

Semiconductor Companies That Minimize Their R&D Expense

(Companies discussed include ADI, AVGO, MTSI, MRVL, and TXN)

We examined the results of 19 semiconductor companies with market capitalizations greater than \$5 billion to assess how much their reported earnings are benefitting from understating the true cost of developing new technologies. We will begin by explaining the accounting mechanisms that create the potential for understatement, provide a table showing how much each firm is benefitting, and then take a closer look at five of these companies that are either particularly aggressive or conservative in this area.

The Non-GAAP Adjustment for Amortization of Intangibles

Virtually all companies' results now include some type of adjustment to their GAAP earnings to purportedly make them more "indicative of underlying performance." While these adjustments may occasionally involve removing unusual gains or one-time events, many companies adjust out recurring expenses. One of the most common of these add-backs is the amortization of intangible assets resulting from acquisitions. The logic is that amortization is viewed as a non-cash expense. However, we will always argue that real cash was spent when making the deals that generated the intangibles in the first place.

Some also argue that since goodwill is not expensed, intangibles shouldn't be either. However, we are strong believers that goodwill should be expensed. When we started our careers, goodwill was required to be amortized over a period not to exceed 40 years, and we have argued extensively for a return to that policy ever since.

When a company makes an acquisition and books half the deal price as goodwill and the other half as an intangible asset and then ignores the associated amortization, the cost of the deal is never reflected on the income statement unless the value of the intangibles is later deemed to have been impaired and is written off. At that point, the company will once again invoke the power of the non-GAAP adjustments to add the impairment charge back to earnings, and Wall Street analysts will gladly ignore it. Behold the magic that is non-GAAP accounting!

So what does all this have to do with research and development? Intellectual property is an asset, and like any asset, money was invested in its creation. Someone built it instead of buying it. As it was built, wages were paid in cash, equipment was purchased, legal work was performed, and there may have been five failures and reconfigurations before success was achieved. During that time, there were considerable expenses moving through the income statement. That lowered income as well as operating and free cash flow. But what about the company that acquires its R&D?:

- When a technologically-focused company buys another firm, it is obtaining the patents, products, and know-how that the acquired company invested to develop over many years. Thus that company in effect bought its R&D through acquisition.
- This shows up as cash spent on the cash flow statement – even though that is typically overlooked in calculating free cash flow. It also may show up on the balance sheet as debt, but certainly as goodwill and intangible assets.
- With goodwill not being expensed and the amortization of other intangibles being ignored and added back, the company acquiring R&D looks more profitable. It likely has higher income and margins over a peer that developed a similar technology in-house.
- However, it quite possibly paid more to acquire the existing asset than it may have cost to build in-house. That shows up on the balance sheet as more debt and often in falling profitability and ROI. But initially, there is no penalty for overpaying. For example:
 - IBM (IBM) paid \$3.5 billion for the Lotus spreadsheet – it later combined it with other software products and sold them all for only \$1.8 billion. Did this have eternal life and cash flow? Did it create value for IBM shareholders?
 - Teva Pharmaceuticals (TEVA) grew with a number of acquisitions and its goodwill rose from \$3.1 billion in 2005 to a peak of \$66.2 billion (bought with borrowed

money) in 1Q17. After downsizing and \$27.5 billion of impairments – goodwill is now only \$16.9 billion.

Adding Back Stock Compensation Paid to R&D Employees

We pointed out in the above section that companies that develop technology in-house have to pay their employees to do so. However, many can minimize this cost by using another very common non-GAAP adjustment- adding back stock compensation expense. Many technologically-intensive companies utilize stock compensation for a significant portion of their R&D staff's compensation packages. Therefore ignoring the cost of these stock awards will lead to an understatement of R&D expense in non-GAAP earnings compared to a peer that either utilizes stock compensation to a lesser degree or doesn't add stock compensation back to its non-GAAP results. It also creates risks in that:

- Employees often leave if a stock price is not rising as they question the value of their stock awards.
- Non-GAAP earnings decline more quickly if stock compensation is replaced with cash.
- Does the company have the cash flow to sustain its operating model if it cannot afford more acquisitions or to pay cash to an R&D staff that is no longer satisfied by stock compensation?

