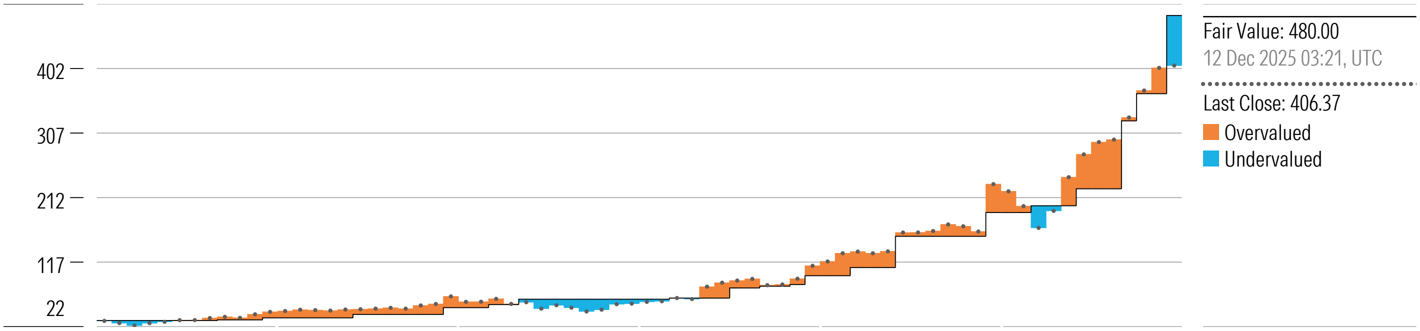
Morningstar Equity Analyst Report | Report as of 12 Dec 2025 03:31, UTC | Reporting Currency: USD | Trading Currency: USD | Exchange: NASDAQ - ALL MARKETS

Broadcom Inc AVGO ★★★★ 12 Dec 2025 03:25, UTC

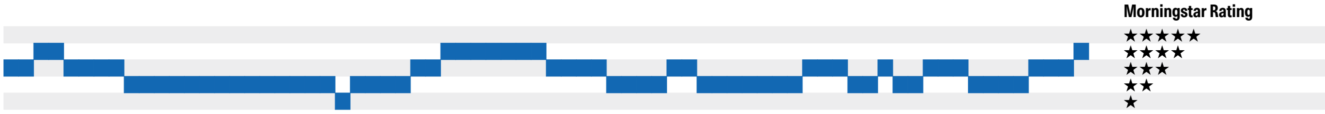
Last Price	Fair Value Estimate	Price/FVE	Market Cap	Economic Moat™	Equity Style Box	Uncertainty	Capital Allocation	ESG Risk Rating Assessment[1]
406.37 USD 11 Dec 2025	480.00 USD 12 Dec 2025 03:21, UTC	0.85	1.92 USD Tril 11 Dec 2025	Wide	Large Growth	High	Exemplary	3 Dec 2025 06:00, UTC

Price vs. Fair Value



	2020	2021	2022	2023	2024	YTD	
	1.25	1.33	0.90	1.15	1.22	0.85	Price/Fair Value
	42.78	55.38	-13.43	103.05	109.64	76.04	Total Return %

Morningstar Rating



Total Return % as of 11 Dec 2025. Last Close as of 11 Dec 2025. Fair Value as of 12 Dec 2025 03:21, UTC.

Contents

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The primary analyst covering this company does not own its stock.

[1] The ESG Risk Rating Assessment is a representation of Sustainalytics' ESG Risk Rating.

Broadcom Earnings: Buy the Dip Before the Rocket Takes Off

Analyst Note William Kerwin, CFA, Senior Equity Analyst, 12 Dec 2025

Broadcom posted strong fiscal fourth-quarter results above guidance. Guidance for January-quarter artificial intelligence revenue was impressive, as was a new $11 billion AI chip order from Anthropic for the second half of 2026, and the announcement of a new custom AI chip customer in 2026.

Why it matters: Broadcom's AI chip business is accelerating, and we project even greater astronomic growth over the next two years. We see phenomenal demand for Google's TPU chip, layering in of new customers, and big incremental orders from existing customers driving immense demand.

- Google is the firm's lead AI customer, and the latest generation of its TPU chip exhibits superb performance that is driving significant orders. The TPU is no longer exclusively internal to Google—we now expect significant orders from Anthropic and Meta for these chips and systems.
- Anthropic will accrue revenue in the second half of fiscal 2026, with $21 billion in wholly incremental orders. Broadcom's brand new customer adds $1 billion in incremental revenue in fiscal 2026. In 2027, we expect OpenAI to supplement the firm's existing five customers.

The bottom line: We raise our fair value estimate for wide-moat Broadcom to $480 per share, from $365, behind a significantly stronger AI chip growth forecast. We see a 5% after-hours selloff as missing the forest for the trees. Investors now have a terrific opportunity to buy into an AI winner.

- We attribute the selloff to commentary on gross margin dilution from AI chips. We aren't concerned with this, given that these chips are operating-margin-accretive. The firm's AI backlog might've missed investor targets too, but we see upside to this and view it highly positively.

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Sector	Industry
Technology	Semiconductors

Business Description

Broadcom is one of the largest semiconductor companies in the world and has also expanded into infrastructure software. Its semiconductors primarily serve computing, wired connectivity, and wireless connectivity. It is primarily a fabless designer but holds some manufacturing in-house, such as for its best-of-breed film bulk acoustic resonator filters that sell into the Apple iPhone. In software, it sells virtualization, infrastructure, and security software to large enterprises, financial institutions, and governments. Broadcom is the product of consolidation. Its businesses are an amalgamation of former companies like legacy Broadcom and Avago Technologies in chips, as well as VMware, Brocade, CA Technologies, and Symantec in software.

- We now expect an even larger surge in second-half fiscal 2026 revenue behind the second Anthropic order. We forecast total AI chip revenue to far more than double in fiscal 2026, and see significant momentum continuing into 2027.

Business Strategy & Outlook William Kerwin, CFA, Senior Equity Analyst, 12 Dec 2025

Broadcom is an amalgamation of high-value chip and software businesses that on the whole are differentiated and moaty, in our view. Put simply, Broadcom is a prolific generator of cash flow. It is a terrific aggregator of firms, big and small. Its ability to acquire and streamline generates strong profits and cash flow and fuels robust shareholder returns. We laud the company for its execution and operating efficiency, which build upon its large organic investment and help it to outperform its end markets organically.

In our view, Broadcom’s networking chip business is its strongest and contributes heavily to the company's wide economic moat. We expect it to retain a dominant position in merchant silicon for switching and routing applications, where we see it as best-of-breed for high speeds. We also expect it to hold a formidable position in custom artificial intelligence accelerators as it benefits from hyperscale cloud vendors building chips to reduce their reliance on Nvidia. Outside of networking, we anticipate it will maintain a technological lead in thin film bulk acoustic resonator filters, which it sells exclusively into Apple’s iPhone. Broadcom’s software businesses sell virtualization software, mainframe software, and cybersecurity software, and we see its offerings as highly competitive. Broadcom’s focus on strategic large software customers like financial institutions, governments, and large enterprises—where it is deeply embedded—elicits steep switching costs. We also see upselling opportunities with VMware under the firm’s belt.

We expect Broadcom to grow rapidly as a result of its skyrocketing AI chip business. We believe AI is already the primary driver of Broadcom’s chip sales and is becoming the firm’s overall leading growth driver. Outside of AI, we see more moderate growth led by VMware and wireless chip sales to Apple. We expect acquisitions to still be on Broadcom’s radar, but perhaps with larger, less frequent deals. After the 2023 VMware purchase, we expect the company to focus on deleveraging for a couple of years before tapping the acquisition market again.

Bulls Say William Kerwin, CFA, Senior Equity Analyst, 12 Dec 2025

- Broadcom is an exemplar of operating efficiency. It earns excellent operating margins and generates enormous cash flow. It is particularly strong at acquiring companies and trimming excess expenses.
- Broadcom’s networking and wireless chip businesses boast best-of-breed technologies, in our view, along with marquee customer relationships with Apple, Google, Cisco, Arista, and others.
- We believe Broadcom will be a significant beneficiary of rising AI spending, which we expect to spur significant growth for its networking semiconductor sales.

