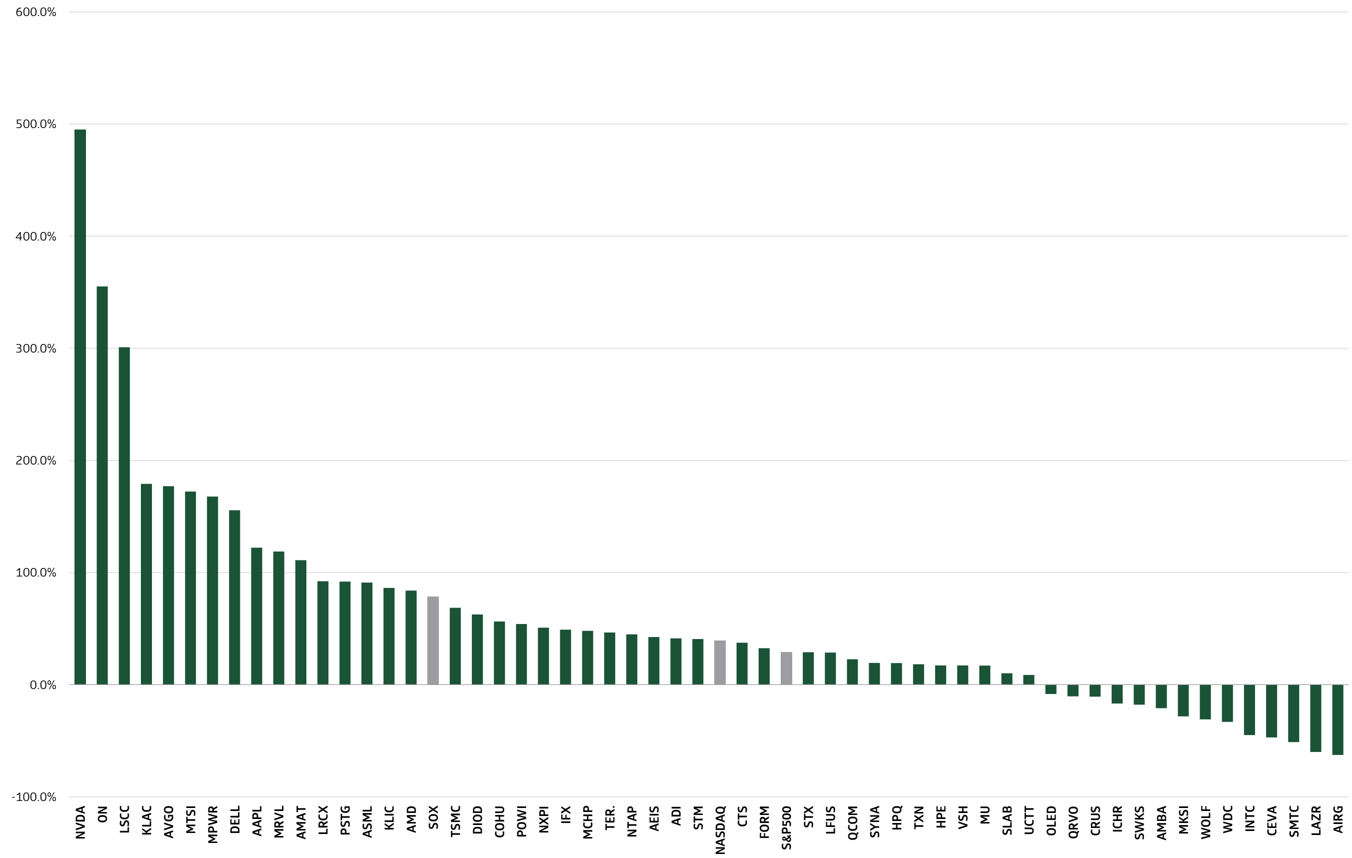
Source: Thomson Reuters Eikon, TD Cowen

Figure 14 Semiconductor Stock Returns Over Time by Subsector – 1yr Returns



Source: TD Cowen.

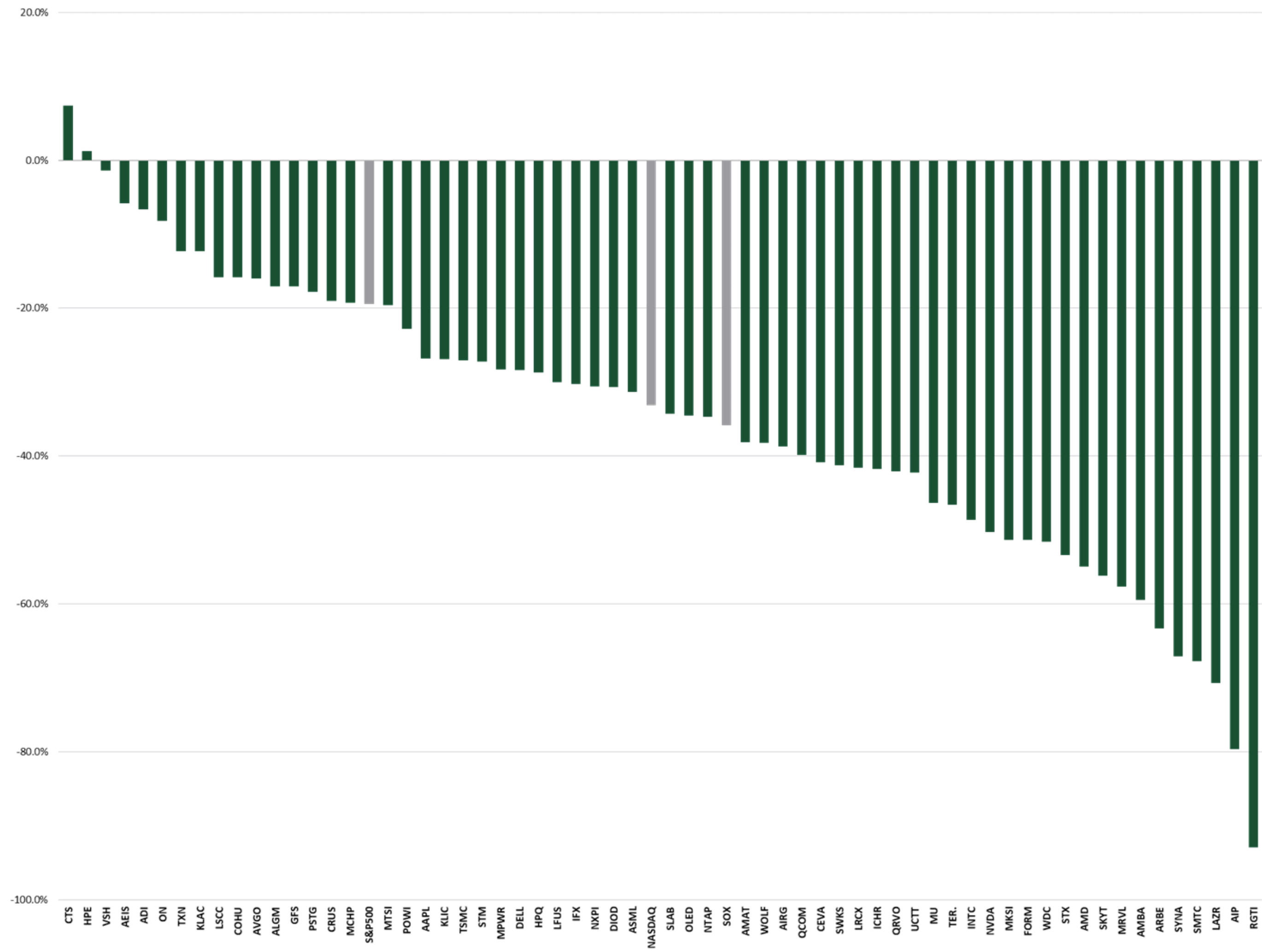
Figure 15 – Semiconductor Stock Performance – 2023 YTD



Source: Thomson Reuters, TD Cowen; Priced as of 10/13/23

AEIS, AAPL, AMAT, ASML.NA, COHU, DELL, FORM, GFS, HPQ, ICHR, KLAC, KLIC, LCRX, MU, MKSI, NTAP, PSTG, RGTI, STX, SKYT, SYNA, TSM, TER, UCTT, OLED, and WDC covered by Krish Sankar.

Figure 16 – Semiconductor Stock Performance – Full Year 2022



Source: Thomson Reuters, TD Cowen; Priced as of December 31, 2022.

CRDO, MBLY, and RGTI (covered by Krish Sankar) not included due to IPO.

AEIS, AAPL, AMAT, ASML.NA, COHU, DELL, FORM, GFS, HPQ, ICHR, KLAC, KLIC, LCRX, MU, MKSI, NTAP, PSTG, STX, SKYT, SYNA, TSM, TER, UCTT, OLED, and WDC covered by Krish Sankar.

Figure 17 – TD Cowen PC CPU Market Share Industry Model

PC Market Share

PC Market Size (Units)	2016	2017	2018	2019	2020	2021	2022	2023E	2024E
Desktop	108	102	100	101	80	86	76	68	70
Notebook	111	101	95	93	86	93	94	80	84
UltraPortables	47	56	60	63	100	127	96	88	92
Chromebook	7	12	15	17	36	36	18	17	18
Total	**273**	**271**	**270**	**274**	**302**	**342**	**284**	**253**	**266**
Y/Y		*-1%*	*0%*	*2%*	*10%*	*13%*	*-17%*	*-11%*	*5%*
Desktop	40%	38%	37%	37%	26%	25%	27%	27%	27%
Notebook	41%	37%	35%	34%	28%	27%	33%	32%	32%
UltraPortables	17%	21%	22%	23%	33%	37%	34%	35%	35%
Chromebook	2%	4%	6%	6%	12%	11%	6%	7%	7%

Apple PC Units	2016	2017	2018	2019	2020	2021	2022	2023E	2024E
Apple DT	7	7	7	7	5	7	7	7	7
Apple NB	11	12	12	11	15	20	19	20	20
Total Apple PC	**18**	**19**	**19**	**18**	**20**	**26**	**26**	**27**	**27**
Apple Intel DT	7	7	7	7	5	4	2	-	-
Apple Intel NB	11	12	12	11	13	7	-	-	-
Total Apple PC									
Apple Arm DT	-	-	-	-	-	2	5	7	7
Apple Arm NB	-	-	-	-	1	13	19	20	20
Total Apple Arm	-	-	-	-	**1**	**15**	**24**	**27**	**27**

Desktop Unit Share	2016	2017	2018	2019	2020	2021	2022	2023E	2024E
Intel Apple Units	6.8%	7.0%	6.9%	6.5%	6.6%	5.0%	3.2%	0.0%	0.0%
AMD	10.2%	11.4%	13.4%	17.7%	18.5%	20.3%	22.0%	24.0%	26.0%
Intel	89.4%	88.3%	86.4%	82.3%	81.5%	76.8%	71.6%	64.7%	62.8%
Apple Arm Desktop	0.0%	0.0%	0.0%	0.0%	0.0%	2.7%	5.9%	10.8%	10.2%
Other Arm Desktop	0.4%	0.3%	0.2%	0.1%	0.0%	0.3%	0.5%	0.5%	1.0%

Notebook/etc Unit Share	2016	2017	2018	2019	2020	2021	2022	2023E	2024E
Intel Apple Units	6.8%	7.0%	6.9%	6.5%	5.9%	2.7%	0.0%	0.0%	0.0%
AMD	6.3%	7.0%	10.0%	14.5%	19.0%	19.5%	19.5%	17.0%	23.0%
Intel	93.7%	93.0%	90.0%	85.5%	80.8%	76.3%	68.8%	69.2%	63.3%
Apple Arm Notebook					0.1%	3.2%	9.2%	10.8%	10.2%
Other Arm Notebook					0.1%	1.0%	2.5%	3.0%	3.5%

ASPs	2016	2017	2018	2019	2020	2021	2022	2023E	2024E
Intel DT	$ 120	$ 127	$ 141	$ 144	$ 149	$ 153	$ 161	$ 169	$ 197
Intel NB	$ 98	$ 108	$ 116	$ 123	$ 120	$ 112	$ 129	$ 136	$ 159
Intel Apple DT ASPs	$ 138	$ 146	$ 162	$ 166	$ 171	$ 176	$ 185	$ -	$ -
Intel Apple NB ASPs	$ 113	$ 124	$ 133	$ 141	$ 138	$ 129	$ 149	$ -	$ -
AMD DT	$ 50	$ 77	$ 88	$ 108	$ 135	$ 162	$ 141	$ 106	$ 123
AMD NB	$ 53	$ 45	$ 46	$ 62	$ 70	$ 87	$ 94	$ 70	$ 81
Arm DT	$ 40.00	$ 61.60	$ 70.40	$ 86.40	$ 108.00	$ 129.60	$ 112.75	$ 84.56	$ 98.52
Arm NB	$ 42.40	$ 36.00	$ 36.80	$ 49.60	$ 56.00	$ 69.60	$ 75.17	$ 56.38	$ 64.83

Revenue	2016	2017	2018	2019	2020	2021	2022	2023E	2024E
Intel Non-Apple DT	$ 10,707	$ 10,536	$ 11,220	$ 11,014	$ 8,898	$ 10,106	$ 8,734	$ 7,376	$ 8,732
Intel Apple DT	$ 1,010	$ 1,043	$ 1,111	$ 1,091	$ 902	$ 751	$ 450	$ -	$ -
Intel Non-Apple NB	$ 15,119	$ 16,961	$ 17,766	$ 18,236	$ 21,451	$ 21,914	$ 18,516	$ 17,404	$ 19,606
Intel Apple NB	$ 1,258	$ 1,468	$ 1,557	$ 1,599	$ 1,814	$ 883	$ -	$ -	$ -
Intel PC	**$ 28,094**	**$ 30,008**	**$ 31,654**	**$ 31,939**	**$ 33,065**	**$ 33,654**	**$ 27,699**	**$ 24,780**	**$ 28,337**
y/y Growth			*5%*	*1%*	*4%*	*2%*	*-18%*	*-11%*	*14%*

