

onsemi: How fast to scale silicon-carbide capacity?

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A strategy case for MBA students and working professionals

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The capital-allocation question

By 6 February 2024, ON Semiconductor Corporation (onsemi) had published its 2023 results and annual report. The company had reported a fourfold year-over-year increase in silicon-carbide (SiC) revenue, record automotive revenue, and more than \$1.5 billion of capital expenditures in 2023. It was also managing a cyclical slowdown in overall sales, meaningful working-capital demands, and the technical and operational challenges of bringing new manufacturing capacity online.

The strategic question for a hypothetical capital-allocation committee is how aggressively to continue expanding SiC manufacturing capacity. Should onsemi accelerate within its disclosed investment direction, stage additional spending where feasible against customer and manufacturing milestones, or slow discretionary additions to preserve capital for other products and uses? These are constructed case alternatives, not documented management proposals. The company had already invested in SiC; the issue is the pace and conditions for its next increments.

A growth story inside a cyclical business

onsemi supplied semiconductor products to customers across automotive, industrial, and other markets. In 2023, automotive products accounted for approximately 52% of revenue and industrial products for approximately 28% (2023 Form 10-K, Item 1, "End-Markets," p. 8, lines 353, 359-362). Automotive revenue reached a record \$4.3 billion, up 29% from 2022. Management said SiC revenue grew fourfold year over year, but did not disclose an absolute SiC revenue figure, a price-volume split, or a SiC contribution margin.

The overall company was not growing at the same rate. Revenue was \$8.253 billion in 2023, down about 1% from \$8.326 billion in 2022. Fourth-quarter revenue was \$2.018 billion, down 7% sequentially and 4% year over year. Gross margin was 47.1% for 2023, compared with 49.0% in 2022; Q4 gross margin was 46.7%. The company guided to first-quarter 2024 revenue of \$1.8-\$1.9 billion and GAAP gross margin of 44.4%-46.4%. Those figures describe onsemi as a whole; they do not show whether SiC demand was following the same trajectory as the rest of the business.

The strategic appeal of SiC was clear in management's growth narrative. SiC devices were part of onsemi's power semiconductor portfolio (2023 Form 10-K, Item 1, p. 9, lines 378-382). The company described SiC manufacturing capability and expansion at multiple facilities, including

EFK, Hudson, the Czech Republic and South Korea; the filing does not imply that every site performs the same production step (Item 1, p. 5, lines 251-253; pp. 10-11, lines 413-415). A company that can produce qualified devices at scale may be positioned to serve customer programs as they ramp. But installing equipment and improving process yields take time; capacity can carry cost before it produces saleable output. The 10-K identified equipment installation and qualification, planned yields, quality control, and employee training and process know-how needed to operate expanded facilities as risks in increasing SiC production (Item 1A, p. 17, lines 606-608).

Signals are not interchangeable

The public record contained several kinds of customer and demand signals. They did not form a disclosed, one-to-one funnel for SiC.

- A design or qualification program is evidence of technical engagement, not a firm order or a guarantee of production revenue.
- A firm order or minimum-purchase obligation, if applicable, would be a more specific commitment; public filings do not identify SiC-specific contract floors or link them to particular fab investments.
- Remaining performance obligations (RPO) represent contracted amounts expected to be recognized in the future, subject to the contract and shipment. onsemi reported about \$16.5 billion of aggregate long-term-agreement RPO at year-end, excluding contracts with a term of one year or less. It estimated that approximately 29% would be recognized over the next 12 months upon shipment. The company did not allocate the amount or estimate to SiC. Neither figure is SiC backlog, a SiC minimum-purchase floor or a guarantee of utilization.
- Shipment alone does not establish revenue-recognition timing (2023 Form 10-K, Note 2, pp. 64-65, lines 2189-2195), and recognized revenue by itself does not describe product margin or fab economics.

The 10-K also noted that customers could seek changes to delivery or other contract terms, and that onsemi might agree to amendments. Aggregate contract data therefore could not by itself settle how much capacity to install or when.

