PRELIMINARY DATA SHEET

NEC

LASER DIODE

# NX8510UD Series

## 1 470 TO 1 610 nm FOR CWDM 2.5 Gb/s InGaAsP MQW-DFB LASER DIODE TOSA

### DESCRIPTION

The NX8510UD is a 1 470 to 1 610 nm Multiple Quantum Well (MQW) structured Distributed Feed-Back (DFB) laser diode TOSA (transmitter optical sub-assembly) with InGaAs monitor PIN-PD in a receptacle type package designed for SFF/SFP transceiver with LC duplex receptacle. This device is ideal for 2.5 Gb/s CWDM application.

### FEATURES

- Internal optical isolator
- Optical output power $P_f$ = 2.0 mW
- Peak emission wavelength $\lambda_p$ = 1 470 to 1 610 nm (Based on CWDM)
- Low threshold current $I_{th}$ = 10 mA TYP. @ $T_C$ = 25°C
- ★ Operating case temperature range $T_C$ = –20 to +85°C
- Side mode suppression ratio SMSR = 40 dB
- InGaAs monitor PIN-PD
- Small package $\phi$3.8 mm TOSA (Total length 12.0 mm MAX.)



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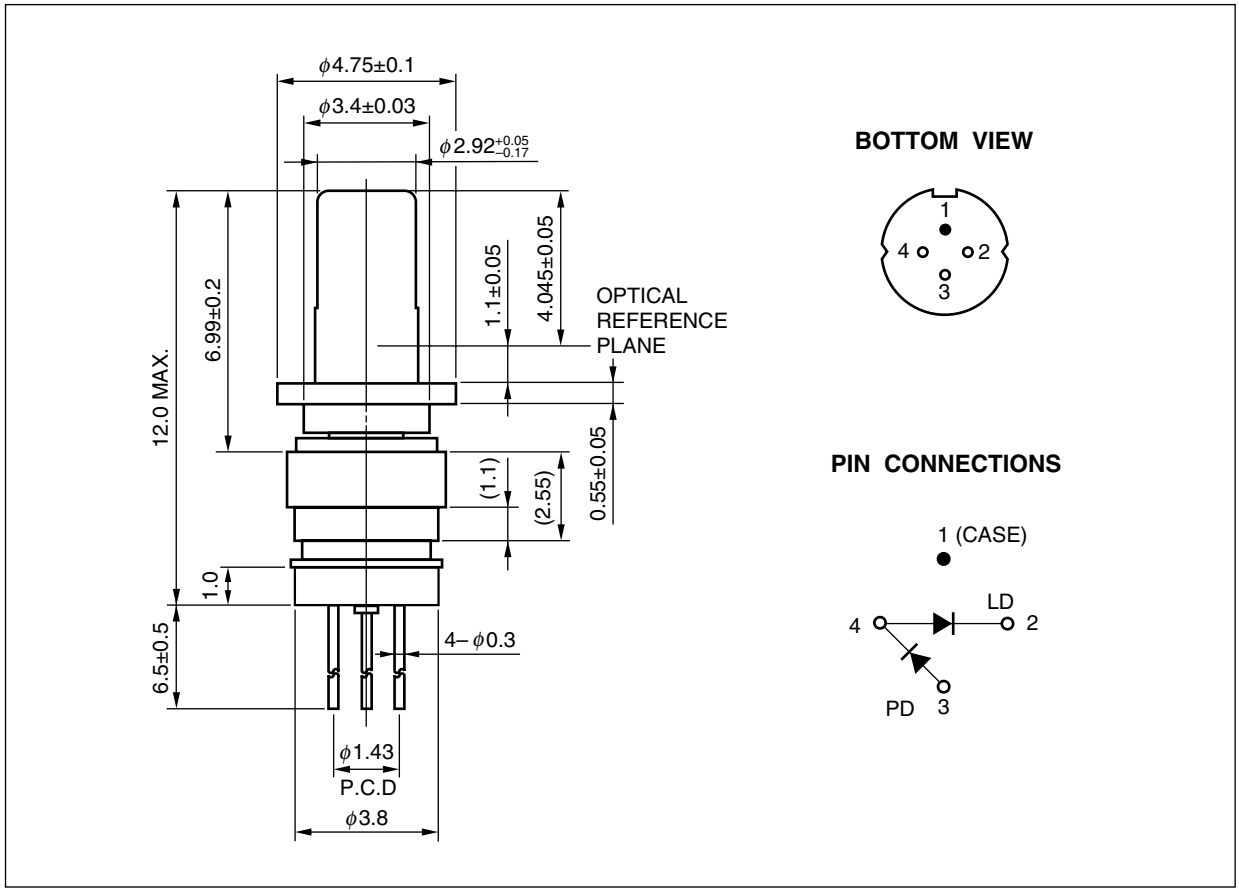
**The mark ★ shows major revised points.**