Revenue	2016	2017	2018	2019	2020	2021	2022	2023E	2024E
AMD DT	$ 549	$ 893	$ 1,178	$ 1,926	$ 1,998	$ 2,821	$ 2,357	$ 1,715	$ 2,256
AMD NB	$ 553	$ 530	$ 787	$ 1,555	$ 2,952	$ 4,336	$ 3,812	$ 2,220	$ 3,636
AMD PC	**$ 1,102**	**$ 1,423**	**$ 1,965**	**$ 3,481**	**$ 4,950**	**$ 7,157**	**$ 6,169**	**$ 3,935**	**$ 5,892**
y/y Growth			*38%*	*77%*	*42%*	*45%*	*-14%*	*-36%*	*50%*

Source: TD Cowen estimates, Mercury Research

Figure 18 – TD Cowen Server CPU Market Share Industry Model

Server Processor Market Share									
Server Market Size (MPU Units)	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023E**	**2024E**
Cloud	10	11	16	15	18	18	19	18	20
Comms & Networking	3	4	4	5	5	6	6	5	6
Enterprise & Govt	12	11	9	9	8	10	6	6	8
Total	**25**	**26**	**29**	**29**	**31**	**33**	**32**	**29**	**33**
Y/Y		*5%*	*13%*	*0%*	*7%*	*6%*	*-5%*	*-10%*	*15%*
Inventory Build (Burn)	0.4	0.8	0.6	1.3	3.1	4.3	(0.1)	(3.1)	(2.0)
Share of Market	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023E**	**2024E**
Cloud	39%	43%	53%	51%	57%	54%	61%	62%	60%
Comms & Networking	13%	15%	15%	17%	17%	17%	19%	18%	17%
Enterprise & Govt	48%	41%	32%	31%	27%	29%	20%	20%	23%
Y/Y	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023E**	**2024E**
Cloud		17%	38%	-4%	18%	2%	7%	-9%	11%
Comms & Networking		23%	11%	17%	2%	6%	9%	-15%	10%
Enterprise & Govt		-10%	-12%	-3%	-8%	15%	-35%	-8%	32%
Cloud Share	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023E**	**2024E**
Intel	98.0%	98.0%	97.0%	92.0%	87.5%	79.0%	68.5%	63.5%	46.0%
AMD	1.0%	1.0%	2.0%	7.0%	11.0%	19.0%	28.0%	31.0%	47.0%
Arm/Internal	1.0%	1.0%	1.0%	1.0%	1.5%	2.0%	3.5%	5.5%	7.0%
Comm/Networking Share	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023E**	**2024E**
Intel	97.5%	97.5%	97.5%	97.5%	96.0%	94.0%	89.0%	88.3%	85.5%
AMD	0.0%	0.0%	0.0%	0.0%	0.5%	1.5%	6.0%	6.2%	7.0%
Arm/Internal	2.5%	2.5%	2.5%	2.5%	3.5%	4.5%	5.0%	5.5%	7.5%
Enterprise & Government Share	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023E**	**2024E**
Intel	99.0%	99.5%	99.5%	99.0%	98.0%	97.5%	95.0%	94.5%	91.5%
AMD	0.0%	0.0%	0.0%	0.5%	1.5%	2.0%	4.5%	5.0%	8.0%
Arm/Internal	1.0%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%
Total Market Share	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023E**	**2024E**
Intel	98.4%	98.5%	97.9%	95.1%	91.7%	86.9%	77.7%	74.2%	63.3%
AMD	0.4%	0.4%	1.1%	3.7%	6.7%	11.1%	19.1%	21.3%	31.1%
Arm/Internal	1.2%	1.0%	1.1%	1.1%	1.6%	2.0%	3.2%	4.5%	5.6%
	-	-	-	-	-	-	-	-	-
Total Units	**2016**	**2017**	**2018**	**2019**	**2020E**	**2021E**	**2022E**	**2023E**	**2024E**
Intel	24.4	25.6	28.8	28.0	28.9	29.0	24.6	21.2	20.8
AMD	0.1	0.1	0.3	1.1	2.1	3.7	6.1	6.1	10.2
Arm/Internal	0.3	0.3	0.3	0.3	0.5	0.7	1.0	1.3	1.8
		5%	13%	-3%	3%	0%	-15%		
ASPs	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023E**	**2024E**
Intel	$ 660	$ 686	$ 734	$ 771	$ 748	$ 718	$ 682	$ 703	$ 787
AMD	$ 450	$ 450	$ 650	$ 690	$ 705	$ 811	$ 876	$ 954	$ 959
Arm/Internal	$ 528	$ 549	$ 588	$ 617	$ 598	$ 574	$ 546	$ 562	$ 630
Server CPU Revenue	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023E**	**2024E**
Intel	$ 16,101	$ 17,597	$ 21,184	$ 21,568	$ 21,599	$ 20,818	$ 16,796	$ 14,882	$ 16,354
AMD	$ 43	$ 51	$ 203	$ 760	$ 1,487	$ 3,013	$ 5,314	$ 5,794	$ 9,781
Arm/Internal	$ 156	$ 146	$ 184	$ 201	$ 295	$ 379	$ 552	$ 720	$ 1,153
Total	**$ 16,300**	**$ 17,794**	**$ 21,571**	**$ 22,529**	**$ 23,381**	**$ 24,211**	**$ 22,662**	**$ 21,395**	**$ 27,288**
Server CPU Revenue Y/Y	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023E**	**2024E**
Intel		9%	20%	2%	0%	-4%	-19%	-11%	10%
AMD		17%	299%	274%	96%	103%	76%	9%	69%
Arm/Internal		-7%	26%	9%	47%	29%	46%	30%	60%
Server CPU Revenue Y/Y	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023E**	**2024E**
Intel		$ 1,496	$ 3,587	$ 384	$ 31	$ (781)	$ (4,022)	$ (1,914)	$ 1,472
AMD		$ 8	$ 152	$ 557	$ 728	$ 1,526	$ 2,300	$ 480	$ 3,988
Arm/Internal		$ (10)	$ 38	$ 16	$ 94	$ 85	$ 173	$ 168	$ 433

Source: TD Cowen estimates, Mercury Research

Advanced Micro Devices Inc (AMD)

Figures in USD MM, Except Per-Share Amounts

Rating and Price Target:

TD Cowen Rating:	**Outperform**
TD Cowen Price Target:	**135.00**
# Analysts:	47
Buys/Hold/Sells:	34/12/1

Valuation:

	CY2023E	CY2024E
On Street Ests.:		
P / EPS (ex Cash)	*37x*	*25x*
EV / S	*7.3x*	*6.0x*
EV / EBITDA	*26x*	*20x*
TD Cowen Tgt. PT / Ests:		
P / EPS (ex Cash)	*49x*	*30x*
EV / S	*9.2x*	*7.5x*
EV / EBITDA	*25x*	*19x*

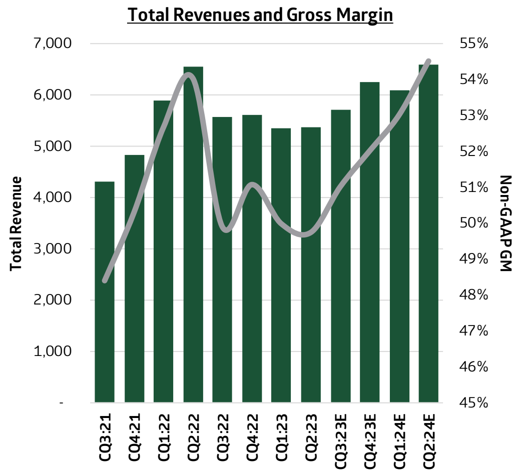
Market Data:

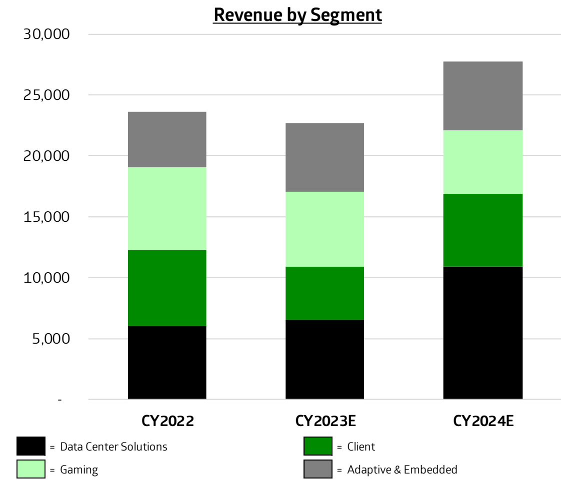
Enterprise Value:	165,973
Market Cap:	169,791
Price:	105.09
Dividend Yield:	n/a
Short Interest:	1.8%

	AMD	^SOX
Total YTD Return:	62%	36%
Total 1-Month Return:	(2%)	(3%)
Total 3-Month Return:	(9%)	(8%)
Total 6-Month Return:	14%	12%
Total 1-Year Return:	88%	53%

Abridged P&L - TD Cowen Estimates:

	CQ3:23E	CQ4:23E	CQ1:24E	CQ2:24E	CY2023E	CY2024E
Total Revenue	**5,701**	**6,250**	**6,093**	**6,582**	**22,663**	**27,704**
Q/Q (Y/Y)	6%	10%	(3%)	8%	(4%)	22%
Street	*5,690*	*6,377*	*6,190*	*6,514*	*22,820*	*27,519*
Non-GAAP GM	51.0%	52.0%	53.0%	54.5%	50.7%	54.7%
Non-GAAP OpM	22.1%	24.7%	24.4%	27.9%	21.9%	29.3%
Non-GAAP EPS	**0.68**	**0.84**	**0.81**	**0.99**	**2.70**	**4.40**
Street	*0.68*	*0.88*	*0.84*	*0.94*	*2.76*	*4.16*





Key Investment Points:

- AMD has made significant strides shoring up n-node silicon supply, which should improve performance and reliability.
- AMD is the only leading supplier with high-performance CPUs, GPUs and FPGA and using these together can differentiate itself versus competitors Intel and NVIDIA especially in AI
- AMD's EPYC server CPU roadmap (Milan, Genoa/Bergamo) should allow solid share gains in core cloud markets vs Intel, driving strong Datacenter growth, enterprise potential in 2024.

Where We are Different from Street:

- We have done extensive industry checks on the competitiveness of AMD's roadmap on 7nm and 5nm at TSMC vs Intel's 10nm and moving 7nm timelines.
- With Intel's roadmap trying to catch-up, we believe AMD's share gain narrative is open-ended.
- We see AMD EPS troughing in 2023E prior to re-accelerating to $4.40 in 2024E.
- We believe AMD's n-node CPU/GPU technologies, plus Xilinx's leading PDL/SERDES and high-margin core FPGA franchise have the potential for significant revenue synergies.

Thoughts Into CQ3:23 Earnings:

- Expect reiteration of 50% H/H Data Center growth target, which is aspirational but achieveable in our view
- Client to likely rebound as PC channel largely clear allowing return to matching sell-in to sell-through, plus seasonality
- Focus on gross margin as Embedded expected to be down Q/Q in 4Q as well, can GM hang in?

Source: Company reports, Thomson Reuters Eikon, TD Cowen; market data as of October 13, 2023

Arm Holdings Plc (ARM)

Figures in USD MM, Except Per-Share Amounts

Rating and Price Target:

TD Cowen Rating:	**Outperform**
TD Cowen Price Target:	**63.00**
# Analysts:	21
Buys/Hold/Sells:	14/6/1

Valuation:

	CY2023E	CY2024E
On Street Ests.:		
P / EPS (ex Cash)	*n/a*	*40x*
EV / S	*n/a*	*14.4x*
EV / EBITDA	*n/a*	*34x*
TD Cowen Tgt. PT / Ests:		
P / EPS (ex Cash)	*76x*	*55x*
EV / S	*22.1x*	*19.0x*
EV / EBITDA	*59x*	*43x*

Market Data:

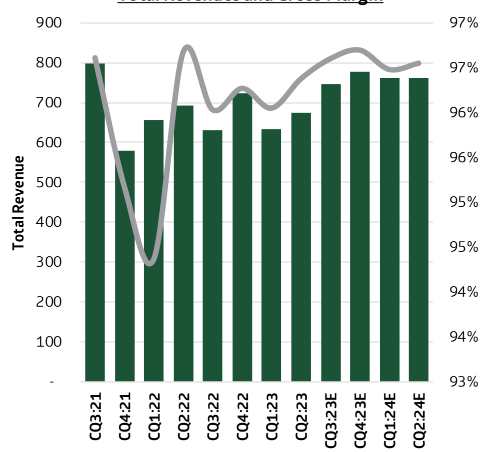
Enterprise Value:	50,030
Market Cap:	52,061
Price:	50.78
Dividend Yield:	n/a
Short Interest:	14.5%

	ARM	^SOX
Total YTD Return:	(20%)	36%
Total 1-Month Return:	(20%)	(3%)
Total 3-Month Return:	(20%)	(8%)
Total 6-Month Return:	(20%)	12%
Total 1-Year Return:	(20%)	53%

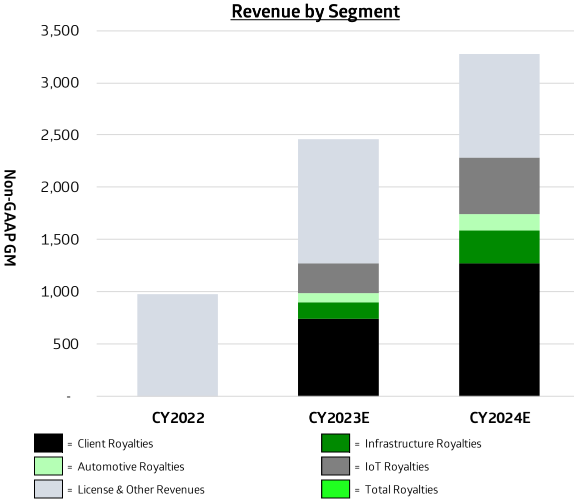
Abridged P&L - TD Cowen Estimates:

	CQ3:23E	CQ4:23E	CQ1:24E	CQ2:24E	CY2023E	CY2024E
Total Revenue	**747**	**777**	**763**	**762**	**2,832**	**3,280**
Q/Q (Y/Y)	11%	4%	(2%)	(0%)	5%	16%
Street	*743*	*769*	*755*	*753*	*NULL*	*3,469*
Non-GAAP GM	96.6%	96.7%	96.5%	96.6%	96.5%	96.6%
Non-GAAP OpM	40.3%	42.1%	39.1%	35.6%	31.8%	38.9%
Non-GAAP EPS	**0.26**	**0.28**	**0.26**	**0.23**	**0.80**	**1.10**
Street	*0.25*	*0.27*	*0.25*	*0.24*	*NULL*	*1.22*

Total Revenues and Gross Margin



Revenue by Segment



Key Investment Points:

Where We are Different from Street:

- We believe Arm is in the early stages of resetting its revenue base higher as it better aligns its value capture with its importance to the semiconductor industry
- We acknowledge potential risk in Client revenue ramp as penetration and mix for v9-based and TCS-based royalty units may take longer than anticipated to flow through the model
- Infrastructure, we are likely more conservative than many on Arm's core CPU server share gain, though more optimistic on SmartNIC/DPU-based unit share
- We see Automotive as a strong future growth vector for the company as higher levels of processing lead to higher Arm share within the vehicle

Thoughts Into CQ3:23 Earnings:

- Initial EPS following the IPO, look to likely hit/beat consensus from IPO model
- Color by end market for royalty revenue? Have expectations changed from IPO?
- State of the smartphone market, competitive dynamics across landscape? Impact from Huawei?

