

Global Group III-Nitride Epitaxy Supply, Demand and Key Producers, 2026-2032

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Abstracts

The global Group III-Nitride Epitaxy market size is expected to reach \$ 4947 million by 2032, rising at a market growth of 10.0% CAGR during the forecast period (2026-2032).

Group III-nitride epitaxial wafers refer to functional semiconductor wafers formed by growing GaN, AlN, InN and their ternary or quaternary alloys, such as AlGaIn, InGaIn, AlInN and AlGaInN, on sapphire, silicon, silicon carbide, GaN, AlN or engineered substrates through epitaxial growth processes such as MOCVD/MOVPE, MBE and HVPE. These wafers are designed with specific crystal quality, doping profiles, quantum well structures, heterostructures, buffer layers, stress-control schemes and defect-control strategies. They are key upstream materials for LEDs, Micro LEDs, laser diodes, UV and deep-UV LEDs, GaN power devices, GaN RF devices, HEMTs, sensors and high-temperature or high-frequency electronic devices. Their core performance indicators include dislocation density, defect control, wafer-level uniformity, thickness uniformity, composition uniformity, doping accuracy, interface quality, stress management, leakage control, two-dimensional electron gas properties, emission-wavelength consistency and device reliability.

Group III-nitride epitaxial wafers are a core upstream material platform within the wide-bandgap semiconductor value chain. The industry is not merely about producing GaN films; rather, it involves the design and controlled manufacturing of GaN, AlN, InN and their alloy-based epitaxial structures across different substrates, device architectures and end-use applications. Compared with conventional silicon-based materials, III-nitride epitaxy faces more complex challenges, including lattice mismatch, thermal-expansion mismatch, stress accumulation, crack suppression, dislocation-density reduction, p-type doping efficiency, quantum-well uniformity and large-wafer process consistency. LED epitaxy emphasizes emission wavelength, quantum-well quality and

yield; power-device epitaxy focuses on high breakdown voltage, low leakage, buffer design and dynamic on-resistance; RF epitaxy values two-dimensional electron gas mobility, thermal management and high-frequency reliability; and deep-UV epitaxy is constrained by high-Al-content AlGaN growth, p-type doping and light-extraction efficiency. For this reason, the proper industry scope should be defined as Group III-nitride epitaxial wafers, rather than being broadened to all nitride films, coatings or ceramic materials. From a supply-side perspective, the III-nitride epitaxy market is clearly segmented by application and substrate platform. GaN-on-sapphire epitaxy for LEDs is already mature, with strong industrial bases in China, Japan, Taiwan China and South Korea. Competition in this segment is mainly driven by cost, wavelength uniformity, yield and large-scale manufacturing capability. GaN power epitaxy is primarily based on GaN-on-Si platforms and is being driven by demand from fast chargers, data-center power supplies, solar and energy storage systems, electric vehicles and industrial power electronics. This segment is moving toward 8-inch compatible manufacturing, higher voltage platforms and improved reliability. GaN RF epitaxy is more dependent on GaN-on-SiC, where the thermal conductivity and high-frequency performance of SiC make it well suited for 5G infrastructure, satellite communications, radar and defense electronics. AlN and AlGaN deep-UV epitaxy remains a smaller but technically demanding segment, where commercialization depends on crystal quality, p-type doping, light extraction and end-market adoption. From a demand perspective, III-nitride epitaxy has expanded beyond traditional LED lighting and display applications into Micro LEDs, laser diodes, GaN power devices, GaN RF devices and deep-UV devices. The conventional LED market is relatively mature but still provides a large and stable volume base. Micro LEDs require higher wavelength consistency, lower defect density and better wafer-level uniformity, making them an important proving ground for advanced epitaxial capability. GaN power devices are benefiting from the need for higher-frequency, higher-efficiency and more compact power conversion systems, creating a major growth opportunity for GaN-on-Si epitaxial wafers. GaN RF devices remain attractive in base stations, radar, satellite communications and high-end RF front ends due to their high power density, high-frequency performance and thermal reliability. Future growth in III-nitride epitaxy will therefore be driven by multiple high-value applications rather than a single end market. From a technology roadmap perspective, III-nitride epitaxy is evolving toward substrate diversification, larger wafer formats, lower defect density and closer integration with device design. GaN-on-sapphire remains the mainstream platform for LEDs and parts of the Micro LED market. GaN-on-Si continues to advance in power devices due to its cost and wafer-size advantages. GaN-on-SiC remains the preferred route for high-end RF applications because of its thermal and high-frequency performance. GaN-on-GaN and AlN-based epitaxy represent higher-performance but higher-cost pathways for laser

diodes, vertical power devices and deep-UV devices. Going forward, competition will shift from simple capacity expansion to a more integrated model based on substrate selection, buffer-layer engineering, epitaxial structure design, device-process compatibility, customer qualification and reliability validation. From an industry outlook perspective, III-nitride epitaxy combines a mature volume base with several high-growth technology segments. LED epitaxy is already in a mature competitive phase with increasing cost pressure, while Micro LED, GaN power, GaN RF and AlN/AlGaIn deep-UV epitaxy continue to offer higher growth potential and stronger technology premiums. As end systems move toward higher efficiency, smaller form factors, higher switching frequencies, higher power density and stronger reliability requirements, the strategic importance of III-nitride epitaxial wafers will continue to rise. Companies with multi-substrate platform capabilities, advanced epitaxial design expertise, low-defect mass-production capability and strong co-development relationships with downstream device makers are likely to gain a stronger competitive position over the long term.

