



Qorvo, Inc. (NYSE: QRVO)

Company Valuation and Analysis Report

Call: **BUY**

Target Price: \$90.84*

Current Price: \$70.35*

Upside: 29.1%

Industry: Semiconductors

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MGT 487: Security Valuation & Analysis

*As of November 10, 2024

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Investment Thesis

We hold a **BUY** rating on Qorvo, Inc. (QRVO). Our rationale for this investment thesis is outlined as follows:

- **Resilience through Geopolitical Upheaval:** QRVO has already experienced significant declines in revenues related to China (going from 40% of revenue to 20%). Even with continuing declines in Chinese revenue, growth in the remaining 80% of revenue markets will outstrip any continued declines.
- **Cost controls:** With declines in inflationary wage pressure, coupled with management's focus on controlling manufacturing costs, we expect QRVO to return to long term average costs as a percentage of revenue, boosting free cash flow.
- **Smartphone Demand:** The introduction of new AI based features will supercharge the replacement cycle, leading to more phones powered by Qorvo chips. Additionally, smartphone demand is expected to grow at 6%.

Key Risks

Qorvo, Inc. has a few key risks as a result of its heavy reliance on a few core areas and niche focus. A summary of the key risks associated with Qorvo include the following:

- **High Revenue Concentration in Few Customers:** Qorvo's revenue stream heavily concentrated among a few key players within the Advanced Cellular Group – predominantly Apple and Samsung. This presents a unique risk to the firm because technology is always emerging, and the life cycle of these products are short-lived. If a client chooses to swap chips used in their products, they could easily do so with short notice.
 - Largest 2 customers represent 58%, 49%, and 44% of revenue in 2024, 2023, 2021 (10k).
 - Apple – 46% and 37% in 2024 and 2023
 - Samsung – 12% in both years
- **Limited Product Diversification Among Product Portfolio:** Qorvo only sells high-end chips, which pigeon holds the firm in a small product offering to market. We have already seen that Android has announced that they plan to swap high-end chips for lower-end chips in their pitch to cut costs (Lu, 2024). This is not great news for Qorvo since they don't operate in the low-end chip production space, although Qorvo can easily adapt that market.

What the Market Has Wrong:

Company Overview

Qorvo, Inc. is a technology company that develops, designs, and manufactures a wide range of chips for uses commercial products. The company is the product of a merger between TriQuint Semiconductor and RF Micro Devices in 2015 and has slowly grown both organically and inorganically over the past few years with 10 acquisitions over the past few years. A list of acquisitions can be found in Appendix A.

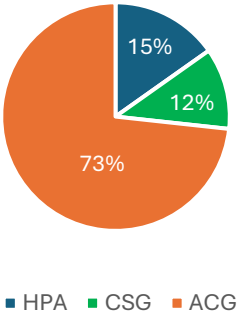
Business Model

Qorvo is organized into three main business lines:

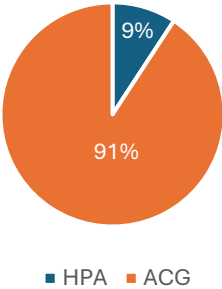
- High Performance Analog (HPA),
 - Radiofrequency (RF), mixed signal, and power management solutions
- Connectivity and Sensors Group (CSG), and
 - Bluetooth, Wi-Fi, internet of things (IOT), microelectromechanical (MEMS)-based sensors
- Advance Cellular Group (ACG).
 - RF solutions for smartphones, laptops, tablets, etc.

Within these three product lines, the company sells chips across a wide range of industries including mobile phones, wireless connectivity devices, infrastructure, defense and aerospace, and automotive (Qorvo, Inc., 2024). Collectively, the company has amassed a market capitalization of \$6.77 billion, generating a revenue of \$3.7B in 2024 fiscal year. The company primarily sells its product B2B to other companies who use Qorvo’s chips as part of their product design.