Source: Company reports, Thomson Reuters Eikon, TD Cowen; market data as of October 13, 2023

Arteris Inc (AIP)

Figures in USD MM, Except Per-Share Amounts

Rating and Price Target:

TD Cowen Rating:	**Outperform**
TD Cowen Price Target:	**12.00**
# Analysts:	6
Buys/Hold/Sells:	5/1/0

Valuation:

	CY2023E	CY2024E
On Street Ests.:		
P / EPS (ex Cash)	*n/a*	*n/a*
EV / S	*2.9x*	*2.4x*
EV / EBITDA	*n/a*	*n/a*
TD Cowen Tgt. PT / Ests:		
P / EPS (ex Cash)	*n/a*	*n/a*
EV / S	*5.9x*	*4.5x*
EV / EBITDA	*n/a*	*n/a*

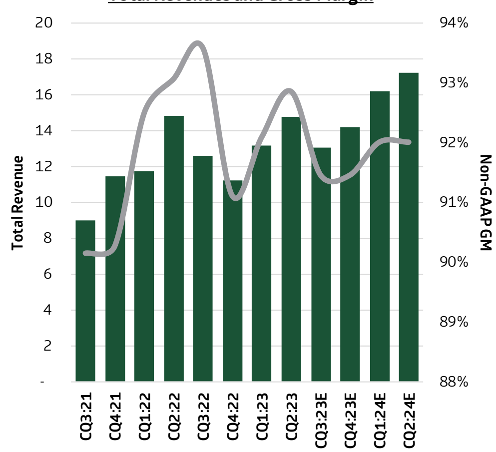
Market Data:

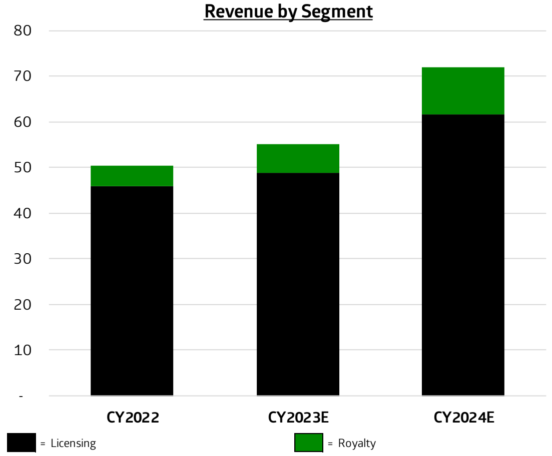
Enterprise Value:	163
Market Cap:	215
Price:	5.96
Dividend Yield:	n/a
Short Interest:	0.6%

	AIP	^SOX
Total YTD Return:	39%	36%
Total 1-Month Return:	(12%)	(3%)
Total 3-Month Return:	(24%)	(8%)
Total 6-Month Return:	47%	12%
Total 1-Year Return:	3%	53%

Abridged P&L - TD Cowen Estimates:

	CQ3:23E	CQ4:23E	CQ1:24E	CQ2:24E	CY2023E	CY2024E
Total Revenue	**13**	**14**	**16**	**17**	**55**	**72**
Q/Q (Y/Y)	(12%)	9%	14%	6%	9%	31%
Street	*13*	*14*	*15*	*16*	*55*	*69*
Non-GAAP GM	91.5%	91.5%	92.0%	92.0%	92.0%	92.3%
Non-GAAP OpM	(46.0%)	(38.8%)	(20.4%)	(12.0%)	(38.6%)	(5.8%)
Non-GAAP EPS	**(0.16)**	**(0.17)**	**(0.10)**	**(0.06)**	**(0.63)**	**(0.14)**
Street	*(0.18)*	*(0.17)*	*(0.16)*	*(0.13)*	*(0.65)*	*(0.43)*





Key Investment Points:

- Arteris offers on-chip NoC IP solutions and SW to enable complex SoC designs via ~90%+ gross margin License/Royalty model.
- In an expanding semi TAM increasingly featuring complex SoC designs, we anticipate demand for Arteris SoC system IP solutions with greater additions of processors, memory, AI accelerators, chiplets, and other peripherals.
- Many semi-vendors are moving from MCUs to more complex SoCs (particularly in Autos) or are new start-up internal cloud design team (AI/ML) and need help with on-chip networking IP.

Where We are Different from Street:

- We believe Arteris has aligned itself to a rich/sticky set of design wins in Auto and AI/ML (~50%+ of sales) with Auto licensees having >80% SoC market share and estimated at ~40% of Royalties that are set to grow 60%+.
- For AI/ML, we anticipate a long-tail of material/profitable growth off of a forecasted ~+37% SoC unit CAGR (C'19-25) and existing design starts to translate into customer product ramps and become a greater portion of mix.
- License fee and royalty business model begets accretive margin trajectory via diversified sources of licenses/royalties as Auto & AI/ML markets inflect versus Consumer concentration at top customers Huawei/HiSilicon.
- Data center and 5G/Wireless present under the radar upside opportunities.

Thoughts Into CQ3:23 Earnings:

- Expect continued momentum in licensing (macro notwithstanding) especially from AI/ML
- Look for reiteration of commentary on model flipping FCF/EPS positive exiting 2024
- Likely focus on competitive environment given newly-public Arm

Source: Company reports, Thomson Reuters Eikon, TD Cowen; market data as of October 13, 2023

Broadcom Inc (AVGO)

Figures in USD MM, Except Per-Share Amounts

Rating and Price Target:

TD Cowen Rating:	**Market Perform**
TD Cowen Price Target:	**900.00**
# Analysts:	29
Buys/Hold/Sells:	24/5/0

Valuation:

	CY2023E	CY2024E
On Street Ests.:		
P / EPS (ex Cash)	*21x*	*19x*
EV / S	*10.7x*	*9.9x*
EV / EBITDA	*17x*	*16x*
TD Cowen Tgt. PT / Ests:		
P / EPS (ex Cash)	*20x*	*n/a*
EV / S	*11.1x*	*n/a*
EV / EBITDA	*17x*	*n/a*

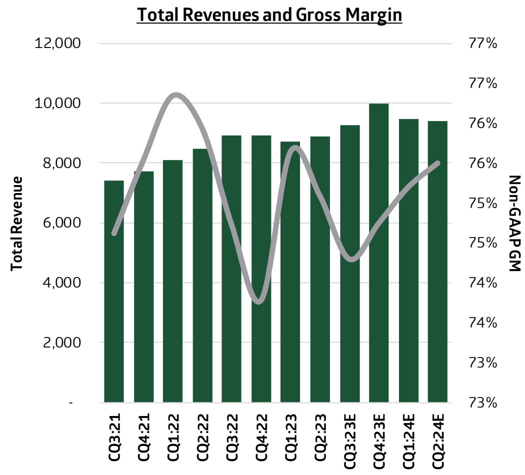
Market Data:

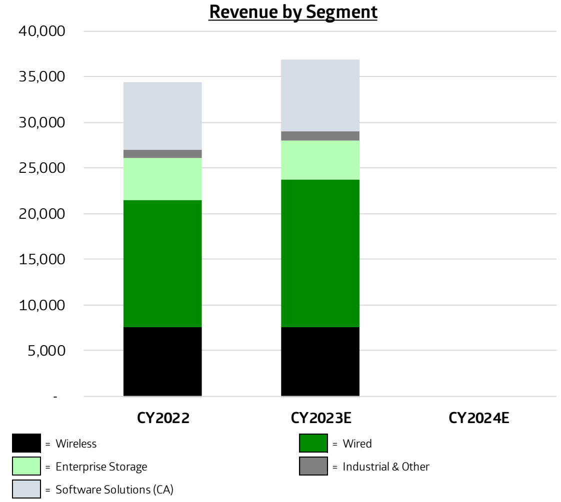
Enterprise Value:	388,069
Market Cap:	364,520
Price:	883.18
Dividend Yield:	2.1%
Short Interest:	1.6%

	AVGO	^SOX
Total YTD Return:	61%	36%
Total 1-Month Return:	4%	(3%)
Total 3-Month Return:	(0%)	(8%)
Total 6-Month Return:	43%	12%
Total 1-Year Return:	112%	53%

Abridged P&L - TD Cowen Estimates:

	CQ3:23E	CQ4:23E	CQ1:24E	CQ2:24E	CY2023E	CY2024E
Total Revenue	**9,270**	**9,978**	**9,484**	**9,401**	**36,857**	**n/a**
Q/Q (Y/Y)	4%	8%	(5%)	(1%)	7%	n/a
Street	*9,137*	*9,365*	*9,393*	*9,576*	*36,292*	*39,283*
Non-GAAP GM	74.3%	74.8%	75.2%	75.5%	74.9%	n/a
Non-GAAP OpM	61.6%	62.4%	61.6%	61.2%	62.1%	n/a
Non-GAAP EPS	**11.00**	**12.13**	**11.41**	**11.32**	**43.92**	**n/a**
Street	*10.78*	*11.05*	*11.11*	*11.39*	*42.67*	*46.72*





Key Investment Points:

- The CA & SYMC acquisitions puzzled us strategically and slowed capital return / growth story, tempering our enthusiasm. However, with the recent VMW transaction, we see SW portfolio may be nearing "complete"...TBD...
- We see the best-in-class margin profile delivering a powerful capital return program with increased dividend/buyback.
- Long-term wireless growth driven by RF content increases, but not overly important to our thesis.
- Recent management changes signal a succession plan and increased investment community communication will be welcomed by the Street; Return of buy-back helps, but M&A clearly still on the table.

Where We are Different from Street:

- At mid-singles growth, >45% OM and ~10% FCF yield shares appear fairly valued at ~12x ex-cash given the new focus on non-core M&A.
- We believe there is an outsized focus on the wireless business and investors are better served dismissing quarter to quarter volatility and look at long-term share gains.
- We see the wired business as sticky, stable, and diversified high margin group of franchises that should see long-term growth.
- We admit the business is becoming more difficult to forecast and value on fundamentals, as its characteristics move more to a public private equity shop model.

Thoughts Into CQ3:23 Earnings:

- Expect another solid quarter, with Gen AI momentum likely buffering weakness in other end markets
- Intra-quarter commentary from Marvell on Data Infra outside the datacenter incrementally negative, but AVGO has thus far outperformed its peer
- Expect scrutiny on the call from TPU headlines, but likely little in the way of concrete answers

Source: Company reports, Thomson Reuters Eikon, TD Cowen; market data as of October 13, 2023

CEVA Inc (CEVA)

Figures in USD MM, Except Per-Share Amounts

Rating and Price Target:		
TD Cowen Rating:		**Outperform**
TD Cowen Price Target:		**25.00**
# Analysts:		7
Buys/Hold/Sells:		5/2/0

Valuation:	**CY2023E**	**CY2024E**
On Street Ests.:		
P / EPS (ex Cash)	*152x*	*26x*
EV / S	*2.7x*	*2.4x*
EV / EBITDA	*206x*	*25x*
TD Cowen Tgt. PT / Ests:		
P / EPS (ex Cash)	*158x*	*32x*
EV / S	*3.9x*	*3.4x*
EV / EBITDA	*51x*	*19x*

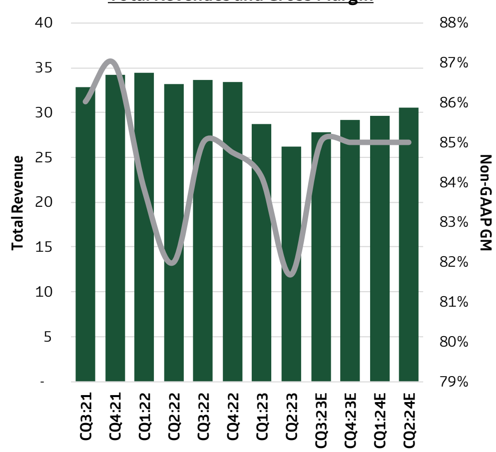
Market Data:	
Enterprise Value:	309
Market Cap:	444
Price:	18.80
Dividend Yield:	n/a
Short Interest:	2.6%

	CEVA	**^SOX**
Total YTD Return:	(27%)	36%
Total 1-Month Return:	(13%)	(3%)
Total 3-Month Return:	(29%)	(8%)
Total 6-Month Return:	(34%)	12%
Total 1-Year Return:	(22%)	53%

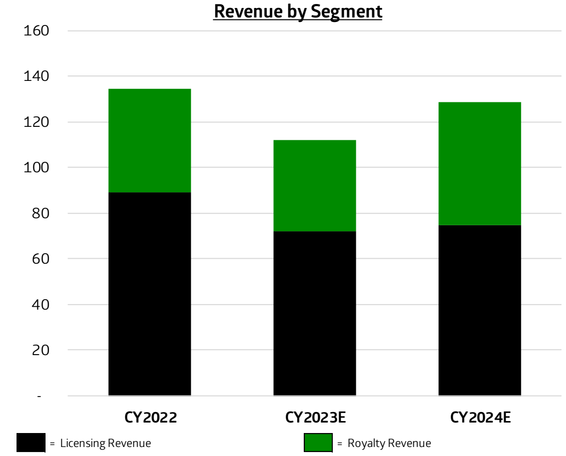
Abridged P&L - TD Cowen Estimates:

	CQ3:23E	**CQ4:23E**	**CQ1:24E**	**CQ2:24E**	**CY2023E**	**CY2024E**
Total Revenue	**28**	**29**	**30**	**31**	**112**	**128**
Q/Q (Y/Y)	6%	5%	1%	3%	(17%)	15%
Street	*28*	*29*	*28*	*30*	*114*	*129*
Non-GAAP GM	85.0%	85.0%	85.0%	85.0%	84.0%	85.0%
Non-GAAP OpM	3.2%	8.2%	8.1%	9.5%	2.0%	12.8%
Non-GAAP EPS	**0.04**	**0.09**	**0.09**	**0.11**	**0.12**	**0.60**
Street	*0.04*	*0.06*	*0.06*	*0.10*	*0.08*	*0.49*

Total Revenues and Gross Margin



Revenue by Segment



Key Investment Points:

- We see long-term sustainable growth driven by non-baseband products beginning as base station revenue begins impacting the model.
- The basestation market presents significantly more favorable economics given higher silicon content than smartphone basebands.
- In our view, CEVA has a diverse set of growth drivers at its disposal, including AI, connectivity, voice processing, and other DSP applications.
- Healthy licensing environment with company recently signing largest agreement to date for 5G use case.