This report studies the global Group III-Nitride Epitaxy production, demand, key manufacturers, and key regions.

This report is a detailed and comprehensive analysis of the world market for Group III-Nitride Epitaxy and provides market size (US\$ million) and Year-over-Year (YoY) Growth, considering 2025 as the base year. This report explores demand trends and competition, as well as details the characteristics of Group III-Nitride Epitaxy that contribute to its increasing demand across many markets.

Highlights and key features of the study

Global Group III-Nitride Epitaxy total production and demand, 2021-2032, (K Pcs)

Global Group III-Nitride Epitaxy total production value, 2021-2032, (USD Million)

Global Group III-Nitride Epitaxy production by region & country, production, value, CAGR, 2021-2032, (USD Million) & (K Pcs), (based on production site)

Global Group III-Nitride Epitaxy consumption by region & country, CAGR, 2021-2032 & (K Pcs)

U.S. VS China: Group III-Nitride Epitaxy domestic production, consumption, key domestic manufacturers and share

Global Group III-Nitride Epitaxy production by manufacturer, production, price, value and market share 2021-2026, (USD Million) & (K Pcs)

Global Group III-Nitride Epitaxy production by Material System, production, value, CAGR, 2021-2032, (USD Million) & (K Pcs)

Global Group III-Nitride Epitaxy production by Application, production, value, CAGR, 2021-2032, (USD Million) & (K Pcs)

This report profiles key players in the global Group III-Nitride Epitaxy market based on the following parameters - company overview, production, value, price, gross margin, product portfolio, geographical presence, and key developments. Key companies covered as a part of this study include IQE plc, Soitec, Sumitomo Chemical Group, NTT Advanced Technology Corporation, Enkris Semiconductor, Inc., PAM-XIAMEN, San'an Optoelectronics, Epistar Corporation, Nichia Corporation, ams OSRAM AG, etc.

This report also provides key insights about market drivers, restraints, opportunities, new product launches or approvals.

Stakeholders would have ease in decision-making through various strategy matrices used in analyzing the World Group III-Nitride Epitaxy market

Detailed Segmentation:

Each section contains quantitative market data including market by value (US\$ Millions), volume (production, consumption) & (K Pcs) and average price (US\$/Pcs) by manufacturer, by Material System, and by Application. Data is given for the years 2021-2032 by year with 2025 as the base year, 2026 as the estimate year, and 2027-2032 as the forecast year.

Global Group III-Nitride Epitaxy Market, By Region:

United States

China

Europe

Japan

South Korea

ASEAN

India

Rest of World

Global Group III-Nitride Epitaxy Market, Segmentation by Material System:

GaN Epitaxy

AlN Epitaxy

InN Epitaxy

InGaN Epitaxy

AlGaN Epitaxy

AlInN / AlGaInN Epitaxy

Other III-Nitride Alloys

Global Group III-Nitride Epitaxy Market, Segmentation by Substrate Platform:

GaN-on-Sapphire

GaN-on-Silicon

GaN-on-SiC

GaN-on-GaN

AlN-on-Sapphire

AlN-on-AlN

III-Nitride-on-Engineered Substrate

Other Substrate Platforms

Global Group III-Nitride Epitaxy Market, Segmentation by Device Structure:

MQW LED Epitaxial Structures

HEMT Epitaxial Structures

p-i-n / Vertical Device Structures

Template Structures

Superlattice / Buffer Structures

Quantum Well / Quantum Barrier Structures

Other Device Structures

Global Group III-Nitride Epitaxy Market, Segmentation by Application:

Microwave RF

Power Electronics

Photoelectric Display

Others

Companies Profiled:

IQE plc

Soitec

Sumitomo Chemical Group

NTT Advanced Technology Corporation

Enkris Semiconductor, Inc.

PAM-XIAMEN

San?an Optoelectronics

Epistar Corporation

Nichia Corporation

ams OSRAM AG

Innoscence

Qorvo, Inc.

Key Questions Answered:

1. How big is the global Group III-Nitride Epitaxy market?
2. What is the demand of the global Group III-Nitride Epitaxy market?
3. What is the year over year growth of the global Group III-Nitride Epitaxy market?
4. What is the production and production value of the global Group III-Nitride Epitaxy market?
5. Who are the key producers in the global Group III-Nitride Epitaxy market?
6. What are the growth factors driving the market demand?

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