

Monolithic Power Systems Inc

MPWR: XNAS (USA)

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Morningstar Rating for Stocks	Fair Value	Economic Moat	Capital Allocation
★★★★★	\$700.00	Wide	Standard

Monolithic Power Offers Highly Differentiated Power Management Chips and a Wide Moat



William Kerwin •
Aug 2, 2024

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Stock Analyst Note



Monolithic Power Earnings: We See AI Deceleration as Short-Term, and We Maintain Our \$700 Valuation

William Kerwin •
Oct 31, 2024

Business Strategy and Outlook

We think Monolithic Power Systems is a disruptor in the power management chip market, using its proprietary process technology to differentiate from larger competitors. In our view, electrical engineers tend to buy power management semiconductors from reputable, proven vendors that use lagging-edge manufacturing. As a relative newcomer, MPS differentiates via its unique fabless model, with which it develops advanced manufacturing processes that integrate many functions on a single chip to offer a smaller form factor and greater energy efficiency to its customers. While MPS remains a small player in power management, we think revenue growth far above its largest competitors shows its differentiated approach to power management is gaining traction in the market.

We think MPS has intangible assets from its innovative chip designs and advancements in manufacturing that carve out a wide economic moat, in our view. We think analog incumbents are likely to continue serving a wide array of end customers with lagging edge, in-house chip manufacturing, rather than competing for MPS' higher-tech sockets. Like its larger rivals, MPS also benefits from high customer switching costs once its chips are designed into end products, especially in end markets with long product life cycles. We think MPS' asset-light fabless model will allow it to extract high returns from a low invested capital base, even as competition grows.

We expect MPS to focus on organic top-line growth across all its end markets going forward and to continue outgrowing other analog chipmakers as it takes market share. We think MPS will experience its most rapid growth in data centers as it benefits from artificial intelligence investment. We also expect high growth for sales into cars, where it is moving up the value chain and winning designs for advanced driver-assist systems and battery management sockets. We also think an improving end market mix and higher efficiency manufacturing will bolster gross margins. Finally, we think MPS will continue investing heavily in further advancing its process technology and aggressively marketing its differentiated approach to maintain its higher-than-market growth.

Bulls Say, Bears Say

Bulls

Monolithic Power's BCD process has the fewest layers and smallest die size among competing analog offerings, providing the best power density and energy efficiency to customers.

MPS has begun notching design wins in advanced driver assist systems and battery management systems, which should lead to stickier and higher-growth revenue.

The firm's fabless model is unique among high-power analog competitors and allows hefty returns on invested capital.

Bears

Monolithic Power holds a small share of the power management chip market and will be challenged to steal market share from large, moat-endowed, well-established competitors.

If larger analog peers like Texas Instruments or Analog Devices committed resources to matching MPS' process technology, this could hamper the latter firm's growth.

The majority of MPS' sales come from markets with relatively short product cycles, and stickier long-cycle markets like automotive and industrial still only make up a minority of the top line.

Financial Strength

In our view, Monolithic Power Systems has a strong balance sheet that will allow the firm to focus on organic investment and shareholder returns. In contrast with its capital-intensive semiconductor peers, the firm carries no debt and had \$1.1 billion in cash and short-term investments as of Dec. 31, 2023. MPS' fabless approach—requiring low capital expenditure—allows it to consistently generate robust free cash flow. We expect Monolithic Power to remain unleveraged and to continue growing its free cash flow. Since the firm isn't an acquirer, it can commit its funds to internal research and development and its go-to-market approach, along with its quarterly dividend, which has maintained a payout ratio above 30% since its institution. We forecast MPS to average over \$500 million in free cash flow through 2028, which we expect to comfortably cover its expenses. We also think Monolithic Power will maintain relatively large inventories to keep up with impressive demand. The firm's target range of 180-200 inventory days is significantly higher than analog peers, which trend closer

to 100-150 days. This discrepancy can be misleading, as MPS is growing much faster than its larger peers, so inventory needed in a couple quarters can appear high relative to current-quarter sales. We think management's high inventory targets are prudent to meet demand and continue the firm's rapid growth.

Economic Moat

We think Monolithic Power Systems boasts a wide economic moat, as a result of intangible assets in analog chip design and switching costs for its integrated power management chips. In our view, these will enable the firm to average returns on invested capital in excess of its weighted average cost of capital over the next 20 years.