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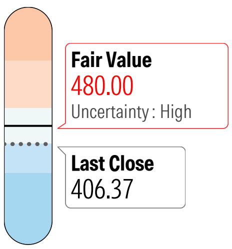
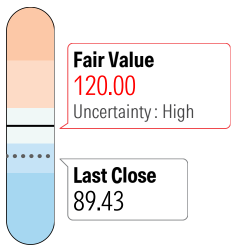
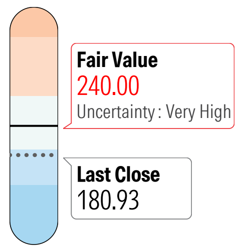
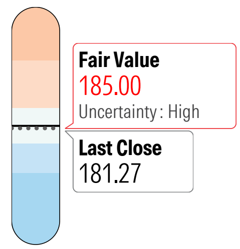
Competitors

	Broadcom Inc AVGO	Marvell Technology Inc MRVL	NVIDIA Corp NVDA	Qualcomm Inc QCOM
				
Economic Moat	Wide	Narrow	Wide	Narrow
Currency	USD	USD	USD	USD
Fair Value	480.00 12 Dec 2025 03:21, UTC	120.00 3 Dec 2025 03:56, UTC	240.00 20 Nov 2025 02:28, UTC	185.00 27 Oct 2025 17:57, UTC
1-Star Price	744.00	186.00	420.00	286.75
5-Star Price	288.00	72.00	120.00	111.00
Assessment	Undervalued 12 Dec 2025	Undervalued 11 Dec 2025	Undervalued 11 Dec 2025	Fairly Valued 11 Dec 2025
Morningstar Rating	★★★★12 Dec 2025 03:25, UTC	★★★★11 Dec 2025 22:48, UTC	★★★★11 Dec 2025 22:46, UTC	★★★11 Dec 2025 22:46, UTC
Analyst	William Kerwin, Senior Equity Analyst	William Kerwin, Senior Equity Analyst	Brian Colello, Senior Equity Analyst	Brian Colello, Senior Equity Analyst
Capital Allocation	Exemplary	Exemplary	Exemplary	Standard
Price/Fair Value	0.85	0.75	0.75	0.98
Price/Sales	30.87	9.97	23.77	4.52
Price/Book	23.61	5.48	36.99	9.18
Price/Earning	101.88	32.63	45.49	37.26
Dividend Yield	0.58%	0.27%	—	1.94%
Market Cap	1,919.03 Bil	75.85 Bil	4,397.50 Bil	194.14 Bil
52-Week Range	138.10—414.61	47.09—127.48	86.62—212.19	120.80—205.95
Investment Style	Large Growth	Mid Growth	Large Growth	Large Value

Bears Say William Kerwin, CFA, Senior Equity Analyst, 12 Dec 2025

- Broadcom's chip business bears significant customer concentration, with a small handful of large AI customers driving the bulk of revenue and future growth.
- Broadcom's software portfolio holds legacy and mature businesses, like virtualization and mainframes, which we think will exhibit moderating growth.
- Broadcom relies heavily on acquisitions to expand its portfolio and may struggle to find deals large enough to move the needle that can pass antitrust scrutiny.

Economic Moat William Kerwin, CFA, Senior Equity Analyst, 13 Oct 2025

We believe Broadcom holds a wide economic moat stemming from intangible assets in chip design and switching costs for its software products. Strength in both chips and software allows the company to earn terrific accounting and economic profits, and we believe its competitive positioning will allow it to

Morningstar Equity Analyst Report | Report as of 12 Dec 2025 03:31, UTC | Reporting Currency: USD | Trading Currency: USD | Exchange: NASDAQ - ALL MARKETS Page 4 of 23

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do so, more likely than not, for the next 20 years. While we see most of Broadcom's businesses as moaty in isolation, we believe its ability to aggregate disparate businesses via acquisitions and run them with terrific efficiency reinforces its wide moat. We see this wide moat evidenced in impressive operating and economic profit margins.

The majority of Broadcom's business is in semiconductors, with broad end-market exposure across enterprise networking, wireless chips for smartphones, broadband access, and storage applications. We see the two largest exposures here—networking and wireless chips—as benefiting from wide-moat design expertise in chip design.

In wireless, Broadcom is the top supplier of thin film bulk acoustic resonator, or FBAR, filters for high-end smartphones like the Apple iPhone, alongside Wi-Fi and Bluetooth chips. FBAR filters are a premium product, with better filtering, lower power consumption, and smaller size than other acoustic wave filters. FBARs are critical for new smartphones especially in the advent of 5G, allowing better reception of higher frequencies while extending battery life. In our view, FBARs require greater engineering complexity and are only successfully sold by a handful of firms, with Broadcom taking the lion's share of the market, thanks to 40 years of engineering and development. Broadcom boasts a strong relationship with Apple for placement into its iPhone models with these filters.

We don't foresee a new entrant encroaching on Broadcom's FBAR prowess and believe it would be difficult even for a rival smartphone chip supplier or for Apple itself. FBAR filters are built on nonsilicon materials like aluminum nitride, which raises barriers to entry, in our view, as expertise in nonsilicon materials is harder to find and develop. While mostly a fabless chipmaker, Broadcom keeps its FBAR manufacturing in-house to guard its design secrets. Though we hold concerns about customer concentration and typically see high reliance on large smartphone makers like Apple as erosive to economic moats, we view Broadcom's focus on the premium end of the market and its large technological lead as moaty. We estimate Broadcom's average dollar content sold into the iPhone to be close to $20 (with roughly $10 alone from modules including its FBAR filters), well above our estimates for peers like Skyworks ($12) and Qorvo ($5).

In networking chips, Broadcom is the premier player with a commanding market share. To us, intangible assets in networking chip design come in the form of engineering expertise, both in terms of silicon design and integration with complementary hardware and customer networking topologies, which results from decades of development, R&D expense, and established customer relationships. Broadcom has the most breadth and depth of any networking chipmaker, offering a bevy of feature-rich chips tailored to specific applications in enterprises, high-speed chips that stay one step ahead of the development of the competition, and a growing custom silicon business for hyperscale cloud players like Google. It holds marquee customer relationships with the largest networking equipment vendors, like Cisco and Arista Networks.

Morningstar Equity Analyst Report | Report as of 12 Dec 2025 03:31, UTC | Reporting Currency: USD | Trading Currency: USD | Exchange: NASDAQ - ALL MARKETS Page 5 of 23

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We see greater competition in newer corners of the networking chip landscape, including optical transceivers (where we see leadership for Marvell Technology) and offload data processors (a crowded field featuring heavyweights like Intel and Nvidia). Nevertheless, we foresee minimal eating of Broadcom's core lunch of switching and routing for enterprises and clouds. Broadcom can outspend all its competitors on research and development to maintain its leadership. The firm estimates $50 million-$100 million in cumulative cost to build out a single new chip, and it has numerous networking chip lines on offer for a variety of tailored applications. We believe it can maintain the highest breadth and depth for switching and routing chips while staying highly competitive in newer areas like optical and processing offload.

Broadcom has significant exposure to enterprise software following its acquisition of VMware in 2023. Its primary exposures are virtualization software, mainframe software, development operations (DevOps) software, and cybersecurity primarily stemming from a string of acquisitions made following the initial Broadcom-Avago merger in 2016. We believe enterprise software is conducive to switching costs, including the tangible time, cost, and effort of finding a replacement, maintaining two systems concurrently during a transition, and managing any operational inefficiencies that result from the switch. Broadcom holds leading market share in virtualization and mainframe software. In virtualization, it dominates server virtualization for data centers and has expanded its offerings to storage virtualization, containerization, network management, and security to further embed itself in customers and make itself hard to rip out. In mainframe software, it focuses on security, monitoring, and analytics software to put primarily on IBM mainframes. IBM will often focus on the core data/payment processing software that requires specialized mainframes and leave Broadcom to specialize in complementary software. In DevOps, Broadcom is a strong player in a market with many options, including moaty businesses like Atlassian, ServiceNow, and Microsoft. In cybersecurity, Broadcom's Symantec brand is a legacy player with existing penetration, but that has struggled to transition to cloud security. We see the Carbon Black brand as more cutting-edge and better in cloud environments.

In software, we view Broadcom's strategic focus on a small group of large enterprise accounts as key to its moat. The firm is embedded in many different touchpoints in its key software customers, with more than 80% using more than five solutions (including security, DevOps, and mainframe software) per management. By focusing on selling multiple offerings into a concentrated bucket of large customers, we see Broadcom making itself difficult to rip out. We foresee Broadcom capitalizing on cross-selling opportunities between its legacy software and new VMware customer bases, enhancing its entrenchment. Replacing Broadcom may require finding three or more new vendors that may be unable to replicate its exact capabilities and may require updated workstreams and IT support. We also see the firm's mainframe and DevOps software as competitively strong, further defending Broadcom against aspiring disruptors. Finally, Broadcom's core software is almost entirely made up of recurring revenue and subscriptions, which increases stickiness, in our view.

Morningstar Equity Analyst Report | Report as of 12 Dec 2025 03:31, UTC | Reporting Currency: USD | Trading Currency: USD | Exchange: NASDAQ - ALL MARKETS Page 6 of 23

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We see Broadcom deriving the vast majority of its sales from moaty businesses in software, networking chips, and wireless chips. We expect it to fend off serious competitive threats and maintain its impressive profitability over the next 20 years, more likely than not.

Fair Value and Profit Drivers William Kerwin, CFA, Senior Equity Analyst, 12 Dec 2025

Our fair value estimate is $480 per share. Our valuation implies fiscal 2026 (ending October 2026) and fiscal 2027 adjusted price/earnings multiples of 45 times and 31 times, respectively, and a fiscal 2026 enterprise value/sales multiple of 23 times. In our view, Broadcom's primary valuation driver going forward is the rapid growth of its AI chip business, which supports such high multiples.

We model 31% revenue growth for Broadcom through fiscal 2030, driven predominantly by the growth of its semiconductor revenue and primarily its AI chip business. Broadcom's non-AI chip businesses are increasingly negligible to results. AI revenue crossed over to the majority of total chip sales in fiscal 2025, and we expect them to make up the majority of total firm sales in fiscal 2026.

