# Semiconductor Laser - Market Share Analysis, Industry Trends & Statistics, Growth Forecasts 2019 - 2029

Market Report | 2024-02-17 | 120 pages | Mordor Intelligence

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**Report description:**

The Laser Market for the Semiconductor Industry market is anticipated to be valued at USD 8.02 billion in 2024 and is expected to become 11.4 billion by 2029, growing at a CAGR of 7.3% during the forecast period.

Key Highlights
-Lasers are attaining significant traction in the semiconductor industry as they present flexible, developed machining to fulfill the stringent needs of the industry, delivering semiconductor manufacturers with an exact method of cutting complex erent materials with high precision. A laser system custom-developed for semiconductor applications can cut a range of materials accurately and fast.
-The semiconductor market is witnessing several innovations owing to robust R&D activities. For instance, in November 2022, researchers from the LP3 Laboratory in France developed a direct laser writing technique to achieve local material processing within the 3D space of semiconductor chips. They claim that the dominating manufacturing technology, lithography, has significant limitations in thoroughly addressing the challenges posed by the semiconductor manufacturing sector. For this reason, fabricating structures under the wafer surfaces would be highly desirable to use the whole space inside the materials. In the International Journal of Extreme Manufacturing, the researchers demonstrated such capability via the newly designed direct laser writing technique, which facilitates fabricating implanted structures inside different semiconductor materials.
-Further, in June 2022, engineers at the University of California, Berkeley (Department of Electrical Engineering and Computer Sciences (EECS)) designed a new type of semiconductor laser that completes an elusive goal in the field of optics: the ability to sustain a single mode of emitted light while retaining the ability to scale up in size and power. It is a significant achievement as it means size does not have to come at the cost of coherence, allowing lasers to become more powerful and cover longer distances for many applications.
-The studied market is noticing an increase in demand due to numerous initiatives by governments of various nations. For

instance, the United States government aims to become independent in the semiconductor supply chain ecosystem. To realize such goals, the United States government has started taking initiatives. Such as the US government recently introduced Investing in Domestic Semiconductor Manufacturing Act in the Senate. This proposed legislation would expand eligibility for CHIPS for America, a government subsidy program for the semiconductor industry, to fund financial assistance beyond entities involved in semiconductor fabrication, testing, assembly, or R&D to organizations involved with materials used to manufacture semiconductors and semiconductor manufacturing equipment. By incentivizing the companies that produce essential materials and equipment, this legislation can create more opportunities for manufacturers nationwide and strengthen the supply chain supporting domestic semiconductor manufacturing.
-Additionally, in September 2022, the Biden administration announced that it would invest USD 50 billion in building up the domestic semiconductor industry to counter dependency on China, as the US produces zero and consumes 25% of the world's leading-edge chips vital for its national security. President Joe Biden signed a USD 280 billion CHIPS bill in August 2022 to boost domestic high-tech manufacturing, part of his administration's push to increase US competitiveness over China. Such robust investments in the semiconductor sector in the region would create lucrative opportunities for the growth of the studied market.
-However, on the Flipside, the initial calibration of lasers is a very complex task and requires a high level of expertise to achieve the high-precision tuning needed for the application. Also, the vast number of parameters has to be considered while tuning the laser, and a small offset may lead to errors or be catastrophic in various applications. The manufacturing process of the lasers is very complex, due to which the manufacturing cost has also increased significantly. Another important aspect of the laser's performance when switching between wavelengths is the stability of the wavelength of the device. As the laser tunes into its desired wavelength, settling drift appears before the channel finally stabilizes. Such factors might hinder the growth of the studied market.
-Furthermore, semiconductor manufacturing is a costly and time-consuming process and requires cutthroat precision in all the equipment/processes involved. As a result, industry expansion is limited in economically less developed regions. Lasers, being one of the integral components of the semiconductor industry, also face similar challenges that slow down the studied market's growth.

Semiconductor Laser Market Trends

The Inspection & Metrology Segment is Expected to Hold a Major Market Share

- Smartphones & other applications across consumer electronics, automotive applications, etc., drive the need for high-performance, low-cost semiconductor chips. Technology transitions have encouraged these industries, including wireless technologies (5G), Artificial Intelligence, etc. Also, the trend of growing Internet of Things (IoT) devices is expected to push the semiconductor industry to invest in this equipment to achieve smart products.
- Moreover, the increasing digitization and trends of remote work and operations have sparked the requirement for advanced semiconductor devices that allow various new capabilities. As the need for semiconductor devices intensifies consistently, advanced packaging techniques deliver the form factor and processing power needed for today's digitized world. According to the Semiconductor Industry Association(SIA), during August 2022, global semiconductor industry sales were USD 47.4 billion, a slight increase of 0.1% over the August 2021 total of USD 47.3 billion. Such an expansion in the semiconductor requirement is anticipated to offer lucrative opportunities for the growth of inspection and metrology equipment.
- Furthermore, capacity developments in the semiconductor industry are also aiding the growth of the studied market. For instance, according to SEMI Equipment Market Data Subscription (EMDS), the semiconductor industry's foot is firmly on the accelerator as the capacity expansion efforts are also aiding the expansion of the front-end and back-end semiconductor equipment industries to meet growth drivers.
- Billings for semiconductor equipment in the first quarter of 2023 increased 9% year-over-year to USD 26.8 billion. Advanced logic and foundry capacity expansions, DRAM investment recovery, and robust NAND Flash spending drove equipment market growth.