**PACKAGE DIMENSIONS (UNIT: mm)**



## ORDERING INFORMATION

NX8510UD xx

- xx: Wavelength code: Refer to **Table A**
- UD: Package code : Refer to **PACKAGE DIMENSIONS**

## ABSOLUTE MAXIMUM RATINGS

| Parameter | Symbol | Ratings | Unit |
|---|---|---|---|
| Optical Output Power from Fiber | $P_f$ | 5.0 | mW |
| Forward Current of LD | $I_F$ | 150 | mA |
| Reverse Voltage of LD | $V_R$ | 2.0 | V |
| Forward Current of PD | $I_F$ | 2.0 | mA |
| Reverse Voltage of PD | $V_R$ | 15 | V |
| ★ Operating Case Temperature | $T_C$ | –20 to +85 | °C |
| Storage Temperature | $T_{stg}$ | –40 to +85 | °C |
| Lead Soldering Temperature | $T_{sld}$ | 350 (3 sec.) | °C |

## ★ ELECTRO-OPTICAL CHARACTERISTICS ($T_C$ = –20 to +85°C, unless otherwise specified)

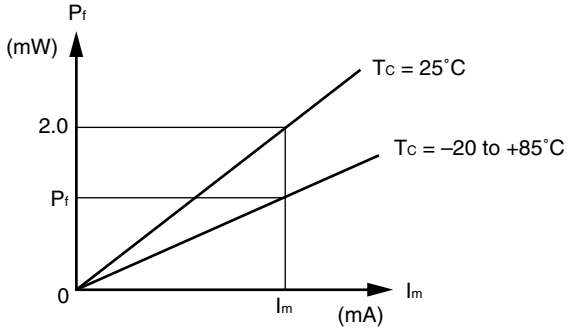
| Parameter | Symbol | Conditions | MIN. | TYP. | MAX. | Unit |
|---|---|---|---|---|---|---|
| Operating Voltage | $V_{op}$ | CW, $P_f$ = 2.0 mW | | 1.1 | 1.6 | V |
| Threshold Current | $I_{th}$ | CW, $T_C$ = 25°C | | 10 | 20 | mA |
| ★ | | CW | | | 50 | |
| Optical Output Power from Fiber | $P_f$ | CW, $T_C$ = 25°C, $I_F$ = $I_{th}$ + 20 mA | | 2.0 | | mW |
| Differential Efficiency | $\eta_d$ | CW, $P_f$ = 2.0 mW, $T_C$ = 25°C | 0.07 | 0.1 | | W/A |
| | | CW, $P_f$ = 2.0 mW | 0.04 | | | |
| ★ Peak Emission Wavelength | $\lambda_p$ | CW, $P_f$ = 2.0 mW, RMS (–20 dB), $T_C$ = 35°C | $\lambda_p$–2 | $\lambda_p$ *1 | $\lambda_p$+2 | nm |
| Temperature Dependence of Peak Emission Wavelength | $\Delta\lambda/\Delta T$ | CW | 0.08 | 0.10 | 0.12 | nm/°C |
| Side Mode Suppression Ratio | SMSR | CW, $P_f$ = 2.0 mW | 30 | 40 | | dB |
| Rise Time | $t_r$ | $I_b$ = $I_{th}$, 20-80%, $P_f$ = 2.0 mW | | | 100 | ps |
| Fall Time | $t_f$ | $I_b$ = $I_{th}$, 80-20%, $P_f$ = 2.0 mW | | | 150 | ps |
| Monitor Current | $I_m$ | CW, $V_R$ = 1.5 V, $P_f$ = 1.0 mW | 100 | 500 | 1 000 | μA |
| ★ Monitor Dark Current | $I_D$ | $V_R$ = 1.5 V, $T_C$ = 25°C | | 0.1 | 10 | nA |
| ★ | | $V_R$ = 1.5 V | | 10 | 100 | |
| Tracking Error*2 | γ | CW, $I_m$ = const. (@ $P_f$ = 2.0 mW) | –1.0 | | 1.0 | dB |
| Connector Repeatability | – | With master pigtail | –1.0 | | 1.0 | dB |