We model Broadcom's AI chip sales rising at more than a 50% compound annual rate through fiscal 2030, with significant growth in fiscal 2026 and 2027. We believe growth will be durable, with rising spending at existing customers and multiple new customers generating double-digit revenue through the end of the decade.

We see software as Broadcom's secondary growth driver but diminishing in impact versus the size and growth of the AI chip business over the next five years. We believe software growth will come primarily through upselling across Broadcom's base of around 3,000 large customers, between its virtualization (from VMware,) mainframe, DevOps, and security businesses. We see VMware as the firm's primary software growth driver. All in for software, we model 8% midcycle growth, with double-digit VMware growth partially offset by flatter growth from Broadcom's legacy software businesses. Software made up 29% of total sales in fiscal 2025, but we expect this to compress to the midteens by fiscal 2030 as a result of immense AI chip growth.

We believe Broadcom will continue to exert operating leverage and keep operating expenses below sales growth. Broadcom did a terrific job cutting expenses after acquiring VMware. We expect margins to now be driven largely by the rise in mix of the custom AI chip business, which is gross-margin-dilutive but operating-margin-accretive via volume leverage. We expect non-GAAP gross margins to compress to the low 70% range in fiscal 2030, from 79% (actual) in fiscal 2025. Nonetheless, we expect modest non-GAAP operating margin expansion over the same period, as Broadcom's concentrated customer base and high volumes in AI chips require low incremental sales investment. Non-GAAP operating margins hover around 66% in our model. Broadcom's preferred profitability metric, adjusted EBITDA, hovers around 67% over our forecast.

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Risk and Uncertainty William Kerwin, CFA, Senior Equity Analyst, 13 Oct 2025

We assign a High Morningstar Uncertainty Rating to Broadcom. As a chipmaker, Broadcom is vulnerable to market supply and demand cycles. Though it has been able to offset cyclicality in recent years with its software exposure and networking strength as a buoy, future cycles may not look similar. It also operates with a high reliance on TSMC for its chip supply, and supply constraints could hamper its ability to ship to customers. Nonetheless, we believe Broadcom is a preferred customer of TSMC and would earn high priority in such a scenario—both for its scale and lengthy relationship.

We see risk arising from customer concentration and AI: Broadcom is increasingly reliant on its AI accelerator business, which is made up of a handful of high-spending customers like Google. Changes in spending patterns from these customers and overall AI demand can create fluctuations in Broadcom's results and affect market sentiment on its stock. We also see medium-term displacement risk in Broadcom's wireless chip sales into Apple and expect Broadcom to lose its Wi-Fi and Bluetooth chip sales into iPhones and other products as early as 2025. Nevertheless, sales to Apple are a minority of sales compared with the larger networking chip segment.

We believe there is key-man risk with CEO Hock Tan, who is in his 70s. Tan has been integral to Broadcom's acquisition and operating strategy, and new management may fail to realize the impressive efficiencies of the current team. Even with Tan at the helm, Broadcom's reliance on acquisitions is risky. The firm is encountering greater regulatory pushback and seeing the size of targets inflate as the business grows. If Broadcom can't find sufficient targets, or overpays for a deal, it could destroy value.

On the environmental, social, and governance front, we see little risk for Broadcom, primarily resulting from hard-to-find engineering talent for wireless and networking chips.

Capital Allocation William Kerwin, CFA, Senior Equity Analyst, 12 Dec 2025

We give Broadcom an Exemplary Capital Allocation Rating based on our assessment of a sound balance sheet, appropriate shareholder distributions, and exceptional investments. In our view, Broadcom's investments are the biggest contributor to shareholder returns.

Broadcom's balance sheet is sound to us, with long-dated debt maturities and robust annual cash flow. Despite a larger debt load following the VMware acquisition, we already see the company as appropriately deleveraged and expect it to exit fiscal 2026 with a gross debt/adjusted EBITDA ratio below 1.0. We also see its shareholder distributions as appropriate. The firm targets 50% of prior-year free cash flow toward dividend payouts and often repurchases shares on top of that. Its shareholder payouts do not hamper its organic or inorganic investment, in our view.

We believe Broadcom's investments, both organic and inorganic, have created shareholder value and reinforced its competitive advantages. Broadcom uses inorganic growth as a key tenet of its strategy. CEO Hock Tan has been steering the ship since the days of stand-alone Avago and is a serial deal-

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maker. Recently, deals have been software-focused (Brocade, CA, Symantec, and VMware). We believe that up to this point, Broadcom has bought niche but moaty software businesses that have augmented its profit profile and overall moatiness. VMware was a departure from that trend as the dominant virtualization software provider but should still augment profits and maintain the moat, in our view. Tan and team's ability to trim expenses and augment target profitability—quickly—is key to our rating.

We don't see any lack of organic investment resulting from the firm's M&A record. In fact, this is the firm's best investment opportunity, in our view. Broadcom's $9 billion annual research and development budget helps it fortify its competitively advantaged existing businesses, in our view. The firm's prescient investments in developing compute capabilities with Google have set it up to be a material winner in AI chips and a meaningful rival to Nvidia. This business has come purely organically.

Analyst Notes Archive

Broadcom Earnings: Buckle Up, Torrid AI Growth Is Accelerating William Kerwin, CFA,Senior Equity Analyst,5 Sep 2025

Broadcom's July-quarter revenue rose 22% year over year to $16 billion, with $5.2 billion in artificial intelligence chip revenue rising 63% year over year. Management qualified a fourth custom AI chip customer, which it expects to drive an acceleration in AI revenue growth in fiscal 2026. Why it matters: AI short- and long-term guidance significantly exceeded our expectations. Management expects up to $10 billion in incremental orders in the second half of fiscal 2026 from the new XPU customer, implying a nearly doubling of total AI revenue next year. The $10 billion is wholly incremental to our prior forecast for 60% AI chip growth in fiscal 2026. Management indicated that the $10 billion in orders is just the beginning for its shipments to the new customer, which portends a rapid ramp-up to the level of other large customers, such as Google and Meta. We see potential for even further upside for Broadcom's XPU sales with three additional potential customers in talks with Broadcom. We surmise the new $10 billion customer might be OpenAI for an inference chip. We also believe Apple and Arm are part of Broadcom's custom AI chip pipeline. The bottom line: We raise our fair value estimate for wide-moat Broadcom to $325 per share, from $225, from a materially increased long-term AI chip growth forecast that includes a revenue ramp for the new XPU customer. Shares look fairly valued to us at our new valuation. Our forecast assumes an acceleration of growth in fiscal 2026, with tapering, but still substantial growth thereafter. Management hinted at another growth acceleration in fiscal 2027 that would imply significant further upside to our updated forecast and valuation. Shares rose a relatively modest 4% after hours, which implies to us that significant AI revenue upside was already baked in. The stock trades at all-time highs, which now appears justified to us, given the accelerating AI chip revenue opportunity.

Broadcom Earnings: Strong AI Guidance Eclipses Our Model and Drives Our Valuation Higher William Kerwin, CFA,Senior Equity Analyst,6 Jun 2025

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Broadcom's April-quarter revenue rose 20% year over year and 1% sequentially to $15.0 billion, while artificial intelligence chip revenue rose 46% year over year and 9% sequentially to $4.4 billion. July-quarter guidance includes close to 60% year-over-year AI chip revenue growth to $5.1 billion.Why it matters: AI continues to drive impressive growth for Broadcom. Guidance surpassed our estimates, and management implied close to 60% growth for AI chip sales in fiscal 2026. We now expect Broadcom to hit $50 billion in AI revenue in fiscal 2027, up from $12 billion in fiscal 2024. We liked hearing that Broadcom is now seeing inference demand on the horizon for its accelerator customers, which could provide further upside to the firm's fiscal 2027 training-centric targets. We also remain impressed with the growth of networking chips into AI alongside custom accelerators. VMware remains the firm's second-largest growth driver, rising more than 60% year over year by our estimates. This impressive growth since the acquisition reflects the successful upselling of customers to the VMware Cloud Foundation full-stack solution, in our view. The bottom line: We raise our fair value estimate for wide-moat Broadcom to $225 per share from $200, as we raise our medium-term AI chip revenue forecast. Shares dipped 5% in after-hours trading, in our view, reflecting optimism already priced into the stock and only a modest beat to consensus estimates. We now model Broadcom to hit the middle of its fiscal 2027 AI revenue target range, and growth has consistently beaten our model this year. There are upside and downside risks to this range, chiefly customer spending patterns and the potential onboarding of new custom accelerator customers. We continue to see shares as overvalued and implying Broadcom hitting the upper end of its fiscal 2027 target range. To us, this implies close to 75% AI chip growth in fiscal 2026 and 2027, compared with our own forecast for 60% growth.

