

Power Semiconductor Modules

ANMD-MRS7-061 · Advanced Semiconductor Applications

A Global Sustainability Due Diligence & Market Research Study

History 2020–2024 · Base Year 2025 · Forecast 2025–2032 · Outlooks 2035 / 2040 / 2050 · Currency US\$

WHY THIS REPORT

Power semiconductor modules are the switching backbone of the electrified economy — the IGBT, MOSFET, SiC and GaN power stages and intelligent power modules that convert, invert and control electricity inside EVs, renewable inverters, industrial drives, rail traction and grid infrastructure. This decision-grade study sizes the global market three ways — value, unit volume and GW switched — across product type, switch technology and voltage class, across seven regions and four scenarios to 2032, with outlooks to 2050.

SUSTAINABILITY & SDG IMPACT — THE ANMD LENS

Sustainability is this report's backbone, not an afterthought. Beyond the device, power modules deliver measurable energy-loss reduction, system-level efficiency and lifecycle carbon avoidance across every electrified application they enable.

Mapped Sustainable Development Goals:

| | | | |
|---|---|--|---------------------------------|
| SDG 7 Affordable & Clean Energy | SDG 9 Industry, Innovation & Infrastructure | SDG 12 Responsible Consumption | SDG 13 Climate Action |
|---|---|--|---------------------------------|

Measurable sustainability outcomes assessed:

- Energy-loss reduction and system-level efficiency
- Lifecycle carbon avoidance across electrified applications
- Wide-bandgap density gains cutting magnetics and copper
- Wafer embodied energy, mineral sourcing and end-of-life as material risks

Framework alignment: Double materiality mapped to GRI, SASB, ISSB, TCFD, TNFD, CSRD and the EU Taxonomy, with greenwashing and SDG-washing screens applied throughout.

WHAT'S INSIDE AT A GLANCE

| | | | |
|------------------------------------|-------------------------------|----------------------------------|-------------------------------|
| 53 Chapters | 9 Report Parts | 7 Regions Covered | 40+ Country Markets |
| 2025–32 Forecast Horizon | 4 Forward Scenarios | 25+ Companies Profiled | 4 SDGs Mapped |

REPORT COVERAGE

Geographic scope: North America, Europe, Asia Pacific, Latin America, Africa, Middle East and Rest of World — with named country intelligence. Asia Pacific is the demand and supply engine; Europe is the automotive-power leader; North America accelerates on IRA / CHIPS incentives; other regions assessed on their own merits.

MARKET OVERVIEW

From legacy silicon to wide-bandgap — where power electronics gets faster, denser and far more efficient.

Power modules are riding the electrification supercycle. Demand is driven by EV powertrain ramp, renewable-inverter build-out and industrial-drive electrification, with wide-bandgap SiC and GaN displacing legacy silicon at the high-performance edge. The market is read three ways — value, unit volume and GW switched — and forecast under four scenarios, each region reported separately.

- **Asia Pacific is the demand and supply engine** — China, Japan, South Korea and Taiwan, on EV volume, inverter manufacturing and packaging base
- **Europe anchors automotive and industrial power** — Germany, France and Italy, on SiC traction-inverter adoption and a deep Tier-1 chain
- **North America scales on EV and grid investment** — United States and Canada, on IRA / CHIPS incentives and domestic SiC capacity
- **Wide-bandgap is the differentiator** — SiC and GaN modules cut losses and shrink magnetics, justifying a price premium

REGIONAL OUTLOOK

Across seven reporting regions, the report separates leading markets from high-growth and emerging ones — each profiled in full rather than aggregated into Rest of World.

| Region | Stage | Lead Markets & Drivers |
|---------------|-------------------|--|
| Asia Pacific | Scale engine | China, Japan, South Korea, Taiwan — EV volume, inverter & packaging base |
| Europe | Automotive leader | Germany, France, Italy — SiC traction inverters, Tier-1 chain |
| North America | Accelerating | United States, Canada — IRA & CHIPS, domestic SiC capacity |
| Latin America | Emerging | Brazil, Mexico — industrial drives, grid modernisation |
| Africa | Frontier | South Africa, Egypt — grid stability, renewable inverters |
| Middle East | Frontier | Saudi Arabia, UAE — solar inverters, sovereign industrial investment |