***1** Available Available for CWDM Wavelengths based on ITU-T recommendations
$\lambda_p$ = 1 470, 1 490, 1 510, 1 530, 1 550, 1 570, 1 590, 1 610 nm
Please refer to **Table A**.

★ **Table A: CWDM wavelength code (@ $T_C$ = 35°C)**

| Wavelength Code | MIN. (nm) | TYP. (nm) | MAX. (nm) |
|---|---|---|---|
| 47 | 1 468 | 1 470 | 1 472 |
| 49 | 1 488 | 1 490 | 1 492 |
| 51 | 1 508 | 1 510 | 1 512 |
| 53 | 1 528 | 1 530 | 1 532 |
| 55 | 1 548 | 1 550 | 1 552 |
| 57 | 1 568 | 1 570 | 1 572 |
| 59 | 1 588 | 1 590 | 1 592 |
| 61 | 1 608 | 1 610 | 1 612 |

★ ***2*** Tracking Error: γ




$$\gamma = \left| 10 \log \frac{P_f}{2.0} \right| [dB]$$

## LD $\phi$3.8 mm FP-TOSA PACKAGES FAMILY FOR OPTICAL FIBER COMMUNICATIONS

| Part Number | Absolute Maximum Ratings | | Electro-Optical Characteristics | | | | Application | Package |
|---|---|---|---|---|---|---|---|---|
| | | | @$T_C$ = 25°C | @$T_C$ | | | | |
| | $T_C$ (°C) | $T_{stg}$ (°C) | $I_{th}$ (mA) | $P_f$ (mW) | $\lambda_C$ (nm) | | | |
| | | | TYP. | TYP. | MIN. | MAX. | | |
| NX7312UA | −40 to +85 | −40 to +85 | 8 | 0.2 | 1 274 | 1 356 | 156 Mb/s: STM-1 (S-1.1) | $\phi$3.8 mm TOSA |
| | | | | | | | 622 Mb/s: STM-4 (S-4.1) | |
| NX7313UA | −40 to +85 | −40 to +85 | 8 | 0.6 | 1 270 | 1 355 | 1.25 Gb/s: GbE | $\phi$3.8 mm TOSA |
| NX7314UA | −40 to +85 | −40 to +85 | 8 | 1.0 | 1 263 | 1 360 | 156 Mb/s: STM-1 (L-1.1) | $\phi$3.8 mm TOSA |
| NX7315UA | −40 to +85 | −40 to +85 | 8 | 0.6 | 1 266 | 1 360 | 2.5 Gb/s: STM-16 (I-16) | $\phi$3.8 mm TOSA |