Broadcom Earnings: Another AI Beat Brings Our Valuation Up, and Shares Look Fairly Valued William Kerwin, CFA,Senior Equity Analyst,7 Mar 2025

Broadcom's fiscal first quarter beat management guidance. Revenue rose 25% year over year and 6% sequentially to $14.9 billion, with artificial intelligence revenue rising roughly 15% sequentially to $4.1 billion. Guidance implies flat sequential revenue, with 7% sequential growth in AI revenue. Why it matters: AI chip sales and VMware continue to overwhelmingly drive Broadcom's results, and AI revenue and guidance once again surpassed our expectations. AI revenue is now more than a fourth of total revenue and roughly half of chip revenue. VMware is more than a fourth of revenue. Broadcom announced two new AI accelerator customers, on top of its five already at different stages of development. Management reiterated a $60 billion-$90 billion serviceable addressable market for its three first customers in 2027, of which we expect it to capture roughly 70% share. Broadcom's non-AI chip markets remain cyclically soft, and we have pushed out our rebound expectations. Still, these markets are a diminishing minority driver of results, and these cyclical downturns don't materially affect our valuation. The bottom line: We raise our fair value estimate for wide-moat Broadcom to $200 per share, from $190, behind a higher AI chip revenue forecast. We also raise our Morningstar Uncertainty Rating to High, stemming from the increasing concentration of AI as a driver of results.

Shares rose about 15% after hours, due to higher AI guidance and optimistic accelerator customer commentary. We now see shares as fairly valued. We are conservative on the midpoint of management's SAM, given uncertainty regarding the cadence of chip customer spending. We model toward the lower end of the SAM but have raised our forecast for 2027 AI revenue, now implying roughly 55% growth over the next three years.

AI DeepSeek Coverage Summary: Maintaining Our Fair Values; Pullback Was Healthy Eric Compton, CFA,Director,28 Jan 2025

We have consolidated our recent DeepSeek-related coverage in this note. Artificial intelligence affects companies across much of our coverage, including semiconductors, cloud infrastructure, software, utilities, and energy.Many of the firms under our coverage with an “AI premium” were already trading in 1- to 2-star territory. Our valuations were already positioned for a pullback of this nature, as we were having a hard time justifying the increases in revenue implied by these valuations. We view the current pullback as healthy, even as we remain positive on the long-term potential of AI. We have maintained our fair value estimates across the affected companies.Our thesis, after the release of DeepSeek, is that we were going to see instances of sleeker, more-efficient AI models that would not rely on massive clusters of AI GPUs and related hardware. This was the only way the ecosystem was going to successfully address large numbers of use cases in the long term. We believe that lower costs—making AI cheaper, therefore more economical—increase the number of use cases it is viable for, and as a result, should increase demand. This is the same path the PC revolution followed, with computing power becoming cheap enough that millions of individuals could use it at an affordable cost. The same happened with the cloud and SaaS revolution thereafter, where the incremental cost of adding users was close to zero. We believe a future where AI was both prohibitively expensive and also “taking over the world” was not likely. As such, we view the advancements made by DeepSeek as promising and healthy for the overall ecosystem.For more in-depth coverage on specific industries, please refer to our notes on Nvidia, the hyperscalers, semiconductor equipment companies, TSMC, Apple and networking, utilities, European utilities, HVAC, and industrials.

DeepSeek R1 Model Doesn't Alter Our Valuations or Forecasts for Technology Hardware Stocks William Kerwin, CFA,Senior Equity Analyst,27 Jan 2025

Many technology hardware stocks under our coverage plunged in Monday trading after reports of DeepSeek's R1 generative artificial intelligence model out of China offering performance parity to top US models at a much lower training cost. The iShares Semiconductor ETF was down 8% in midday trading.Why it matters: In our view, the market selloff implies fears of weaker future generative AI infrastructure investment resulting from cheaper models. We are less pessimistic and expect strong generative AI investment to continue. We've expected generative AI models to become slimmer and more efficient. We expect US model builders to develop more efficient models, but overall hardware spending will continue to rise, particularly with a serious competitive alternative out of China. In the longer term, we foresee a commoditization of AI models that shouldn't diminish investment in hardware infrastructure. Lower-cost models should accelerate the path to financial returns for model builders, but that they will continue to invest heavily in hardware to support them.The bottom line: We maintain our fair value estimates and moat ratings for our technology hardware coverage, including Apple, Broadcom, Marvell Technology, Arista Networks, and Micron Technology. The DeepSeek news and market selloff don't alter our long-term forecasts today. We don't expect a cut to infrastructure investment in the short term and believe US and European model builders will continue to invest heavily in developing larger and higher-performing models. Demand still exceeds chip supply, and we don't expect that to change due to the DeepSeek news. We believe the selloff largely reflects more uncertainty being priced into AI-exposed stocks, which we believe to be reasonable. We believe AI investment will continue to rise rapidly, but that more bullish forecasts might have underestimated efficiency gains in new models.

Broadcom Earnings: We Raise Our Valuation to $190 on a Higher Medium-Term AI Revenue Forecast

William Kerwin, CFA,Senior Equity Analyst,13 Dec 2024

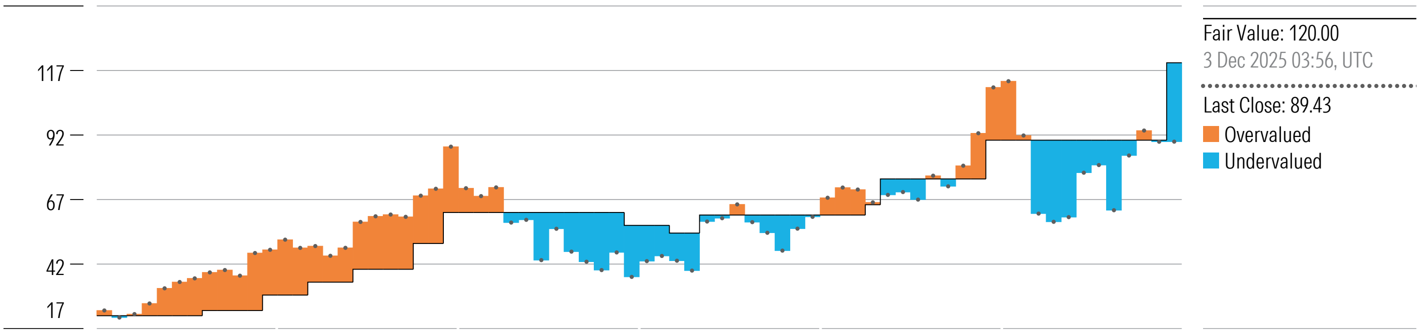
Broadcom reported October-quarter revenue of $14.1 billion, rising 8% sequentially. Longer-term, management also estimated its serviceable addressable market, or SAM, for artificial intelligence chips at its three largest customers to be between $60 billion and $90 billion in fiscal 2027.The bottom line: We raise our fair value estimate for wide-moat Broadcom to $190 per share, from $155, as we raise our AI revenue growth forecast for the firm. We now see shares as roughly fairly valued after a 15% jump after hours in response to strong results and guidance. We now forecast nearly 40% annual revenue growth for Broadcom's AI chips through fiscal 2029, inclusive of more than 50% annual growth through fiscal 2027. This puts us on the conservative end of management's SAM. We model $44.2 billion in AI chip revenue in fiscal 2027. To buy Broadcom shares today, we believe investors have to believe in the midpoint or upper end of management's SAM and expect Broadcom to retain a 70% share of this opportunity.Why it matters: Broadcom's SAM estimate for fiscal 2027 implies significantly higher AI revenue growth over the next three years than we expected, at a roughly 62% annual rate from fiscal 2024. We believe Broadcom has a path to a majority share of this future SAM. Management estimates its fiscal 2024 SAM to be between $15 billion and $20 billion, which implies Broadcom holding a roughly 70% share with $12.2 billion in fiscal 2024 AI chip revenue. We see potential upside to management's SAM, given Broadcom has just begun working with two more custom AI accelerator customers (who we believe to be Apple and OpenAI) and sells its merchant networking chips for AI to a wider customer base. Big picture: Broadcom's impressive outlook for AI revenue adheres to our long-term thesis that the firm possesses differentiated chip design capabilities for high-performance networking and computing that allow it to capitalize on significant cloud investment and take market share.

Morningstar Equity Analyst Report | Report as of 12 Dec 2025 03:31, UTC | Reporting Currency: USD | Trading Currency: USD | Exchange: NASDAQ - ALL MARKETS