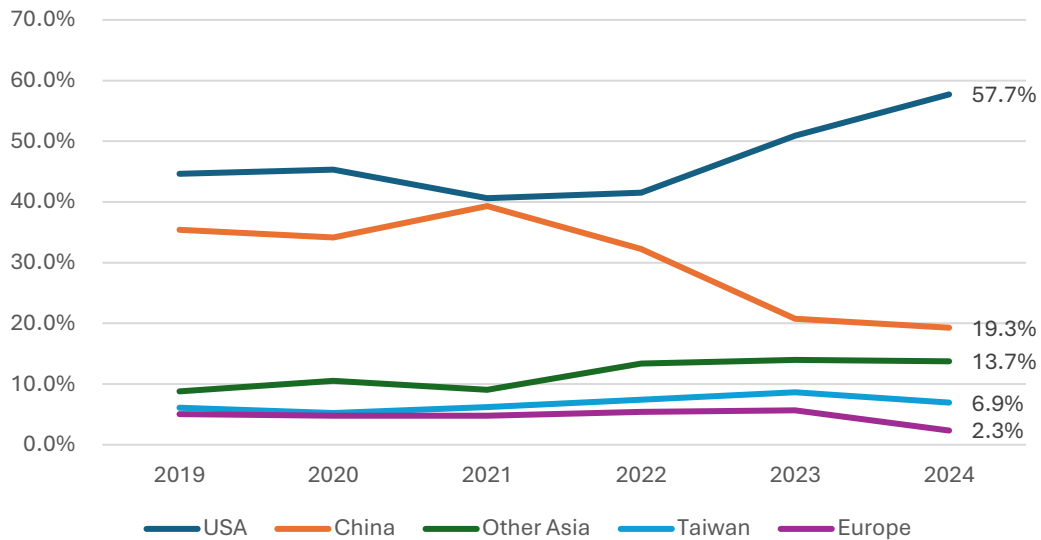
Revenue by Business Segment



Operating Income by Business Segment



Revenue by Geography



Competitive Landscape

Semiconductors are arguably one of the most valuable technologies in the world now given its universal use in everyday technologies such as in our cars, phones, computers, and even artificial intelligence (AI). To narrow our focus in on Qorvo's direct subsector within semiconductors, they produce chips that are used in consumer products in products such as the ones Apple and Samsung produce. Within this space, competition is fierce because of the rapidly changing technological landscape and advancements in chip manufacturing. Moreover, because clients like Apple and Samsung turn their products over so rapidly, the demand for certain chips have short lifespans, which requires constant manufacturing and production of new products to bring to market to meet up with demands of clients. In one recent development, Android-makers announced that it would no longer use Qorvo's high-end chip in favor of lower-end chips to use within their products (Lu, 2024). This is one example of how risky and fast paced this industry is.

Competition

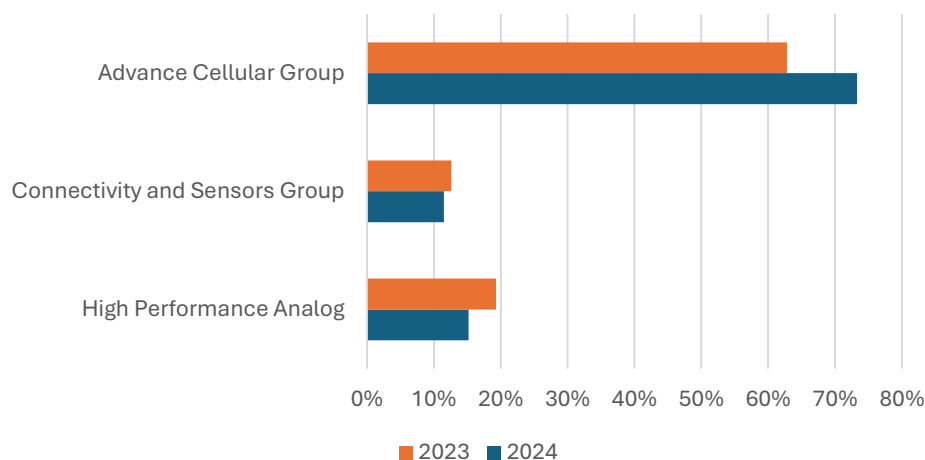
Qorvo competes with many different semiconductors across its three core product lines. Within the HPA line, Qorvo stated that they identify Analog Devices, Inc.; Infineon Technologies AG; MACOM Technology Solutions Holdings, Inc as competitors. Within the CSG product line, Qorvo has identified Broadcom Inc.; Nordic Semiconductor; NXP Semiconductors N.V. as key competitors. Finally, within its ACG line, Qorvo has identified Broadcom Inc.; Murata Manufacturing Co., Ltd.; Qualcomm Technologies, Inc. as key competitors (Qorvo, Inc., 2024). As you can tell this industry is highly competitive and very broad across a wide range of uses for consumer product related chips.

