

Photonic Integrated Circuit - Market Share Analysis, Industry Trends & Statistics, Growth Forecasts (2025 - 2030)

Market Report | 2025-04-28 | 120 pages | Mordor Intelligence

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Report description:

The Photonic Integrated Circuit Market size is estimated at USD 18.20 billion in 2025, and is expected to reach USD 46.19 billion by 2030, at a CAGR of 20.47% during the forecast period (2025-2030).

Growing Applications Drive Photonic Integrated Circuit Market

Key Highlights

- The Photonic Integrated Circuit (PIC) market is experiencing robust growth due to expanding applications in telecommunications and data centers. PICs provide superior performance compared to traditional integrated circuits, offering advantages like higher speed, increased bandwidth, and improved power efficiency. These benefits make PICs a disruptive technology for short-range connections in data centers and long-haul optical communication networks.
- Efficiency improvement: PICs reduce power consumption in critical applications by at least 50%.
- Frequency advantage: PIC frequencies are 1,000 to 10,000 times higher than those of microelectronics.
- Higher energy efficiency: The technology supports much higher frequencies while being more energy-efficient than traditional ICs.

Telecommunications and Data Center Applications Fuel Growth:

Key Highlights

- Telecommunications is seeing widespread PIC adoption due to the growing demand for high-speed internet communication systems. With mobile data usage expanding by about 40% annually, PICs play a key role in meeting bandwidth needs. North

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- America leads in mobile data consumption, with traffic forecasted to reach 48 GB per month per smartphone by the end of 2023.
- Space and cost savings: PICs integrated into optical communication systems provide significant space, power, and cost reductions.
 - Capacity enhancement: The technology increases transmission capacity while enabling new functionalities.
 - Data center innovations: Hybrid photonics for long-haul communication networks in data centers convert photonic data to electrical signals for processing, facilitating the shift towards photonic switching components.
 - Investments and Research Drive Miniaturization: The push for miniaturizing PICs is driven by sectors like automotive, aeronautics, and telecommunications. Companies are developing smaller, cost-effective, and reliable PICs for use in devices like spectrometers and LiDAR.
 - Recent advances: In August 2020, researchers developed the smallest on-chip optical modulator with a switching speed of up to 11 Gbit/s.
 - Mitsubishi's innovations: The company is exploring new silicon photonics building blocks to extend processor capabilities.
 - Emerging Applications in Sensors and Metrology: The rising use of PICs in optical sensors, including LiDAR for Advanced Driver Assistance Systems (ADAS), is boosting the market. The increasing demand for high-precision distance sensors in industries like machinery and inspection contributes to market growth.
 - Intel's investment: Mobileye plans to use PICs in its next-gen LiDAR technology by 2025.
 - New collaborations: Tower Semiconductor's partnership with AnelloPhotonics is developing low-loss Silicon Optical Waveguide technology for automotive LiDAR and other applications.
 - Market Dynamics and Future Outlook: Strategic partnerships and acquisitions define the market, with companies securing new contracts and expanding into different sectors. The future of the PIC market looks promising, with silicon photonic chips expected to become widespread in high-speed data transmission between data centers over the next three years.
 - Partnership-driven growth: In March 2022, Ansys and GlobalFoundries (GF) partnered to enhance photonic design capabilities.
 - Long-term predictions: Alibaba's DAMO Academy predicts silicon photonic chips will replace electronic chips in various computer industries within 5-10 years.

Photonic Integrated Circuit Market Trends

Data Center Segment Dominates Market

Data center applications are leading the Photonic Integrated Circuit (PIC) market, accounting for 67.88% of the market share in 2021. This dominance is driven by the need for high-speed data transmission and the rapid expansion of cloud computing infrastructure.

- Traffic surge: Cisco's Cloud Index forecasts North America generating 7.7 ZB of cloud traffic annually by 2021, highlighting the growing need for efficient data processing.
- Data center concentration: The U.S. has about 2,600 data centers, representing 33% of the global total, creating a sizable market for PIC solutions.
- Collaborative innovation: Companies like IBM, Intel, and Cisco are developing PIC-based solutions in collaboration with academia and government.
- Growth forecast: The segment is projected to grow from USD 5,429.64 million in 2021 to USD 17,485.97 million by 2027, with a CAGR of 19.96%.

Asia-Pacific Witness Major Growth

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Asia-Pacific is the fastest-growing region in the PIC market, expected to achieve a CAGR of 23.36% between 2022 and 2027, driven by technological advancements and increasing investment.

- Market surge: The Asia-Pacific PIC market is forecasted to grow from USD 1,615.15 million in 2021 to USD 6,150.74 million by 2027.
- Innovative breakthroughs: In November 2021, researchers at the University of Illinois created a miniature photonic circuit using sound waves to isolate and regulate light.
- Strategic partnerships: Collaborations like the one between Ansys and GF in 2022 are driving advancements in photonic design for data centers and supercomputing in the region.
- Government support: Public-private initiatives, such as the Ontario Photonics Industry Network, are boosting PIC innovation in the region.

Photonic Integrated Circuit Industry Overview

Competitive Landscape Analysis: The Photonic Integrated Circuit (PIC) market is dominated by a few global players, with companies such as Neophotonics Corporation, Poet Technologies, II-VI Incorporated, and Intel Corporation leading the market. These companies have strong geographical presence and robust market shares, shaping the competitive landscape of the industry.

Technological leadership: Leading companies invest heavily in research and development, focusing on innovation and miniaturization. For example, II-VI Incorporated's high-efficiency multifunctional metalenses are designed for ultracompact optical sensors.

Strategic partnerships: Collaborations are key to maintaining market leadership. Ansys' partnership with GF is one example, expanding photonic design capabilities across sectors.

Strategies for Future Success: Companies aiming for future success in the PIC market should focus on several critical strategies:

R&D investment: Investing in the advancement of PIC technology, particularly in miniaturization and integration, is crucial.

Cost-effective solutions: Expanding manufacturing capabilities to lower production costs and improve scalability is necessary.

Partnerships and collaborations: Strategic partnerships like POET Technologies' with Liobate Technologies will enable faster product development.

Diversification: Exploring new applications beyond traditional sectors, including automotive, aerospace, and biomedical industries, will open new market opportunities.

Additional Benefits:

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

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