Where We are Different from Street:

- We believe the Street does not recognize the significant opportunity driven by the favorable economics of 5G base station production, particularly new opportunities with Samsung and Ericsson, in addition to Nokia and ZTE.
- We believe consensus is baking in limited success in AI, voice processing, and computer vision.
- Apple moving back to Qualcomm is a near-term headwind, but base-station and increasingly diversified footprint for DSPs is more critical to the long-term story, with potential for Apple to return to the model in '23+.

Thoughts Into CQ3:23 Earnings:

- Weak end markets likely temper royalty expectations, with headwinds to license revenue from Intrinsix sale
- More stability expected on the gross margin line as NRE more predictable with Intrinsix out of the model
- Look for update regarding momentum ex-smartphone

Source: Company reports, Thomson Reuters Eikon, TD Cowen; market data as of October 13, 2023

Cirrus Logic Inc (CRUS)

Figures in USD MM, Except Per-Share Amounts

Rating and Price Target:

TD Cowen Rating:	**Outperform**
TD Cowen Price Target:	**100.00**
# Analysts:	9
Buys/Hold/Sells:	6/3/0

Valuation:

	CY2023E	CY2024E
On Street Ests.:		
P / EPS (ex Cash)	*11x*	*10x*
EV / S	*2.0x*	*1.9x*
EV / EBITDA	*9x*	*9x*
TD Cowen Tgt. PT / Ests:		
P / EPS (ex Cash)	*17x*	*13x*
EV / S	*3.1x*	*2.6x*
EV / EBITDA	*11x*	*9x*

Market Data:

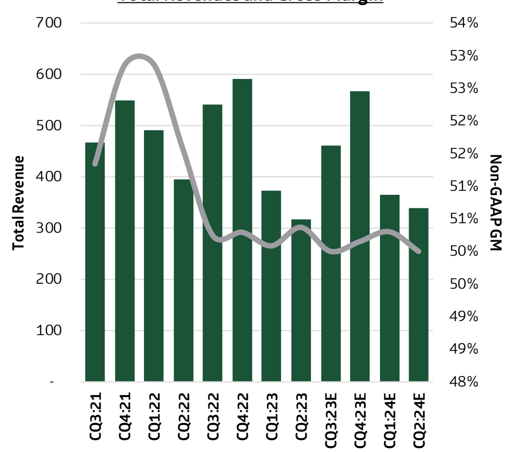
Enterprise Value:	3,473
Market Cap:	3,861
Price:	70.58
Dividend Yield:	n/a
Short Interest:	2.2%

	CRUS	^SOX
Total YTD Return:	(5%)	36%
Total 1-Month Return:	(2%)	(3%)
Total 3-Month Return:	(14%)	(8%)
Total 6-Month Return:	(22%)	12%
Total 1-Year Return:	9%	53%

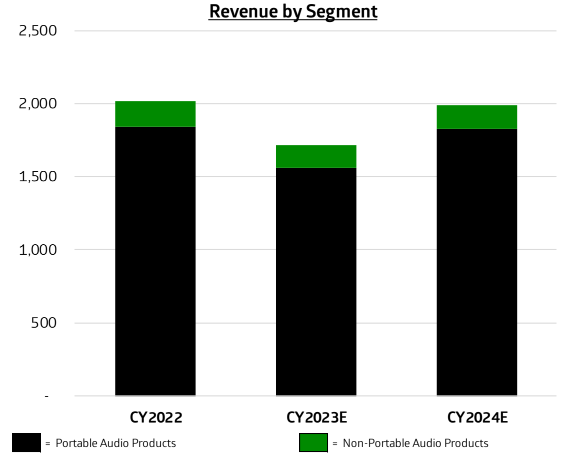
Abridged P&L - TD Cowen Estimates:

	CQ3:23E	CQ4:23E	CQ1:24E	CQ2:24E	CY2023E	CY2024E
Total Revenue	**461**	**566**	**364**	**339**	**1,716**	**1,988**
Q/Q (Y/Y)	45%	23%	(36%)	(7%)	(15%)	16%
Street	*458*	*539*	*369*	*338*	*1,735*	*1,808*
Non-GAAP GM	50.0%	50.2%	50.3%	50.0%	50.1%	50.2%
Non-GAAP OpM	24.6%	29.0%	16.6%	13.4%	22.7%	25.2%
Non-GAAP EPS	**1.57**	**2.24**	**0.87**	**0.68**	**5.40**	**7.11**
Street	*1.55*	*2.07*	*0.98*	*0.75*	*5.53*	*6.02*

Total Revenues and Gross Margin



Revenue by Segment



Key Investment Points:

- In our view, Cirrus Logic is out-investing its peers in the growing audio IC market, placing it in prime position to capitalize on potential long-term audio growth.
- We see a $10B+ portable audio TAM across the company's businesses, including codecs, digital headsets, ANC, voice biometrics, and amplifiers.
- Many of these markets remain nascent, with significant uncertainty on timing/magnitude of potential ramps.
- Cirrus model remains heavily tied to Apple and the iPhone, given its top customer drives ~70%+ of revenue.

Where We are Different from Street:

- We believe investors underappreciate the long-term opportunity across Cirrus's product portfolio of audio ICs including investments much higher than industry peers in a long-term important area.
- Apple choppiness is likely well understood. But we see a two-year cadence of content increases at its top customers.
- We believe Cirrus is increasingly looking to leverage its core expertise in low-power, low-latency mixed-signal processing which has applicability anywhere that the analog-digital boundary requires ultra-fast response times.
- We present a proprietary top-down analysis of Cirrus's potential $10B+ portable audio TAM while noting its inherent uncertainty.

Thoughts Into CQ3:23 Earnings:

- Moderate expectations given lack of new content in iPhone 15 series, but expect strong seasonal quarter from launch
- Little traction likely, but look for commentary on Android market given supply constraints may be easing--can CRUS "break the bundle" with QCOM?
- Any update for content growth on the 2024 iPhone? SE? Progress on 22nm codec?

Source: Company reports, Thomson Reuters Eikon, TD Cowen; market data as of October 13, 2023

Credo Technology Group Holding Ltd (CRDO)

Figures in USD MM, Except Per-Share Amounts

Rating and Price Target:

TD Cowen Rating:	**Market Perform**
TD Cowen Price Target:	**16.00**
# Analysts:	13
Buys/Hold/Sells:	11/1/1

Valuation:

	CY2023E	CY2024E
On Street Ests.:		
P / EPS (ex Cash)	*284x*	*52x*
EV / S	*11.2x*	*7.8x*
EV / EBITDA	*165x*	*56x*
TD Cowen Tgt. PT / Ests:		
P / EPS (ex Cash)	*n/a*	*n/a*
EV / S	*13.2x*	*n/a*
EV / EBITDA	*n/a*	*n/a*

Market Data:

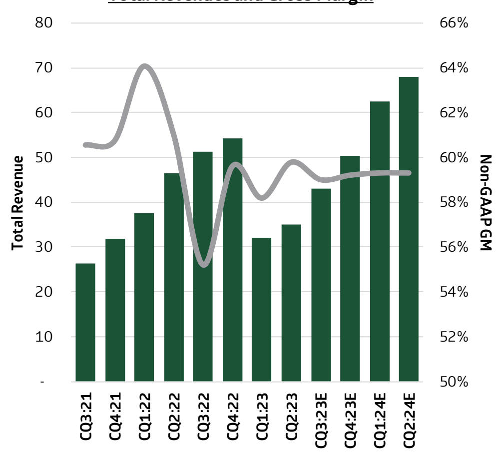
Enterprise Value:	2,097
Market Cap:	2,334
Price:	15.56
Dividend Yield:	n/a
Short Interest:	7.4%

	CRDO	^SOX
Total YTD Return:	17%	36%
Total 1-Month Return:	3%	(3%)
Total 3-Month Return:	(9%)	(8%)
Total 6-Month Return:	74%	12%
Total 1-Year Return:	46%	53%

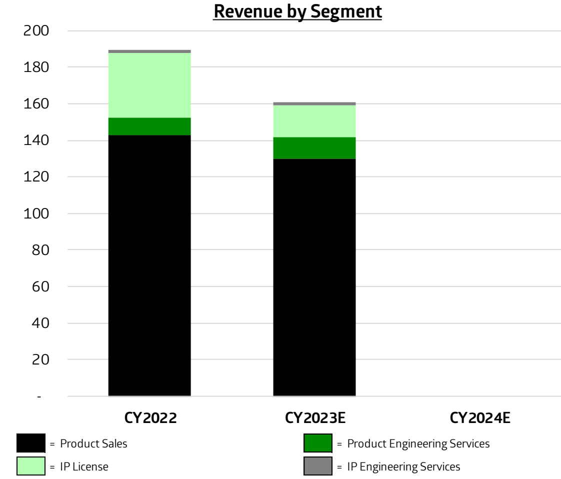
Abridged P&L - TD Cowen Estimates:

	CQ3:23E	CQ4:23E	CQ1:24E	CQ2:24E	CY2023E	CY2024E
Total Revenue	**43**	**50**	**62**	**68**	**161**	**n/a**
Q/Q (Y/Y)	23%	17%	24%	9%	(15%)	n/a
Street	*40*	*48*	*58*	*65*	*188*	*268*
Non-GAAP GM	59.0%	59.2%	59.3%	59.3%	59.1%	n/a
Non-GAAP OpM	(6.1%)	3.3%	14.1%	16.5%	(9.9%)	n/a
Non-GAAP EPS	**(0.00)**	**0.03**	**0.07**	**0.08**	**(0.05)**	**n/a**
Street	*(0.01)*	*0.02*	*0.04*	*0.06*	*0.05*	*0.27*

Total Revenues and Gross Margin



Revenue by Segment



Key Investment Points:

- CRDO is a growing player in the data center interconnect market with a portfolio spanning SerDes IP, interconnect electric cables, optical DSPs and line cards (retimers, gearboxes, MACsec chips).
- In the early innings of transition from an IP-focused company to a product-focused company.
- Given focus on hyperscaler cloud interconnect market, large customer concentration (we believe Microsoft) currently, and likely to persist in near-to-intermediate term.
- Ongoing inventory correction likely pressures fundamentals for the next 3-4 quarters and keeps us on the sidelines, but long-term technological trends well intact

Where We are Different from Street:

- Given our team's data center industry background in computing and server architecture, we believe we can add a unique perspective on Credo's business.
- We believe Credo's dominant position in SerDes IP and n-1 process technology strategy will continue to serve as a competitive advantage against incumbents in the market.
- We believe the company stands to benefit from the exponential growth of data traffic inside the DC that requires faster interconnection speeds to service new applications, including AI/ML, IoT and video streaming.