## LD $\phi$3.8 mm DFB-TOSA PACKAGES FAMILY FOR OPTICAL FIBER COMMUNICATIONS

| Part Number | Absolute Maximum Ratings | | Electro-Optical Characteristics | | | | Application | Package |
|---|---|---|---|---|---|---|---|---|
| | | | @$T_C$ = 25°C | @$T_C$ | | | | |
| | $T_C$ (°C) | $T_{stg}$ (°C) | $I_{th}$ (mA) | $P_f$ (mW) | $\lambda_p$ (nm) | | | |
| | | | TYP. | TYP. | MIN. | MAX. | | |
| NX8310UA | −40 to +85 | −40 to +85 | 10 | 2.0 | 1 280 | 1 335 | 622 Mb/s: STM-4 (L-4.1) | $\phi$3.8 mm TOSA |
| NX8311UD | −20 to +85 | −40 to +85 | 10 | 2.0 | 1 280 | 1 335 | 2.5 Gb/s: STM-16 (L-16.1) | $\phi$3.8 mm TOSA |
| NX8312UA | −20 to +85 | −40 to +85 | 10 | 1.0 | 1 280 | 1 335 | 2.5 Gb/s: STM-16 (S-16.1) | $\phi$3.8 mm TOSA |
| NX8312UD | −20 to +85 | −40 to +85 | 10 | 1.0 | 1 280 | 1 335 | 2.5 Gb/s: STM-16 (S-16.1) | $\phi$3.8 mm TOSA |
| ★ NX8510UD Series | −20 to +85 | −40 to +85 | 10 | 2.0 | $\lambda_p$−2 *1 | $\lambda_p$+2 *1 | 2.5 Gb/s: CWDM | $\phi$3.8 mm TOSA |
| ★ NX8511UD | −20 to +85 | −40 to +85 | 10 | 2.0 | 1 530 | 1 570 | 2.5 Gb/s: STM-16 (L-16.2) | $\phi$3.8 mm TOSA |

★ ***1** $T_C$ = 35°C
Available for CWDM Wavelengths based on ITU-T recommendations
$\lambda_p$ = 1 470, 1 490, 1 510, 1 530, 1 550, 1 570, 1 590, 1 610 nm

**REFERENCE**

| Document Name | Document No. |
|---|---|
| OPTICAL SEMICONDUCTOR DEVICES FOR FIBEROPTIC COMMUNICATIONS SELECTION GUIDE | PL10161E |
| Opto-Electronics Devices Pamphlet | PX10160E |

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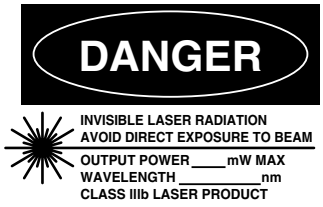
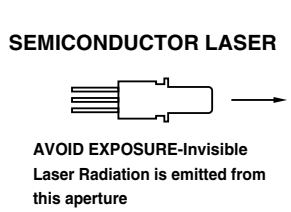
## SAFETY INFORMATION ON THIS PRODUCT




| | |
|---|---|
| **Warning** Laser Beam | A laser beam is emitted from this diode during operation.<br>The laser beam, visible or invisible, directly or indirectly, may cause injury to the eye or loss of eyesight.<br>• Do not look directly into the laser beam.<br>• Avoid exposure to the laser beam, any reflected or collimated beam. |
| **Caution** GaAs Products | This product uses gallium arsenide (GaAs).<br>GaAs vapor and powder are hazardous to human health if inhaled or ingested, so please observe the following points.<br>• Follow related laws and ordinances when disposing of the product. If there are no applicable laws and/or ordinances, dispose of the product as recommended below.<br>1. Commission a disposal company able to (with a license to) collect, transport and dispose of materials that contain arsenic and other such industrial waste materials.<br>2. Exclude the product from general industrial waste and household garbage, and ensure that the product is controlled (as industrial waste subject to special control) up until final disposal.<br>• Do not burn, destroy, cut, crush, or chemically dissolve the product.<br>• Do not lick the product or in any way allow it to enter the mouth. |

▶**For further information, please contact**

**NEC Compound Semiconductor Devices, Ltd.** **http://www.ncsd.necel.com/**
E-mail: salesinfo@ml.ncsd.necel.com (sales and general)
techinfo@ml.ncsd.necel.com (technical)
5th Sales Group, Sales Division TEL: +81-44-435-1588 FAX: +81-44-435-1579

**NEC Compound Semiconductor Devices Hong Kong Limited**
E-mail: ncsd-hk@elhk.nec.com.hk (sales, technical and general)
Hong Kong Head Office TEL: +852-3107-7303 FAX: +852-3107-7309
Taipei Branch Office TEL: +886-2-8712-0478 FAX: +886-2-2545-3859
Korea Branch Office TEL: +82-2-558-2120 FAX: +82-2-558-5209

**NEC Electronics (Europe) GmbH** **http://www.ee.nec.de/**
TEL: +49-211-6503-0 FAX: +49-211-6503-1327

**California Eastern Laboratories, Inc.** **http://www.cel.com/**
TEL: +1-408-988-3500 FAX: +1-408-988-0279

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