Qorvo Financial Overview & Forecast

	2022	2023	2024 Q1- Q3	2024 Q4	2024 (FY)	2025	2026	2027	2028	2029
Revenue	\$4,102.9	\$3,461.2	\$2,874.2	\$931.40	\$3,805.57	\$3,947.22	\$4,078.39	\$4,193.15	\$4,285.99	\$4,351.99
Growth %	(9.9%)	(15.6%)			9.9%	3.7%	3.3%	2.8%	2.2%	1.5%
US Revenue	\$1,703.07	\$1,762.86	\$1,659.11	\$537.65	\$2,196.75	\$2,350.53	\$2,491.56	\$2,616.13	\$2,720.78	\$2,802.40
US Growth %	(7.9%)	3.5%	57.7%		24.6%	7.0%	6.0%	5.0%	4.0%	3.0%
China Revenue	\$1,324.03	\$718.94	\$554.18	\$179.59	\$733.76	\$660.39	\$594.35	\$534.91	\$481.42	\$433.28
China Growth %	(26.0%)	(45.7%)	19.3%		2.1%	(10.0%)	(10.0%)	(10.0%)	(10.0%)	(10.0%)
ROW Revenue	\$1,075.76	\$979.42	\$660.89	\$214.17	\$875.05	\$936.30	\$992.48	\$1,042.11	\$1,083.79	\$1,116.30
ROW Growth %	17.8%	(9.0%)	23.0%		(10.7%)	7.0%	6.0%	5.0%	4.0%	3.0%
Gross Profit	\$1,759.8	\$1,285.5	\$1,163.7	\$403.30	\$1,567.03	\$1,709.14	\$1,765.94	\$1,815.64	\$1,855.83	\$1,884.41
% Margin	42.9%	37.1%	40.5%	43.3%	41.2%	43.3%	43.3%	43.3%	43.3%	43.3%
SG&A	\$359.8	\$379.0	\$315.8	\$95.00	\$410.79	\$402.62	\$416.00	\$427.70	\$437.17	\$443.90
% Margin	8.8%	10.9%	11.0%	10.2%	10.8%	10.2%	10.2%	10.2%	10.2%	10.2%
R&D	\$644.9	\$666.0	\$568.5	\$169.51	\$738.05	\$718.39	\$742.27	\$763.15	\$780.05	\$792.06
% Margin	15.7%	19.2%	19.8%	18.2%	19.4%	18.2%	18.2%	18.2%	18.2%	18.2%
EBIT	\$743.8	\$245.5	\$209.2	\$138.8	\$348.0	\$588.1	\$607.7	\$624.8	\$638.6	\$648.4
% Margin	18.1%	7.1%	7.3%	14.9%	9.1%	14.9%	14.9%	14.9%	14.9%	14.9%
Corporate Tax Rate	15.8%	23.0%	21.8%	23.0%	22.3%	23.0%	23.0%	23.0%	23.0%	23.0%
D&A	\$207.0	\$198.1	\$127.8	\$95.00	\$222.76	\$402.62	\$416.00	\$427.70	\$437.17	\$443.90
% of Rev	5.0%	5.7%	4.4%	10.2%	5.9%	10.2%	10.2%	10.2%	10.2%	10.2%
CAPEX	(\$175.3)	(\$128.6)	(\$104.0)	(\$46.57)	(\$150.53)	(\$197.36)	(\$203.92)	(\$209.66)	(\$214.30)	(\$217.60)
% of Rev	4.3%	3.7%	(3.6%)	5.0%	(4.0%)	5.0%	5.0%	5.0%	5.0%	5.0%
Increase (Decrease) in NWC	(\$58.9)	(\$169.8)	(\$41.6)	\$9.3	(\$32.2)	\$39.5	\$40.8	\$41.9	\$42.9	\$43.5
% of Rev	(1.4%)	(4.9%)	(1.4%)	1.0%	(0.8%)	1.0%	1.0%	1.0%	1.0%	1.0%

