

Memristors Market - Growth, Trends, Covid-19 Impact, and Forecasts (2023 - 2028)

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Report description:

The memristors market is expected to register a CAGR of about 52.2% during the forecast period. However, the commercialization of the memristors market is currently in its initial stages. The market is expected to witness remarkable growth as memristors have several critical advantages over other passive electronic devices, including small size, high retention capacity, fast read and write times, and 3D design capabilities.

Key Highlights

Memristor technology has seen a series of developments over the last 50 years. During this period, companies like Intel, Panasonic, and Micron, among others, have continued to innovate in this field. Given the promising features to improve power saving, performance, bandwidth requirement, and space-saving augmented with data transfer rate, memristors are expected to become a mainstream product by the end of the forecast period.

Memristor-based memories are considered the more extensive prospect to replace CMOS in the storage class memory, as they are capable of delivering outstanding performance, such as low power consumption, fast write speed, great scalability, three-dimensional integration, low cost, and compatibility with the CMOS fabrication process. Furthermore, because many materials are showing memristive effects, broadly classified as 2D materials, metal oxides, emerging materials, and organics, commercialization of this technology can open several new use cases, driving the growth of the studied market.

Technology commercialization is possible, mainly in areas like ReRAM, hybrid circuits, synapses, neuromorphic architectures, deep learning, and reconfigurable logic. Resistive RAM, or ReRAM, has been the most developed among all the memristor-based technologies. ReRAM has had many papers published and several patents granted over the years.

However, the technology is new and poses many challenges like state retention capacity concerning time, finding new material which fits into memristive framework, applications in analog and digital domains, response to reading/write stimulus, and compatibility issues in terms of power requirement, among others.

Although the outbreak of COVID-19 had a minimal impact on the memristors market, the fact that the pandemic has significantly increased consumers' awareness about digital and advanced technologies is expected to have a long-term effect on the growth of the studied market as memristor presents itself as promising next-generation technology, which is expected to have a high

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impact on the future trends of the electronics and related industries.

Memristors Market Trends

IT and Telecom Sector to Hold a Significant Market Share

Memristors are expected to be a breakthrough technology for the IT and Telecom sector as they have the potential to enhance several areas of integrated circuit design and computing. Memristors can be used in servers, supercomputers, data centers, portable electronics, and industrial robotics. Considering the benefits, leading semiconductor and memory companies are investing in the memristor market, which is expected to boost the market's growth.

The electronic, IT, and telecommunications industries hold significant market shares for memristors. The requirements for high-speed performance are continuously increasing in the IT sector, owing to the rising need for high processing power and memory density while maintaining the cost. Additionally, the arrival of higher graphics systems further drives the need for better processing speeds, thus driving the demand for memristors.

Memristors' advantage over other memory components is that they make it easier to produce devices with neural architecture. With trends such as Neural Architecture Search (NAS) increasingly making space in the data center industry, memristors can be a key technology enabler to help the industry realize the potential of such technologies.

Furthermore, the increasing awareness and acceptance of digital technologies, such as cloud computing, are expected to create a good market scenario for the growth of the memristors market. For instance, according to the European Commission, about 41% of enterprises in the European Union used cloud computing in 2021. Furthermore, according to the European innovation scoreboard, which measures innovation in Europe through various indicators, Finland had the highest innovation scores in information technologies. Such trends will positively impact the growth of the studied market during the forecast period.

North America to Hold the Largest Market Share

North America is one of the most significant markets for memristors, owing to the high rate of investment in R&D by local players and the highly informed integrator base of memristor components compared to other regions. Many of the prominent market players are US-based, and the country is also one of the most prominent contributors to a majority of the applications of memristors, including neuromorphic computing, automotive, flexible electronics, IoT, edge computing, and industrial robotics in the recent past.

The region's investment in markets like edge computing and advanced electronics is significantly higher compared to other parts of the world. According to The State of Edge report published by the Linux Foundation, it is estimated that about 20.5% of the global Infrastructure Edge will be deployed in North America by 2028, owing to its dominance in the internet and cloud computing industry.

The North American region also highly demands advanced consumer products such as smartphones, computers, and other intelligent home gadgets. As the implementation of memristors takes a step further to creating powerful and cheap distributed solutions for sensing and processing, their demand is expected to grow further during the forecast period.

Furthermore, the developments and innovations in the regional neuromorphic computing, IoT, and storage memory market, especially by local players, are anticipated to augment the market growth for the memristor technology not only in the region but also globally. Also, it will expand its adoption across various end-user industries, including data centers and industrial, which are also reporting rapid growth in the North American region.

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Memristors Market Competitor Analysis

The memristors market is growing in competition as new players are inclining toward it. Few players hold a significant presence in the market; however, with technological advancements, more and more players are expected to enter the market, driving the market's competition. To further consolidate their market presence, the vendors are increasingly focusing on expanding their R&D footprint into developing innovative solutions. Some major players in the market include Crossbar Inc., IBM Corporation, and Knowm Inc.

In July 2022, researchers working on a multi-institutional project led by IIT Jodhpur successfully fabricated high-performance resistive memory (memristor) devices with ultralow power consumption. The fabricated device comprises cadmium selenide (CdSe) quantum dots (QDs) with a high on/off ratio, good RAM performance, fast operation speed, and long retention time. This device is suitable for high-density data storage applications as it can perform logical operations with fast operation speed.

In May 2022, a new material for an electronic component that can be used in broad applications ranges was developed by researchers from ETH Zurich, the University of Zurich, and Empa. These components will help create more efficient electronic circuits to perform machine-learning tasks. Furthermore, the memristors developed are made of halide perovskite nanocrystals, a semiconductor material known primarily for its use in photovoltaic cells.

Additional Benefits:

The market estimate (ME) sheet in Excel format
3 months of analyst support

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