The following table shows the amortization of intangible assets being added back to non-GAAP earnings as a percentage of sales for 19 semiconductor companies with market caps of more than \$5 billion. Data is shown for the last four quarters and the last five fiscal years:

Amortization Added Back to Non-GAAP Earnings as a Percentage of Sales

Ticker	Company	Q0	Q-1	Q-2	Q-3	FY 0	FY -1	FY -2	FY -3	FY -4
LSCC	Lattice Semiconductor	0.5%	0.5%	0.5%	0.5%	0.6%	0.5%	1.1%	3.4%	4.4%
OLED	Universal Display	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
RMBS	Rambus Inc	3.4%	3.3%	3.5%	3.2%	3.4%	5.3%	7.5%	7.5%	12.7%
SWKS	Skyworks Solutions Inc	3.7%	3.9%	3.9%	5.0%	4.2%	4.9%	1.5%	1.1%	1.3%
MTSI	MACOM Technology Solutions	4.9%	4.8%	4.0%	3.8%	4.3%	5.0%	7.6%	9.5%	15.0%
QRVO	Qorvo Inc	2.7%	4.8%	5.2%	4.4%	3.7%	3.2%	6.3%	7.6%	14.7%
ADI	Analog Devices Inc	16.3%	15.4%	15.5%	15.5%	16.8%	11.5%	10.3%	9.5%	9.2%
AMD	Advanced Micro Devices Inc	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
INTC	Intel Corp	2.4%	2.7%	3.2%	2.6%	2.4%	1.9%	1.8%	1.8%	1.8%
MCHP	Microchip Technology Inc	6.7%	6.6%	7.5%	7.7%	7.9%	12.6%	17.1%	18.8%	12.6%
MPWR	Monolithic Power Systems Inc	6.9%	7.5%	7.3%	7.2%	7.4%	3.6%	0.0%	17.5%	na
MRVL	Marvell Technology Inc	20.3%	20.4%	19.3%	17.6%	18.4%	21.9%	14.9%	13.6%	6.4%
MU	Micron Technology Inc.	0.5%	0.6%	0.6%	0.6%	0.6%	0.3%	0.3%	0.4%	0.4%
NVDA	NVIDIA Corporation	1.1%	2.5%	3.0%	3.1%	2.6%	2.1%	3.7%	0.2%	0.2%
ON	ON Semiconductor Corp	0.6%	0.6%	0.8%	0.8%	1.0%	1.5%	2.3%	2.1%	1.9%
QCOM	QUALCOMM Inc.	0.5%	0.5%	0.4%	0.7%	0.5%	0.7%	0.8%	0.3%	1.7%
TXN	Texas Instruments Inc	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
AVGO	Broadcom Inc	8.9%	9.0%	9.9%	11.9%	13.1%	19.7%	26.0%	23.1%	17.0%
NXPI	NXP Semiconductors NV	2.1%	2.5%	2.7%	3.3%	3.9%	5.4%	15.4%	16.2%	15.4%

- Unless a company is making frequent acquisitions, the amount of amortization should decline over time as it is fully expensed. Look at Lattice (LSCC) or Qorvo (QRVO) above as examples.
- This is also a function of how quickly the intangible assets are amortized. We have seen some companies assign an 8-year life to something like Acquired Customer Relationships while others use 15 years. The company using 8 years is being more conservative but would show a larger amount of non-GAAP earnings early on.
- Keep in mind – while Goodwill is an intangible asset – it is not included in the table since it is not expensed. Often the most aggressive form of accounting simply assigns more of the purchase price for a deal to Goodwill rather than other Intangible assets where the amortization is added back.

An important point to consider for companies that are acquiring their R&D is how big the strain is on cash flow. To that end, the following table shows free cash flow before and after cash spent on acquisitions for the last four quarters and five fiscal years for the 19 companies:

