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Computer Microchips Market Assessment, By Functionality [Logic Chips, Memory Chips, Application-specific Integrated Chips, System-on-a-chip Devices, By Use Cases, Consumer Electronics, Automotive, Industrial Automation, Telecommunication, Aerospace and Defense, Healthcare Devices, Data Centers], By Region, Opportunities and Forecast, 2017-2031F

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Abstracts

Global computer microchips market size was valued at USD 26.82 billion in 2023, expected to reach USD 62.25 billion in 2031, with a CAGR of 11.1% for the forecast period between 2024 and 2031. The computer microchips market is growing significantly due to increased demand for advanced technologies in various industries. Factors such as artificial intelligence, 5G networks, and the Internet of Things drive the need for more powerful microchips. The growing use of smart devices and consumer electronics also contributes to this expansion. Innovations in semiconductor technologies, including smaller nanometer processes, enhance chip performance. Additionally, trends like edge computing and autonomous systems are further boosting demand. The continuous growth of the microchips market underscores their essential role in shaping the digital landscape, with ongoing innovations promising sustained expansion in the coming years.

The Semiconductor Industry Association (SIA) reported positive trends in the global semiconductor market, impacting the revenue of the computer microchips market. In October 2023, semiconductor sales reached USD 46.6 billion, showing a 3.9% increase from September. Though slightly lower than October 2022, the consistent month-to-

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month growth indicates ongoing demand. The industry forecast, supported by SIA, predicts a 9.4% sales decrease in 2023 but a 13.1% increase in 2024, projecting global sales at USD 520 billion in 2023 and USD 588.4 billion in 2024. Despite a year-end decline, this data suggests a strong rebound in 2024 driven by sustained positive momentum and global demand for semiconductor products contributing to the revenue growth of the computer microchips market.

For instance, in November 2023, Broadcom revolutionized switching silicon with Trident 5-X12, introducing the industry's first on-chip neural network, NetGNT. Doubling bandwidth, reducing power by 25%, and enabling real-time traffic analysis, this chip addresses evolving needs in telemetry, security, and traffic engineering. Trident 5-X12's programmability, upgradeability, and 16.0 Terabits/second bandwidth make it a power-efficient Top of Rack (ToR) solution, supporting 800G ports for advanced connectivity. Broadcom's commitment to innovation responds to customer demands for diverse, customizable chips, reaffirming its position as a leader in delivering cutting-edge features to the computer microchips market.

Growing Demand in Consumer Electronics Promoting the Computer Microchips Market’s Growth

The computer microchips market witnessed a boost owing to the increasing demand for gadgets like smartphones and laptops. The adoption for advanced microchips rises as more people use these devices daily. For example—smartphones rely on top-notch microchips to offer features like fast processors, efficient energy use, and cutting-edge connectivity. Consumers look for devices that are faster, more powerful, and energy-efficient, driving the need for sophisticated microchips. This demand extends to other gadgets like smart home devices and wearables, making the computer microchips market thrive. Manufacturers respond by creating more powerful and specialized microchips to keep up with the growing expectations, solidifying the crucial role of microchips in the ever-expanding world of consumer electronics.

For instance, in September 2023, GlobalFoundries announced power-efficient enhancements to its 22FDX platform, addressing IoT and automotive demands. Features include ultra-low power memory and temperature resilience. In IoT, 22FDX+ brings advancements, while 22FDX+ AutoPro™ 150 extends automotive capabilities.

Growth in AI Hardware Fueling the Growth of Computer Microchips Market

The growth in AI hardware is a big driver for the computer microchips market. The

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demand for specific microchips increases as more specialized hardware, like AI accelerators, is developed and used for AI tasks. This is because these microchips are designed to handle the unique requirements of artificial intelligence. For example, AI accelerators boost the speed at which machine learning algorithms process information, making AI more efficient. This increased need for AI-focused hardware encourages ongoing innovation in how microchips are designed and produced. It creates a scenario where advancements in AI technology directly lead to a higher demand for specialized microchips, playing a crucial role in the continuous growth of the computer microchips market.

For example, in December 2023, AMD launched the Ryzen 8040 Series mobile processors, featuring integrated Ryzen AI NPU for superior AI processing. Acer, Asus, Dell, HP, Lenovo, and Razer laptops will incorporate these processors, offering up to 1.6x more AI performance. AMD's Zen 4 architecture ensures leading single-core and multi-core capabilities, making these processors ideal for creative professionals, gamers, and mainstream users seeking powerful laptops with AI capabilities. The Ryzen AI 1.0 software further facilitates machine learning model deployment on these AI-ready PCs, enriching user experiences.

Advancement in Healthcare Technology Drives the Computer Microchips Market

Advancements in healthcare technology drive substantial growth in the computer microchips market. The increasing sophistication of medical devices, imaging systems, and healthcare technologies necessitates highly advanced microchips to enhance performance and capabilities. For example, medical imaging systems rely on specialized microchips to process intricate data, delivering higher resolution and faster diagnostics. Additionally, modern healthcare devices, such as smart implants and diagnostic tools, demand microchips with improved computational power for accurate and real-time data analysis. The demand for these sophisticated microchips intensifies as the healthcare sector embraces digital transformation. This dynamic market scenario prompts continuous innovation in microchip design, pushing manufacturers to create specialized solutions tailored to the evolving needs of healthcare technology. Ultimately, the integration of advanced microchips into healthcare devices propels growth, fostering a more efficient and capable healthcare ecosystem.