Thoughts Into CQ3:23 Earnings:

- We are expecting a return to strong sequential growth as the non-Gen AI buildouts at Microsoft/Amazon return alongside Genoa ramp
- Keeping to the cadence guided to back in February will be important given the stock's run since NVIDIA guide in May
- Expect updates on optical ramps/engagements at hyperscaler/diversification beyond AEC

Source: Company reports, Thomson Reuters Eikon, TD Cowen; market data as of October 13, 2023

Intel Corp (INTC)

Figures in USD MM, Except Per-Share Amounts

Rating and Price Target:

TD Cowen Rating:	**Market Perform**
TD Cowen Price Target:	**38.00**
# Analysts:	43
Buys/Hold/Sells:	7/30/6

Valuation:

	CY2023E	CY2024E
On Street Ests.:		
P / EPS (ex Cash)	*58x*	*21x*
EV / S	*3.4x*	*3.0x*
EV / EBITDA	*17x*	*10x*
TD Cowen Tgt. PT / Ests:		
P / EPS (ex Cash)	*62x*	*24x*
EV / S	*3.2x*	*2.8x*
EV / EBITDA	*17x*	*23x*

Market Data:

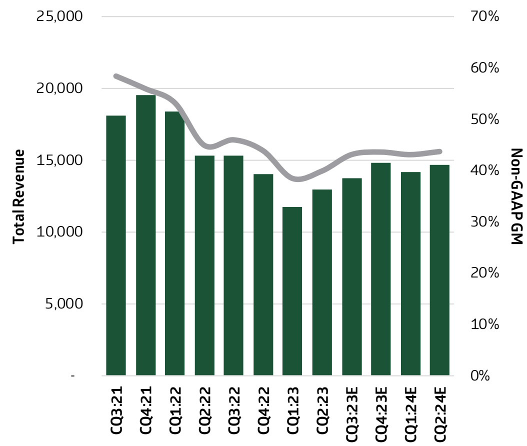
Enterprise Value:	178,885
Market Cap:	150,642
Price:	35.97
Dividend Yield:	1.4%
Short Interest:	1.3%

	INTC	^SOX
Total YTD Return:	39%	36%
Total 1-Month Return:	(7%)	(3%)
Total 3-Month Return:	7%	(8%)
Total 6-Month Return:	13%	12%
Total 1-Year Return:	43%	53%

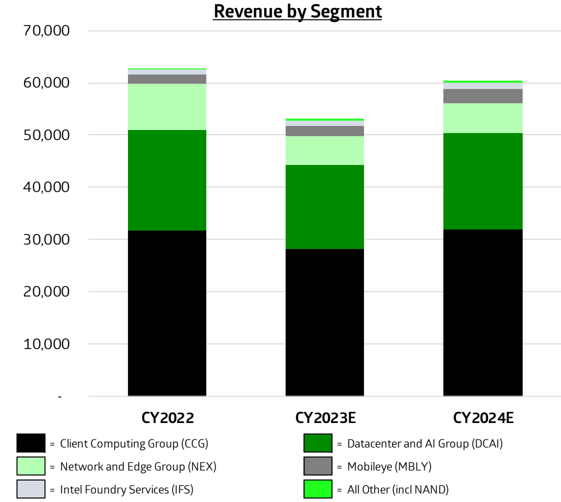
Abridged P&L - TD Cowen Estimates:

	CQ3:23E	CQ4:23E	CQ1:24E	CQ2:24E	CY2023E	CY2024E
Total Revenue	**13,761**	**14,786**	**14,193**	**14,694**	**53,211**	**60,393**
Q/Q (Y/Y)	6%	7%	(4%)	4%	(16%)	13%
Street	*13,492*	*14,330*	*13,760*	*14,233*	*52,479*	*58,664*
Non-GAAP GM	43.0%	43.5%	43.0%	43.6%	41.3%	43.9%
Non-GAAP OpM	7.4%	9.3%	8.2%	11.7%	4.8%	12.5%
Non-GAAP EPS	**0.22**	**0.30**	**0.25**	**0.36**	**0.61**	**1.57**
Street	*0.21*	*0.32*	*0.29*	*0.37*	*0.62*	*1.74*

Total Revenues and Gross Margin



Revenue by Segment



Key Investment Points:

- Near-term results will be challenged as the company faces delays in its server product roadmap, a declining PC TAM, and significant capex investments required to progress through 5 nodes in 4 years.
- We see Intel continuing to cede share in datacenter to AMD, and see its long-dominant share in the enterprise segment under threat.
- Long term, we view the transition to Gate-All-Around at both Intel/TSMC as key—while TSMC deserves the benefit of the doubt, it's not certain and presents an opportunity (and risk) to re-gain process technology leadership.

Where We are Different from Street:

- Given our team's data center industry background in computing and server architecture, we believe we can add a unique perspective on Intel's business.
- We believe that while Intel is facing a difficult '23/'24 in terms of fundamentals, in our view, the dividend is likely safe—a key concern for many investors given a dividend cut would drive forced selling at some institutions.
- We continue to believe Mr. Gelsinger brings credibility with customers, technical depth to galvanize/direct a deep bench of engineers, and an organic understanding of the importance of restoring manufacturing competitiveness.

Thoughts Into CQ3:23 Earnings:

- Quarter likely to come in ahead of the midpoint of guide, as management has stated, with upside from Client
- DCAI expectations very muted (especially compared to AMD) as management sees 2 more quarters of inventory digestion likely
- Expect commentary talking down gross margin for 2024, in line with commentary from Intel Innovation

Source: Company reports, Thomson Reuters Eikon, TD Cowen; market data as of October 13, 2023

Lattice Semiconductor Corp (LSCC)

Figures in USD MM, Except Per-Share Amounts

Rating and Price Target:

TD Cowen Rating:	**Outperform**
TD Cowen Price Target:	**105.00**
# Analysts:	11
Buys/Hold/Sells:	7/4/0

Valuation:

	CY2023E	CY2024E
On Street Ests.:		
P / EPS (ex Cash)	*36x*	*31x*
EV / S	*13.5x*	*11.9x*
EV / EBITDA	*30x*	*25x*
TD Cowen Tgt. PT / Ests:		
P / EPS (ex Cash)	*49x*	*39x*
EV / S	*19.2x*	*16.2x*
EV / EBITDA	*43x*	*35x*

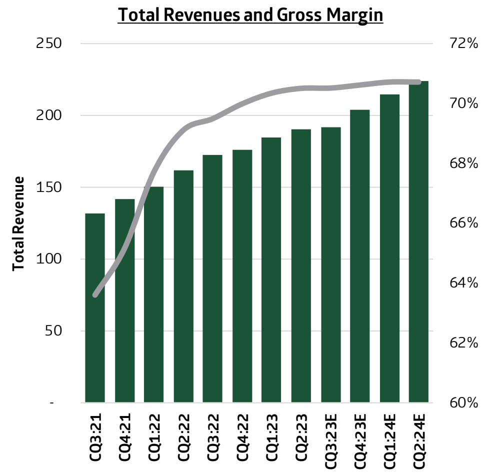
Market Data:

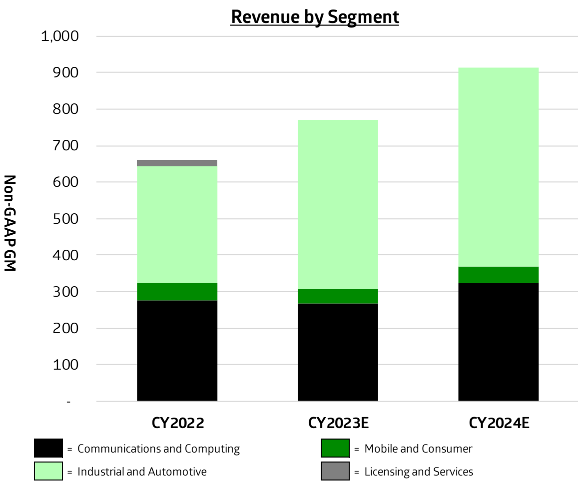
Enterprise Value:	10,289
Market Cap:	10,349
Price:	75.08
Dividend Yield:	n/a
Short Interest:	7.2%

	LSCC	^SOX
Total YTD Return:	16%	36%
Total 1-Month Return:	(16%)	(3%)
Total 3-Month Return:	(22%)	(8%)
Total 6-Month Return:	(19%)	12%
Total 1-Year Return:	66%	53%

Abridged P&L - TD Cowen Estimates:

	CQ3:23E	CQ4:23E	CQ1:24E	CQ2:24E	CY2023E	CY2024E
Total Revenue	**192**	**204**	**215**	**224**	**770**	**913**
Q/Q (Y/Y)	1%	6%	5%	4%	17%	19%
Street	*192*	*196*	*203*	*212*	*762*	*862*
Non-GAAP GM	70.5%	70.6%	70.7%	70.7%	70.5%	70.8%
Non-GAAP OpM	39.8%	41.4%	41.8%	42.5%	40.6%	42.9%
Non-GAAP EPS	**0.52**	**0.58**	**0.62**	**0.65**	**2.13**	**2.70**
Street	*0.52*	*0.54*	*0.57*	*0.60*	*2.09*	*2.46*





Key Investment Points:

- Preeminently positioned to serve FPGA market as new applications like AI at the edge are seeing increased demand; Investments in FD-SOI and Nexus/Avant platforms make Lattice leading-low power FPGA provider.
- LSCC is only FPGA supplier focused purely on edge processing vs. competitors like XLNX/INTC battling for Fin-FET based higher order processing.
- 5G and servers present under the radar upside opportunities.
- Slow and steady margin progression and de-leveraging should drive EPS upside.

Where We are Different from Street:

- We believe investors have primarily been focused on AI training and will soon focus on edge implementation where Lattice's FPGAs have the potential to grow significantly.
- We think FPGAs will prove ideal for higher order edge processing given its parallel processing, energy efficiency, flexibility and low-cost.
- Lattice's software investments in its SensAI stack likely will prove critical for developers.
- Key verticals for Lattice include server security, 5G, factory automation, facial detection/recognition, and factory automation amongst others.

Thoughts Into CQ3:23 Earnings:

- Expect another quietly clean quarter, despite bogeyman of potential competition from Intel's newly-independent PSG
- Scrutiny likely around lead times, especially in Industrial and Auto while management likely to highlight recent Auto design win at Mazda
- Competitive environment likely a focus for Q&A given Intel's PSG commentary on re-focusing on low- and mid-range markets

Source: Company reports, Thomson Reuters Eikon, TD Cowen; market data as of October 13, 2023

Marvell Technology Inc (MRVL)

Figures in USD MM, Except Per-Share Amounts

Rating and Price Target:

TD Cowen Rating:	**Outperform**
TD Cowen Price Target:	**65.00**
# Analysts:	31
Buys/Hold/Sells:	28/3/0

Valuation:

	CY2023E	CY2024E
On Street Ests.:		
P / EPS (ex Cash)	*33x*	*23x*
EV / S	*8.8x*	*7.6x*
EV / EBITDA	*26x*	*20x*
TD Cowen Tgt. PT / Ests:		
P / EPS (ex Cash)	*43x*	*29x*
EV / S	*10.7x*	*9.4x*
EV / EBITDA	*31x*	*23x*

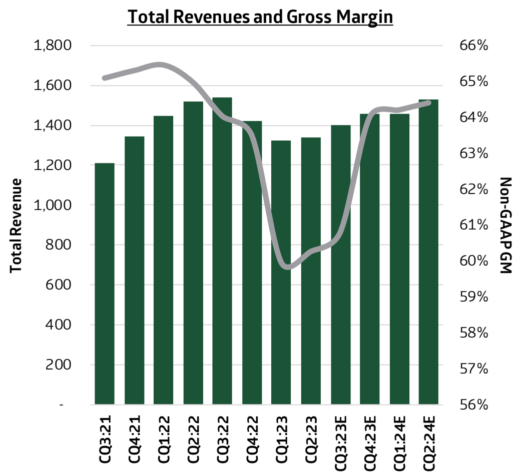
Market Data:

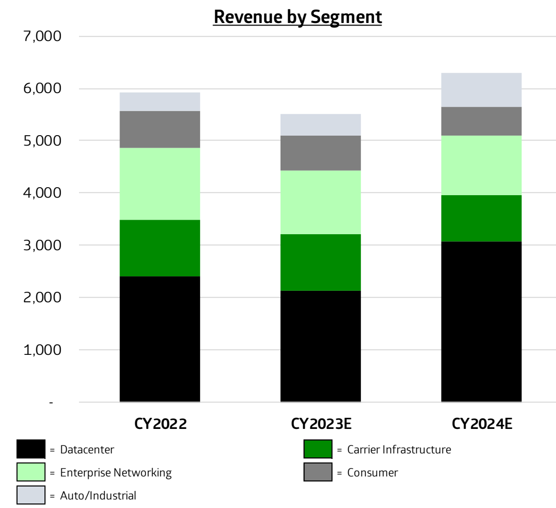
Enterprise Value:	49,130
Market Cap:	45,401
Price:	52.62
Dividend Yield:	0.5%
Short Interest:	1.6%

	MRVL	^SOX
Total YTD Return:	43%	36%
Total 1-Month Return:	(5%)	(3%)
Total 3-Month Return:	(19%)	(8%)
Total 6-Month Return:	31%	12%
Total 1-Year Return:	43%	53%

Abridged P&L - TD Cowen Estimates:

	CQ3:23E	CQ4:23E	CQ1:24E	CQ2:24E	CY2023E	CY2024E
Total Revenue	**1,401**	**1,456**	**1,454**	**1,530**	**5,520**	**6,301**
Q/Q (Y/Y)	4%	4%	(0%)	5%	(7%)	14%
Street	*1,377*	*1,441*	*1,485*	*1,552*	*5,559*	*6,438*
Non-GAAP GM	60.8%	64.0%	64.2%	64.4%	61.3%	64.6%
Non-GAAP OpM	29.6%	34.5%	33.2%	34.9%	29.2%	35.9%
Non-GAAP EPS	**0.40**	**0.49**	**0.47**	**0.53**	**1.53**	**2.25**
Street	*0.38*	*0.46*	*0.50*	*0.53*	*1.59*	*2.28*





Key Investment Points:

- Bandwidth upgrade cycle of electro-optical links to PAM4 inside and between data centers, particularly 400G and 800G DSP platforms.
- 5G infrastructure builds globally, ex-China.
- ADAS-enabled and battery electric vehicles requiring faster Ethernet connections and more compute.
- Transformation and growth of system architectures toward tailored workloads rather than general-purpose workloads.

Where We are Different from Street:

- Given our team's data center industry background in computing and server architecture, we believe we can add a unique perspective on Marvell's business.
- We see strong opportunities for Marvell in two of our AI-infused markets: Data center and Automotive.
- With bandwidth/interconnect increasingly becoming gating factors for compute performance, DC customers will increasingly look to best-of-breed networking solutions such as Marvell's 400G and 800G DSP solutions.
- As compute and latency requirements increase exponentially in autos, networking requirements likely will increase as well, leading Ethernet to replace legacy bus solutions.