As metrology and inspection are crucial processes involved in the manufacturing of semiconductor chips, such trends also create a favorable outlook for the laser market.
- Further, according to WSTS, in 2022, semiconductor sales reached USD 580.13 billion worldwide. Semiconductors are crucial in electronic devices, and the industry is highly competitive. The YoY growth rate in 2022 reached 4.4 percent and is anticipated to grow more in the coming future. Such trends are anticipated to support the growth of metrology and inspection equipment and associated laser systems during the forecast period.

The Asia Pacific Region is Expected to Witness a High Market Growth

- The Asia-Pacific is one of the main regions for the semiconductor industry's manufacturing and consumption. According to Semiconductor Equipment and Materials International (SEMI), China's semiconductor equipment spending surpassed USD 28.27 billion in 2022. Moreover, in South Korea, spending amounted to USD 21.51 billion, while in Taiwan, it stood at USD 26.82 billion during the same period. As lasers are widely used in semiconductor equipment, such trends favor the studied market's growth.
- The region also boasts many initiatives by governments to boost the semiconductor industry. For instance, the Chinese government's National Integrated Circuit Industry Development Guidelines and the Made in China 2025 initiative aim to bolster the growth of the local semiconductor industry in the country, reducing the level of dependence on other countries.
- A similar trend is being observed across other countries. For instance, India's Ministry of Electronics and Information Technology (MeitY) recently approved a comprehensive PLI scheme for developing semiconductor & display manufacturing ecosystems. Incentives worth INR 76,000 crore (USD 9.81 billion) are to be distributed over the next six years. Such initiatives in the region are expected to drive the growth of the ecosystem of the semiconductor industry, creating opportunities in the laser market as well.
- Semiconductors remain the backbone material of electronics integrated with modern devices such as cars, smartphones, robots, and many other intelligent devices; driven by the continuous need for miniaturized and robust chips, current semiconductor manufacturing technologies face increasing pressure. The growing adoption of consumer electronics and automobiles in the Asia Pacific region also creates a favorable outlook for the growth of the studied market.
- Japan holds a unique place in the studied market as the country is among the leading suppliers of semiconductor equipment and materials. According to SEMI, Japan accounts for more than 30% of the global semiconductor manufacturing equipment and material sales. Hence, the country is anticipated to hold notable growth opportunities for lasers used in the semiconductor industry.
- The semiconductor need has grown significantly in the Asia Pacific region in recent years. As prominent semiconductor customers in several countries strengthen their supply chains, investments in the semiconductor industry value chain are further accelerated. For instance, in July 2022, GigaphotonInc., a manufacturer of light sources used primarily in semiconductor lithography, announced that it would increase its production capacity by 2.5 times by constructing a new building in Japan. The company invested around JPY 5 billion (USD 36.2 million) in the construction of the new facility, which is expected to be completed by June 2023. Such investments would boost the semiconductor industry's expansion of the laser market.

Semiconductor Laser Industry Overview

The Laser Market for Semiconductor Industry is a moderately competitive market with significant players like Lumentum Operations, Trumpf, SUSS MicroTec, Coherent, etc. The market players are striving to innovate advanced products and processes to cater to the evolving demands of their customers.

- March 2023 - Tower Semiconductor, in collaboration with Quintessent, Inc, announced the world's first heterogeneous integration of GaAs quantum dot (QD) lasers and a foundry silicon photonics platform (PH18DB). This PH18DB platform targets optical

transceiver modules in data centers & telecom networks and new emerging applications in artificial intelligence (AI), machine learning, LiDAR, and other sensors. The new platform offers GaAs-based quantum dot lasers & semiconductor optical amplifiers (SOA) created on Tower's high-volume base PH18M silicon photonics foundry technology containing low-loss waveguides, photodetectors, & modulators heterogeneously integrated on a single silicon chip. This platform allows dense photonic integrated circuits (PICs) to assist higher-channel count in small form factors.
- January 2023 - Coherent Corp. announced the introduction of its next-generation pump laser diodes that execute an industry-record high output power of 50 W from a single chip. The deployment of fiber lasers for materials processing applications like cutting, welding, marking, and additive manufacturing is accelerating, driving the need for key components that lower the output power cost per watt. The new laser diodes reach 50 W of output power, 40% more than the existing product, allowing high-power industrial fiber laser designs with fewer pump laser diodes.

Additional Benefits:

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

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