

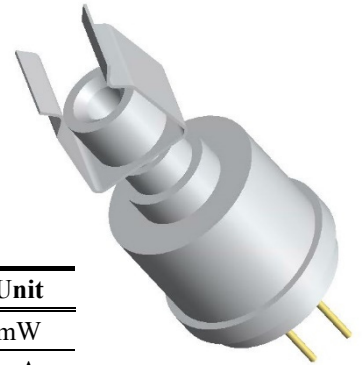
Part No. NUV209

Applications



Features

- Typical Optical Output Power: 900mW
- Typical Peak Wavelength: 403nm
- Multi-transverse Mode
- Laser Diode with a Fiber Receptacle (for easy attachment of an optical fiber)
- Designed to be used with an SC Ferrule



Absolute Maximum Ratings

| Item | Symbol | Absolute Maximum Ratings | Unit |
|---|------------------|--------------------------|------|
| Optical Output Power ^{1, 2} | P _O | Figure 1 | mW |
| Allowable Reverse Current | I _R | 85 | mA |
| Storage Temperature | T _{stg} | -40 ~ 85 | °C |
| Operating Case Temperature | T _C | 15 ~ 30 | °C |
| Airborne Particle Cleanliness ^{3, 4} | - | ISO Class 6 | - |

¹ Characteristics measured with an optical fiber attached to the LD. Conditions of the attached optical fiber: core diameter=40μm, NA=0.20, length=1.0m, using an SC ferrule. The optical fiber and the SC ferrule have polished-flat end faces.

² The maximum rating provided in Figure 1 should not be exceeded.

As the forward current and/or the operating case temperature become higher, the lifetime of the LD will become shorter.

³ Reference Standard: ISO 14644-1

⁴ Using chemical filter(s) is recommended.

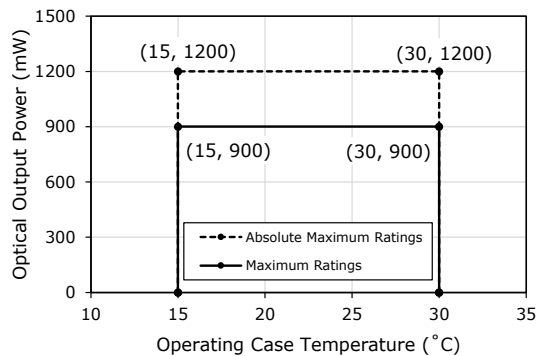


Figure 1. Derating Characteristics

Initial Electrical/Optical Characteristics^{1, 5, 6}

| Item | Symbol | Test Condition | Min | Typ. | Max | Unit |
|-------------------|-----------------|-----------------------|-----|--------|------|------|
| Peak Wavelength | λ _p | P _O =900mW | 400 | (403) | 406 | nm |
| Threshold Current | I _{th} | CW | 150 | (280) | 400 | mA |
| Operating Current | I _{OP} | P _O =900mW | 700 | (1000) | 1400 | mA |
| Slope Efficiency | η | CW | 0.9 | (1.4) | 2.0 | W/A |
| Operating Voltage | V _{OP} | P _O =900mW | 3.8 | (4.3) | 4.8 | V |

⁵ Characteristics values are values measured under Nichia's measurement conditions/environments; there may be variations for the measurement repeatability/reproducibility of these values. The values in parentheses are for reference purposes only.

⁶ Characteristics at T_C = 25°C and measured in CW mode.

The above specifications are for reference purposes only and are subject to change without prior notice.