Thoughts Into CQ3:23 Earnings:

- Strong demand in Datacenter ex-Storage, but challenging conditions across effectively every other vertical
- Our expectations for F4Q24 are modest (+4% Q/Q), with strength in Datacenter offset by weakness everywhere else
- Storage visibility continues to be poor, with recovery not anticipated until ~middle of next year (F2025)

Source: Company reports, Thomson Reuters Eikon, TD Cowen; market data as of October 13, 2023

MACOM Technology Solutions Holdings Inc (MTSI)

Figures in USD MM, Except Per-Share Amounts

Rating and Price Target:

TD Cowen Rating:	**Outperform**
TD Cowen Price Target:	**90.00**
# Analysts:	14
Buys/Hold/Sells:	8/6/0

Valuation:

	CY2023E	CY2024E
On Street Ests.:		
P / EPS (ex Cash)	*29x*	*27x*
EV / S	*8.7x*	*8.2x*
EV / EBITDA	*25x*	*24x*
TD Cowen Tgt. PT / Ests:		
P / EPS (ex Cash)	*36x*	*n/a*
EV / S	*10.3x*	*n/a*
EV / EBITDA	*33x*	*n/a*

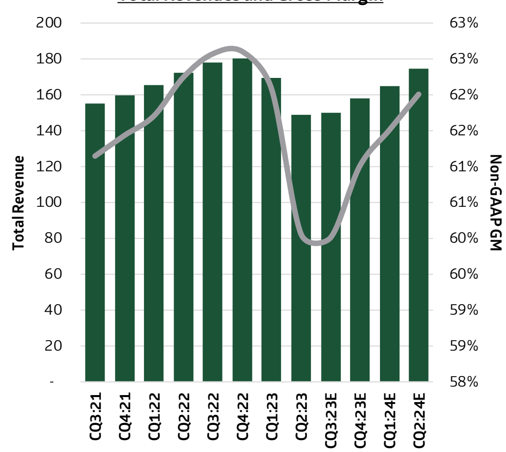
Market Data:

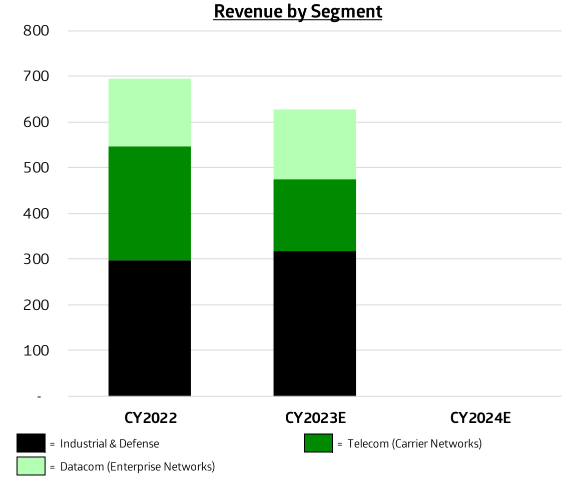
Enterprise Value:	5,682
Market Cap:	5,656
Price:	79.68
Dividend Yield:	n/a
Short Interest:	4.7%

	MTSI	^SOX
Total YTD Return:	27%	36%
Total 1-Month Return:	1%	(3%)
Total 3-Month Return:	17%	(8%)
Total 6-Month Return:	24%	12%
Total 1-Year Return:	58%	53%

Abridged P&L - TD Cowen Estimates:

	CQ3:23E	CQ4:23E	CQ1:24E	CQ2:24E	CY2023E	CY2024E
Total Revenue	**150**	**158**	**165**	**174**	**626**	**n/a**
Q/Q (Y/Y)	1%	5%	4%	6%	(10%)	n/a
Street	*150*	*155*	*162*	*173*	*654*	*695*
Non-GAAP GM	60.0%	61.0%	61.5%	62.0%	60.8%	n/a
Non-GAAP OpM	25.1%	27.2%	28.5%	30.2%	27.8%	n/a
Non-GAAP EPS	**0.55**	**0.62**	**0.67**	**0.75**	**2.50**	**n/a**
Street	*0.55*	*0.59*	*0.64*	*0.73*	*2.71*	*2.93*





Key Investment Points:

- Dominant positions in high-performance analog, RF power and optical interconnect position the company well to capitalize on solving the bandwidth and data transfer problems in data centers, 5G infrastructure and A&D.
- $2B TAM for RF power that could double to $4B by 2024 as GaN on SiC and GaN on Si quadruple from here; MTSI maintains an entrenched position in industrial, satcom, defense where GaN should see accelerating adoption.
- $2.50 EPS within reach for 2023 – record earnings power.

Where We are Different from Street:

- We believe MACOM remains in the early innings of a turnaround, catalyzed by new management exiting unprofitable sales, reinvested in technology IP addressing 5G and cloud data center markets, and reduced leverage.
- We see it having leading positions in RF power, high-performance analog and optoelectronics, which should benefit from 5G infrastructure build-out.

Thoughts Into CQ3:23 Earnings:

- Last quarter's ~0.9x book-to-bill likely indicates a flat Q/Q for 3Q23, with strength in Datacenter offset by weakness in Telecom and I&D
- Weakness in Telco especially acute and does not appear to be improving near-term (see Ericsonn's neg pre)
- Scrutiny likely around sustainability of Datacenter strength--is this an experiment or AI-driven structural growth?

Source: Company reports, Thomson Reuters Eikon, TD Cowen; market data as of October 13, 2023

Monolithic Power Systems Inc (MPWR)

Figures in USD MM, Except Per-Share Amounts

Rating and Price Target:

TD Cowen Rating:	**Outperform**
TD Cowen Price Target:	**625.00**
# Analysts:	14
Buys/Hold/Sells:	11/3/0

Valuation:

	CY2023E	CY2024E
On Street Ests.:		
P / EPS (ex Cash)	*39x*	*34x*
EV / S	*12.0x*	*10.4x*
EV / EBITDA	*34x*	*28x*
TD Cowen Tgt. PT / Ests:		
P / EPS (ex Cash)	*52x*	*43x*
EV / S	*16.1x*	*13.4x*
EV / EBITDA	*43x*	*35x*

Market Data:

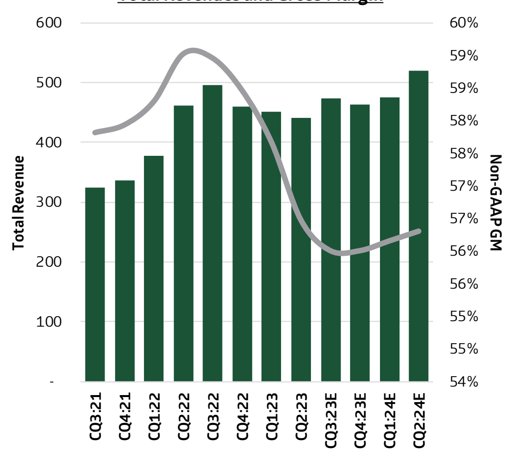
Enterprise Value:	21,790
Market Cap:	22,730
Price:	475.75
Dividend Yield:	0.8%
Short Interest:	3.6%

	MPWR	^SOX
Total YTD Return:	35%	36%
Total 1-Month Return:	1%	(3%)
Total 3-Month Return:	(17%)	(8%)
Total 6-Month Return:	0%	12%
Total 1-Year Return:	55%	53%

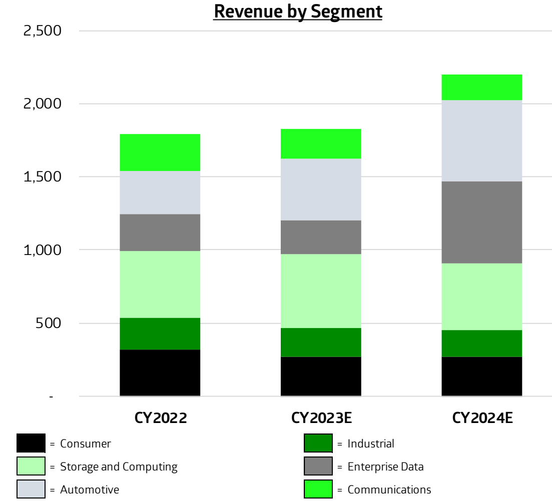
Abridged P&L - TD Cowen Estimates:

	CQ3:23E	CQ4:23E	CQ1:24E	CQ2:24E	CY2023E	CY2024E
Total Revenue	**474**	**464**	**475**	**520**	**1,830**	**2,200**
Q/Q (Y/Y)	7%	(2%)	2%	10%	2%	20%
Street	*474*	*454*	*464*	*506*	*1,821*	*2,091*
Non-GAAP GM	56.0%	56.0%	56.2%	56.3%	56.5%	56.7%
Non-GAAP OpM	35.3%	34.5%	34.6%	36.0%	35.2%	37.0%
Non-GAAP EPS	**3.06**	**2.93**	**2.88**	**3.27**	**11.80**	**14.25**
Street	*3.07*	*2.87*	*2.86*	*3.20*	*11.76*	*13.52*

Total Revenues and Gross Margin



Revenue by Segment



Key Investment Points:

- We view MPS as one of the most attractive organic growth stories in the semiconductor industry, poised to continue outgrowing peers by 10-15% long-term.
- Despite its significant 5-year growth CAGR we believe MPS's auto business remains in early innings with most design wins secured years in advance.
- We believe MPS is moving up the value chain in both PCs and servers, which should dramatically increase its socket TAM as the company begins to provide core-power solutions on Intel's newest platforms.
- While we recognize macroeconomic headwinds are affecting many of the company's end markets near-term, we believe content gains in auto, industrial, servers, and PCs likely help offset and insulate from unit softness.

Where We are Different from Street:

- We see programmable analog solutions as an important technological shift that should allow MPS to maintain its outsized growth rates across end markets long term.
- Multi-pronged upside to the model driven by continued and demonstrated ability to deliver growth from R&D.
- Valuation receives pushback, but we believe MPS's 3-4x industry growth rate warrants a significant premium.
- We view e-Commerce, field-programmability, and e.Motion as underappreciated sources of upside that are not baked into our, or consensus models; particularly e.Motion, where we believe a recurring royalty model exists.

Thoughts Into CQ3:23 Earnings:

- We anticipate strong results in Enterprise Data as upside from NVIDIA, AMD server ramps likely to flow into the model materially
- Auto potentially a mixed bag as strong content gains are being offset by unit cuts at customers
- Mixed bag elsewhere, as Consumer, Comms, and Storage all facing macro headwinds juxtaposed with MPWR content gains

Source: Company reports, Thomson Reuters Eikon, TD Cowen; market data as of October 13, 2023

NVIDIA Corp (NVDA)

Figures in USD MM, Except Per-Share Amounts

Rating and Price Target:

TD Cowen Rating:	**Outperform**
TD Cowen Price Target:	**700.00**
# Analysts:	53
Buys/Hold/Sells:	51/2/0

Valuation:

	CY2023E	CY2024E
On Street Ests.:		
P / EPS (ex Cash)	*45x*	*27x*
EV / S	*21.3x*	*14.0x*
EV / EBITDA	*37x*	*23x*
TD Cowen Tgt. PT / Ests:		
P / EPS (ex Cash)	*65x*	*35x*
EV / S	*32.4x*	*19.5x*
EV / EBITDA	*54x*	*30x*

Market Data:

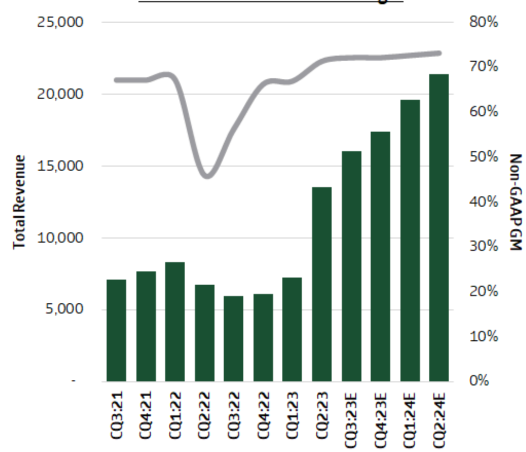
Enterprise Value:	1,116,569
Market Cap:	1,122,887
Price:	454.61
Dividend Yield:	0.0%
Short Interest:	1.1%

	NVDA	^SOX
Total YTD Return:	211%	36%
Total 1-Month Return:	(0%)	(3%)
Total 3-Month Return:	(1%)	(8%)
Total 6-Month Return:	72%	12%
Total 1-Year Return:	305%	53%

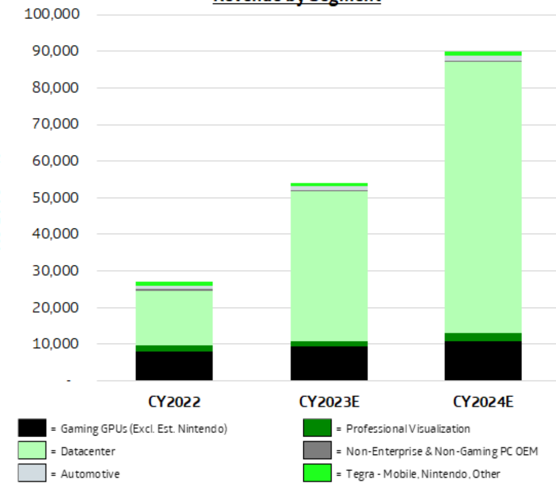
Abridged P&L - TD Cowen Estimates:

	CQ3:23E	CQ4:23E	CQ1:24E	CQ2:24E	CY2023E	CY2024E
Total Revenue	**16,020**	**17,348**	**19,601**	**21,412**	**54,067**	**90,000**
Q/Q (Y/Y)	19%	8%	13%	9%	100%	66%
Street	*14,467*	*17,118*	*18,238*	*19,433*	*52,396*	*80,004*
Non-GAAP GM	72.0%	72.0%	72.5%	73.0%	71.1%	73.3%
Non-GAAP OpM	59.5%	59.5%	61.3%	62.5%	56.8%	63.3%
Non-GAAP EPS	**3.31**	**3.61**	**4.21**	**4.69**	**10.71**	**20.00**
Street	*2.93*	*3.58*	*3.83*	*4.08*	*10.16*	*16.53*

Total Revenues and Gross Margin



Revenue by Segment



Key Investment Points:

- In our view, NVIDIA represents an attractive long-term growth story with diverse parallel computing products across semis end markets of gaming, data center, and auto all fused by AI based computing.
- Recently launched Ampere and Mellanox should boost Data center momentum as a normalized and resilient Gaming channel bucks typical seasonal swings.
- We see the automotive business driving significant long-term value, as we see NVIDIA serving as the thought leader in the space as AVs begin to take off.
- Arm deal off the table, Arm roadmap fully intact.