While digital integrated circuits process digital inputs—sequences of 1s and 0s—into digital outputs, analog chips process continuous real-world signals into a digital output. The priority in digital semiconductors is packing ever-smaller chips with more transistors using cutting-edge manufacturing in pursuit of Moore's Law, but analog design uses lagging-edge manufacturing, with customers prioritizing reliability, accuracy, and precision. In the case of Monolithic Power's bread and butter of power management, power management integrated circuits regulate incoming electricity—with varying voltage and current—to produce a stable electrical output to safely power a device. It is our view that power management discrete transistors—like metal-oxide-semiconductor field-effect transistors and insulated gate bipolar transistors—are generally less differentiated and more commoditylike than other semiconductor applications, but Monolithic's focus on highly integrated power management chips helps create a differentiated product with a compelling value proposition.

Monolithic Power's value proposition is eponymous: it can provide a single (monolithic) integrated power chip to replace a system otherwise composed of several discrete transistors or chips. Monolithic does this through its proprietary bipolar-CMOS-DMOS (BCD) process technology, now in its sixth generation. BCD combines analog, digital, and memory components into a single integrated chip; the combination of these three components creates a final product with higher power density and configurability than a combination of three point solutions. While other analog players also have BCD

technology (STMicroelectronics invented it in the 1980s), MPS has made it the core of its entire business.

Because analog chips generally sell on the basis of reliability rather than cutting-edge performance, large analog chipmakers typically build their own manufacturing sites (fabs) with lagging-edge manufacturing processes and extract high returns from producing the same product over the course of decades without much additional development. As a small fish in a big analog pond, Monolithic Power has opted instead for a fabless model, designing its own manufacturing process (BCD) in tandem with third-party foundry partners. Monolithic uses its foundry partners' older, fully depreciated digital fabs to design its own production lines and tools for its proprietary BCD at a relatively lower cost. By not owning its own fabs, MPS can be nimbler in innovating its process technology than larger peers that are content to produce lagging-edge, steadfastly reliable chips that produce steady cash flows. We think this has allowed MPS to achieve a 55-nanometer process for its BCD, while other analog players' most cutting-edge BCDs currently sit at either 110 nanometers or 90 nanometers.

Monolithic Power's contrasting approach to analog design and focus on innovation has resulted in a process with the fewest layers of any BCD on the market, which results in higher power density and faster time to market than competing offerings. For customers, benefits to higher power density include a smaller form factor, longer battery life in devices, and reduced cooling and ventilation needs in server configurations.

For Monolithic Power, its ability to integrate multiple technologies into a single chip allows it to bring innovative new products to market, like its marquee QSMOD controller. QSMOD regulates power input to a processor to a high degree of precision, resulting in lower power loss and greater efficiency than a typical microcontroller. The higher levels of efficiency also allow end designs to reduce the size of a chip's capacitor (which stores short-term power for the processor), giving an even smaller form factor to customers. High levels of power precision allow Monolithic to use QSMOD in designs alongside of different types of chips, like field-programmable gate arrays, application-specific integrated circuits, and graphics processing units. These expensive, high horsepower chips require a constant, steady supply of power, and QSMOD's precision is well suited to be integrated alongside such processors. Thus,

Monolithic can serve a variety of applications with a centralized technology, incurring relatively low incremental research and development expense for each iteration.

In industrial motor applications, Monolithic Power's e.Motion chips — also built with its BCD — integrate a motor driver and magnetic field sensor, allowing for precise, real-time, automatic control of a motor. This contrasts with the more ubiquitous technology that combines a motor driver chip with three independent hall sensors to gauge motor position. According to management, the legacy tech runs a customer \$20, while Monolithic can charge \$5 for a smaller, more precise e.Motion chip while earning a high margin.

We think Monolithic Power's tech, stemming from its proprietary BCD process, would be difficult for another established analog chipmaker to replicate, much less a new entrant. In fact, management has indicated that few in the firm itself actually know the process end-to-end in order to preserve the firm's secret sauce. In our view, talent for analog chip design is scarcer than it is for digital chips, due to greater emphasis in the broader semiconductor industry being placed on digital improvements in accordance with Moore's Law. Analog chip designs are highly proprietary, and it can take years to train new engineers on the intricacies of analog design. We think that existing analog competitors are unlikely to dedicate such scarce engineering talent to develop an entirely new line of products that will replicate Monolithic's technology.

We also think Monolithic Power benefits from customer switching costs for its power chips, resulting from its high levels of integration and low relative cost. Monolithic's highly integrated chips allow its customers to create unique, streamlined designs that couldn't be achieved with lagging-edge analog technology. In doing so, Monolithic acts as a close design partner to its customers, using its experience and acumen to help design a system integrated with its technology. If a customer wanted to switch suppliers, it would have to undergo a complete system redesign, likely incorporating several different chips or discrete transistors to achieve the same functionality that a singular MPS solution offered. The costs of switching away from Monolithic Power in this case would include the time and financial burden spent finding a new supplier and conducting a redesign, as well as producing a chip with a larger form factor and greater energy needs, both of which would create a higher-cost solution.