Capital, cash and manufacturing commitments

Capital expenditures reached \$1.576 billion in 2023, approximately 19% of revenue. The annual report attributed the elevated spending primarily to expansion of SiC manufacturing. Management expected consolidated 2024 capital expenditures to fall to 10%-12% of revenue as SiC investments and other initiatives decreased. This was guidance for the company's total capex, not a disclosed SiC-only budget.

Cash generation and investment competed for attention. Operating cash flow was \$1.978 billion in 2023, down from \$2.633 billion in 2022. The company attributed much of the decline to inventory and working capital for strategic SiC and fab-transition inventory, along with the timing of variable compensation. The disclosures show that an expansion could require cash before the related production translated into shipped and recognized revenue.

The company also returned capital to shareholders. It repurchased \$564 million of shares in 2023 and had authorization for up to \$3.0 billion in repurchases through 31 December 2025. The authorization did not require the company to spend that amount; purchases remained discretionary. It was one competing capital use, alongside investment elsewhere in the product portfolio and balance-sheet flexibility.

What the disclosures did not provide was central to the decision: SiC capacity by fab, utilization, usable yields, equipment cost per incremental unit, conversion timing by customer program, contract-specific purchase floors, SiC revenue and contribution, or project payback. The company also operated shared facilities, and its filings did not isolate SiC manufacturing costs from other products in segment cost of revenue (2023 Form 10-K, Note 3, “Revenue and Segment Information,” p. 66, lines 2263-2265, and p. 69, lines 2373-2374). Consolidated gross margin could not serve as a proxy for SiC project returns.

A competitor's signals, with limits

Wolfspeed, a competitor focused on SiC materials and devices, reported a companywide backlog of \$2.9 billion as of 25 June 2023 and \$8.3 billion of companywide design-ins for its fiscal year. The figures represented different measures and time periods. Wolfspeed cautioned that backlog might not predict revenue and that design-ins might not convert to design-wins or revenue.

Those disclosures illustrate that demand indicators carry conversion risk. They are not onsemi data, not SiC-only totals, and not comparable to onsemi's aggregate LTSA RPO. Wolfspeed's business mix, integration and scale also differed from onsemi's. The figures cannot be used to estimate onsemi demand, market share or utilization.

Three investment postures

The capital-allocation committee has three constructed paths to consider. Each has a plausible logic and a material risk.

Accelerate within the disclosed envelope. Prioritize SiC capacity, process engineering and customer qualification, accepting the possibility of temporary underutilization. If customer programs scale quickly and capacity lead times are long, waiting for fully firm demand signals could sacrifice a growth opportunity. The risk is committing more capital before programs convert, yields improve or market demand supports the added output.

Stage further spending where feasible. Sequence additional equipment, fab conversions and workforce commitments against decision points such as product qualification, customer orders or minimums where documented, yield progress and utilization. This approach could preserve flexibility while continuing the ramp. Its feasibility is unknown: public data do not connect customer commitments to particular SiC capacity, and qualification or yield information may arrive too late to avoid a supply delay.

Slow discretionary additions and preserve capital. Limit new commitments beyond ongoing work, emphasize existing capacity and other products, and retain flexibility for later investment, debt management or shareholder returns. This posture responds to falling companywide revenue and cash absorption, but could leave onsemi less prepared if SiC customer programs expand faster than available qualified capacity.

The decision is not resolved by the 4x SiC revenue-growth claim, the \$16.5 billion aggregate LTSA RPO, the capex forecast or a competitor's backlog. Each describes something different. A recommendation must state which signals are decision-relevant, what information is missing, and how onsemi should handle the cost of waiting as well as the cost of overbuilding.

Exhibits

Exhibit 1. onsemi performance and outlook

Measure	FY2022	FY2023 / Q4 2023
FY revenue	\$8,326.2m	\$8,253.0m (–1% year over year)
FY gross margin	49.0%	47.1%
Automotive revenue	-	\$4.3bn (+29% year over year)
SiC revenue growth	-	4x year over year (management-reported; absolute amount not disclosed)
Q4 revenue	-	\$2,018.1m (–7% sequential; –4% year over year)
Q4 gross margin	-	46.7%
Q1 2024 revenue outlook	-	\$1.8bn-\$1.9bn
Q1 2024 GAAP gross-margin outlook	-	44.4%-46.4%

Source and provenance: onsemi FY2023 results, Form 8-K Exhibit 99.1, filed 5 February 2024; financial results and Q1 outlook tables and opening highlights. SiC growth is the company's stated year-over-year claim; no absolute revenue is inferred. GAAP outlook is shown; it is not combined with the separate non-GAAP outlook. [SEC Exhibit 99.1](#).

