NEC

# LASER DIODE
# NX7461LE

## 1 480 nm EDFA APPLICATION
## InGaAsP MQW-FP LASER DIODE MODULE

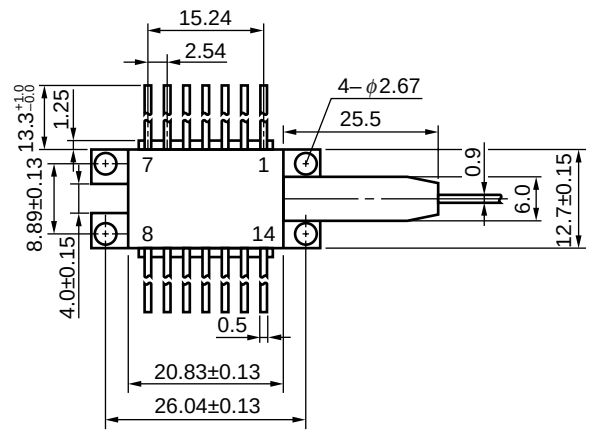
### DESCRIPTION

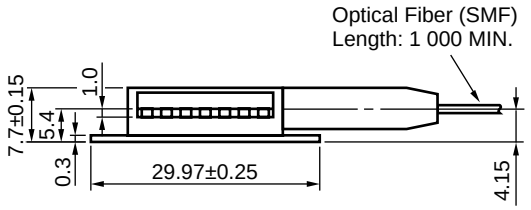
The NX7461LE is a 1 480 nm pumping laser diode module with optical isolator for an EDFA (Er Doped optical Fiber Amplifier) that can expand the transmission span and compensate optical losses. The device is a Multiple Quantum Well (MQW) structured Fabry-Perot (FP) laser diode that features high output power, high efficiency, and stable fundamental mode.

### FEATURES

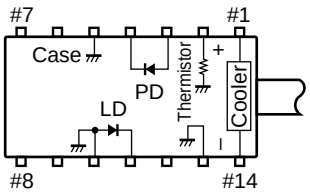
- InGaAsP strained MQW-FP laser diode
- High output power $P_f$ = 150 mW MIN. @ $I_F$ = 600 mA CW
- Internal optical isolator, thermoelectric cooler and InGaAs monitor photo diode
- Hermetically sealed 14-pin butterfly package
- Single mode fiber pigtail

### ★ PACKAGE DIMENSIONS (UNIT: mm)




**TOP VIEW**




**PIN CONNECTIONS**

| Pin No. | Function | Pin No. | Function |
|---|---|---|---|
| 1 | Cooler Anode | 8 | NC |
| 2 | Thermistor | 9 | NC |
| 3 | PD Anode | 10 | LD Anode, |
| 4 | PD Cathode | | Case Ground |
| 5 | Case Ground | 11 | LD Cathode |
| 6 | NC | 12 | NC |
| 7 | NC | 13 | Case Ground |
| | | 14 | Cooler Cathod |



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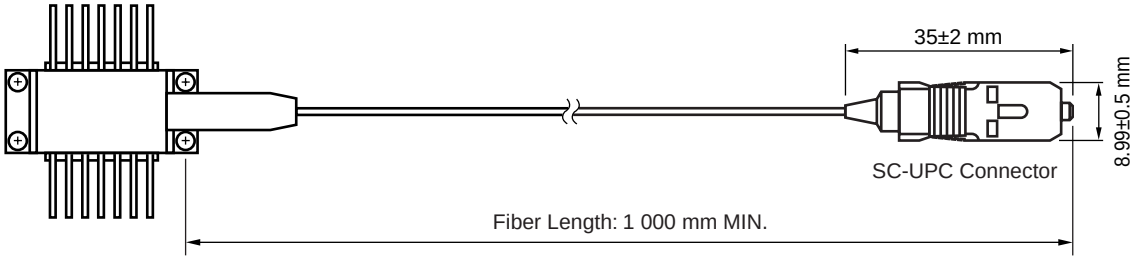
**The mark ★ shows major revised points.**

## ★ OPTICAL FIBER CHARACTERISTICS

| Parameter | Specification | Unit |
|---|---|---|
| Mode Field Diameter | 9.5±1 | μm |
| Cladding Diameter | 125±2 | μm |
| Maximum Cladding Noncircularity | 2 | % |
| Maximum Core/Cladding Concentricity | 1.6 | % |
| Outer Diameter | 0.9±0.1 | mm |
| Cut-off Wavelength | 1 100 to 1 270 | nm |
| Minimum Fiber Bending Radius | 30 | mm |
| Fiber Length | 1 000 MIN. | mm |
| Flammability | UL1581 VW-1 | |



## ORDERING INFORMATION

| Part Number | Available Connector |
|---|---|
| NX7461LE | Without Connector |
| NX7461LE-BA | With FC-PC Connector |
| NX7461LE-CA | With SC-PC Connector |