Broadcom Inc AVGO ★★★★ 12 Dec 2025 03:25, UTC

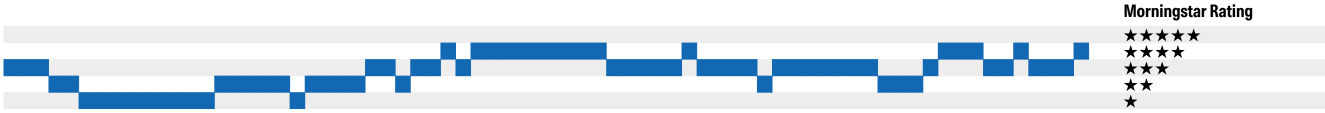
Competitors Price vs. Fair Value

Marvell Technology Inc MRVL



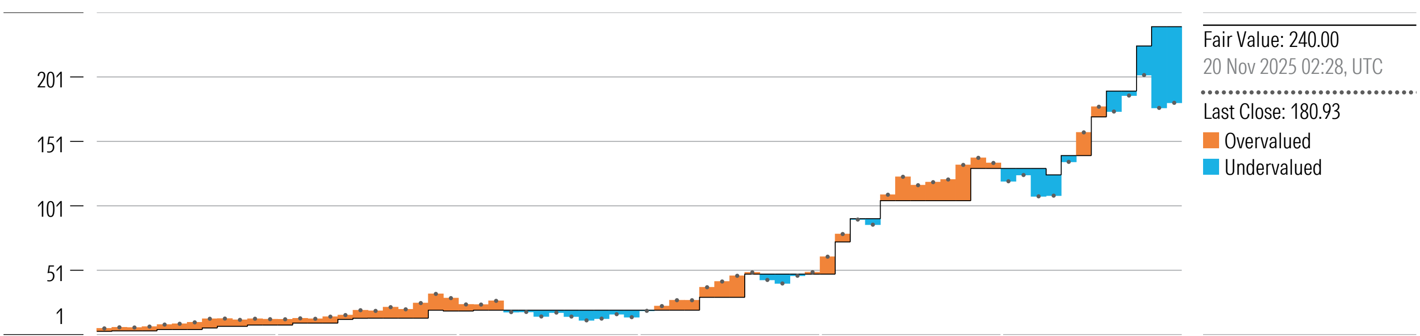
2020	2021	2022	2023	2024	YTD	
1.58	1.41	0.65	0.99	1.23	0.75	Price/Fair Value
79.89	84.41	-57.39	63.47	83.54	-18.81	Total Return %

Morningstar Rating



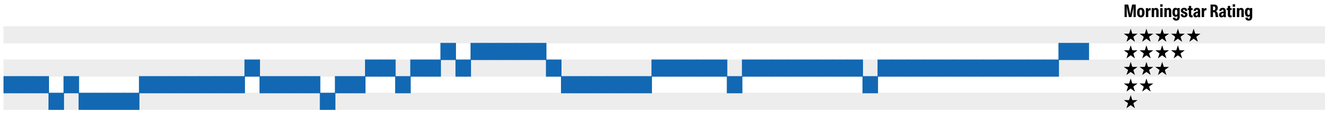
Total Return % as of 11 Dec 2025. Last Close as of 11 Dec 2025. Fair Value as of 3 Dec 2025 03:56, UTC.

NVIDIA Corp NVDA



2020	2021	2022	2023	2024	YTD	
1.54	1.52	0.73	1.03	1.03	0.75	Price/Fair Value
122.20	125.41	-50.26	238.98	171.24	34.76	Total Return %

Morningstar Rating



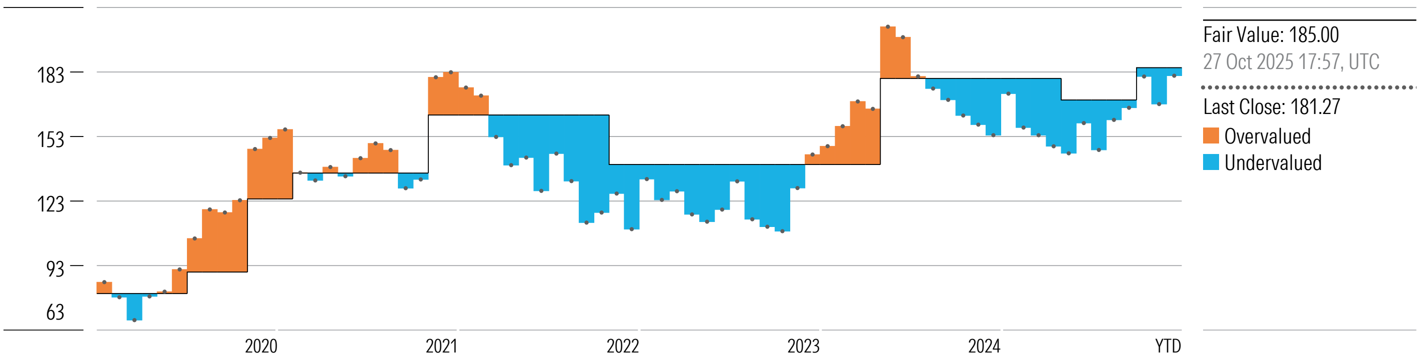
Total Return % as of 11 Dec 2025. Last Close as of 11 Dec 2025. Fair Value as of 20 Nov 2025 02:28, UTC.

Morningstar Equity Analyst Report | Report as of 12 Dec 2025 03:31, UTC | Reporting Currency: USD | Trading Currency: USD | Exchange: NASDAQ - ALL MARKETS Page 13 of 23

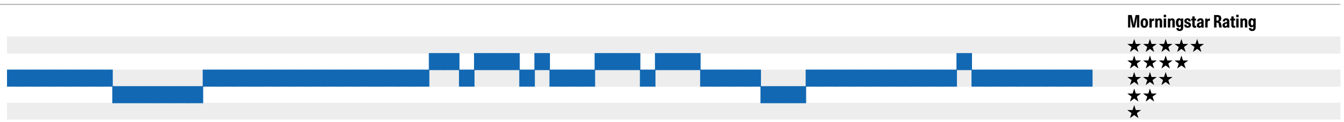
Broadcom Inc AVGO ★★★★ 12 Dec 2025 03:25, UTC

Competitors Price vs. Fair Value

Qualcomm Inc QCOM



	2020	2021	2022	2023	2024	YTD
Price/Fair Value	1.23	1.12	0.79	1.03	0.85	0.98
Total Return %	75.58	21.81	-38.28	34.42	8.53	20.29



Total Return % as of 11 Dec 2025. Last Close as of 11 Dec 2025. Fair Value as of 27 Oct 2025 17:57, UTC.

Morningstar Equity Analyst Report | Report as of 12 Dec 2025 03:31, UTC | Reporting Currency: USD | Trading Currency: USD | Exchange: NASDAQ - ALL MARKETS

Broadcom Inc AVGO ★★★★ 12 Dec 2025 03:25, UTC

Last Price	Fair Value Estimate	Price/FVE	Market Cap	Economic Moat™	Equity Style Box	Uncertainty	Capital Allocation	ESG Risk Rating Assessment[1]
406.37 USD 11 Dec 2025	480.00 USD 12 Dec 2025 03:21, UTC	0.85	1.92 USD Tril 11 Dec 2025	Wide	Large Growth	High	Exemplary	3 Dec 2025 06:00, UTC

Morningstar Valuation Model Summary

Financials as of 11 Dec 2025	Actual			Forecast				
Fiscal Year, ends 31 Oct	2023	2024	2025	2026	2027	2028	2029	2030
Revenue (USD Mil)	35,819	51,574	63,887	101,241	142,996	187,935	216,756	250,548
Operating Income (USD Mil)	16,451	14,996	26,075	48,619	73,844	101,825	118,393	139,193
EBITDA (USD Mil)	20,042	23,473	34,259	56,628	81,189	108,498	124,429	144,645
Adjusted EBITDA (USD Mil)	23,213	31,897	43,004	67,693	95,700	126,260	145,357	168,295
Net Income (USD Mil)	14,082	5,895	23,126	37,380	58,116	72,182	86,110	103,460
Adjusted Net Income (USD Mil)	18,040	23,251	33,114	52,227	74,828	90,191	105,869	124,755
Free Cash Flow To The Firm (USD Mil)	17,306	2,643	29,760	43,148	41,764	83,628	58,668	114,432
Weighted Average Diluted Shares Outstanding (Mil)	4,270	4,778	4,853	4,876	4,843	4,796	4,741	4,680
Earnings Per Share (Diluted) (USD)	3.30	1.23	4.77	7.67	12.00	15.05	18.16	22.11
Adjusted Earnings Per Share (Diluted) (USD)	4.22	4.87	6.82	10.71	15.45	18.80	22.33	26.66
Dividends Per Share (USD)	1.84	2.10	2.36	2.60	2.60	3.40	4.00	4.60

Margins & Returns as of 11 Dec 2025		Actual			Forecast					
	3 Year Avg	2023	2024	2025	2026	2027	2028	2029	2030	5 Year Avg
Operating Margin %	37.1	45.9	29.1	40.8	48.0	51.6	54.2	54.6	55.6	52.7
EBITDA Margin %	51.7	56.0	45.5	53.6	55.9	56.8	57.7	57.4	57.7	57.1
Adjusted EBITDA Margin %	—	64.8	61.9	67.3	66.9	66.9	67.2	67.1	67.2	67.0
Net Margin %	29.0	39.3	11.4	36.2	36.9	40.6	38.4	39.7	41.3	39.4
Adjusted Net Margin %	49.1	50.4	45.1	51.8	51.6	52.3	48.0	48.8	49.8	50.1
Free Cash Flow To The Firm Margin %	33.3	48.3	5.1	46.6	42.6	29.2	44.5	27.1	45.7	37.8

Growth & Ratios as of 11 Dec 2025		Actual			Forecast					
	3 Year CAGR	2023	2024	2025	2026	2027	2028	2029	2030	5 Year CAGR
Revenue Growth %	24.4	7.9	44.0	23.9	58.5	41.2	31.4	15.3	15.6	31.4
Operating Income Growth %	22.2	15.2	-8.8	73.9	86.5	51.9	37.9	16.3	17.6	39.8
EBITDA Growth %	17.8	4.3	17.1	46.0	65.3	43.4	33.6	14.7	16.3	40.6
Adjusted EBITDA Growth %	26.9	10.4	37.4	34.8	57.4	41.4	31.9	15.1	15.8	31.4
Earnings Per Share Growth %	21.6	24.3	-62.6	286.2	60.9	56.5	25.4	20.7	21.7	35.9
Adjusted Earnings Per Share Growth %	21.6	12.2	15.2	40.2	57.0	44.3	21.7	18.8	—	35.9