Monolithic Power's switching costs are steepest in its longer cycle businesses, specifically the automotive and industrial verticals. In industrial applications like motor drives, end products can have life cycles of a decade or more. In automotive applications, Monolithic works with OEMs or Tier 1 suppliers two to four years in advance of a car hitting the market, and model lives typically range from five to seven years, creating a total relationship length of up to 10 years. A customer is unlikely to want to switch suppliers mid-product cycle, which would require a system redesign and halted production for the duration of the switch.

Monolithic Power's switching costs are magnified when one considers the small portion of an end product's overall cost made up by Monolithic's chips. In our view, analog chips are generally low-cost, and customers choose based on performance (reliability) rather than price. Monolithic's value proposition to customers of an overall lower-cost solution reinforces this dynamic. In a data center, a single server configured with two processors can cost well above \$5,000, and Monolithic's maximum dollar content would be about \$100. In cars, the bill of materials can eclipse \$10,000, and Monolithic's content maxes out at about \$125. We think customers will be loath to swap out a perfectly functioning power management system, incurring a partial system redesign in the process, for only 1%-2% of the overall cost—especially when the chip poses a smaller form factor and better energy efficiency than a replacement.

In our view, the combination of Monolithic Power's differentiated process technology and the switching costs posed by its integrated chips carve out a wide economic moat. Due to its fabless model requiring low capital expenditures compared with other chipmakers, MPS is able to earn high returns on a small invested capital base. By our assessment, MPS' returns on invested capital haven't dipped below 20%—even when its business was barely breaking \$100 million in revenue—and have steadily grown with its top-line and margin expansion. Over the next 20 years, we think Monolithic's asset-light business model will allow it to continue to earn returns above its cost of capital over the course of the business cycle and through heightened competition as it grows.

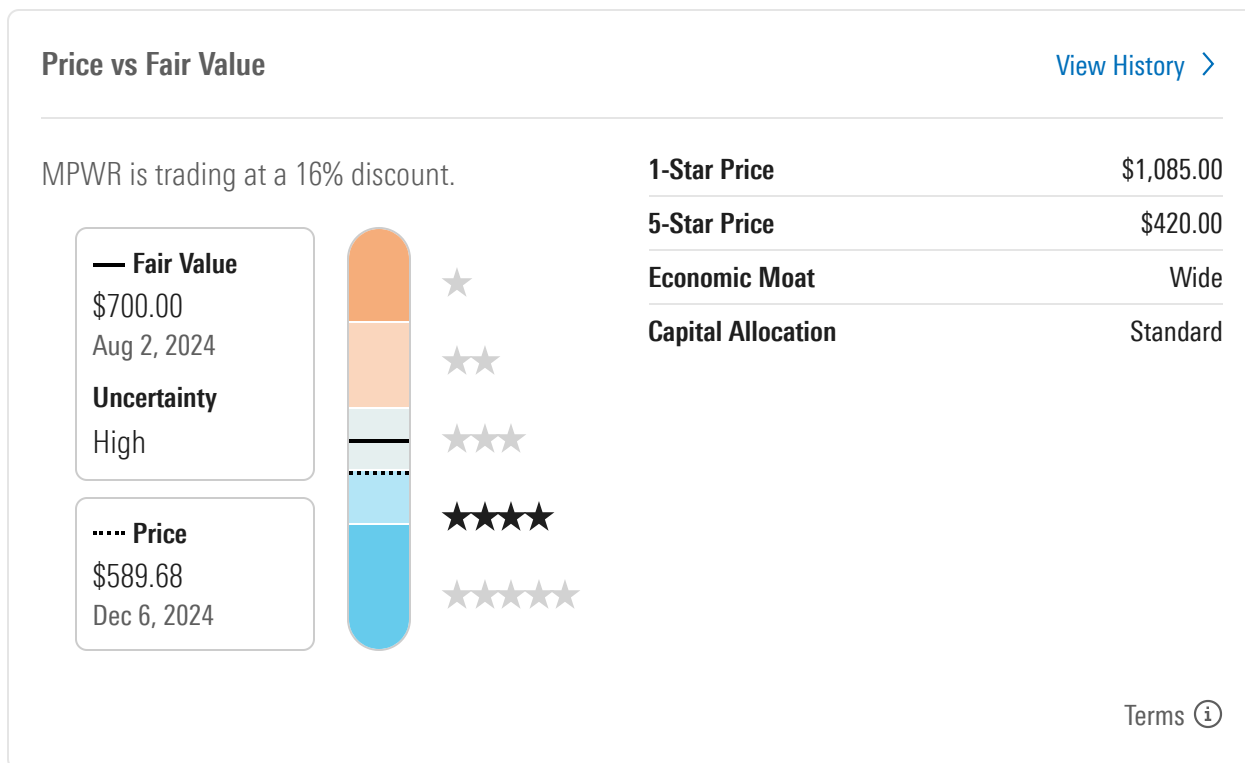
Fair Value and Profit Drivers

Our fair value estimate is \$700 per share. Our valuation implies 2024 price/adjusted earnings of 47 times and 2024 enterprise value/sales of 14 times.