## ★ ABSOLUTE MAXIMUM RATINGS ($T_C$ = 25 °C, unless otherwise specified)

| Parameter | Symbol | Ratings | Unit |
|---|---|---|---|
| Forward Current of LD | $I_F$ | 720 | mA |
| Reverse Voltage of LD | $V_R$ | 2.0 | V |
| Forward Current of PD | $I_F$ | 10 | mA |
| Reverse Voltage of PD | $V_R$ | 20 | V |
| Operating Case Temperature | $T_C$ | –20 to +75 | °C |
| Storage Temperature | $T_{stg}$ | –40 to +85 | °C |
| Thermistor Current | $I_t$ | 0.5 | mA |
| Thermistor Voltage | $V_t$ | 12.0 | V |
| Cooler Current | $I_C$ | 1.8 | A |
| Cooler Voltage | $V_C$ | 6.0 | V |
| Lead Soldering Temperature | $T_{sld}$ | 260 (10 sec.) | °C |

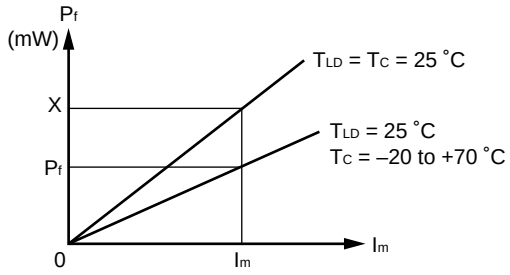
## ★ ELECTRO-OPTICAL CHARACTERISTICS ($T_{LD}$ = 25 °C, $T_C$ = –20 to +70 °C, unless otherwise specified)

| Parameter | Symbol | Conditions | MIN. | TYP. | MAX. | Unit |
|---|---|---|---|---|---|---|
| Threshold Current | $I_{th}$ | CW | | 50 | 60 | mA |
| Forward Voltage | $V_F$ | $I_F$ = 600 mA | | 2.4 | 2.7 | V |
| Optical Output Power from Fiber | $P_f$ | $I_F$ = 600 mA, $T_{LD}$ = $T_C$ = 25 °C | 150 | | | mW |
| Center Emission Wavelength | $\lambda_C$ | $I_F$ = 600 mA, RMS (–20 dB) | 1 460 | 1 480 | 1 490 | nm |
| Spectrum Width | $\sigma$ | $I_F$ = 600 mA, RMS (–20 dB) | | 4.0 | 8.0 | nm |
| Isolation | $I_S$ | 1 460 nm to 1 490 nm | 25 | | | dB |

**ELECTRO-OPTICAL CHARACTERISTICS**
**(Applicable to Monitor PD: $T_{LD}$ = 25 °C, $T_C$ = –20 to +70 °C)**

| Parameter | Symbol | Conditions | MIN. | TYP. | MAX. | Unit |
|---|---|---|---|---|---|---|
| Monitor Current | $I_m$ | $V_R$ = 5 V, $I_F$ = 600 mA | 100 | 600 | 1 000 | μA |
| Monitor Dark Current | $I_D$ | $V_R$ = 5 V | | 2 | 10 | nA |
| Tracking Error | $\gamma^{*1}$ | $I_m$ = const. | | | 0.5 | dB |

***1** $\gamma = \left| 10 \log \frac{P_f}{150 \text{ mW}} \right|$




(@$P_f$ (25 ˚C) = 150 mW)

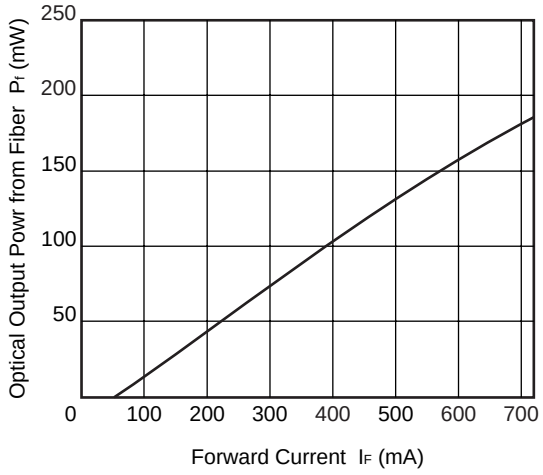
★ **ELECTRO-OPTICAL CHARACTERISTICS**
**(Applicable to Thermistor and TEC: $T_{LD}$ = 25 °C, $T_C$ = –20 to +70 °C)**

| Parameter | Symbol | Conditions | MIN. | TYP. | MAX. | Unit |
|---|---|---|---|---|---|---|
| Thermistor Resistance | R | $T_{LD}$ = 25 °C | 9.5 | 10.0 | 10.5 | kΩ |
| B Constant | B | | 3 350 | 3 450 | 3 550 | K |
| Cooler Current | $I_C$ | $\Delta T$ = 45 °C, $I_F$ = 720 mA | | 1.2 | 1.4 | A |
| Cooler Voltage | $V_C$ | $\Delta T$ = 45 °C, $I_F$ = 720 mA | | 3.0 | 3.6 | V |
| Cooling Capacity | $\Delta T^{*1}$ | $I_C$ = 1.4 A, $I_F$ = 720 mA | 45 | | | K |