		Q0	Q-1	Q-2	Q-3	FY0	FY-1	FY-2	FY-3	FY-4
LSCC	Lattice Semiconductor									
	Free Cash Flow	\$74.6	\$63.9	\$33.8	\$68.5	\$203.9	\$146.0	\$70.8	\$98.9	\$35.0
	FCF Less Cash on Acquis.	\$74.6	\$63.9	\$33.8	\$68.5	\$203.9	\$77.9	\$70.8	\$98.9	\$35.0
OLED	Universal Display Corporation									
	Free Cash Flow	\$34.9	-\$74.4	\$38.5	-\$8.7	\$79.6	\$147.6	\$120.7	\$163.9	\$96.4
	FCF Less Cash on Acquis.	\$34.9	-\$74.4	\$38.5	-\$8.7	\$79.6	\$147.6	\$120.7	\$163.9	\$96.4
RMBS	Rambus Inc.									
	Free Cash Flow	\$43.6	\$43.7	\$31.2	\$46.5	\$209.9	\$195.4	\$155.7	\$122.1	\$75.1
	FCF Less Cash on Acquis.	\$43.6	\$43.7	\$31.2	\$46.5	\$194.0	\$98.3	\$155.7	\$55.3	\$75.1
SWKS	Skyworks Solutions Inc									
	Free Cash Flow	\$288.4	\$270.8	\$359.0	\$702.1	\$1,620.3	\$914.9	\$1,119.9	\$806.0	\$944.0
	FCF Less Cash on Acquis.	\$288.4	\$270.8	\$359.0	\$702.1	\$1,620.3	\$914.9	-\$1,631.1	\$806.0	\$944.0
MTSI	MACOM Technology Solutions									
	Free Cash Flow	\$44.5	\$42.5	\$26.5	\$28.7	\$142.2	\$150.5	\$130.5	\$153.8	-\$17.3
	FCF Less Cash on Acquis.	\$44.5	\$5.7	-\$24.4	\$28.7	\$54.5	\$150.5	\$130.5	\$153.8	-\$17.6
QRVO	Qorvo Inc									
	Free Cash Flow	\$64.4	\$5.4	\$31.3	\$203.0	\$684.3	\$835.8	\$1,114.9	\$781.5	\$589.4
	FCF Less Cash on Acquis.	\$64.4	\$5.4	\$31.3	\$202.9	\$684.2	\$446.6	\$1,067.8	-\$164.5	\$589.4
ADI	Analog Devices Inc									
	Free Cash Flow	\$817.9	\$797.2	\$1,230.1	\$844.8	\$3,776.1	\$2,391.4	\$1,842.8	\$1,977.7	\$2,187.5
	FCF Less Cash on Acquis.	\$817.9	\$797.2	\$1,230.1	\$844.8	\$3,776.1	\$2,391.4	\$1,828.6	\$1,966.6	\$2,134.6
AMD	Advanced Micro Devices Inc									
	Free Cash Flow	\$297.0	\$254.0	\$328.0	\$443.0	\$3,115.0	\$3,220.0	\$777.0	\$276.0	-\$129.0
	FCF Less Cash on Acquis.	\$283.0	\$254.0	\$328.0	\$443.0	\$1,571.0	\$3,220.0	\$777.0	\$276.0	-\$129.0
INTC	Intel Corp									
	Free Cash Flow	\$71.0	-\$3,080.0	-\$9,198.0	\$2,004.0	-\$9,411.0	\$10,723.0	\$21,605.0	\$16,932.0	\$14,251.0
	FCF Less Cash on Acquis.	\$71.0	-\$3,080.0	-\$9,198.0	\$2,004.0	-\$9,411.0	\$10,514.0	\$20,768.0	\$14,974.0	\$14,061.0
MCHP	Microchip Technology Inc									
	Free Cash Flow	\$522.3	\$852.0	\$558.2	\$1,113.8	\$3,020.6	\$2,350.9	\$1,734.9	\$1,404.7	\$1,427.3
	FCF Less Cash on Acquis.	\$522.3	\$852.0	\$558.2	\$1,113.8	\$3,020.6	\$2,350.9	\$1,734.9	-\$6,445.9	\$1,427.3
MPWR	Monolithic Power Systems Inc									
	Free Cash Flow	\$148.8	\$82.4	\$210.0	\$39.4	\$187.8	\$224.8	\$212.2	\$119.5	\$118.9
	FCF Less Cash on Acquis.	\$148.8	\$82.4	\$210.0	\$39.4	\$187.8	\$224.8	\$212.2	\$119.5	\$118.9
MRVL	Marvell Technology Inc									
	Free Cash Flow	-\$27.4	\$55.8	\$256.6	\$331.0	\$929.0	\$497.9	\$597.8	\$201.4	\$413.1
	FCF Less Cash on Acquis.	-\$27.4	\$50.3	\$256.6	\$331.0	\$816.7	-\$3,057.1	\$597.8	-\$869.7	-\$2,236.9
MU	Micron Technology Inc.									
	Free Cash Flow	-\$1,212.0	-\$1,537.0	-\$1,862.0	-\$1,506.0	-\$6,117.0	\$3,114.0	\$2,438.0	\$83.0	\$3,409.0
	FCF Less Cash on Acquis.	-\$1,212.0	-\$1,537.0	-\$1,862.0	-\$1,506.0	-\$6,117.0	\$3,114.0	\$2,438.0	\$83.0	\$3,409.0
NVDA	NVIDIA Corporation									
	Free Cash Flow	\$6,059.0	\$2,663.0	\$1,739.0	-\$138.0	\$3,808.0	\$8,132.0	\$4,694.0	\$4,272.0	\$3,143.0
	FCF Less Cash on Acquis.	\$6,059.0	\$2,580.0	\$1,739.0	-\$138.0	\$3,808.0	\$8,132.0	\$4,694.0	\$4,272.0	\$3,143.0
ON	ON Semiconductor Corp									
	Free Cash Flow	\$133.6	-\$39.8	\$87.4	\$389.3	\$1,628.1	\$1,337.4	\$500.7	\$160.1	\$759.4
	FCF Less Cash on Acquis.	\$133.6	-\$39.8	-\$312.0	\$389.3	\$1,625.7	\$938.0	\$496.2	-\$727.9	\$688.5