NICHIA CORPORATION

◆ HEADQUARTERS

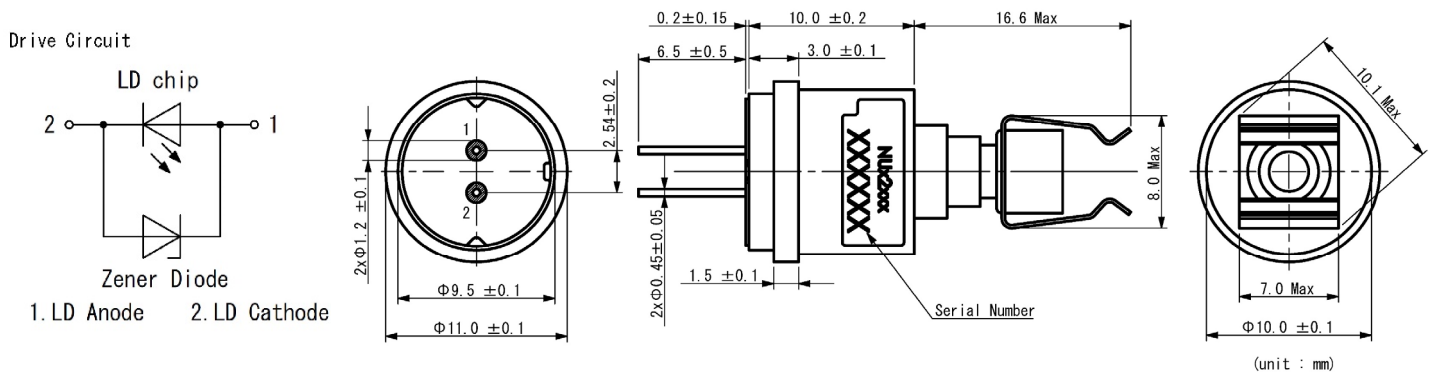
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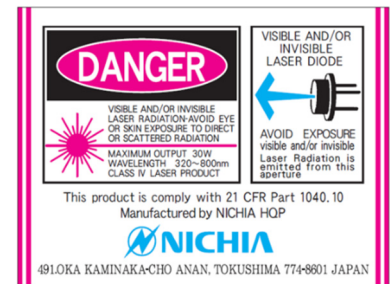
■ Outline Dimension



■ Cautions

(1) Laser Hazard

- This LD is a laser diode classified as Class 4 per JIS C 6802, IEC 60825-1, and FDA/CDRH 21 CFR Part 1040.10; this is the most hazardous class. Ensure that the latest editions of IEC 60825-1 and/or applicable standards for general safety requirements and guidance for laser products are complied with.
- There is a risk of serious injury to the skin/eyes if they are exposed to the LD light. Even diffused/reflected light is harmful. It must be ensured that the maximum permissible exposure is not exceeded; use proper safety glasses for the wavelength and optical output power of the LD.



(2) Storage

- To avoid condensation, the LDs must not be stored in areas where temperature and humidity fluctuate greatly both before and after opening the antistatic bag. The LDs must be stored under an environment of 5-35°C, 40-75% RH.
- This LD has plated parts. If the LDs are exposed to a corrosive environment, it may cause the plated surface to tarnish causing issues (e.g. electric connection failures). Once the antistatic bag is opened, ensure that the LDs are assembled into the chosen application/heatsink immediately; if they are not used immediately, they must be stored in a hermetically sealed container (e.g. the original antistatic bag).
- Do not store the LDs in a dusty environment.
- Do not expose the LDs to direct sunlight and/or an environment over a long period of time where the temperature is higher than normal room temperature.

(3) Design Consideration

- This LD is a semiconductor device that has a high current density during operation in the emission layer. Exceeding the Absolute Maximum Ratings may damage the LD. The circuit must be designed to ensure that the Absolute Maximum Ratings (see Absolute Maximum Ratings and Figure 1) are not exceeded even if the LDs are operated only for a short period of time.
- Since the lifetime of the LD will become shorter as the operating current and/or the optical output power become larger, the maximum ratings provided in Figure 1 should not be exceeded.
- This LD should be operated in an automatic power control (APC) circuit. The circuit to operate the LDs should be designed taking into consideration the current rise time. If no measures are incorporated into the circuit and the current rise time is too short, even though there seems to be no issues (e.g. inrush current, etc.) with the waveform of the current when observed with an oscilloscope, it may cause the LDs to emit excessive light resulting in it being damaged.
- To control the optical output power of the LD accurately in APC mode, use an external PD; the change rate of the monitor current (I_M) of the PD in the LD and the change rate of the optical output power vary depending on each individual LD.
- When the power supply is turned on or off, the circuit may have issues (e.g. chattering, current spikes, inrush current, etc.) resulting in the Absolute Maximum Rating of the Optical Output Power being exceeded. The circuit must be designed to prevent this from occurring.
- The failure modes for this LD can be either a short circuit or an open circuit and this is very important to understand when designing the circuit. If the LDs become short-circuited during operation, the forward voltage (V_F) may fluctuate resulting in damage to the circuit. To ensure that there are no issues with the designed circuit when these failure modes occur in the LDs, perform a sufficient verification prior to use. This verification should be performed taking into consideration the conditions/environments in which the end-product containing these LDs will actually be used.
- Depending on the environment where the LD is operated, dust/particles may be attracted by the light of the LD (i.e. optical dust collection effect) and adhere to the end faces of the optical fiber, the top surface of the lens, etc., resulting in an adverse effect on the optical characteristics.