Revenue Forecast

Revenue by Product Group



Qorvo's historical revenue is predominantly driven by revenue to from the ACG, which has been driven by its largest end customer, Apple Inc. Unfortunately, the company does not have data publicly available under these product groups because of an apparent restructuring of product lines conducted in 2022.

For single quarter projections, Qorvo management's mean revenue guidance has been below the actual revenue performance for 19 of the prior 20 quarters. The average outperformance has been 3.5%.

There are several key factors which will drive revenue growth for the remainder of our projection period:

- **Smart Phone Demand:** Demand for smartphones is expected to taper down to 6% - primarily driven by market growth in China and other emerging markets. QRVO minority stake in those markets, we expect an even lower market growth rate for it's highest revenue generating line of business. (Popal, Scarsella, Reith, & Shirer, 2024)
- **Chinese Market:** On the Chinese market, specifically, we expect a significant reckoning to come in the next year with increased tensions between the US and China, emphasis on domestic production of chips and manufacturing within China, and other market issues. We believe management also believes this as last year, QRVO management divested some of their assets in Beijing and Dezhou. (Zack's Equity Research, 2023). Despite this, Qorvo still has Chinese exposure at 19.3% total revenue coming from this market, which analysts point to China's strong Android market, which we know is swapping out of QRVO's product line offering (Lu, 2024).
- **Product Line:** Qorvo is doubling down on its high-end chip product line with investments in future programs to bring 4G and 5G to new markets. While this is a play for maintaining it's existing customer base, this further alienates other customer types for a range of chips that may not necessarily require the high-end chip types that Qorvo designs and manufactures. (Semiconductor Today, 2024)
- **Impact of AI:** The introduction of AI in everyday life will supercharge the demand for AI Powered chips that can handle more sophisticated queries. Apple's most recent launch of the iPhone 16 has already demonstrated how they have shifted to more sophisticated computing capabilities for their product lineup (The Associated Press, 2024). We believe the impact of AI will continue to increase the demand for these products or at least improve margins over time.

Based on our analysis, of the above factors listed, we believe that the geographical market is the most salient factor in revenue growth because historical track record that we have already witnessed play out. We are forecasting based on 3 different geographic regions: USA (58% of revenue), China (19% of revenue), and rest of world (28% of revenue). With risk of increase tariffs, higher competition within the Chinese market, and other trade tension between the two markets, we have forecasted a (10%) growth rate for the Chinese market. For the other two markets, we took the average revenue growth for the prior 5 years, which came out to 7% for both the US and ROW regions. For the remaining years, we applied a 1% decay until arriving at 3% growth in 2029 with a 2% growth rate applied for the perpetual growth rate in our DCF.