QCOM	QUALCOMM Inc.									
	Free Cash Flow	\$3,797.0	\$2,351.0	\$1,004.0	\$2,697.0	\$9,849.0	\$6,834.0	\$8,648.0	\$4,407.0	\$6,399.0
	FCF Less Cash on Acquis.	\$3,669.0	\$2,305.0	\$972.0	\$2,668.0	\$9,614.0	\$1,922.0	\$7,271.0	\$4,222.0	\$6,147.0
TXN	Texas Instruments Inc									
	Free Cash Flow	\$442.0	-\$47.0	\$178.0	\$1,075.0	\$5,923.0	\$6,294.0	\$5,490.0	\$5,802.0	\$6,058.0
	FCF Less Cash on Acquis.	\$442.0	-\$47.0	\$178.0	\$1,075.0	\$5,923.0	\$6,294.0	\$5,490.0	\$5,802.0	\$6,058.0
AVGO	Broadcom Inc									
	Free Cash Flow	\$4,597.0	\$4,380.0	\$3,933.0	\$4,461.0	\$16,312.0	\$13,321.0	\$11,598.0	\$9,265.0	\$8,245.0
	FCF Less Cash on Acquis.	\$4,580.0	\$4,380.0	\$3,933.0	\$4,461.0	\$16,066.0	\$13,313.0	\$726.0	-\$6,768.0	\$3,452.0
NXPI	NXP Semiconductors NV									
	Free Cash Flow	\$746.0	\$504.0	\$339.0	\$806.0	\$2,673.0	\$2,178.0	\$1,960.0	\$1,745.0	\$3,686.0
	FCF Less Cash on Acquis.	\$746.0	\$504.0	\$339.0	\$806.0	\$2,646.0	\$2,155.0	\$1,926.0	\$47.0	\$3,668.0

- Keep in mind that since stock compensation and amortization of intangibles are non-cash expenses in the period they are recorded, they are already added back into free cash flow as higher cash from operations. This rewards companies that use stock compensation more heavily along with those that make deals.
- Companies that build new capacity and develop new products in-house generally expense those items as part of the daily cost of doing business. That lowers their income which is part of cash from operations. The acquirers allocating deal prices to goodwill and intangible assets get to add back the amortization and may get by with less R&D spending.
- Companies relying heavily on stock compensation are at risk of losing that non-cash source of currency if their stock prices decline. If they cannot use stock for wages, then cash wages could rise which is not added back. If stock cannot be used for acquisitions, they may need to develop more R&D in-house.
- Notice that the argument made that acquisition costs are non-cash – fails when you see what free cash flow looks like after accounting for the payment for the deal. Examples above like SWKS's FY-2, and MCHP's FY-3, show that the free cash flow deficit from one deal may be greater than 3+ years of normal free cash flow.

Below, we take a closer look at four companies whose results are benefitting from the above factors along with one that is very conservative.

Marvell Technology, Inc. (MRVL)

MRVL has made several acquisitions in recent years. The company makes substantial adjustments to its non-GAAP earnings which include adding back stock compensation, amortization of acquired intangibles, acquisition/divestment costs, restructuring, and legal costs.