Where We are Different from Street:

- Given our team's data center industry background in computing and server architecture, we believe we can add a unique perspective on NVIDIA's business.
- We see continued computing dollar shift from CPUs to high-core, parallel processing GPUs driving continued growth in NVIDIA's data center business.
- In our view, the automotive business does not garner enough investor attention, as we believe NVIDIA is poised to win in the space that could drive significant silicon content when volumes ramp; DRIVE sim differentiates.
- Mellanox acquisition diversifies NVIDIA's data center footprint and increases its footprint with HPC customers.

Thoughts Into CQ3:23 Earnings:

- Expect another blow-out quarter and raised guidance on improving supply, price, and demand through the roof
- Commentary likely to focus on echoing themes from recent investor meetings on sustainability of spend given ROI from Gen AI
- Gross margin upside potential from increasing mix of Grace CPU-based systems, offset by pass-through margins for memory, etc

Source: Company reports, Thomson Reuters Eikon, TD Cowen; market data as of October 13, 2023

Power Integrations Inc (POWI)

Figures in USD MM, Except Per-Share Amounts

Rating and Price Target:

TD Cowen Rating:	**Market Perform**
TD Cowen Price Target:	**80.00**
# Analysts:	6
Buys/Hold/Sells:	3/3/0

Valuation:

	CY2023E	CY2024E
On Street Ests.:		
P / EPS (ex Cash)	*42x*	*28x*
EV / S	*8.0x*	*6.7x*
EV / EBITDA	*31x*	*21x*
TD Cowen Tgt. PT / Ests:		
P / EPS (ex Cash)	*45x*	*30x*
EV / S	*8.6x*	*7.2x*
EV / EBITDA	*34x*	*25x*

Market Data:

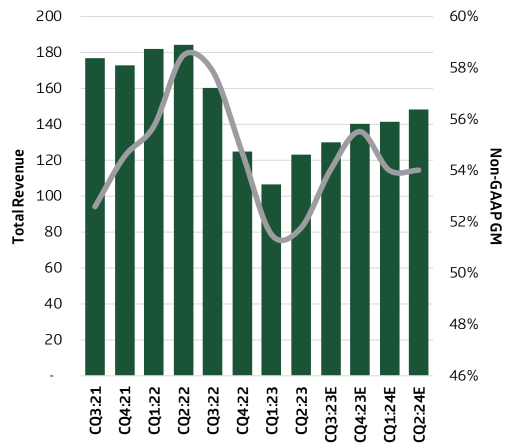
Enterprise Value:	3,988
Market Cap:	4,334
Price:	75.52
Dividend Yield:	1.0%
Short Interest:	5.3%

	POWI	^SOX
Total YTD Return:	6%	36%
Total 1-Month Return:	(3%)	(3%)
Total 3-Month Return:	(23%)	(8%)
Total 6-Month Return:	(6%)	12%
Total 1-Year Return:	21%	53%

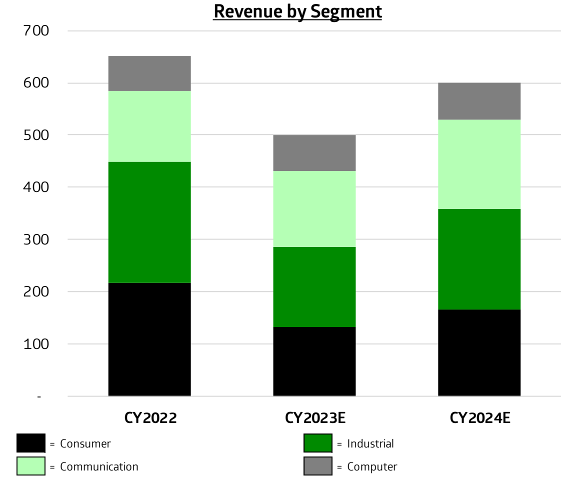
Abridged P&L - TD Cowen Estimates:

	CQ3:23E	CQ4:23E	CQ1:24E	CQ2:24E	CY2023E	CY2024E
Total Revenue	**130**	**140**	**141**	**148**	**500**	**600**
Q/Q (Y/Y)	6%	8%	1%	5%	(23%)	20%
Street	*130*	*139*	*138*	*146*	*499*	*598*
Non-GAAP GM	54.0%	55.5%	54.0%	54.0%	53.3%	54.0%
Non-GAAP OpM	20.5%	23.9%	21.8%	23.0%	18.7%	23.1%
Non-GAAP EPS	**0.47**	**0.57**	**0.55**	**0.60**	**1.65**	**2.45**
Street	*0.47*	*0.56*	*0.54*	*0.60*	*1.64*	*2.48*

Total Revenues and Gross Margin



Revenue by Segment



Key Investment Points:

- Primary beneficiary of power converter integration in consumer/industrial appliances, wall chargers.
- Nascent auto opportunity that could amount to $500MM as EVs become mainstream.
- GaN solutions are becoming increasingly attractive to address high-voltage applications with maximum efficiency, and POWI is perhaps the only pure-play GaN exposed stock to consumer markets.
- 20%+ OpMs in play over next three years as OPEX undergrows revenues.

Where We are Different from Street:

- We see POWI as a unique asset in power semis, boasting a power conversion IC portfolio with applications ranging from the lowest power consumer appliances to GW power conversion in industrial/renewable energy.
- We see share gain potential due to GaN technology enabling high-efficiency conversion at high-voltages, making it easier to shrink adaptor products/form factors.
- Longer term we see potential for POWI in auto both on charging infrastructure and on-board chargers.
- That being said, with a significant inventory correction looming, we would prefer companies with better valuation support.

Thoughts Into CQ3:23 Earnings:

- Recovery now underway, albeit at a relatively tepid pace as visibilty remains poor especially in China
- Channel inventory reduction likely to continue in 3Q, and sell-through continues to exceed sell-in per management
- Potential risk from sharp decline in orders in June...recovery contingent on demand, which remains soft

Source: Company reports, Thomson Reuters Eikon, TD Cowen; market data as of October 13, 2023

Qorvo Inc (QRVO)

Figures in USD MM, Except Per-Share Amounts

Rating and Price Target:

TD Cowen Rating:	**Market Perform**
TD Cowen Price Target:	**110.00**
# Analysts:	30
Buys/Hold/Sells:	8/19/3

Valuation:

	CY2023E	CY2024E
On Street Ests.:		
P / EPS (ex Cash)	*17x*	*13x*
EV / S	*2.8x*	*2.6x*
EV / EBITDA	*13x*	*10x*
TD Cowen Tgt. PT / Ests:		
P / EPS (ex Cash)	*29x*	*16x*
EV / S	*3.9x*	*3.2x*
EV / EBITDA	*15x*	*10x*

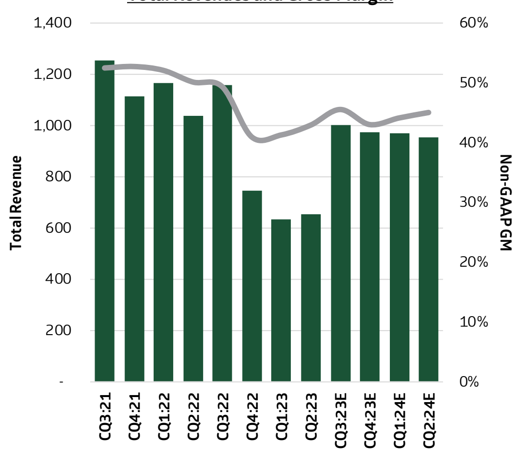
Market Data:

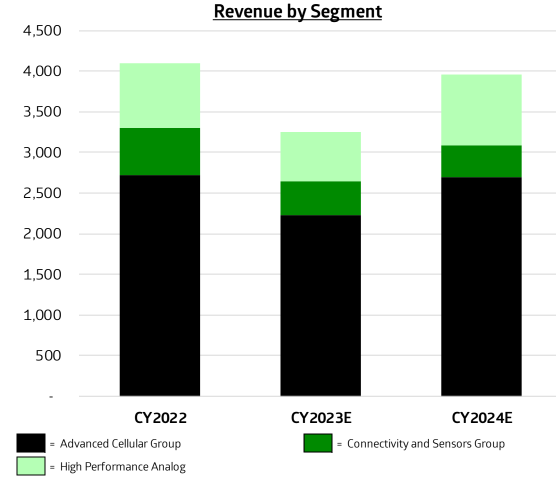
Enterprise Value:	10,206
Market Cap:	8,902
Price:	90.92
Dividend Yield:	n/a
Short Interest:	1.8%

	QRVO	^SOX
Total YTD Return:	0%	36%
Total 1-Month Return:	(4%)	(3%)
Total 3-Month Return:	(15%)	(8%)
Total 6-Month Return:	(3%)	12%
Total 1-Year Return:	14%	53%

Abridged P&L - TD Cowen Estimates:

	CQ3:23E	CQ4:23E	CQ1:24E	CQ2:24E	CY2023E	CY2024E
Total Revenue	**1,000**	**973**	**967**	**953**	**3,257**	**3,953**
Q/Q (Y/Y)	54%	(3%)	(1%)	(1%)	(21%)	21%
Street	*1,002*	*990*	*958*	*942*	*3,590*	*3,968*
Non-GAAP GM	45.5%	43.0%	44.1%	45.0%	43.4%	45.5%
Non-GAAP OpM	21.2%	18.1%	19.1%	19.3%	14.4%	20.7%
Non-GAAP EPS	**1.75**	**1.44**	**1.52**	**1.50**	**3.79**	**6.71**
Street	*1.78*	*1.62*	*1.36*	*1.39*	*5.22*	*6.82*





Key Investment Points:

- We see significant content increase for RF due to 5G complexity in mobile.
- Qorvo's capabilities in GaN RF should allow it to benefit from 5G infrastructure build-out, as well as defense and radar applications.
- Despite significant benefit from initial 5G roll-out, smartphone sales remain <50% penetrated globally representing further opportunity for content-driven growth.
- That being said, ongoing inventory correction and share-loss in Android leave us preferring QCOM and SWKS RF peers

Where We are Different from Street:

- We see the 5G-driven content increase story as longer lasting than is appreciated by much of the street.
- Qorvo's greater leverage to the Android ecosystem positions it well to benefit from the lower-tier smartphones beginning to upgrade to 5G (~50% penetrated globally), though timing is uncertain.
- UWB should begin to ramp in mobile and then in IoT, with Qorvo one of two suppliers for the technology (NXP).
- The IDP segment benefits from strong secular tailwinds in 5G infrastructure, Wi-Fi 6/7, electronic warfare and GaN RF that should in the (very) long-term shift investor sentiment beyond smartphone.

Thoughts Into CQ3:23 Earnings:

- Expect in-line print and in-line guide, as company has given highly detailed forward guidance as they return to matching sell-in to sell-through
- Management remains confident a recovery in Qorvo revenue not contingent on recovery in Android end market
- We remain cautious as visibility remains extremely poor for most in the industry

Source: Company reports, Thomson Reuters Eikon, TD Cowen; market data as of October 13, 2023

Qualcomm Inc (QCOM)

Figures in USD MM, Except Per-Share Amounts

Rating and Price Target:

TD Cowen Rating:	**Outperform**
TD Cowen Price Target:	**135.00**
# Analysts:	35
Buys/Hold/Sells:	23/11/1

Valuation:

	CY2023E	CY2024E
On Street Ests.:		
P / EPS (ex Cash)	*13x*	*12x*
EV / S	*3.5x*	*3.3x*
EV / EBITDA	*10x*	*9x*
TD Cowen Tgt. PT / Ests:		
P / EPS (ex Cash)	*17x*	*n/a*
EV / S	*4.6x*	*n/a*
EV / EBITDA	*12x*	*n/a*

Market Data:

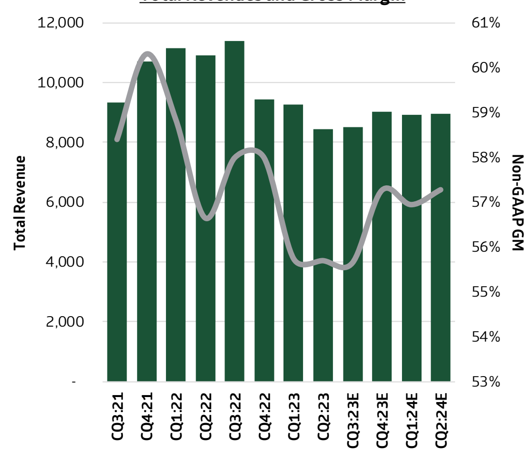
Enterprise Value:	128,078
Market Cap:	121,265
Price:	108.66
Dividend Yield:	2.9%
Short Interest:	1.3%

	QCOM	^SOX
Total YTD Return:	1%	36%
Total 1-Month Return:	(4%)	(3%)
Total 3-Month Return:	(11%)	(8%)
Total 6-Month Return:	(9%)	12%
Total 1-Year Return:	1%	53%

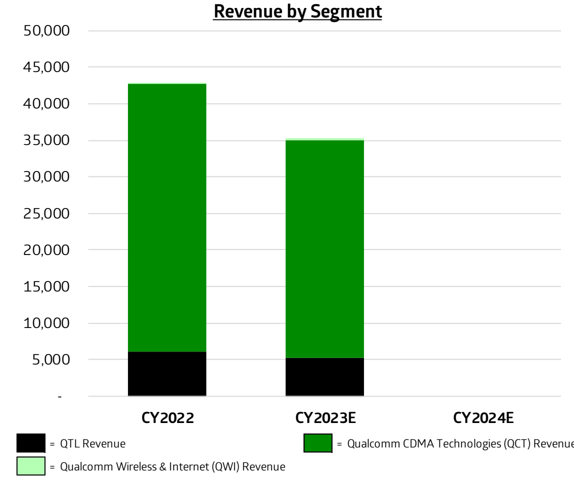
Abridged P&L - TD Cowen Estimates:

	CQ3:23E	CQ4:23E	CQ1:24E	CQ2:24E	CY2023E	CY2024E
Total Revenue	**8,502**	**9,015**	**8,934**	**8,967**	**35,226**	**n/a**
Q/Q (Y/Y)	1%	6%	(1%)	0%	(18%)	n/a
Street	*8,513*	*9,191*	*9,122*	*9,166*	*36,146*	*38,296*
Non-GAAP GM	55.6%	57.3%	56.9%	57.3%	56.1%	n/a
Non-GAAP OpM	30.0%	33.2%	33.0%	33.7%	31.4%	n/a
Non-GAAP EPS	**1.90**	**2.22**	**2.19**	**2.25**	**8.15**	**n/a**
Street	*1.91*	*2.23*	*2.18*	*2.19*	*8.52*	*9.40*

Total Revenues and Gross Margin



Revenue by Segment



Key Investment Points:

- We see significant value in Qualcomm's IP portfolio heading into a 5G upgrade cycle with nearly all 5G devices using QCOM's RF content, providing a boost to revenue/MSM opportunity and overall TAM.
- Our checks continue to indicate a sizable lead in 5G modems and we expect revenue/MSM and share gains as a result. Qualcomm has dominated virtually all 5G devices thus far.
- F2024 earnings power ~$9.50 range, making current levels a favorable risk/reward set-up with abated Apple share loss concerns.
- "Now-what?" risk remains long-term, but we are encouraged by progress in adjacent markets.

