

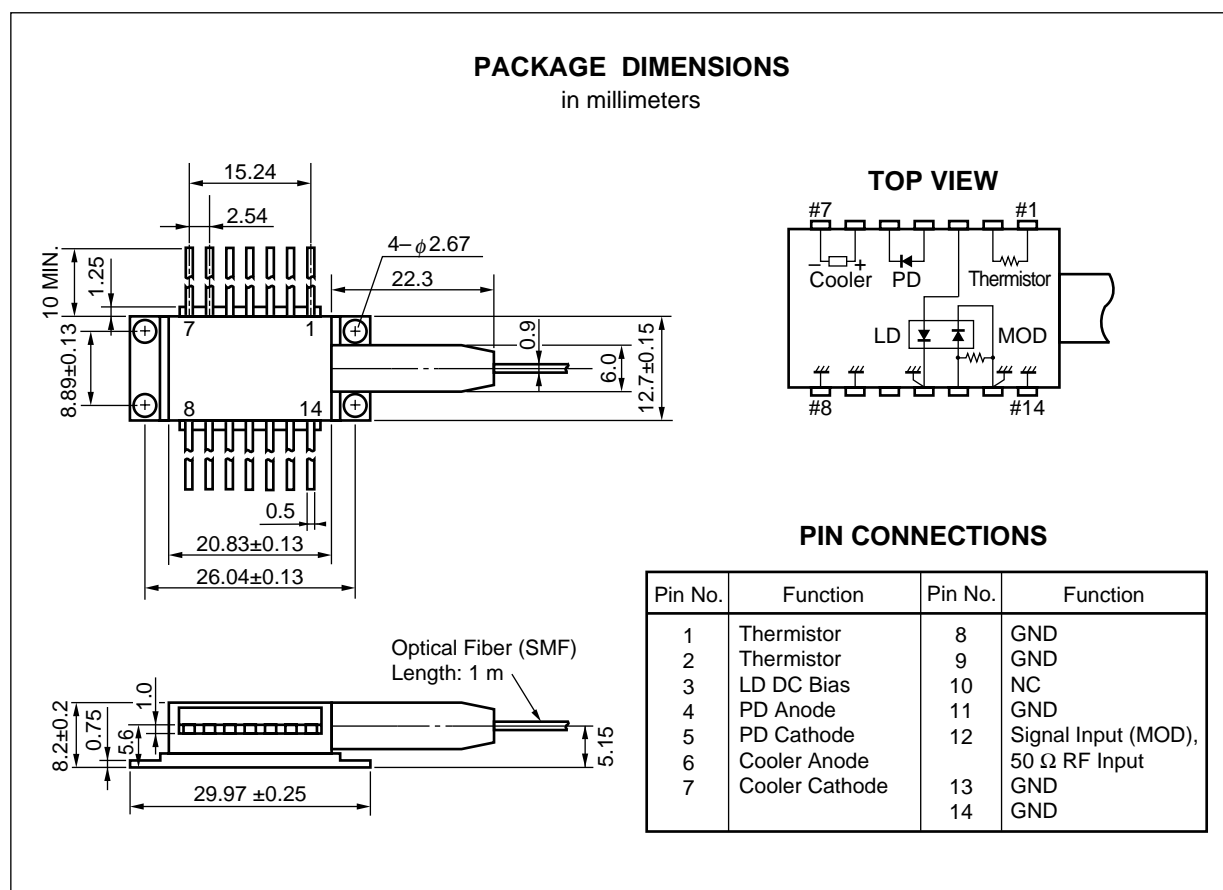
1 550 nm OPTICAL FIBER COMMUNICATIONS EA MODULATOR INTEGRATED MQW-DFB LASER DIODE MODULE FOR 2.5 Gb/s ULTRALONG-REACH APPLICATIONS

DESCRIPTION

The NDL7910P is an EA modulator integrated 1 550 nm DFB-LD for 2.5 Gb/s. The newly developed bandgap energy controlled Selective MOVPE technology is utilized as fabrication method. It is designed for 2.5 Gb/s ultralong-reach applications.

FEATURES

- Integrated electroabsorption modulator
- Low modulation voltage
- Wavelength selectable for ITU-T standards
- 14-pin butterfly package



The information in this document is subject to change without notice.

ORDERING INFORMATION

| Part Number | Available Connector |
|-------------|----------------------|
| NDL7910P | Without Connector |
| NDL7910PC | With FC-PC Connector |

ABSOLUTE MAXIMUM RATINGS (T_c = 25 °C, unless otherwise specified)

| Parameter | Symbol | Ratings | Unit |
|-----------------------------------|------------------|------------|------|
| Optical Output Power from Fiber | P _f | 10 | mW |
| Forward Current of LD | I _{FLD} | 150 | mA |
| Reverse Voltage of LD | V _{RLD} | 2.0 | V |
| Forward Voltage of Modulator | V _{Fm} | 1 | V |
| Reverse Voltage of Modulator | V _{Rm} | 5 | V |
| Forward Current of PD | I _{FPD} | 1 | mA |
| Reverse Voltage of PD | V _{RPD} | 10 | V |
| Cooler Current | I _c | 1.5 | A |
| Cooler Voltage | V _c | 2.5 | V |
| Operating Case Temperature | T _c | −20 to +70 | °C |
| Storage Temperature | T _{stg} | −40 to +85 | °C |
| Lead Soldering Temperature (10 s) | T _{sld} | 260 | °C |

