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Data Center Semiconductor Market by Processor (GPU, TPU, Trainium, Inferentia, Biren, ASIC, CPU), DRAM & NAND, Sensor (Temperature, Humidity, Airflow), Connectivity (NIC/Ethernet Adapters, Switches, Interconnects), Power – Global Forecast to 2029

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Abstracts

The data center semiconductor market is expected to grow from USD 86.8 billion in 2024 to USD 265.8 billion by 2029, reflecting a 25.1% CAGR over the period. Enterprises are increasingly deploying generative AI for applications such as content creation, customer service automation, drug discovery, and personalized marketing. This widespread adoption is significantly increasing demand for high-performance AI servers capable of handling intensive workloads.

“Power stage segment will hold largest market share in 2029.”

The power stage segment is projected to hold the largest share of the data center semiconductor market by 2029, primarily because it is fundamental to efficient power conversion and delivery across every critical component within a data center. Modern AI-driven workloads—especially those powered by GPUs and custom accelerators—require extremely high current at low voltages, placing significant demands on power delivery networks. Power stages, which integrate key elements such as MOSFETs and gate drivers, are essential for converting and regulating this power efficiently while minimizing losses and heat generation. As server architectures become more power-dense, each CPU, GPU, memory module, and networking chip requires multiple power stages, leading to high unit volumes per server. Additionally, the industry-wide shift toward 48V power distribution systems in hyperscale data centers is increasing the

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need for advanced, high-efficiency power stages capable of handling higher input voltages and delivering precise output. Furthermore, energy efficiency has become a top priority due to rising electricity costs and sustainability goals. Power stages directly influence conversion efficiency and thermal performance, making them a critical investment area for data center operators. Their widespread deployment, high value contribution, and essential role in enabling reliable, efficient, and scalable AI infrastructure collectively drive their dominant market share.

“Multi-channel ADC/DAC is estimated to record the highest CAGR during the forecast period.”

The multi-channel ADC/DAC segment is expected to post the highest CAGR in the data center semiconductor market, driven by the growing need for precise, real-time monitoring and control in increasingly complex, power-dense AI infrastructure. As data centers scale to support high-performance computing and AI workloads, there is a growing need to monitor multiple analog signals simultaneously—such as voltage, current, temperature, and airflow—across CPUs, GPUs, memory, and power delivery systems. Multi-channel ADCs efficiently convert numerous analog inputs into digital data for system analytics, while DACs enable fine-grained control of power and thermal management systems. The transition toward intelligent, software-defined data centers and autonomous optimization further accelerates adoption, as these converters are critical to closed-loop control systems. Additionally, the proliferation of advanced power architectures—such as 48V systems and distributed power management—requires high-channel-count data acquisition to improve accuracy and responsiveness. Compared with single-channel solutions, multi-channel ADC/DACs offer higher integration, reduced board space, and lower system cost, making them increasingly attractive. Their role in enabling predictive maintenance, energy efficiency, and system reliability positions them for the fastest growth.

Extensive primary interviews were conducted with key industry experts in the data center semiconductor market to determine and verify the market size for segments and subsegments identified through secondary research. The breakdown of primary participants for the report is provided below:

The study contains insights from various industry experts, including component suppliers, Tier 1 companies, and OEMs. The breakdown of the primary participants is as follows:

By Company Type: Tier 1–50%, Tier 2–20%, and Tier 3–30%

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By Designation: C-level–20%, Directors–30%, and Others–50%

By Region: North America–40%, Europe–20%, Asia Pacific–30%, and RoW–10%

Research Coverage:

This research report categorizes the data center semiconductor market by processor type, DRAM & NAND, sensors, power, connectivity, and other analog devices. It describes the major drivers, restraints, challenges, and opportunities in the data center semiconductor market and forecasts the market through 2029.

Key Benefits of Buying the Report

The report will provide market leaders and new entrants with the closest approximations of the overall data center semiconductor market and its subsegments. It will help stakeholders understand the competitive landscape and gain insights to position their businesses more effectively and plan suitable go-to-market strategies. The report also helps stakeholders understand the pulse of the market and provides them with information on key market drivers, restraints, challenges, and opportunities.

The report provides insights into the following pointers:

Analysis of key drivers (continuous advancement in AI-specific hardware), restraints (high initial investment costs), opportunities (planned investments in data centers by cloud service providers), and challenges (supply chain disruptions).

Product Development/Innovation: Detailed insights on upcoming technologies, research & development activities, and new product launches in the data center semiconductor market

Market Development: Comprehensive information about lucrative markets

Competitive Assessment: In-depth assessment of market share and growth strategies

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