

Global OPA Silicon Photonics Chip Market Growth (Status and Outlook) 2026-2032

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Abstracts

The global OPA Silicon Photonics Chip market size is predicted to grow from US\$ 35.22 million in 2025 to US\$ 144 million in 2032; it is expected to grow at a CAGR of 22.8% from 2026 to 2032.

OPA (Optical Phased Aspect) silicon photonics chips are optoelectronic devices that integrate optical phased array technology onto single or multiple CMOS-compatible silicon-based chips using silicon photonics processes. Their core principle is to achieve mechanical-free beam scanning in space by precisely controlling the phase of each emitting unit in the arrayed waveguide, thus replacing traditional rotating mirrors or MEMS structures for high-speed, programmable beam pointing control. OPA silicon photonics chips are widely used in automotive LiDAR, autonomous driving perception, 3D imaging, free-space optical communication (FSO), AR/VR spatial perception, and defense detection systems. Their core advantages lie in high integration, miniaturization, low power consumption, absence of mechanical structures, high reliability, and the ability to mass-produce CMOS chips.

The OPA silicon photonics chip industry chain can be divided into three major segments: upstream materials and equipment, midstream chip design and manufacturing, and downstream system integration and applications. The upstream mainly includes silicon wafers (SOI wafers), III-V group materials, lithography and etching equipment (EUV/DUV), PECVD/ALD thin film processes, and packaging and testing equipment. The core midstream segment is silicon photonics chip design and manufacturing, including optical waveguide design, phase modulators, beam splitters, array antenna design, and heterogeneous integration with CMOS processes. The downstream segment is OPA system module integration, such as automotive LiDAR systems, AR/VR optical engines, drone obstacle avoidance systems, robot vision

modules, and space optical communication terminals, thus forming a complete optoelectronic industry chain from 'materials ? chips ? modules ? complete system applications.'

The long-term prospects for OPA silicon photonics chips are very strong, with core drivers coming from the expansion of AI computing networks, the penetration of L3/L4 autonomous driving, the upgrading of robot perception, and the explosive growth in demand for AR/VR spatial computing. In the data center sector, silicon photonics OPAs are upgrading from traditional 'pluggable optical modules' to 'co-packaged optics (CPO) + on-chip optical interconnects' to address the power consumption and bandwidth bottlenecks of GPU clusters. In the automotive sector, OPA LiDARs are gradually replacing mechanically rotating radars, achieving smaller size, lower cost, and higher reliability. In consumer electronics and defense, OPAs are used in ultra-thin AR optomechanical systems and high-precision long-range detection. With the maturation of silicon photonics processes and breakthroughs in III-V laser heterogeneous integration, OPA chips are expected to enter a stage of large-scale cost reduction. The industry is transitioning from laboratory and small-batch applications to shipments of millions of units, and will remain in the early stages of rapid growth for the next decade.

This report presents a comprehensive overview, market shares, and growth opportunities of OPA Silicon Photonics Chip market by product type, application, key players and key regions and countries.

Segmentation by Type:

One-Dimensional OPA

Two-Dimensional OPA

Hybrid OPA

Segmentation by Light Source Integration Methods:

External Laser OPA

Silicon Photonics Integrated Laser OPA

Monolithically Integrated OPA

Segmentation by Application:

Automotive LiDAR OPA

Data Center Optical Interconnect OPA

AR/VR Display and Sensing OPA

Free Space Optical Communication OPA (FSO)

Military/Aerospace Exploration OPA

This report also splits the market by region:

United States

China

Europe

Other regions

Japan

South Korea

Southeast Asia

Rest of world

The report also presents the market competition landscape and a corresponding detailed analysis of the major players in the market. The key players covered in this report:

Qunfa Photonics

Wuhan Tianmou Optoelectronics Co., Ltd.

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