Gross Profit Forecast

Gross Profit									
2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
1,057.1	1,158.1	1,125.9	1,184.3	1,303.0	1,697.4	2,244.3	1,759.8	1,285.5	1,163.7
40.1%	38.6%	38.2%	38.5%	41.6%	45.5%	49.3%	42.9%	37.1%	40.5%

Qorvo's gross profit margin on average is around 40% and has fluctuated between 18% and 50% over the past 10 years. The overall revenue margin trend is pretty healthy, but is trending down slightly, often being pressured downward by changing client preferences, increased costs, and high competition. Based on this, we expect gross profits to 43.3%, to be in line with the recent 5-year average. Based on the AI demand, efforts to reduce costs, and increased market share capture during the recent years, QRVO will be able to maintain higher gross profits than previously.

Selling, General, and Administrative (SG&A) Forecast

SG&A									
2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
543.8	539.9	537.6	523.9	333.5	374.2	343.9	359.8	379.0	315.8
20.6%	18.0%	18.2%	17.0%	10.6%	10.0%	7.6%	8.8%	10.9%	11.0%

SG&A expenses historically have circled around 13.5%. In the most recent 5 years, the average has been closer to 9.6%. Given the market conditions and slight uptick in SG&A in recent years, we have opted to take the elevated three-year average of 10.2% going forward.

Research & Development (R&D) Forecast

R&D									
2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
457.0	462.4	450.0	448.4	470.2	550.1	612.2	644.9	666.0	568.5
17.3%	15.4%	15.2%	14.6%	15.0%	14.7%	13.4%	15.7%	19.2%	19.8%

For R&D, the both the recent 5-year and long-term R&D costs have been 15.6%. Despite historical trends, we can see that R&D has trended upwards in the last two years driven by Qorvo's investment in multi-year programs and its digital transformation efforts. We have found that QRVO's investment into these R&D programs is driven by their need to remain competitive and maintain contracts with their existing customer base. As a result, we have decided to opt for a 18.2% forecast going forward, which is the three-year elevated average.

Depreciation & Amortization (D&A) Forecast

D&A									
2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
174.5	196.3	189.4	184.6	212.1	201.4	209.9	207.0	198.1	127.8
6.6%	6.5%	6.4%	6.0%	6.8%	5.4%	4.6%	5.0%	5.7%	4.4%

D&A expenses have been relatively stable year-over-year. The all-time average for D&A is 5.9% and the 5-year average is 5.5%. We found that the 5.5% is more reflective of QRVO's D&A expenses moving forward when analyzing their projected revenue.

Capital Expenditure (CAPEX) Forecast

Capex									
2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
(351.2)	(471.4)	(403.4)	(217.8)	(164.3)	(144.6)	(240.4)	(175.3)	(128.6)	(104.0)
(13.3%)	(15.7%)	(13.7%)	(7.1%)	(5.2%)	(3.9%)	(5.3%)	(4.3%)	(3.7%)	(3.6%)

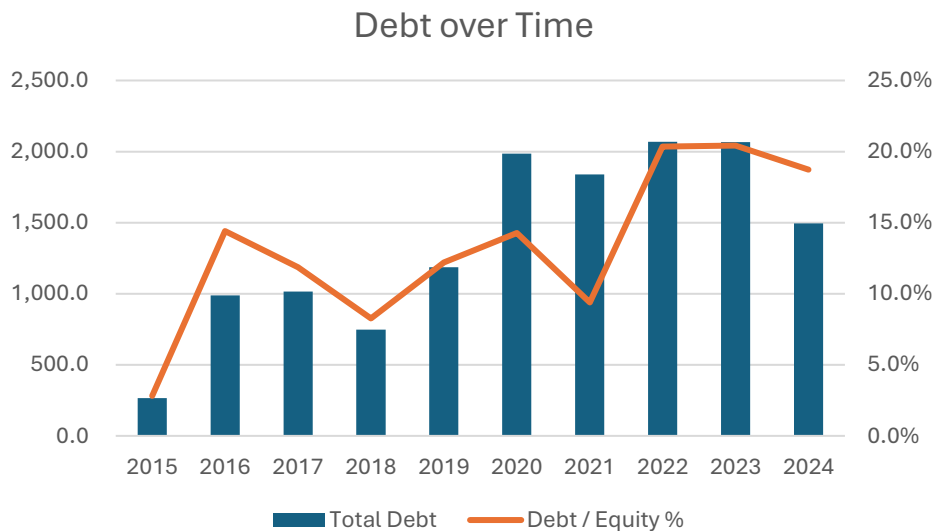
CAPEX historically great at 8.0% of revenue, but in the last 5-years it has shrunk to 4.5%. In analyzing QRVO's future CAPEX, management has stated that have a long-term target of 5% capex margin (2024 FQ4 earnings call). As a result, we forecasted a 5% CAPEX, in line with management's expectations.