Exhibit 2. Capital and cash context

Measure	FY2022	FY2023	2024 outlook / context
Capital expenditures	\$1,005.0m	\$1,575.6m; 19% of revenue	10%-12% of revenue, companywide guidance
Operating cash flow	\$2,633.1m	\$1,977.5m	-
Share repurchases	-	\$564.0m	Up to \$3.0bn authorization through 31 Dec 2025; no minimum purchase requirement

Source and provenance: onsemi 2023 Form 10-K, Item 7, investing activities, cash flows and share repurchases. The filing attributes capex primarily to SiC manufacturing expansion and part of the operating-cash-flow decline to SiC and fab-transition inventory working capital. The 2024 capex range is management guidance, not actual spending or a SiC-only allocation. [SEC 10-K](#).

Exhibit 3. Contract and demand indicators

Indicator disclosed by onsemi	What the filing says	What it does not establish
SiC growth	Management reported 4x year-over-year SiC revenue growth	Absolute SiC revenue, growth mix, margin or future demand
LTSA RPO	Approximately \$16.5bn at 31 Dec 2023, excluding contracts with terms of one year or less	No SiC allocation; not a SiC backlog or purchase floor
Estimated RPO recognition	Approximately 29% expected over the following 12 months upon shipment	Not guaranteed shipment, revenue, utilization or contribution
Customer programs	Product qualification/design engagement can precede production	No public conversion rate or program-level capacity linkage
Orders/minimums	Some contracts can include commitments; customer amendments may occur	No SiC-specific minimum quantities, prices or fab-level floors disclosed

Source and provenance: onsemi 2023 Form 10-K, Note 3, “Revenue from Contracts with Customers,” and customer-contract risk disclosure; company-reported measures at year-end. The categories are not a disclosed onsemi conversion funnel. [SEC 10-K](#).

Exhibit 4. Wolfspeed's disclosed indicators (companywide)

Wolfspeed measure	Disclosed amount and period	Caveat
Backlog	\$2.9bn at 25 June 2023	Point-in-time; companywide, not SiC-only; may not predict revenue
Design-ins	\$8.3bn for FY2023	Companywide; different measure and time base; may not convert to design-wins or revenue

Source and provenance: Wolfspeed FY2023 Form 10-K, Item 1 and MD&A. These figures are shown only to illustrate demand-signal uncertainty. They are not comparable to onsemi's LTSA RPO or a basis for estimating onsemi demand or market share. [SEC Wolfspeed 10-K](#).

Discussion questions

1. What is the capital-allocation decision, and what is the relevant unit: process, fab, product family, customer program or companywide capex envelope?
2. Which evidence supports accelerating SiC capacity? Which evidence cautions against it? How much should the aggregate revenue slowdown affect a SiC decision?
3. How do design/qualification signals, firm orders or minimums, aggregate RPO, shipments and recognized revenue differ? Which could reasonably trigger an irreversible capacity commitment?
4. Which posture would you recommend: accelerate, stage where feasible, or slow discretionary additions? What assumptions are most important to your answer?
5. What information would you request from management before approving the next increment? How would you define gates without assuming the public filings contain SiC-specific floors or fab data?
6. How should the committee compare SiC investment with other product opportunities, cash flexibility and discretionary shareholder returns?

Sources available by the cutoff

- onsemi, [FY2023 results, Form 8-K Exhibit 99.1](#), filed 5 February 2024.
- onsemi, [2023 Form 10-K](#), filed 5 February 2024.
- Wolfspeed, [FY2023 Form 10-K](#), filed 23 August 2023.

The information cutoff is close of business on 6 February 2024 ET. onsemi's results 8-K was accepted at 8:06 a.m. ET on 5 February; the 10-K was accepted at 11:27 a.m. ET that day. The earnings call was scheduled for 9:00 a.m. ET on 5 February. Call remarks are excluded because the replay and transcript were not reviewed.