Valuation as of 11 Dec 2025	Actual			Forecast				
	2023	2024	2025	2026	2027	2028	2029	2030
Price/Earning	40.2	75.9	59.6	37.9	26.3	21.6	18.2	—
Price/Sales	9.7	15.4	30.0	19.0	13.4	10.2	8.9	—
Price/Book	30.2	26.1	24.3	21.4	17.0	14.0	11.5	—
Price/Cash Flow	—	—	—	—	—	—	—	—
EV/EBITDA	16.2	26.7	45.8	29.1	20.6	15.6	13.5	—
EV/EBIT	22.8	56.9	754.7	40.5	26.7	19.3	16.6	—
Dividend Yield %	1.1	0.6	0.6	0.6	0.6	0.8	1.0	—
Dividend Payout %	43.6	43.2	34.6	24.3	16.8	18.1	17.9	17.3
Free Cash Flow Yield %	—	—	—	—	—	—	—	—

Operating Performance / Profitability as of 11 Dec 2025	Actual			Forecast				
Fiscal Year, ends 31 Oct	2023	2024	2025	2026	2027	2028	2029	2030
ROA %	15.3	19.3	3.6	13.5	20.1	27.6	30.7	32.5
ROE %	49.4	58.7	8.7	28.4	40.4	50.3	51.7	51.2
ROIC %	18.5	22.7	18.3	19.3	30.9	40.7	49.4	50.4

Morningstar Equity Analyst Report | Report as of 12 Dec 2025 03:31, UTC | Reporting Currency: USD | Trading Currency: USD | Exchange: NASDAQ - ALL MARKETS Page 15 of 23

Broadcom Inc AVGO ★★★★ 12 Dec 2025 03:25, UTC

Last Price	Fair Value Estimate	Price/FVE	Market Cap	Economic Moat™	Equity Style Box	Uncertainty	Capital Allocation	ESG Risk Rating Assessment[1]
406.37 USD 11 Dec 2025	480.00 USD 12 Dec 2025 03:21, UTC	0.85	1.92 USD Tril 11 Dec 2025	Wide	Large Growth	High	Exemplary	3 Dec 2025 06:00, UTC

Financial Leverage (Reporting Currency)	Actual			Forecast				
Fiscal Year, ends 31 Oct	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**
Debt/Capital %	10.2	7.9	2.7	2.4	2.0	1.7	1.4	1.2
Assets/Equity	3.0	2.4	2.1	2.0	1.8	1.7	1.6	1.5
Net Debt/EBITDA	1.2	2.5	1.4	0.5	0.3	-0.1	0.0	-0.3
Total Debt/EBITDA	1.7	2.1	1.5	0.9	0.6	0.4	0.3	0.2
EBITDA/ Net Interest Expense	20.9	9.0	15.6	21.8	29.9	8.9	10.5	12.4

Forecast Revisions as of 11 Dec 2025	2026		2027		2028	
Prior data as of 13 Oct 2025	**Current**	**Prior**	**Current**	**Prior**	**Current**	**Prior**
Fair Value Estimate Change (Trading Currency)	480.00	365.07	—	—	—	—
Revenue (USD Mil)	101,241	86,940	142,996	125,767	187,935	163,191
Operating Income (USD Mil)	48,619	38,626	73,844	60,842	101,825	83,244
EBITDA (USD Mil)	67,693	57,650	95,700	83,094	126,260	108,449
Net Income (USD Mil)	52,227	45,261	74,828	67,219	90,191	88,685
Earnings Per Share (Diluted) (USD)	7.67	6.33	12.00	10.59	15.05	14.90
Adjusted Earnings Per Share (Diluted) (USD)	10.71	9.45	15.45	14.15	18.80	18.86
Dividends Per Share (USD)	2.60	2.36	2.60	3.36	3.40	4.56

Key Valuation Drivers as of 11 Dec 2025	
Cost of Equity %	9.0
Pre-Tax Cost of Debt %	5.8
Weighted Average Cost of Capital %	8.9
Long-Run Tax Rate %	17.5
Stage II EBI Growth Rate %	10.0
Stage II Investment Rate %	20.0
Perpetuity Year	20

Additional estimates and scenarios available for download at https://pitchbook.com/.

Discounted Cash Flow Valuation as of 11 Dec 2025	**USD Mil**
Present Value Stage I	242,685
Present Value Stage II	1,006,071
Present Value Stage III	1,113,696
Total Firm Value	**2,362,452**
Cash and Equivalents	16,178
Debt	65,136
Other Adjustments	0
Equity Value	**2,313,494**
Projected Diluted Shares	4,863
Fair Value per Share (USD)	**480.00**

Morningstar Equity Analyst Report | Report as of 12 Dec 2025 03:31, UTC | Reporting Currency: USD | Trading Currency: USD | Exchange: NASDAQ - ALL MARKETS Page 16 of 23

Broadcom Inc AVGO ★★★★ 12 Dec 2025 03:25, UTC

Last Price	Fair Value Estimate	Price/FVE	Market Cap	Economic Moat™	Equity Style Box	Uncertainty	Capital Allocation	ESG Risk Rating Assessment[1]
406.37 USD 11 Dec 2025	480.00 USD 12 Dec 2025 03:21, UTC	0.85	1.92 USD Tril 11 Dec 2025	Wide	Large Growth	High	Exemplary	3 Dec 2025 06:00, UTC

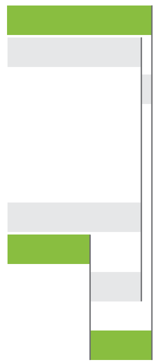
ESG Risk Rating Breakdown

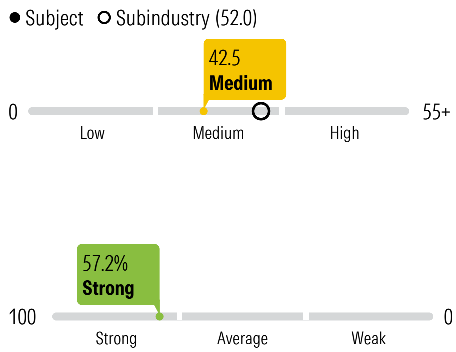
Exposure

Company Exposure[1]	42.5
– Manageable Risk	39.4
Unmanageable Risk[2]	**3.1**

Management

Manageable Risk	39.4
– Managed Risk[3]	22.5
Management Gap[4]	**16.8**
Overall Unmanaged Risk	**20.0**





- Exposure represents a company's vulnerability to ESG risks driven by their business model
- Exposure is assessed at the Subindustry level and then specified at the company level
- Scoring ranges from 0-55+ with categories of low, medium, and high-risk exposure

- Management measures a company's ability to manage ESG risks through its commitments and actions
- Management assesses a company's efficiency on ESG programs, practices, and policies
- Management score ranges from 0-100% showing how much manageable risk a company is managing

ESG Risk Rating

ESG Risk Ratings measure the degree to which a company's value is impacted by environmental, social, and governance risks, by evaluating the company's ability to manage the ESG risks it faces.

1. A company's Exposure to material ESG issues 2. Unmanageable Risk refers to risks that are inherent to a particular business model that cannot be managed by programs or initiatives 3. Managed Risk = Manageable Risk multiplied by a Management score of 57.2% 4. Management Gap assesses risks that are not managed, but are considered manageable 5. ESG Risk Rating Assessment = Overall Unmanaged Risk = Management Gap plus Unmanageable Risk

ESG Risk Rating Assessment[5]

ESG Risk Rating is of Dec 03, 2025. Highest Controversy Level is as of Dec 08, 2025. Sustainalytics Subindustry: Semiconductor Design and Manufacturing. Sustainalytics provides Morningstar with company ESG ratings and metrics on a monthly basis and as such, the ratings in Morningstar may not necessarily reflect current Sustainalytics' scores for the company. For the most up to date rating and more information, please visit: sustainalytics.com/esg-ratings/.