Change in Net Working Capital

NWC Change									
2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
279.1	(74.4)	144.8	(36.4)	(54.6)	(18.3)	305.6	(58.9)	(169.8)	(41.6)
10.6%	(2.5%)	4.9%	(1.2%)	(1.7%)	(0.5%)	6.7%	(1.4%)	(4.9%)	(1.4%)

Using the historical average, we anticipate changes in net working capital to be stabilize at 1.1%. Historically, net working capital has been floating around 1.1% in the long term and (0.4%) in the short term.

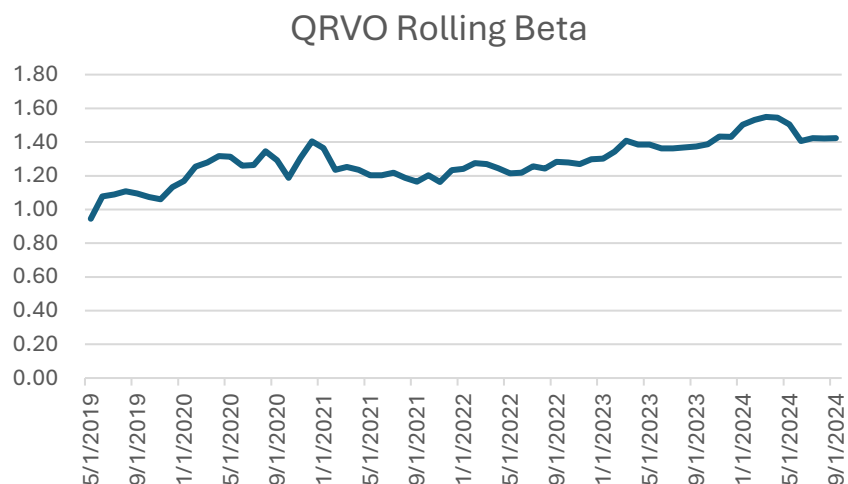
Debt Forecast Forecast



Qorvo's total debt has increased over the last several years. The increases are primarily explained by financing seven acquisitions between 2019 and 2021 (Appendix A). The company has not expressed any significant interest in additional acquisitions or reducing debt. Therefore, we are assuming the company's debt level remains consistent during the projection period.

Rolling Beta Calculation

To calculate Qorvo's Beta, we leveraged the prior 10 years of QRVO stock performance and compared it to the outperformance of the Wilshire 5000 index when compared to the 1-month treasury rate for the same period. Given the outsized volatility during the initial period of the pandemic, we removed data points for March-April 2020. As a result of these calculations, we will leverage a beta of 1.28 for the purposes of our valuation.