- Goodwill of \$11.6 billion at MRVL would be costing the company 8 cents per quarter if it was expensed over 40 years.
- MRVL's most recent five acquisitions were heavily allocated to Goodwill, which is not being expensed, and intangibles where it ignores the amortization expense:

Deal	Cost	Goodwill	Intang.	% Total
Innovium	\$1,004	\$462	\$433	89.1%
Inphi	\$9,918	\$5,688	\$4,420	101.9%
Avera	\$594	\$130	\$379	85.8%
Aquantia	\$502	\$227	\$193	83.5%
Cavium	\$6,162	\$3,498	\$2,744	101.3%

- In addition to the 8 cents of Goodwill per quarter not being expensed. MRVL is ignoring these acquisition and restructuring costs, along with stock compensation in its non-GAAP EPS. The company is not profitable without these adjustments:

	2Q24	1Q24	4Q23	3Q23	2Q23	1Q23	4Q22	3Q22
Non-GAAP EPS	\$0.33	\$0.31	\$0.46	\$0.57	\$0.57	\$0.46	\$0.50	\$0.43
Adjustments made	\$0.57	\$0.51	\$0.48	\$0.55	\$0.56	\$0.48	\$0.49	\$0.51
GAAP EPS	-\$0.24	-\$0.20	-\$0.02	\$0.02	\$0.01	-\$0.02	\$0.01	-\$0.08

- Cash R&D and capital spending are up, but not by much. MRVL only breaks out the allocation of stock compensation annually. In 2022, 57% stock compensation went to R&D, and in 2023, 67% went to R&D. We used those figures to estimate cash R&D:

	2Q24	1Q24	4Q23	3Q23	2Q23	1Q23	4Q22	3Q22
R&D	\$475	\$481	\$443	\$448	\$449	\$444	\$399	\$372
R&D Stock Comp	\$102	\$96	\$88	\$98	\$97	\$88	\$77	\$68
Cash R&D	\$373	\$385	\$356	\$350	\$352	\$356	\$322	\$304
Cap. Exp.	\$140	\$153	\$95	\$80	\$97	\$88	\$74	\$110

- Free cash flow looks strong with the low capital spending, but look at it when there are acquisitions:

	F23	F22	F21	F20	F19
CFO	\$1,289	\$819	\$817	\$360	\$597
Cap. Exp.	\$360	\$321	\$220	\$159	\$156
Free Cash Flow	\$929	\$498	\$598	\$201	\$413
Acquisitions	\$112	\$3,555	\$0	\$1,071	\$2,650
Adj FCF	\$817	-\$3,057	\$598	-\$870	-\$2,237

- Note that our capex figure includes the company's sizeable cash payments for technology licenses which the company records in the financing section of its cash flow statements. This is yet another reason that quick screening can leave investors with a very skewed picture of what is going on at a company.
- Debt is \$4.15 billion against only \$423 million in cash. Trailing 12-month EBITDA (without adding back stock compensation) is \$1.3 billion. That debt paid for acquisitions. In addition to \$11.6 billion in Goodwill, MRVL has another \$4.6 billion in intangible assets. EBITDA and adjusted earnings may be saying the acquisitions do not cost anything, but the balance sheet and the cash flow statement say otherwise.

Analog Devices, Inc. (ADI)

ADI is unique in that its largest acquisitions were purchased with its own stock. The company adds back all the standard acquisition items to its non-GAAP earnings. However, to its credit, ADI does not add back stock compensation.

- Goodwill is \$26.9 billion – if this was amortized over 40 years, ADI’s EPS would be 33 cents lower every quarter. GAAP EPS was \$1.74 and non-GAAP was \$2.49 last quarter, so 33 cents is a material item.
- Stock compensation is not very high at ADI – about \$70-\$80 million per quarter. Compared to the other companies who add this back, ADI is penalizing earnings by 12-13 cents per quarter by not doing so.
- The two largest deals of late were Maxim and Linear. Maxim cost \$28 billion in stock. Of the purchase price, \$12.43 billion went into intangibles and \$14.66 billion into Goodwill. Linear was a cash and stock deal amounting to \$15.8 billion with \$5.16 billion assigned to intangibles and \$10.53 billion to Goodwill. By using stock – free cash flow looks solid still. However, the share count has skyrocketed:

	F22	F21	F20	F19	F18	F17
CFO	\$4,475	\$2,735	\$2,009	\$2,253	\$2,442	\$1,154
Cap. Exp.	\$699	\$344	\$166	\$275	\$255	\$204
Free Cash Flow	\$3,776	\$2,391	\$1,843	\$1,978	\$2,187	\$950
Acquisitions	\$0	-\$2,426	\$14	\$11	\$53	\$9,633
Adj FCF	\$3,776	\$4,817	\$1,829	\$1,967	\$2,134	-\$8,683
Diluted Shares	523.2	401.3	372.0	372.9	374.9	350.5