Peer Analysis 03 Dec 2025

Peers are selected from the company's Sustainalytics-defined Subindustry and are displayed based on the closest market cap values

Company Name	Exposure		Management		ESG Risk Rating	
Broadcom Inc	42.5 | Medium	0 – 55+	57.2 | Strong	100 – 0	20.0 | Low	0 – 40+
Marvell Technology Inc	31.7 | Low	0 – 55+	60.2 | Strong	100 – 0	13.9 | Low	0 – 40+
Qualcomm Inc	43.8 | Medium	0 – 55+	68.7 | Strong	100 – 0	16.0 | Low	0 – 40+
NVIDIA Corp	30.2 | Low	0 – 55+	62.9 | Strong	100 – 0	12.4 | Low	0 – 40+
All Winner Technology Co Ltd	48.0 | Medium	0 – 55+	12.6 | Weak	100 – 0	42.5 | Severe	0 – 40+

Morningstar Equity Analyst Report | Report as of 12 Dec 2025 03:31, UTC | Reporting Currency: USD | Trading Currency: USD | Exchange: NASDAQ - ALL MARKETS

Appendix

Historical Morningstar Rating

Broadcom Inc AVGO 12 Dec 2025 03:23, UTC

Dec 2025	Nov 2025	Oct 2025	Sep 2025	Aug 2025	Jul 2025	Jun 2025	May 2025	Apr 2025	Mar 2025	Feb 2025	Jan 2025
★★★★	★★★	★★★	★★★	★★	★★	★★	★★	★★★	★★★	★★★	★★
Dec 2024	Nov 2024	Oct 2024	Sep 2024	Aug 2024	Jul 2024	Jun 2024	May 2024	Apr 2024	Mar 2024	Feb 2024	Jan 2024
★★	★★★	★★	★★	★★★	★★★	★★★	★★	★★	★★	★★	★★
Dec 2023	Nov 2023	Oct 2023	Sep 2023	Aug 2023	Jul 2023	Jun 2023	May 2023	Apr 2023	Mar 2023	Feb 2023	Jan 2023
★★	★★	★★★	★★★	★★	★★	★★	★★	★★★	★★★	★★★	★★★
Dec 2022	Nov 2022	Oct 2022	Sep 2022	Aug 2022	Jul 2022	Jun 2022	May 2022	Apr 2022	Mar 2022	Feb 2022	Jan 2022
★★★★	★★★★	★★★★	★★★★	★★★★	★★★★	★★★★	★★★	★★★	★★	★★	★★
Dec 2021	Nov 2021	Oct 2021	Sep 2021	Aug 2021	Jul 2021	Jun 2021	May 2021	Apr 2021	Mar 2021	Feb 2021	Jan 2021
★★	★	★★	★★	★★	★★	★★	★★	★★	★★	★★	★★
Dec 2020	Nov 2020	Oct 2020	Sep 2020	Aug 2020	Jul 2020	Jun 2020	May 2020	Apr 2020	Mar 2020	Feb 2020	Jan 2020
★★	★★	★★	★★	★★★	★★★	★★★	★★★	★★★★	★★★★	★★★	★★★

Marvell Technology Inc MRVL 11 Dec 2025 22:48, UTC

Dec 2025	Nov 2025	Oct 2025	Sep 2025	Aug 2025	Jul 2025	Jun 2025	May 2025	Apr 2025	Mar 2025	Feb 2025	Jan 2025
★★★★	★★★	★★★	★★★	★★★★	★★★	★★★	★★★★	★★★★	★★★★	★★★	★★
Dec 2024	Nov 2024	Oct 2024	Sep 2024	Aug 2024	Jul 2024	Jun 2024	May 2024	Apr 2024	Mar 2024	Feb 2024	Jan 2024
★★	★★	★★★	★★★	★★★	★★★	★★★	★★★	★★★	★★	★★★	★★★
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Dec 2025	Nov 2025	Oct 2025	Sep 2025	Aug 2025	Jul 2025	Jun 2025	May 2025	Apr 2025	Mar 2025	Feb 2025	Jan 2025
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Research Methodology for Valuing Companies

Overview

At the heart of our valuation system is a detailed projection of a company's future cash flows, resulting from our analysts' research. Analysts create custom industry and company assumptions to feed income statement, balance sheet, and capital investment assumptions into our globally standardized, proprietary discounted cash flow, or DCF, modeling templates. We use scenario analysis, indepth competitive advantage analysis, and a variety of other analytical tools to augment this process. Moreover, we think analyzing valuation through discounted cash flows presents a better lens for viewing cyclical companies, high-growth firms, businesses with finite lives (e.g., mines), or companies expected to generate negative earnings over the next few years. That said, we don't dismiss multiples altogether but rather use them as supporting cross-checks for our DCF-based fair value estimates. We also acknowledge that DCF models offer their own challenges (including a potential proliferation of estimated inputs and the possibility that the method may miss shortterm market-price movements), but we believe these negatives are mitigated by deep analysis and our longterm approach.

Morningstar's equity research group ("we," "our") believes that a company's intrinsic worth results from the future cash flows it can generate. The Morningstar Rating for stocks identifies stocks trading at a discount or premium to their intrinsic worth—or fair value estimate, in Morningstar terminology. Five-star stocks sell for the biggest risk adjusted discount to their fair values, whereas 1-star stocks trade at premiums to their intrinsic worth.

Four key components drive the Morningstar rating: (1) our assessment of the firm's economic moat, (2) our estimate of the stock's fair value, (3) our uncertainty around that fair value estimate and (4) the current market price. This process ultimately culminates in our singlepoint star rating.

1. Economic Moat

The concept of an economic moat plays a vital role not only in our qualitative assessment of a firm's long-term investment potential, but also in the actual calculation of our fair value estimates. An economic moat is a structural feature that allows a firm to sustain excess profits over a long period of time. We define economic profits as returns on invested capital (or ROIC) over and above our estimate of a firm's cost of capital, or weighted average cost of capital (or WACC). Without a moat, profits are more susceptible to competition. We have identified five sources of economic moats: intangible assets, switching costs, network effect, cost advantage, and efficient scale.

Companies with a narrow moat are those we believe are more likely than not to achieve normalized excess returns for at least the next 10 years. Wide-moat companies are those in which we have very high confidence that excess returns will remain for 10 years, with excess returns more likely than not to remain for at least 20 years. The longer a firm generates economic profits, the higher its intrinsic value. We believe low-quality, no-moat companies will see their normalized returns gravitate toward the firm's cost of capital more quickly than companies with moats.

When considering a company's moat, we also assess whether there is a substantial threat of value destruction, stemming from risks related to ESG, industry disruption, financial health, or other idiosyncratic issues. In this context, a risk is considered potentially value destructive if its occurrence would eliminate a firm's economic profit on a cumulative or midcycle basis. If we deem the probability of occurrence sufficiently high, we would not characterize the company as possessing an economic moat.

2. Estimated Fair Value

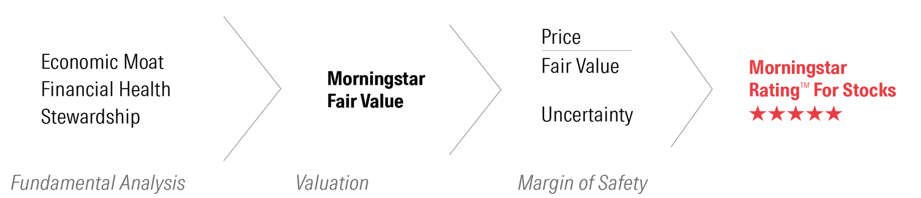
Combining our analysts' financial forecasts with the firm's economic moat helps us assess how long returns on invested capital are likely to exceed the firm's cost of capital. Returns of firms with a wide economic moat rating are assumed to fade to the perpetuity period over a longer period of time than the returns of narrow-moat firms, and both will fade slower than no-moat firms, increasing our estimate of their intrinsic value.

Our model is divided into three distinct stages:

Stage I: Explicit Forecast

In this stage, which can last five to 10 years, analysts make full financial statement forecasts, including items such as revenue, profit margins, tax rates, changes in workingcapital accounts, and capital spending. Based on these projections, we calculate earnings before interest, after taxes (EBI) and the net new investment (NNI) to derive our annual free cash flow forecast.

Morningstar Equity Research Star Rating Methodology



Stage II: Fade

The second stage of our model is the period it will take the company's return on new invested capital—the return on capital of the next dollar invested ("RONIC")—to decline (or rise) to its cost of capital. During the Stage II period, we use a formula to approximate cash flows in lieu of explicitly modeling the income statement, balance sheet, and cash flow statement as we do in Stage I. The length of the second stage depends on the strength of the company's economic moat. We forecast this period to last anywhere from one year (for companies with no economic moat) to 10–15 years or more (for wide-moat companies). During this period, cash flows are forecast using four assumptions: an average growth rate for EBI over the period, a normalized investment rate, average return on new invested capital (RONIC), and the number of years until perpetuity, when excess returns cease. The investment rate and return on new invested capital decline until a perpetuity value is calculated. In the case of firms that do not earn their cost of capital, we assume marginal ROICs rise to the firm's cost of capital (usually attributable to less reinvestment), and we may truncate the second stage.

Stage III: Perpetuity

Once a company's marginal ROIC hits its cost of capital, we calculate a continuing value, using a standard perpetuity formula. At perpetuity, we assume that any growth or decline or investment in the business neither creates nor destroys value and that any new investment provides a return in line with estimated WACC.

Because a dollar earned today is worth more than a dollar earned tomorrow, we discount our projections of cash flows in stages I, II, and III to arrive at a total present value of expected future cash flows. Because we are modeling free cash flow to the firm—representing cash available to provide a return to all capital providers—we discount future cash flows using the WACC, which is a weighted average of the costs of equity, debt, and preferred stock (and any other funding sources), using expected future proportionate long-term, market-value weights.

3. Uncertainty Around That Fair Value Estimate

Morningstar's Uncertainty Rating is designed to capture the range of potential outcomes for a company's intrinsic value. This rating is used to assign the margin of safety required before investing, which in turn explicitly drives our stock star rating system. The Uncertainty Rating is aimed at identifying the confidence we should have in assigning a fair value estimate for a given stock.