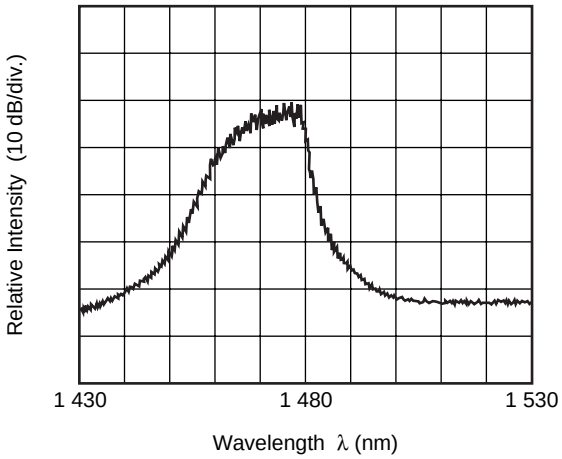
***1** $\Delta T = \left| T_C - T_{LD} \right|$

## ★ TYPICAL CHARACTERISTICS ($T_C$ = 25 °C)

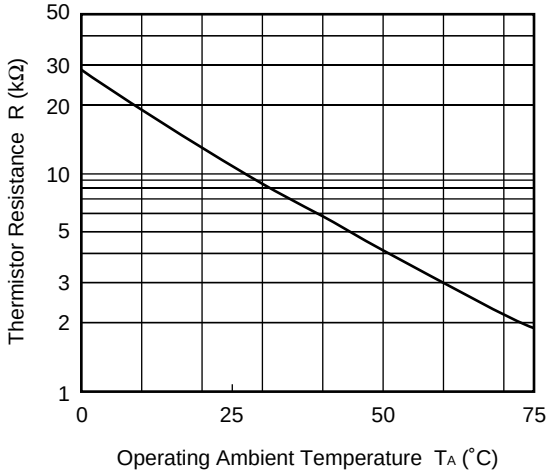
OPTICAL OUTPUT POWER FROM FIBER vs. FORWARD CURRENT




LONGITUDINAL MODE




THERMISTOR RESISTANCE vs. OPERATING AMBIENT TEMPERATURE




**Remark** The graphs indicate nominal characteristics.

## ★ LD FAMILY FOR DENSE WDM APPLICATION

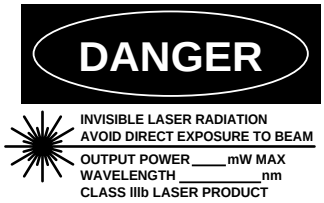
| Part Number | Absolute Maximum Ratings | | Typical Characteristics ($T_C$ = 25 °C) | | | Description | Package |
|---|---|---|---|---|---|---|---|
| | $T_C$ (°C) | $T_{stg}$ (°C) | $I_{th}$ (mA) | $P_f$ (mW) | $\lambda_C$ (nm) | | |
| | | | TYP. | MIN. | TYP. | | |
| NX7460LE | −20 to +65 | −40 to +85 | 550 | 120 | 1 480 | For EDFA pumping | BFY |
| NX7461LE | −20 to +75 | −40 to +85 | 600 | 150 | 1 480 | For EDFA pumping | BFY |

### REFERENCE

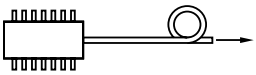
| Document Name | Document No. |
|---|---|
| NEC semiconductor device reliability/quality control system | C11159E |
| Quality grades on NEC semiconductor devices | C11531E |
| Semiconductor device mounting technology manual | C10535E |
| SEMICONDUCTOR SELECTION GUIDE Products & Packages (CD-ROM) | X13769X |

**CAUTION**

**Within this device there exists GaAs (Gallium Arsenide) material which is a harmful substance if ingested. Please do not under any circumstances break the hermetic seal.**




**SEMICONDUCTOR LASER**



**AVOID EXPOSURE-Invisible Laser Radiation is emitted from this aperture**

**NEC Corporation**
**NEC Building, 7-1, Shiba 5-chome, Minato-ku, Tokyo 108-01, Japan**

**Type number:** _____
**Manufactured:** _____
**Serial Number:** _____

**This product conforms to FDA regulations as applicable to standards 21 CFR Chapter 1. Subchapter J.**

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