Qorvo's Valuation (DCF Model Output)

Risk Free Rate: 4.24% (Federal Bank of St. Louis, 2024)

Market Risk Premium: 4.6% (Damodaran, 2024)

Perpetual Growth Rate: 2%

Cost of Equity: 10.24%

After-Tax Cost of Debt: 3.32%

D/E Ratio: 22.8%

WACC: 8.67%

WACC Calculation

Treasury Yield (10 yr)	4.31%
Market Risk Premium	4.60%
Beta	1.29
Cost of Equity	10.24%
Debt Rate	4.31%
Tax Rate	23%
After Tax Cost of Debt	3.32%

Total Debt	\$1,961.4
Total Market Cap	\$6,650.0
Debt %	22.8%
Equity %	77.2%
WACC	8.67%

Terminal Value Calculation

Terminal UCF	\$682.09
Long Term Growth Rate	2%
Terminal Value	\$10,231.38
Discount Factor	0.66
PV of Terminal Value	\$6,752.33

Enterprise Value Calculation

Cumulative Value of UFCF	\$2,699.1
PV of Terminal Value	\$6,752.3
Enterprise Value	\$9,451.5
Minus Debt	(\$1,961.4)
Minus Minority Interest	\$0.0
Plus Cash	\$1,096.5
Implied Equity Value	\$8,586.5

Current Market Cap	\$6,650.0
Expected Gain (Loss)	29%

0

	2022	2023	2024 Q1- Q3	2024 Q4	2024 (FY)	2025	2026	2027	2028	2029
Revenue	\$4,102.9	\$3,461.2	\$2,874.2	\$931.40	\$3,805.57	\$3,947.22	\$4,078.39	\$4,193.15	\$4,285.99	\$4,351.99
Growth %	(9.9%)	(15.6%)			9.9%	3.7%	3.3%	2.8%	2.2%	1.5%
US Revenue	\$1,703.07	\$1,762.86	\$1,659.11	\$537.65	\$2,196.75	\$2,350.53	\$2,491.56	\$2,616.13	\$2,720.78	\$2,802.40
US Growth %	(7.9%)	3.5%	57.7%		24.6%	7.0%	6.0%	5.0%	4.0%	3.0%
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Gross Profit	\$1,759.8	\$1,285.5	\$1,163.7	\$403.30	\$1,567.03	\$1,709.14	\$1,765.94	\$1,815.64	\$1,855.83	\$1,884.41
% Margin	42.9%	37.1%	40.5%	43.3%	41.2%	43.3%	43.3%	43.3%	43.3%	43.3%
SG&A	\$359.8	\$379.0	\$315.8	\$95.00	\$410.79	\$402.62	\$416.00	\$427.70	\$437.17	\$443.90
% Margin	8.8%	10.9%	11.0%	10.2%	10.8%	10.2%	10.2%	10.2%	10.2%	10.2%
R&D	\$644.9	\$666.0	\$568.5	\$169.51	\$738.05	\$718.39	\$742.27	\$763.15	\$780.05	\$792.06
% Margin	15.7%	19.2%	19.8%	18.2%	19.4%	18.2%	18.2%	18.2%	18.2%	18.2%
EBIT	\$743.8	\$245.5	\$209.2	\$138.8	\$348.0	\$588.1	\$607.7	\$624.8	\$638.6	\$648.4
% Margin	18.1%	7.1%	7.3%	14.9%	9.1%	14.9%	14.9%	14.9%	14.9%	14.9%
Income Tax	\$117.3	\$56.5	\$45.6	\$31.92	\$77.5	\$135.27	\$139.77	\$143.70	\$146.88	\$149.14
Corporate Tax Rate	15.8%	23.0%	21.8%	23.0%	22.3%	23.0%	23.0%	23.0%	23.0%	23.0%
NOPAT	\$626.56	\$189.00	\$163.62	\$106.86	\$270.48	\$452.86	\$467.91	\$481.08	\$491.73	\$499.30
D&A	\$207.0	\$198.1	\$127.8	\$95.00	\$222.76	\$402.62	\$416.00	\$427.70	\$437.17	\$443.90
% of Rev	5.0%	5.7%	4.4%	10.2%	5.9%	10.2%	10.2%	10.2%	10.2%	10.2%
CAPEX	(\$175.3)	(\$128.6)	(\$104.0)	(\$46.57)	(\$150.53)	(\$197.36)	(\$203.92)	(\$209.66)	(\$214.30)	(\$217.60)
% of Rev	4.3%	3.7%	(3.6%)	5.0%	(4.0%)	5.0%	5.0%	5.0%	5.0%	5.0%
Increase (Decrease) in NWC	(\$58.9)	(\$169.8)	(\$41.6)	\$9.3	(\$32.2)	\$39.5	\$40.8	\$41.9	\$42.9	\$43.5
% of Rev	(1.4%)	(4.9%)	(1.4%)	1.0%	(0.8%)	1.0%	1.0%	1.0%	1.0%	1.0%
UFCF	\$717.15	\$428.31	\$228.98	\$145.98	\$374.96	\$618.65	\$639.21	\$657.19	\$671.74	\$682.09
Stub Period				0.125		1	2	3	4	5
WACC				8.67%		8.67%	8.67%	8.67%	8.67%	8.67%
Discount Factor				0.99		0.92	0.85	0.78	0.72	0.66
PV of UFCF				\$144.47		\$569.31	\$541.31	\$512.16	\$481.75	\$450.15