Our Uncertainty Rating is meant to take into account anything that can increase the potential dispersion of future

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Research Methodology for Valuing Companies

outcomes for the intrinsic value of a company, and anything that can affect our ability to accurately predict these outcomes. The rating begins with a suggested rating produced by a quantitative process based on the trailing 12-month standard deviation of daily stock returns. An analyst overlay is then applied, with analysts using the suggested rating, historical rating data, and their own knowledge of the company to inform them as they make the final Uncertainty Rating decision. Ultimately, the rating decision rests with the analyst. Analysts take into account many characteristics when making their final decision, including cyclical factors, operational and financial factors such as leverage, company-specific events, ESG risks, and anything else that might increase the potential dispersion of future outcomes and our ability to estimate those outcomes.

Our recommended margin of safety—the discount to fair value demanded before we'd recommend buying or selling the stock—widens as our uncertainty of the estimated value of the equity increases. The more uncertain we are about the potential dispersion of outcomes, the greater the discount we require relative to our estimate of the value of the firm before we would recommend the purchase of the shares. In addition, the Uncertainty Rating provides guidance in portfolio construction based on risk tolerance.

Our Uncertainty Ratings are: Low, Medium, High, Very High, and Extreme.

	Margin of Safety	
Qualitative Analysis Uncertainty Ratings	★★★★★Rating	★Rating
Low	20% Discount	25% Premium
Medium	30% Discount	35% Premium
High	40% Discount	55% Premium
Very High	50% Discount	75% Premium
Extreme	75% Discount	300% Premium

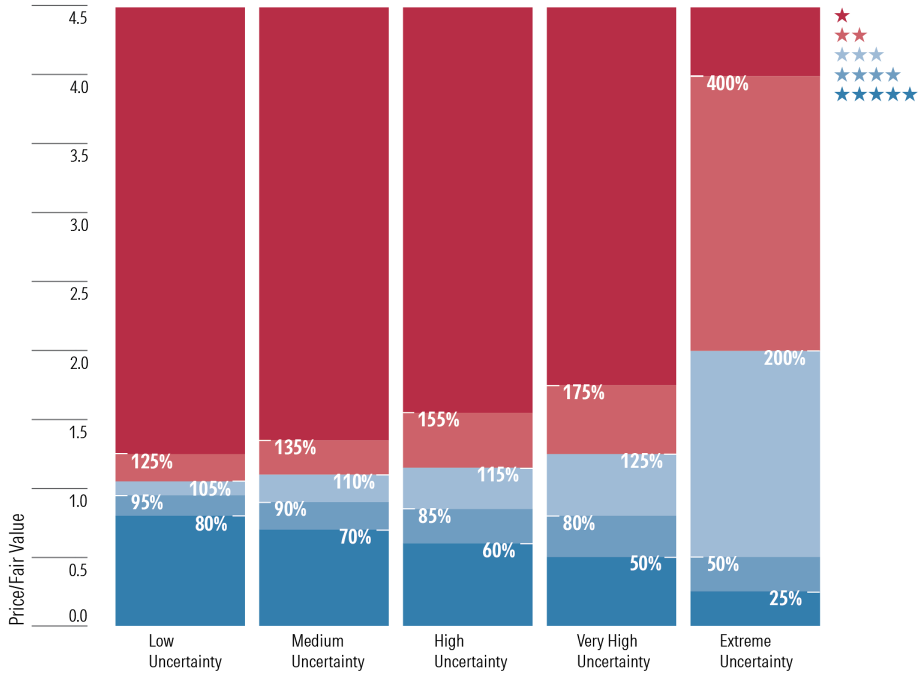
Our uncertainty rating is based on the interquartile range, or the middle 50% of potential outcomes, covering the 25th percentile–75th percentile. This means that when a stock hits 5 stars, we expect there is a 75% chance that the intrinsic value of that stock lies above the current market price. Similarly, when a stock hits 1 star, we expect there is a 75% chance that the intrinsic value of that stock lies below the current market price.

4. Market Price

The market prices used in this analysis and noted in the report come from exchange on which the stock is listed which we believe is a reliable source.

For more details about our methodology, please go to https://shareholders.morningstar.com

Morningstar Equity Research Star Rating Methodology



Morningstar Star Rating for Stocks

Once we determine the fair value estimate of a stock, we compare it with the stock's current market price on a daily basis, and the star rating is automatically re-calculated at the market close on every day the market on which the stock is listed is open. Our analysts keep close tabs on the companies they follow, and, based on thorough and ongoing analysis, raise or lower their fair value estimates as warranted.

Please note, there is no predefined distribution of stars. That is, the percentage of stocks that earn 5 stars can fluctuate daily, so the star ratings, in the aggregate, can serve as a gauge of the broader market's valuation. When there are many 5-star stocks, the stock market as a whole is more undervalued, in our opinion, than when very few companies garner our highest rating.

We expect that if our base-case assumptions are true the market price will converge on our fair value estimate over time generally within three years (although it is impossible to predict the exact time frame in which market prices may adjust).

Our star ratings are guideposts to a broad audience and individuals must consider their own specific investment goals, risk tolerance, tax situation, time horizon, income needs, and complete investment portfolio, among other factors.

The Morningstar Star Ratings for stocks are defined below:

★★★★★ We believe appreciation beyond a fair risk adjusted return is highly likely over a multiyear time frame. Scenario analysis developed by our analysts indicates that the current market price represents an excessively pessimistic outlook, limiting downside risk and maximizing upside potential.

★★★★ We believe appreciation beyond a fair risk-adjusted return is likely.

★★★ Indicates our belief that investors are likely to receive a fair risk-adjusted return (approximately cost of equity).

★★ We believe investors are likely to receive a less than fair risk-adjusted return.

★ Indicates a high probability of undesirable risk-adjusted returns from the current market price over a multiyear time frame, based on our analysis. Scenario analysis by our analysts indicates that the market is pricing in an excessively optimistic outlook, limiting upside potential and leaving the investor exposed to Capital loss.

Other Definitions

Last Price: Price of the stock as of the close of the market of the last trading day before date of the report.

Capital Allocation Rating: Our Capital Allocation (or Stewardship) Rating represents our assessment of the quality of management's capital allocation, with particular emphasis on the firm's balance sheet, investments,

Research Methodology for Valuing Companies

and shareholder distributions. Analysts consider companies' investment strategy and valuation, balance sheet management, and dividend and share buyback policies. Corporate governance factors are only considered if they are likely to materially impact shareholder value, though either the balance sheet, investment, or shareholder distributions. Analysts assign one of three ratings: "Exemplary", "Standard", or "Poor". Analysts judge Capital Allocation from an equity holder's perspective. Ratings are determined on a forward looking and absolute basis. The Standard rating is most common as most managers will exhibit neither exceptionally strong nor poor capital allocation.

Capital Allocation (or Stewardship) analysis published prior to Dec. 9, 2020, was determined using a different process. Beyond investment strategy, financial leverage, and dividend and share buyback policies, analysts also considered execution, compensation, related party transactions, and accounting practices in the rating.

Capital Allocation Rating: Our Capital Allocation (or Stewardship) Rating represents our assessment of the quality of management's capital allocation, with particular emphasis on the firm's balance sheet, investments, and shareholder distributions. Analysts consider companies' investment strategy and valuation, balance sheet management, and dividend and share buyback policies. Corporate governance factors are only considered if they are likely to materially impact shareholder value, though either the balance sheet, investment, or shareholder distributions. Analysts assign one of three ratings: "Exemplary", "Standard", or "Poor". Analysts judge Capital Allocation from an equity holder's perspective. Ratings are determined on a forward looking and absolute basis. The Standard rating is most common as most managers will exhibit neither exceptionally strong nor poor capital allocation.

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Sustainalytics ESG Risk Rating Assessment: The ESG Risk Rating Assessment is provided by Sustainalytics; a Morningstar company.

Sustainalytics' ESG Risk Ratings measure the degree to which company's economic value at risk is driven by environment, social and governance (ESG) factors.

Sustainalytics analyzes over 1,300 data points to assess a company's exposure to and management of ESG risks. In other words, ESG Risk Ratings measures a company's unmanaged ESG Risks represented as a quantitative score. Unmanaged Risk is measured on an open-ended scale starting at zero (no risk) with lower scores representing less unmanaged risk and, for 95% of cases, the unmanaged ESG Risk score is below 50.

Based on their quantitative scores, companies are grouped into one of five Risk Categories (negligible, low, medium, high, severe). These risk categories are absolute, meaning that a 'high risk' assessment reflects a comparable degree of unmanaged ESG risk across all subindustries covered.

The ESG Risk Rating Assessment is a visual representation of Sustainalytics ESG Risk Categories on a 1 to 5 scale. Companies with Negligible Risk = 5 Globes, Low Risk = 4, Medium Risk = 3 Globes, High Risk = 2 Globes, Severe Risk = 1 Globe. For more information, please visit sustainalytics.com/esg-ratings/

Ratings should not be used as the sole basis in evaluating a company or security. Ratings involve unknown risks and uncertainties which may cause our expectations not to occur or to differ significantly from what was expected and should not be considered an offer or solicitation to buy or sell a security.

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