We forecast 19% compound annual revenue growth for Monolithic Power through 2028. We expect the firm to take market share and win new sockets during this period, across its served markets. We forecast a more challenging 2024 for MPS' computing, consumer, and industrial end markets as it encounters soft demand, but still believe it can achieve double-digit growth with high-value sockets for new CPUs and GPUs. Long-term, we expect the strongest growth for MPS in the automotive and data center markets. In automotive, the firm has a strong position in infotainment but is quickly moving up the value chain into advanced driver-assist systems and onboard electric vehicle systems. In data centers, MPS benefits from strong placement alongside GPUs for AI models and increasing penetration alongside x86 server CPUs as well. Eventually, we think MPS' market outperformance will moderate as its top line swells and market share gains come more slowly, but we are still expecting low-double-digit sales growth through the end of the decade.

Over the next 10 years, we expect Monolithic Power to steadily expand its gross margins toward the levels of its larger power management chipmaking peers. We think that a higher mix of automotive, industrial, and computing revenue, along with greater manufacturing efficiency, will push GAAP gross margin toward 60% by 2028, up from a depressed level of 56% in 2023. Management targets steady quarterly sequential gross margin expansion of roughly 10-20 basis points under periods of healthy demand, but sees 60% as a long-term target.

We think operating margins have modest room to expand with gross margins, but expect organic investments to stay high to fuel growth. MPS is expanding its manufacturing capacity and diversifying its geographic footprint as demand heightens and it grows larger. We think management will keep reinvesting in the business as long as it can realize continued outperformance of its underlying markets, which we think will continue at a similar pace for several years. We expect more modest outperformance in the second half of the decade to motivate MPS to flex its operating leverage. We expect non-GAAP operating margins to reach a steady state close to 40%, compared with a depressed level of 35% in 2023.



Risk and Uncertainty

We assign Monolithic Power Systems a High Morningstar Uncertainty Rating. MPS operates in the cyclical semiconductor industry, and its financial results can fluctuate with demand cycles. We think MPS' greatest uncertainty stems from its ability to maintain an advantage in its proprietary process technology over analog competitors with larger budgets. If a well-capitalized competitor were to successfully rival MPS' BCD process and value proposition, it could limit the firm's top-line growth. We don't foresee significant environmental, social, or governance risk for Monolithic Power, but its greatest risk on this front would be in regard to human capital. Analog engineering talent is scarce, and losing qualified talent to competitors could slow the company's innovation. We also think there is a degree of key person risk at MPS, with the company's founder and CEO, Michael Hsing, being intricately involved in the technological side of the business. We also think that Monolithic Power faces risk arising from its revenue and manufacturing concentration out of China. More than a quarter of sales come from Chinese end customers, and MPS has significant reliance on Chinese foundries. We think that heightened regulation in China or trade uncertainty between the US and China could pose a threat to this portion of MPS' business. We also think international business restrictions could hamper MPS' foundry partnerships. Currently, the firm is diversifying its manufacturing base and R&D staff

geographically to rely less on Chinese manufacturing and talent. Additionally, MPS' sales into Chinese end customers are generally lower-value chips for consumer applications or into autos, which present less of a national security restriction risk, in our view.

Capital Allocation

We assess Monolithic Power Systems' Capital Allocation Rating as Standard, based on a sound balance sheet, fair investments, and appropriate shareholder distributions. The firm carries no debt, rarely engages in acquisitions, and pays a quarterly dividend. We think Monolithic Power's balance sheet is sound, based on no debt and steady positive free cash flow generation. We also think the firm's shareholder distributions are appropriate, with a quarterly dividend that has steadily increased since 2015. MPS' dividend makes up nearly half of free cash flow, of which we approve, given the firm has low capital requirements and still invests heavily in its own growth. We think Monolithic Power's investments are fair. The firm has made a few, small acquisitions in its history, mostly focusing instead on organic research and development. We support the focus on organic growth, as we view MPS' proprietary process technology as an internally developed intangible asset that requires investment to maintain its lead over the competition. We think internal development has resulted in steadily increasing returns on invested capital over the last five years.

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