- The share count before fiscal 2017 was 312.3 million shares. It was 503.5 million last quarter as free cash flow now goes toward stock repurchases.
- Because the Maxim deal was fully paid in stock, the acquisition shows up as ADI acquiring the cash on Maxim’s books.
- The adjustments to EPS are still huge simply by adding back the amortization of intangibles, restructuring, and the tax impacts:

	3Q23	2Q23	1Q23	4Q22	3Q22	2Q22	1Q22	4Q21
GAAP EPS	\$1.74	\$1.92	\$1.88	\$1.82	\$1.44	\$1.49	\$0.53	\$0.16
Adjustments	\$0.75	\$0.91	\$0.87	\$0.91	\$1.08	\$0.91	\$1.41	\$1.57
non-GAAP EPS	\$2.49	\$2.83	\$2.75	\$2.73	\$2.52	\$2.40	\$1.94	\$1.73

- R&D spending is basically flat in the last two years. ADI does not add back stock compensation and only shows the allocation of stock compensation to R&D annually. In fiscal 2022 and 2021, it was 37% and 36% of total stock compensation and we'll use that to estimate cash R&D by quarter. The rising capital spending is a positive sign for us too.

	3Q23	2Q23	1Q23	4Q22	3Q22	2Q22	1Q22	4Q21
R&D	\$424	\$416	\$414	\$421	\$432	\$421	\$427	\$399
Stock Comp	\$83	\$69	\$75	\$81	\$85	\$71	\$87	\$125
Cash R&D	\$393	\$390	\$386	\$391	\$400	\$395	\$395	\$353
Cap. Exp.	\$325	\$284	\$176	\$305	\$165	\$119	\$111	\$131

- Debt is not a problem here at \$7.0 billion and net debt of \$5.8 billion. EBITDA without adding back stock compensation is \$6.8 billion on a trailing twelve-month basis. At 1x EBITDA or less when netting out the cash, ADI does not look like it has an issue here. However, one-third of earnings is the result of treating acquisitions as though they are free.

Broadcom Inc. (AVGO)

Broadcom made several large deals – the last three were in fiscal 2018-20. It adds back the standard non-GAAP adjustments of stock compensation, amortization of acquired intangibles, along with restructuring and integration charges. It assigns a huge amount of acquisition costs to goodwill, which is not expensed.

- Goodwill is \$43.6 billion and if that was expensed over 40 years – it would cost AVGO 64 cents per quarter in EPS. That's against GAAP EPS of \$7.74 and non-GAAP of \$10.54 last quarter.
- AVGO's largest deals all assigned more than 100% of the cost to Goodwill and intangible assets. Goodwill isn't expensed and AVGO adds back the amortization of intangibles. It's magic! AVGO didn't have to build anything, and \$60 billion in deals has ZERO cost per their non-GAAP earnings.

Deal	Cost	Goodwill	Intang.	% Total
Symantec	\$10.7	\$6.6	\$5.4	112%
CA	\$16.1	\$9.8	\$12.0	135%
Brocade	\$4.8	\$2.2	\$3.4	117%
Broadcom	\$28.8	\$23.0	\$14.8	131%

- Free cash flow looks fine when AVGO is not making acquisitions. That's when it needs additional funding:

	YTD 23	F22	F21	F20	F19	F18
CFO	\$13,257	\$16,736	\$13,764	\$12,061	\$9,687.0	\$8,880.0
Cap. Exp.	\$347	\$424	\$443	463	\$432	\$635
Free Cash Flow	\$12,910	\$16,312	\$13,321	\$12,056	\$9,255	\$8,245
Acquisitions	\$17	\$246	\$0	\$10,872	\$16,033	\$4,800
Adj FCF	\$12,893	\$16,066	\$13,321	\$1,184	-\$6,778	\$3,445

- Like MVRL, AVGO books capacity with other companies' foundries so we don't expect capital spending to look like TXN. However, capital spending has been flat for some time. Also, while R&D is rising, that is really due to higher stock compensation which AVGO adds back to adjusted earnings. Note that cash R&D is falling:

	3Q23	2Q23	1Q23	4Q22	3Q22	2Q22	1Q22	4Q21
R&D	\$1,358	\$1,312	\$1,195	\$1,197	\$1,255	\$1,261	\$1,206	\$1,200
Stock Comp	\$444	\$354	\$267	\$260	\$259	\$261	\$268	\$279
Cash R&D	\$914	\$958	\$928	\$937	\$996	\$1,000	\$938	\$921
Cap. Exp.	\$122	\$122	\$103	\$122	\$116	\$85	\$101	\$88

- The adjustments to EPS even without Goodwill are huge. AVGO routinely gets 25% of its earnings from adding back acquisition-related items and stock compensation.