What the Market Has Wrong

The current price level of \$70.35 is only justified if the company maintains high costs as a percentage of revenue and remains sluggish in growth. If revenue growth remains sluggish, only growing at the perpetual growth rate of 2.5%, coupled with R&D and SG&A as a percentage of revenue remaining at their recent peaks of 20% and 11% of revenue, then the current price would be justified. However, this estimate assumes the negative conditions of the past few years persist into the future. China revenue declines explain most of the decline in overall revenue over the past few years. As a matter of base effects, the declines cannot be as large going forward, and with the advent of AI integrated smartphones driving the consumer upgrade cycle and positive catalysts related to 5G infrastructure growth, it is in our view, too pessimistic to keep such negative assumptions in the projection.

Appendix A: QRVO Acquisitions (S&P 500 Capital IQ)

Transaction Type	Role	Target	Sellers	Size (\$mm)
Merger/Acquisition	Buyer	Anokiwave Inc.	Gefinor Capital; Pear Tree Partners, LP	93.69
Merger/Acquisition	Buyer	United Silicon Carbide, Inc.		258.4
Merger/Acquisition	Buyer	NextInput, Inc.	Band of Angels; Cota Capital Management LLC; Danhua Capital; Intel Capital Corporation; Sierra Ventures Management, LLC; UMC Capital	173.37
Merger/Acquisition	Buyer	Sevenhugs, Inc.	Karista; Kima Ventures SAS; NovX Capital; Xerys Gestion SAS	48.7
Merger/Acquisition	Buyer	DecaWave Limited	ACT Venture Capital Limited; Atlantic Bridge Services Limited; International Investment & Underwriting Limited; Summit Bridge Capital <i>Seller Funds</i> : China Ireland Technology Growth Capital Fund	372.7
Merger/Acquisition	Buyer	Custom MMIC Design Services, Inc.		96.0
Merger/Acquisition	Buyer	Cavendish Kinetics, Inc.	Quadia SA; Qualcomm Ventures LLC; Tallwood Venture Capital; Wellington Partners Advisory AG	198.39
Merger/Acquisition	Buyer	Active-Semi International, Inc.		325.0
Merger/Acquisition	Buyer	Rapid Diagnostek, Inc.	Capital Midwest Fund; NEW Capital Management, Inc.	-
Merger/Acquisition	Buyer	GreenPeak Technologies BV	Allegro Investment Fund NV; Gimv NV (ENXTBR:GIMB); Ingleby (1994) plc (nka: Molten Ventures Plc (LSE:GROW)); Motorola Solutions Venture Capital; Robert Bosch Venture Capital GmbH <i>Seller Funds</i> : Gimv Arkiv I	118.7
Merger/Acquisition	Seller	Assembly and Test Facilities in Beijing and Dezhou. China of Qorvo, Inc.	Qorvo, Inc. (NasdaqGS:QRVO)	240.0

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