(4) Handling Precautions

- When handling the LD, do not apply excessive force to the holder and/or the clip; otherwise, they may be damaged causing the optical fiber not to be attached to the LD properly.
- This LD is hermetically sealed; ensure that excessive force is not applied to the sealing glass at the base of the lead when handling the LDs. If the glass is damaged, the hermetic seal for the LD may fail causing reduction in the optical output power and/or change in the shape of the beam to be accelerated and eventually the LD not to illuminate. Note that if the LD is dropped, it may also break the hermetic seal for the LD.
- Do not solder the LD directly to a heatsink.
- The pull and push force applied to the lead of this LD must be $\leq 5N$.
- When bending the lead, securely hold the lead on the side closer to the stem from where the bending occurs in order to reduce the load that is applied to the base of the lead. Bending must be done only once.
Maximum Bending Angle: 90°
Bending location: No closer than 2mm from the base of the lead

(5) Soldering

- This LD is designed to be hand soldered. If reflow soldered, Nichia will not guarantee the reliability of the LDs.
- Ensure that the hand soldering is done under the conditions below:
Soldering temperature: $\leq 350^\circ C$, ≤ 3 sec
Soldering location: 2mm from the base of the lead
- Ensure that the tip of the soldering iron does not touch the sealing glass at the base of the lead.
- Ensure that solder does not attach to the sealing glass at the base of the lead.

(6) Optical Fiber

- Ensure that the end faces of the optical fiber are not damaged/contaminated before attaching the optical fiber to the LD; it may cause the end faces of the optical fiber to become burnt resulting in a reduction in the optical output power and/or an adverse effect on the optical characteristics.
- When attaching/detaching an optical fiber to/from the LD, ensure that the clip and/or the holder are not damaged.

(7) Electrostatic Discharges (ESD) and Electrical Surges

- This LD is sensitive to transient excessive voltages (e.g. ESD, lightning surge). If this excessive voltage occurs in the circuit, it may cause the LD to be damaged causing issues (e.g. the LD to become dimmer or not to illuminate). Ensure that when handling the LDs, necessary measures are taken to protect them from ESD.

(8) Thermal Management

- The temperature of the LDs while in operation may vary depending on the thermal resistance of the heatsink and other materials (e.g. thermal interface materials, etc.), the condition of the contact surface of the heatsink (e.g. holes/opening, cavities/recesses, foreign materials, etc.), and how the LDs are attached to the heatsink (e.g. with/without grease, etc.). Once the heatsink and other materials are selected, sufficient verification should be performed to ensure that adequate adhesion is achieved and that Absolute Maximum Operating Case Temperature (T_C) is not exceeded.
- When thermal grease is used, ensure that it does not adversely affect the electrical characteristics of the LD and that the volatile compounds from the grease do not have an effect on the optical characteristics.

(9) Miscellaneous

- This LD is intended to be used for household appliances and electronic devices (e.g. mobile communication devices); it is not designed or manufactured for use in applications that require safety critical functions (e.g. automobiles, trains, vessels, aircraft, spacecraft, submarine repeaters, nuclear reactor control systems, traffic control equipment, combustion equipment, life support systems, safety devices, etc.). If the LDs are planned to be used for these applications, unless otherwise detailed in the specification, Nichia will neither guarantee that the LD is fit for that purpose nor be responsible for any resulting property damage, injuries and/or loss of life/health. This LD does not comply with IATF 16949 and is not intended for automotive applications.
- When using this LD for the chosen application (e.g. equipment, devices, etc.), design for safety must be considered to ensure that any LD failure does not cause any injuries to the human body and/or damage to property.
- This LD can fail at a certain rate. The failure rate and/or failure mode of the LD can vary depending on several factors (e.g. circuit, environmental conditions, etc.).
- Without prior written permission from Nichia, the customer will not reverse engineer, disassemble or otherwise attempt to extract knowledge/design information from the LD. In the case of any incident that appears not to conform to the foregoing specifications, the local Nichia sales representative should be notified to discuss instructions on how to proceed while ensuring that the LD in question is not disassembled.
- Both the customer and Nichia will agree on the official specifications for the supplied LDs before any programs are officially launched. Without this agreement in writing (i.e. Customer Specific Specification), changes to the content of this specification may occur without notice (e.g. changes to the foregoing specifications and appearance, discontinuation of the LDs, etc.).
- All copyrights and other intellectual property rights in this specification in any form are reserved by Nichia or the right holders who have granted Nichia permission to use the content. Without prior written permission from Nichia, no part of this specification may be reproduced in any form or by any means.