Where We are Different from Street:

- We see Qualcomm holding the premier modem technology to an industry on the cusp of its first major upgrade cycle in nearly a decade.
- We view the company's technological leadership across various 5G modem/RF and related technologies buffered by a ~1 year+ position as compared to its closest competitors.
- With multi-year agreement with Apple, significant overhang removed and allows Qualcomm's leading IP to take root.
- Much has been made of Huawei (cut off from TSMC) risks, but we believe there is upside as customers Honor, Oppo, Vivo, Xiaomi, Apple and Samsung fill the void as Huawei runs out of component inventory.

Thoughts Into CQ3:23 Earnings:

- Retention of Apple through 2025 a positive on the margin, though we get the sense investors not willing to pay a multiple for Apple-based earnings
- Near-term macro headwinds continue to buffett results, with F2024 commentary overall underwhelming
- Understanding further impact from Huawei modem will be key, as it was estimated to present a ~$250M/qtr headwind

Source: Company reports, Thomson Reuters Eikon, TD Cowen; market data as of October 13, 2023

Silicon Laboratories Inc (SLAB)

Figures in USD MM, Except Per-Share Amounts

Rating and Price Target:

TD Cowen Rating:	**Outperform**
TD Cowen Price Target:	**165.00**
# Analysts:	12
Buys/Hold/Sells:	6/5/1

Valuation:

	CY2023E	CY2024E
On Street Ests.:		
P / EPS (ex Cash)	*26x*	*24x*
EV / S	*3.4x*	*3.2x*
EV / EBITDA	*20x*	*20x*
TD Cowen Tgt. PT / Ests:		
P / EPS (ex Cash)	*43x*	*32x*
EV / S	*5.7x*	*5.2x*
EV / EBITDA	*32x*	*25x*

Market Data:

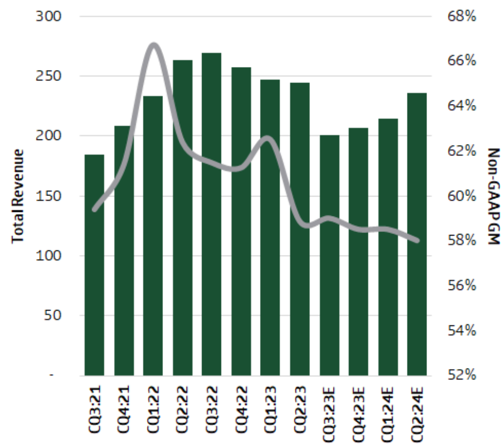
Enterprise Value:	3,057
Market Cap:	3,483
Price:	109.31
Dividend Yield:	n/a
Short Interest:	3.6%

	SLAB	^SOX
Total YTD Return:	(19%)	36%
Total 1-Month Return:	(10%)	(3%)
Total 3-Month Return:	(34%)	(8%)
Total 6-Month Return:	(35%)	12%
Total 1-Year Return:	(5%)	53%

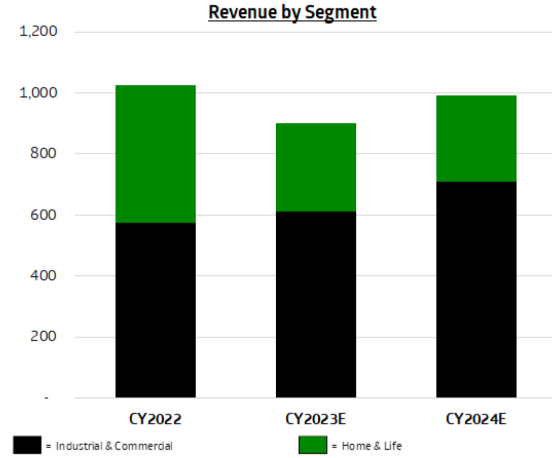
Abridged P&L - TD Cowen Estimates:

	CQ3:23E	CQ4:23E	CQ1:24E	CQ2:24E	CY2023E	CY2024E
Total Revenue	**200**	**207**	**214**	**236**	**899**	**993**
Q/Q (Y/Y)	(18%)	3%	4%	10%	(12%)	10%
Street	*200*	*205*	*212*	*229*	*898*	*958*
Non-GAAP GM	59.0%	58.5%	58.5%	58.0%	59.7%	58.1%
Non-GAAP OpM	11.6%	11.1%	12.5%	15.7%	14.8%	17.8%
Non-GAAP EPS	**0.60**	**0.60**	**0.70**	**0.95**	**3.36**	**4.50**
Street	*0.61*	*0.67*	*0.70*	*0.84*	*3.44*	*3.72*

Total Revenues and Gross Margin



Revenue by Segment



Key Investment Points:

- Silicon Labs is the only semiconductor supplier with >$8.0B market cap with revenue tied to IoT applications and hardware/software.
- We believe differentiated products through integrated MCU, mixed-signal/RF design, multi-protocol wireless support and real-time operating system/software offerings for smart home/city, wearable and industrial markets.
- We view the IoT segment's long term 20% growth target as aggressive but achievable across its MCU, wireless, and sensing portfolio.

Where We are Different from Street:

- In our view, Silicon Labs offers the industry's most complete portfolio of capabilities targeting the IoT, with its wireless portfolio a key differentiator, including the recently acquired Z-Wave portfolio.
- We believe Silicon Labs' competitors in the IoT space have been distracted by M&A, which has helped drive share gains.
- With the Infrastructure & Automotive segment divested, profitability will take a significant hit. Overtime, we believe earnings leverage will move OpMs higher, but the focus for now will be on investing for IoT growth.
- Stock is strongly tied to IoT performance.

Thoughts Into CQ3:23 Earnings:

- Expectations are likely muted given last quarter's sharp guide down
- Investors will look for management's visibility into the I&C segment, fearing a repeat of collapse in H&L
- Series 2 design win momentum should be a bright spot, but translation to revenue timing remains uncertain

Source: Company reports, Thomson Reuters Eikon, TD Cowen; market data as of October 13, 2023

Skyworks Solutions Inc (SWKS)

Figures in USD MM, Except Per-Share Amounts

Rating and Price Target:

TD Cowen Rating:	**Outperform**
TD Cowen Price Target:	**125.00**
# Analysts:	31
Buys/Hold/Sells:	13/16/2

Valuation:

	CY2023E	CY2024E
On Street Ests.:		
P / EPS (ex Cash)	*11x*	*10x*
EV / S	*3.3x*	*3.1x*
EV / EBITDA	*8x*	*8x*
TD Cowen Tgt. PT / Ests:		
P / EPS (ex Cash)	*15x*	*n/a*
EV / S	*4.6x*	*n/a*
EV / EBITDA	*11x*	*n/a*

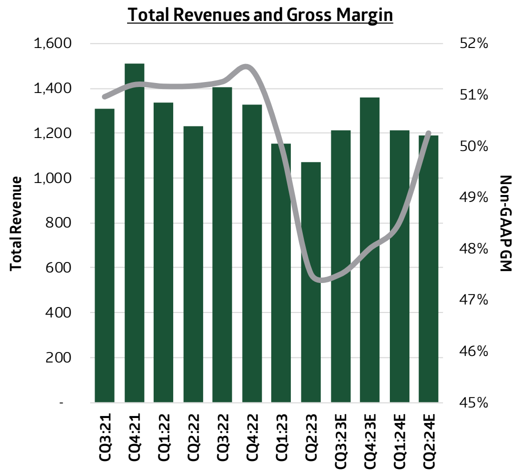
Market Data:

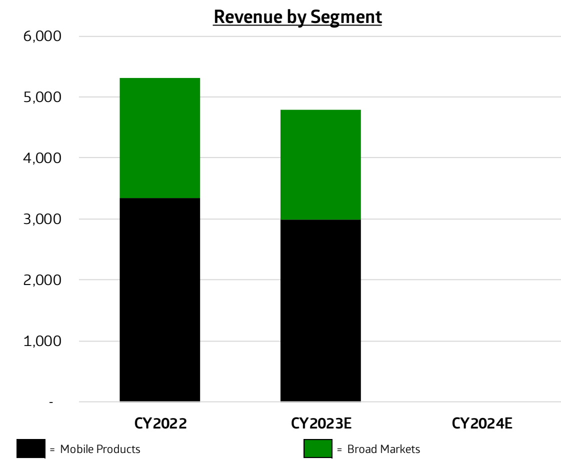
Enterprise Value:	15,834
Market Cap:	15,079
Price:	94.60
Dividend Yield:	2.9%
Short Interest:	2.4%

	SWKS	^SOX
Total YTD Return:	6%	36%
Total 1-Month Return:	(2%)	(3%)
Total 3-Month Return:	(17%)	(8%)
Total 6-Month Return:	(12%)	12%
Total 1-Year Return:	20%	53%

Abridged P&L - TD Cowen Estimates:

	CQ3:23E	CQ4:23E	CQ1:24E	CQ2:24E	CY2023E	CY2024E
Total Revenue	**1,215**	**1,360**	**1,214**	**1,189**	**4,799**	**n/a**
Q/Q (Y/Y)	13%	12%	(11%)	(2%)	(10%)	n/a
Street	*1,216*	*1,292*	*1,168*	*1,163*	*4,825*	*5,097*
Non-GAAP GM	47.5%	48.0%	48.5%	50.3%	48.2%	n/a
Non-GAAP OpM	32.7%	34.5%	33.2%	34.5%	32.9%	n/a
Non-GAAP EPS	**2.10**	**2.50**	**2.16**	**2.22**	**8.35**	**n/a**
Street	*2.10*	*2.30*	*2.00*	*2.04*	*8.54*	*9.35*





Key Investment Points:

- We see significant content increase for RF due to 5G complexity in mobile.
- Despite significant benefit from initial 5G roll-out, smartphone sales remain <50% penetrated globally representing further opportunity for content-driven growth.
- Sticky socket wins at Apple benefit SWKS long-term, with additional benefit potential from transition to hardware subscription services.
- Long term IoT and other 5G applications should benefit SWKS as a leading RF solutions provider.

Where We are Different from Street:

- We see the 5G-driven content increase story as longer lasting than is appreciated by much of the street.
- With the acquisition of Silicon Labs' Infrastructure and Automotive division, Skyworks' Broad Markets segment gains another growth vector to diversify away from mobile.
- Adoption of Wi-Fi 6 presents further opportunity for both Mobile and Broad Markets for RF content increases, which appears to be underappreciated by Street.

Thoughts Into CQ3:23 Earnings:

- Expect strong results in seasonally strong Apple-driven quarter, having guided above seasonality for SepQ
- Questions likely surrounding positioning at Apple, with answers likely not forthcoming
- Broad Markets weakness unsurprising given the macro, but will be important to show return to growth to give diversification story legs

Source: Company reports, Thomson Reuters Eikon, TD Cowen; market data as of October 13, 2023

Ticker	Rating	Price*	Price Target	Ticker	Rating	Price*	Price Target
AMD	Outperform	$106.46	$135.00	**AVGO**	Market Perform	$902.57	$900.00
CEVA	Outperform	$19.16	$25.00	**CRUS**	Outperform	71.17	$100.00
CRDO	Market Perform	$15.72	$16.00	**LSCC**	Outperform	77.11	$105.00
MRVL	Outperform	$53.66	$65.00	**MPWR**	Outperform	$483.12	$625.00
NVDA	Outperform	460.95	$700.00	**POWI**	Market Perform	76.61	$80.00
QRVO	Market Perform	$92.22	$110.00	**QCOM**	Outperform	$110.51	$135.00
SLAB	Outperform	110.82	$165.00	**SWKS**	Outperform	95.84	$125.00
AIP	Outperform	$5.92	$12.00	**MTSI**	Outperform	$80.21	$90.00
INTC	Market Perform	$36.56	$38.00	**ARM**	Outperform	$52.09	$63.00

**As of 10/16/2023*

VALUATION METHODOLOGY AND RISKS

Valuation Methodology

Semiconductors:

Our valuation methodology is primarily based on forward P/E multiples plus cash followed by EV/EBITDA. In many cases, we use EV/sales as a third methodology.

We make investment recommendations on certain early stage, pre-revenue companies based upon an assessment of their business model, technology, probability of market success, and the potential market opportunity, balanced by an assessment of applicable risks. Such companies may not be assigned a price target.

Investment Risks

Semiconductors:

The semiconductor industry is cyclical and has strong correlation to global GDP. If global growth slows, consumer demand and IT spending could impact our forecasts. Additionally, pricing pressure is severe in certain parts of the market, particular those that are consumer focused.

ADDENDUM

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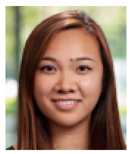

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