ELECTRO-OPTICAL CHARACTERISTICS

(T_{LD} = 25 °C, T_c = −20 to +70 °C, unless otherwise specified)

| Parameter | Symbol | Conditions | MIN. | TYP. | MAX. | Unit |
|---------------------------------|-------------------|--|-------|------|-------|------|
| Operating Current | I _{op} | | 50 | | 100 | mA |
| Modulation Center Voltage | V _{Rmc} | | 0.5 | | 1.5 | V |
| Modulation Voltage | V _{Rmpp} | | 2 | | 3 | V |
| Forward Voltage of LD | V _{FLD} | I _{FLD} = I _{op} | | | 1.8 | V |
| Threshold Current | I _{th} | | | 7 | 20 | mA |
| Optical Output Power from Fiber | P _f | V _{Rm} = 0 V, I _{FLD} = I _{op} | 0.5 | | | mW |
| Peak Emission Wavelength | λ _p | I _{FLD} = I _{op} , V _{Rm} = 0 V | 1 545 | | 1 560 | nm |
| Spectral Line Width | Δν | I _{FLD} = I _{op} , −20 dB, Under modulation ^{*1} | | 4 | | GHz |
| Side Mode Suppression Ratio | SMSR | I _{FLD} = I _{op} , V _{Rm} = 0 V | 30 | | | dB |
| Extinction Ratio | ER | I _{FLD} = I _{op} , Under modulation ^{*1} | 10 | | | dB |
| Cut-off Frequency | f _c | I _{FLD} = I _{op} , V _{Rm} = 1/2 V _{Rmpp} , −3 dB, 50 Ω | 3.2 | | | GHz |
| Rise Time | t _r | I _{FLD} = I _{op} , 20-80 %, Under modulation ^{*1} | | | 125 | ps |
| Fall Time | t _f | I _{FLD} = I _{op} , 80-20 %, Under modulation ^{*1} | | | 125 | ps |
| Isolation | I _s | | 30 | | | dB |

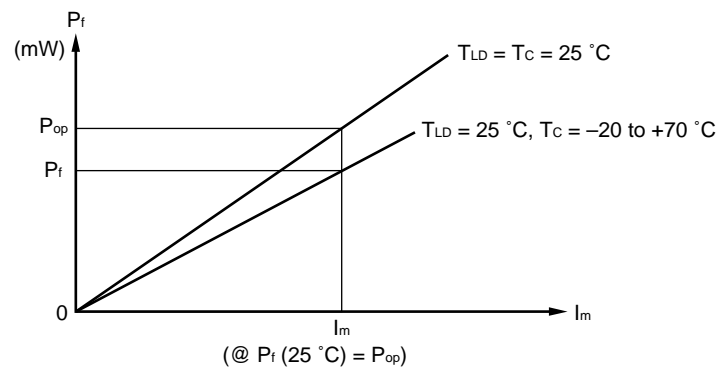
*1 2.48832 Gb/s, PRBS 2²³⁻¹, V_{Rm} = V_{Rmc} ± 1/2 V_{Rmpp}, NEC Test System

ELECTRO-OPTICAL CHARACTERISTICS

(Applicable to Monitor PD: $T_{LD} = 25\text{ }^{\circ}\text{C}$, $T_c = -20\text{ to }+70\text{ }^{\circ}\text{C}$)

| Parameter | Symbol | Conditions | MIN. | TYP. | MAX. | Unit |
|---------------------|------------|---|------|------|-------|---------------|
| Monitor Current | I_m | $I_{FLD} = I_{op}$, $V_{Rm} = 0\text{ V}$ | 20 | | 1 000 | μA |
| Dark Current | I_D | $V_{RPD} = 5\text{ V}$ | | | 10 | nA |
| Tracking Error | γ^* | $I_m = \text{const.}$ | | | 0.5 | dB |
| Monitor Capacitance | C_t | $V_{RPD} = 5\text{ V}$, $f = 1\text{ MHz}$ | | | 15 | pF |

$$*1 \quad \gamma = \left| 10 \log \frac{P_f}{P_{op}} \right|$$



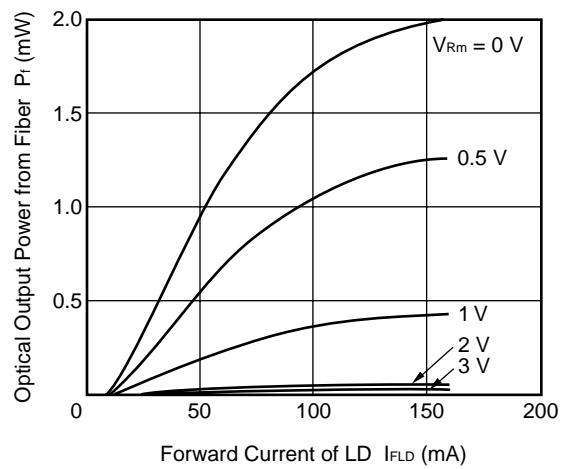
ELECTRO-OPTICAL CHARACTERISTICS

(Applicable to Thermistor and TEC: $T_{LD} = 25\text{ }^{\circ}\text{C}$, $T_c = -20\text{ to }+70\text{ }^{\circ}\text{C}$)