	3Q23	2Q23	1Q23	4Q22	3Q22	2Q22	1Q22	4Q21
GAAP EPS	\$7.74	\$8.15	\$8.80	\$7.83	\$7.15	\$5.93	\$5.59	\$4.45
Adjustments	<u>\$2.80</u>	<u>\$2.17</u>	<u>\$1.53</u>	<u>\$2.62</u>	<u>\$2.58</u>	<u>\$3.14</u>	<u>\$2.80</u>	<u>\$3.36</u>
nonGAAP EPS	\$10.54	\$10.32	\$10.33	\$10.45	\$9.73	\$9.07	\$8.39	\$7.81

- Debt is \$39.3 billion and net of cash it's \$27.3 billion. Trailing 12-month EBITDA without subtracting stock compensation is \$21.0 billion. The debt looks manageable.

Macom Technology Solutions Holdings, Inc. (MTSI)

MTSI did several acquisitions from 2015-2017 and added three in the last year – RF Wolfspeed was not completed by the time the November 10-K was released. The company adds back stock compensation as well as all acquisition amortization and restructuring costs.

- Goodwill at \$323.4 billion is not amortized of course. This is adding 3 cents per quarter to both GAAP and non-GAAP EPS.
- Macom has not been the worst in allocating everything to intangibles, but it's still not pretty. Again, if none of it is expensed against earnings, why build anything?

Deal	Cost	Goodwill	Intang.	% Total
RF Wolfspeed	\$75	n/a	n/a	n/a
MESC	\$37	\$0	\$4	10%
Linearizer	\$52	\$12	\$30	81%
AppMicro	\$695	\$183	\$413	86%
Picomatrix	\$34	\$6	\$19	75%
FiBest	\$59	\$16	\$46	103%
Aeroflex	\$37	\$8	\$21	78%
BioOptics	\$169	\$88	\$137	133%

- MACOM has positive free cash flow as long as its does not make acquisitions. It is amazing how little it spends on capital spending too:

	F23	F22	F21	F20	F19	F18	F17	F16	F15
CFO	\$167	\$177	\$148	\$171	\$21	\$36	\$61	\$79	\$34
Cap. Exp.	\$25	\$27	\$18	\$18	\$38	\$53	\$33	\$31	\$38
Free Cash Flow	\$142	\$142	\$130	\$154	-\$17	-\$17	\$28	\$48	-\$5
Acquisitions	\$88	\$0	\$0	\$0	\$0	\$1	\$270	\$86	\$208
Adj FCF	\$55	\$142	\$130	\$154	-\$18	-\$18	-\$242	-\$38	-\$213

- In F17, it issued \$465 million in equity to complete a deal. The cash flow statement only shows the cash payment.
- Both R&D and Capital Spending are flat to down over the last two years. About 10% of R&D is paid in stock too:

	4Q23	3Q23	2Q23	1Q23	4Q22	3Q22	2Q22	1Q22
R&D	\$37.5	\$36.7	\$35.5	\$38.8	\$39.7	\$37.6	\$35.5	\$35.5
Stock Comp	\$3.6	\$3.3	\$3.7	\$4.2	\$4.1	\$3.7	\$3.5	\$3.6
Cash R&D	\$33.9	\$33.4	\$31.8	\$34.6	\$35.6	\$33.9	\$32.0	\$31.9
Cap. Exp.	\$5.8	\$3.3	\$6.0	\$9.6	\$7.7	\$6.6	\$7.1	\$5.1

- There are times the adjustments to EPS are half of reported earnings. That doesn't even factor in the Goodwill for another 3 cents per quarter. The market is valuing the non-GAAP EPS at 30x and 30%-50% of that EPS is based on the idea that acquisitions have no cost:

	4Q23	3Q23	2Q23	1Q23	4Q22	3Q22	2Q22	1Q22
GAAP EPS	\$0.34	\$0.17	\$0.36	\$0.41	\$0.51	\$0.45	\$0.42	\$0.29
Adjustments	\$0.22	\$0.37	\$0.43	\$0.40	\$0.26	\$0.28	\$0.26	\$0.35
Non-GAAP EPS	\$0.56	\$0.54	\$0.79	\$0.81	\$0.77	\$0.73	\$0.68	\$0.64

- 4Q22, MTSI reported GAAP EPS of \$3.36 due to releasing tax loss valuation allowances that amounted to \$2.85.
- 1Q22, MTSI reported GAAP EPS of \$1.95 due to a gain on asset sale that was \$1.66 per share.