KEY MARKET DRIVERS & RESTRAINTS

| Drivers | Restraints |
|---|---|
| <ul style="list-style-type: none"> • EV powertrain & charging electrification • Renewable inverter & grid build-out • Wide-bandgap (SiC/GaN) efficiency gains • Industrial-drive & rail traction demand • Energy-efficiency & net-zero policy pull | <ul style="list-style-type: none"> • SiC/GaN wafer & substrate cost premium • Packaging, thermal & reliability challenges • Silicon-vs-wide-bandgap design trade-off • Supply concentration & geopolitical risk • Qualification cycles & automotive AEC-Q burden |

SEGMENTATION SNAPSHOT

| | |
|-----------------------------|---|
| By Product Type | IGBT modules · MOSFET modules · SiC power modules · GaN power modules · intelligent power modules |
| By Switch Technology | Silicon IGBT/MOSFET · silicon carbide (SiC) · gallium nitride (GaN) |
| By Voltage Class | Low-voltage · 650–1200 V · multi-kV high-voltage |
| By Application | EV powertrain · renewable inverters · industrial drives · rail traction · grid infrastructure |
| By End User | Automotive OEMs · industrial OEMs · utilities · rail operators |
| By Business Model | Device sale · IP licensing · foundry · co-design |

TABLE OF CONTENTS — PARTS & CHAPTERS

The full report is organised into nine parts across 53 chapters, listed below. Detailed sub-headings, country tables and directories are provided in the full report.

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- > Chapter 4. Strategic Findings, Materiality and Investment Verdict Preview

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COMPETITIVE & INVESTMENT SNAPSHOT

The competitive field spans integrated device manufacturers, wide-bandgap specialists and automotive-grade module houses. Deal activity — SiC substrate supply agreements, wafer-capacity expansions and OEM co-development — signals a market consolidating around bankable, automotive-qualified SiC and GaN platforms.

Representative players profiled in the full report:

Infineon Technologies AG · STMicroelectronics N.V. · ON Semiconductor Corporation · Mitsubishi Electric Corporation · Fuji Electric Co., Ltd. · Wolfspeed, Inc. · ROHM Co., Ltd. · and 18+ further profiled players.

Investment intelligence: venture, infrastructure, development, climate and blended finance, green bonds and sustainability-linked loans — culminating in a bankability assessment and a conditional investment view.

KEY QUESTIONS THIS REPORT ANSWERS

- How large is the global power semiconductor modules market, and how fast will it grow to 2032?
- Which regions, countries and segments offer the strongest risk-adjusted opportunity?
- How does wide-bandgap change value versus legacy-silicon incumbents?
- Who leads, and where is the competitive and patent white space?
- Is the investment case bankable — and under what conditions?
- How does the category align with the SDGs, energy transition and disclosure regulation?

WHY ANMD — THE DIFFERENCE

Most market studies stop at units and revenue. This report is built as a sustainability due diligence instrument — fusing market sizing with ESG, SDG, climate, water and natural-capital intelligence and a decision-ready bankability view in a single architecture.

- **Triangulated sizing** — every market read three ways so value, volume and the physical-unit views reconcile rather than conflict.
- **Region-honest forecasting** — Latin America, Africa and the Middle East reported in full, never hidden inside Rest of World, every forecast resolved to the 2025 base year.
- **Integrated evidence base** — company, patent and project databases linked to the analysis, with published-filing patents and FTO treated as an indicator, not a legal conclusion.
- **No-fabrication discipline** — every estimate carries a data-confidence rating and disclosed sources; gaps are flagged for further diligence, never filled with invented numbers.
- **Anti-greenwashing rigour** — SDG-washing and greenwashing screens plus claim-substantiation checks built into the ESG and project analysis.
- **Decision-first structure** — 9 Parts and 53 Chapters culminating in stakeholder playbooks and a clear, conditional investment view.

WHO SHOULD BUY THIS REPORT

Investors, OEMs, system designers, foundries, utilities, lenders and policymakers, and strategic corporate planners and decision-makers.

Access the Full Report

The complete report delivers all 53 chapters in full, with every sub-heading, country table, company and patent directory, forecast model and due diligence checklist.

Purchase at www.anewmarketdynamics.com · Standard & Premium licences · Single-Site (SSL) and Global-Site (GSL) options at checkout.

Want the Complete Detailed Table of Contents?

This prospectus lists the nine parts and 53 chapters. The complete detailed table of contents — every sub-heading, country table, exhibit, company and patent directory and annex — is available on request to registered users. To receive it, register with your official company email at www.anewmarketdynamics.com. The full detailed table of contents will be sent directly to your registered company email address.