For instance, in July 2023, Micron Technology began sampling the industry's first 8-high 24GB HBM3 Gen2 memory, featuring over 1.2TB/s bandwidth and 9.2Gb/s pin speed. These developments reduce training times for large language models like GPT-4, optimize AI inference, and improve the total cost of ownership. Micron's 1? DRAM

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process node, 12-high stack with 36GB capacity, and partnership in TSMC's 3DFabric Alliance highlight their commitment to shaping future semiconductor and system innovations in the computer microchips market.

Asia-Pacific Dominates Computer Microchips Market

The Asia-Pacific region dominates the computer microchips market due to key factors such as countries like China, Taiwan, and South Korea playing a major role as manufacturing hubs, investing significantly in cutting-edge facilities for large-scale chip production. This region experiences high demand for electronics, automotive tech, and industrial automation, boosting the need for various microchip applications. Furthermore, Asia-Pacific benefits from a skilled workforce and government initiatives supporting the semiconductor industry. China, especially, has implemented policies to strengthen domestic semiconductor capabilities, reinforcing the region's influence. In essence, a combination of manufacturing strength, market demand, and supportive policies positions the Asia-Pacific region as a leader in the global computer microchips market.

For instance, in March 2023, eMemory and UMC announced the qualification of eMemory’s Resistive Random Access Memory (RRAM) IP on UMC’s 22nm ultra-low-power process. The 8Mb RRAM IP, with additional critical functions, caters to IoT devices, enabling code storage in microcontrollers and power management ICs. The collaboration extends to jointly developing RRAM solutions for the automotive market. The ongoing development aims at larger density, higher speed, and enhanced storage lifetime, emphasizing the companies' commitment to advancing embedded memory solutions for diverse computer microchip applications.

Government Initiatives is Fostering Revenue Growth for the Computer Microchips Market

Governments boost revenue in the computer microchips market by supporting strategic initiatives. They offer financial incentives and invest in research to promote semiconductor development and manufacturing. For example, the United States passed the CHIPS and Science Act in 2022, providing significant funding for these purposes, and enhancing the nation's economy and security. These actions attract private investments, with companies announcing major projects that create jobs and stimulate economic activity in the computer microchips market. Government policies that focus on strengthening leadership in chip design, developing the workforce, and ensuring access to global markets contribute to a positive environment, fostering revenue growth in the

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computer microchips market.

For instance, in October 2023, GF's semiconductor manufacturing facility in Vermont, in collaboration with the United States government with federal funding of USD 35 million, moved closer to large-scale manufacture of next-generation gallium nitride chips for application in aerospace and military, cellular communications, industrial IoT, and vehicles.

Impact of COVID-19

The computer microchips market faced challenges due to COVID-19 initially, with disruptions in production and supply chain issues. Lockdowns and increased demand for electronics during that period created a temporary imbalance. However, with the transition to the post-pandemic phase, the market is showing resilience. There's a notable increase in demand for microchips with economies recovering. The shift towards remote work, growing digitalization, and advancements in technologies like 5G and AI are fueling this demand. The semiconductor industry is responding by focusing on innovation and scaling up production capacity to meet the rising need for computer microchips in the evolving post-COVID landscape.

Impact of Russia-Ukraine War

The Russia-Ukraine war has impacted the computer microchips market due to semiconductor supply chain disruptions. Ukraine plays a crucial role in producing raw materials essential for chip manufacturing. The conflict has led to uncertainties and potential disruptions in the supply of these materials, affecting the overall production of microchips. Additionally, geopolitical tensions have prompted concerns about the stability of the supply chain, leading to increased volatility in prices and potential shortages. Any disturbances in the geopolitical landscape, like the Russia-Ukraine war, can reverberate across the industry impacting production capabilities and market dynamics as the computer microchips market heavily relies on a global and interconnected supply network. The situation emphasizes the importance of geopolitical stability for the resilience of the computer microchips market.

Key Players Landscape and Outlook

The computer microchips market is fiercely competitive with key players reshaping the industry landscape. Leading this transformation are prominent entities such as Taiwan Semiconductor Manufacturing Company Limited, renowned for its cutting-edge

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semiconductor manufacturing technologies. Globalfoundries Inc. contributes significantly with its semiconductor foundry services. Advanced Micro Devices, Inc. is a major player, known for innovative microprocessor and graphics technologies. Broadcom, Inc. stands out for its diverse semiconductor and infrastructure software solutions. This competitive environment propels continuous innovation, driving advancements in chip design and manufacturing. The market outlook is characterized by ongoing research and development, strategic partnerships, and a focus on meeting the escalating demand for microchips across various applications, ensuring a dynamic and evolving landscape in the computer microchips market.

In September 2023, GlobalFoundries' new USD 4 billion expansion fabrication plant in Singapore marked a significant stride in the computer microchips market's growth. The 23,000 sqm facility enhances GF's global manufacturing capabilities, adding 450,000 wafers annually and raising overall capacity to around 1.5 million wafers. The expansion aligns with Singapore's Manufacturing 2030 vision and strengthens the country's position in the semiconductor market, set to contribute to 11 percent of global semiconductor output.

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