Texas Instruments Incorporated (TXN)

TXN is the gold standard for earnings quality in this semiconductor space. It does not post adjusted EPS as it does not add back restructuring charges, amortization of intangibles, or stock compensation.

Acquisitions also happen infrequently. The last material acquisition it made was in 2011 when it bought National Semiconductor for \$5.425 billion and 2010 when it bought some fabs in China and Japan for \$199 million.

- Of the \$5.425 billion spent on National Semiconductor, \$3.5 billion went to Goodwill, and another \$2.9 billion to intangibles that were expensed. The deals for the fabs went fully to PP&E and was depreciated. All intangibles other than Goodwill have been fully amortized at this time.
- Total Goodwill is \$4.362 billion and if it was being expensed over 40 years, TXN's quarterly EPS would be only 3 cents lower than reported.
- Cash R&D is 94%-95% of the total R&D expense (about 30% of stock compensation is allocated to R&D). Not adding back stock compensation while its peers do costs TXN about 7-9 cents per quarter.
- TXN is boosting both R&D spending and capital spending to expand production and reinvest in the business rather than buying R&D and capacity:

TXN	3Q23	2Q23	1Q23	4Q22	3Q22	2Q22	1Q22	4Q21	3Q21
R&D	\$471	\$477	\$455	\$434	\$431	\$414	\$391	\$389	\$388
CapEx	\$1,495	\$1,446	\$982	\$967	790	597	443	1282	486

- Net debt is only \$2.3 billion, or 0.22x EBITDA. About \$1.0-\$1.2 billion of that debt is due to high inventory tying up cash. Total cash and investments are \$8.9 billion. It's been a cyclically tough year for TXN – yet TTM ROI is 29% ignoring cash, and 41% using equity and net debt.

Explanation of EQ Rating Scale

6- (Exceptionally Strong)- Indicates uncommonly conservative accounting policies to the point that revenue and earnings are essentially understated relative to the company's peers. Higher possibility of reporting positive earnings surprises

5 (Strong)- Indicates the company has no areas of concern with its reported results and we see very little risk of the company disappointing due to recent results being overstated from aggressive reporting in recent periods.

4 (Acceptable)- Indicates the company may have exhibited a minor "red flag", but the severity of the issue is not yet a concern. Minimal risk of an earnings disappointment resulting from previous earnings or cash flow overstatement

3 (Minor Concern)- Indicates the company has exhibited either a larger number of or more serious warning signs than companies receiving a 4. The likelihood of an immediate earnings or cash flow disappointment is not considered to be high, but the signs mentioned deserve a higher degree of attention in the future.

2 (Weak) Indicates the company's recently reported results have benefitted materially from aggressive accounting. Follow up work should be performed to determine the nature and extent of the problem. There is a possibility that upcoming results could disappoint as the impact of unsustainable benefits disappears.

1 (Strong Concern)- Indicates that the company's recent results are significantly overstated and that we view a disappointment in upcoming quarters is highly likely

In addition to the numerical rating, the EQ Review Rating also include either a minus or plus sign. A minus sign indicates that our analysis shows the overall earnings quality of the company has worsened since the last review and there is a possibility the numerical rating will fall should the problem continue into upcoming quarters. Likewise, a positive sign indicates that the overall earnings quality is improving, and the company may see an upgrade in its numerical rating should the trend continue.

Key Points to Understand About the EQ Score

The EQ Review Rating is much more than a blind, quantitative scoring method. While we utilize proprietary adjustments, ratios, and methods developed over decades of earnings quality analysis, the foundation of all of our analysis is reading recent SEC filings, press releases, conference call transcripts and in some cases, conversations with managements.

The EQ Review Rating is not comparable to a traditional buy/sell rating. The Rating is intended to specifically convey the extent to which reported earnings may be over/understated. Fundamental factors such as forecasts for future growth, increasing competition, and valuation are not reflected in the rating. Therefore, a high score does not in itself indicate a company is a buy but rather indicates that recent results are a good indication of the underlying earnings and cash generation capacity of the company. A low score (1-2) will likely result in us performing a more thorough review of fundamental factors to determine if the company warrants a full-blown sell recommendation.

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