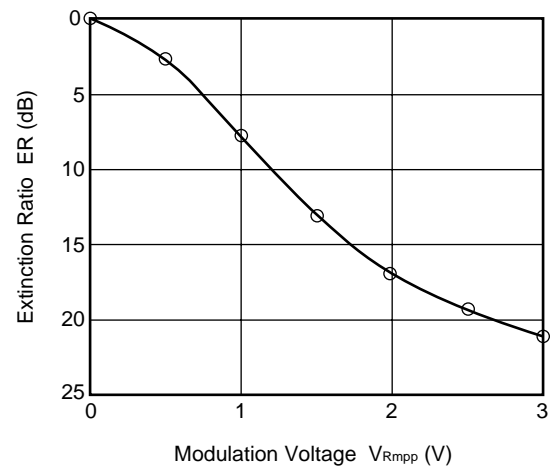
| Parameter | Symbol | Conditions | MIN. | TYP. | MAX. | Unit |
|-----------------------|--------|---------------------------------------|-------|-------|-------|------------------|
| Thermistor Resistance | R | $T_{LD} = 25\text{ }^{\circ}\text{C}$ | 9.5 | 10.0 | 10.5 | $\text{k}\Omega$ |
| B Constant | B | | 3 300 | 3 400 | 3 500 | K |
| Cooler Current | I_c | $\Delta T = 70 - T_{set}$ | | | 1.5 | A |
| Cooler Voltage | V_c | $\Delta T = 70 - T_{set}$ | | | 2.5 | V |

TYPICAL CHARACTERISTICS ($T_{LD} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified)

OPTICAL OUTPUT POWER FROM FIBER vs.
FORWARD CURRENT OF LD (CW)



EXTINCTION RATIO vs. MODULATION
VOLTAGE (CW)



Remark The graphs indicate nominal characteristics.

★ DFB-LD FAMILY FOR TELECOM

| Part Number | Absolute Maximum Ratings | | Typical Characteristics | | | SDH Application | Package |
|-----------------|--------------------------|--------------------------|-------------------------|------------------------|------------------------|---|---------|
| | T _c (°C) | T _{stg} (°C) | I _{th} (mA) | P _r (mW) | λ _c (nm) | | |
| | | | TYP. | MIN. | TYP. | | |
| NDL7603P Series | −40 to +85 | −40 to +85 | 15 | 2 | 1 310 | ≤ STM-4 : 622 Mb/s | Coaxial |
| NDL7620P Series | 0 to +70 | −40 to +85 | 45 (MAX.) | 2 | 1 310 | ≤ STM-16: 2.5 Gb/s | Coaxial |
| NDL7701P Series | −20 to +85 | −40 to +85 | 15 | 2 | 1 550 | ≤ STM-4 : 622 Mb/s | Coaxial |
| NDL7705P Series | −40 to +85 | −40 to +85 | 15 | 2 | 1 550 | ≤ STM-4 : 622 Mb/s | Coaxial |
| NX8562LB | −20 to +65 | −40 to +85 | 20 | 20 | 1 550 ^{*1} | CW Light Source for external modulator | BFY |
| NX8563LB Series | −20 to +65 | −40 to +85 | 20 | 10 | ITU-T ^{*2} | CW Light Source for external modulator | BFY |
| NDL7910P | −20 to +70 | −40 to +85 | 7 | 0.5 | 1 550 ^{*1} | ≤ STM-16: 2.5 Gb/s EA modulator integrated DFB-LD | BFY |

*1 Wavelength selectable for ITU-T standards upon request.

*2 Wavelength selectable for ITU-T standards.

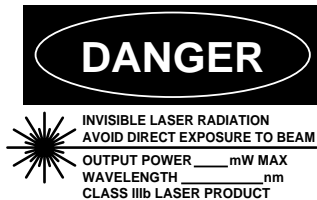
REFERENCE

| 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 | X10679E |

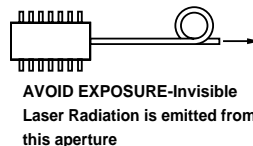
[MEMO]

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



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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Special: Transportation equipment (automobiles, trains, ships, etc.), traffic control systems, anti-disaster systems, anti-crime systems, safety equipment and medical equipment (not specifically designed for life support)

Specific: Aircrafts, aerospace equipment, submersible repeaters, nuclear reactor control systems, life support systems or medical equipment for life support, etc.

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Anti-radioactive design is not implemented in this product.