

Gallium Nitride Blue Laser Diode



AI Overview

GaN blue laser diodes are high-efficiency semiconductor lasers emitting around 445–447 nm, widely used in industrial, research, and display applications.

Overview Gallium Nitride (GaN) laser diodes are semiconductor devices based on GaN and related alloys such as InGaN and AlGaN, offering direct bandgap emission in the violet, blue, and green spectrum. The wide bandgap of GaN (3.4 eV) allows efficient light output without the need for nonlinear frequency conversion, making these diodes ideal for compact, high-performance systems. Blue laser diodes typically operate in the 420–499 nm range, with 445–447 nm being the most common for industrial and display applications.

Performance and Power Modern GaN blue laser diodes can achieve high optical output powers, with single emitters reaching 11–15 W in pulsed operation. Multi-mode diodes are available with powers ranging from 1.6 to 5 W, suitable for automotive, industrial, and pico-projector applications. These diodes maintain excellent beam quality and high efficiency, minimizing thermal load and enabling long operational lifetimes, often up to 10,000 hours at 40°C.

Applications GaN blue laser diodes are used in a variety of fields:

- Industrial processing:** Copper welding, cutting, and materials processing due to high power and focused beam.
- Displays and projection:** Compact, high-brightness sources for laser projectors and pico projectors.
- Scientific research:** Fluorescence microscopy, spectroscopy, and atomic clocks requiring narrow linewidth and stable emission.
- Medical and OEM systems:** Integration into diagnostic and imaging devices where precise wavelength and stability are critical.

Key Considerations When selecting a GaN blue laser diode, consider:

- Wavelength:** Determines suitability for specific applications (e.g., 445 nm for displays, 405 nm for fluorescence microscopy).
- Output power:** High-power diodes are needed for industrial processing, while lower-power diodes suffice for imaging or display.
- Beam quality:** Single-mode diodes provide narrow, high-quality...

Article Content

Gallium-Nitride Diode Lasers | Ferdinand-Braun-Institut

We develop diode lasers based on the (InAlGa)N material system. We specifically tune their properties to the respective field of application - such as atomic

Method of growing gallium nitride crystal

Gallium nitride (GaN) type blue/violet semiconductor lasers will be used for reading-out data of the next generation large capacity photodiscs. Putting GaN type blue/violet laser diodes (LDs) into practice

Global Blue Laser Diode Market 2026-2030

Table of Contents The global blue laser diode market is forecasted to grow by USD 466599.6 thousand during 2025-2030, accelerating at a CAGR of 16.2% during the forecast period.

Method of growing semiconductor heterostructures based on gallium nitride

Abstract: The method of growing non-polar epitaxial heterostructures for light-emitting diodes producing white emission and lasers, on the basis of compounds and alloys in AlGaInN system, comprising the

Light-emitting diode

Aluminium gallium nitride (AlGa_N) of varying Al/Ga fraction can be used to manufacture the cladding and quantum well layers for ultraviolet LEDs, but these

Gallium nitride blue laser diodes with pulsed current

In this paper, we review the IEC phenomena of (Ga,Mn)As-based multilayers investigated by magneto-transport experiments.

GaN Laser Diodes - Bluglass

GaN Laser Diodes BluGlass offers GaN lasers to the industrial, defence, quantum, scientific, biotech and display markets.

Semiconductor Industry News Archive

Vertical gallium nitride could transform high-voltage power electronics and support UK net-zero ambitions, says CSA Catapult 27 January 2026 Nuvoton releases high-power 1W 379nm UV

Gallium Stocks List Ranked for 2026

Gallium is predominantly used in electronics. Gallium arsenide, the primary chemical compound of gallium in electronics, is used in microwave circuits, high-speed switching circuits, and

Development of High-Power Blue Laser Diodes

With the aim of applying the blue laser diode to the laser processing, we have developed the high-power Gallium Nitride-based (GaN-based) blue laser diodes.

History of the LED

Today, magnesium-doping of gallium nitride remains the basis for all commercial blue LEDs and laser diodes. In the early 1970s, these devices were too dim for

Nobel Prize-winning creator of blue LEDs is focused on laser-based ...

Shuji Nakamura already transformed the world once. His invention of blue light-emitting diodes (LEDs) changed everything about our daily lives.

Furukawa Electric Review No.52 (August, 2021)

In this section, we report the manufacturing method and characteristics of this high output blue laser diodes. Output power and WPE improvement of the blue laser diodes. Figure 2 shows the schematic

Gallium nitride blue laser diodes with pulsed current operation ...

In short, this study is dedicated to improving the performance of blue laser diodes, focusing on enhancing their power and efficiency through meticulous studies of dislocation control during the

Gallium nitride blue laser diodes with pulsed current operation ...

Gallium nitride (GaN) laser diodes (LDs) are considered for visible light communications (VLC) in free space, underwater, and in plastic optical fibers (POFs).

8-inch free-standing GaN substrates grown by hydride

Download Citation | 8-inch free-standing GaN substrates grown by hydride vapor phase epitaxy | The absence of large-size gallium nitride (GaN) substrates with low dislocation density

Nichia NUBM44 450nm 6W 9mm Blue Laser Diode

This is only possible due to the recently developed Gallium Nitride laser technology. Low long-term degradation levels at elevated temperatures cannot be achieved

Blue lasers on high pressure grown GaN single crystal substrates

In the sixties, GaN (gallium nitride) and its cousins AlN and InN were already known to be ideal candidates for blue and DV semiconductor light-emitting diodes (LEDs) and laser diodes (LDs).

Visible InGaN Laser Diodes

Blue multi-mode laser diodes complete our broad InGaN portfolio. We offer various versions from 1.6 to 5.0 Watt for industry and automotive applications with a

Laser Television Projector Market

Blue Laser Diode Supply Concentration: Nichia and OSRAM control gallium-nitride epitaxy capacity, creating input bottlenecks for second-tier projector OEMs. GB Standard Laser Safety

Global GaN Laser Diodes Market Size, Industry Share, Trends

GaN Laser Diodes Market Overview 2026-2033 The GaN (Gallium Nitride) laser diodes market represents a critical frontier in optoelectronic innovation, characterized by the integration of

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