

1 500 nm OPTICAL FIBER COMMUNICATIONS InGaAsP MQW-DFB LASER DIODE COAXIAL MODULE

DESCRIPTION

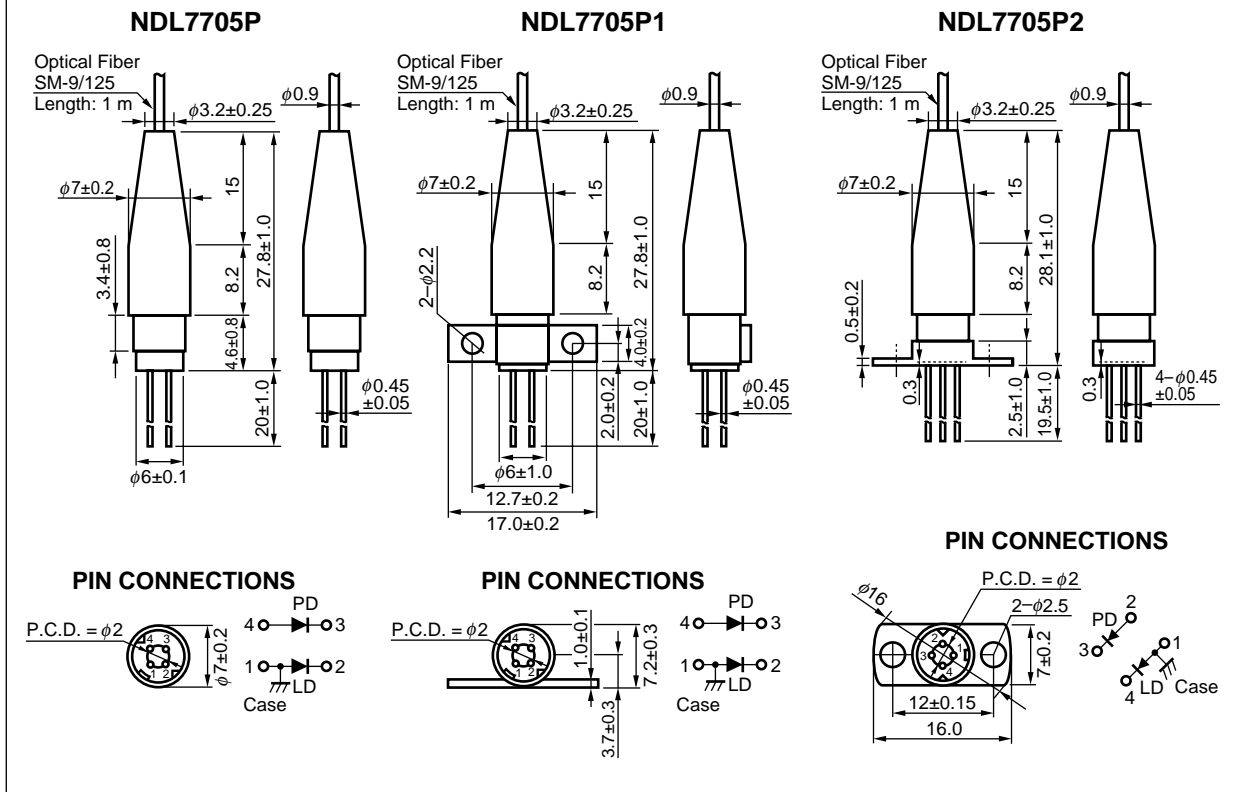
The NDL7705P Series is a 1 550 nm phase-shifted DFB (Distributed Feed-Back) laser diode module with optical isolator. Multiple Quantum Well (MQW) structure is adopted to achieve stable dynamic single longitudinal mode operation over wide temperature range of -40 to $+85$ °C.

It is designed for all STM-1 and STM-4 applications.

FEATURES

- Peak emission wavelength $\lambda_p = 1\,550$ nm
- Optical output power $P_r = 2.0$ mW
- Wide operating temperature range $T_c = -40$ to $+85$ °C
- $\lambda/4$ -phase-shifted DFB
- InGaAs monitor PIN-PD
- Internal optical isolator

PACKAGE DIMENSIONS in millimeters



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

ORDERING INFORMATION

| Part Number | Available Connector | Flange Type |
|-------------|----------------------|-----------------------|
| NDL7705P | Without Connector | No flange |
| NDL7705PC | With FC-PC Connector | |
| NDL7705PD | With SC-PC Connector | |
| NDL7705P1 | Without Connector | Flat Mount Flange |
| NDL7705P1C | With FC-PC Connector | |
| NDL7705P1D | With SC-PC Connector | |
| NDL7705P2 | Without Connector | Vertical Mount Flange |
| NDL7705P2C | With FC-PC Connector | |
| NDL7705P2D | With SC-PC Connector | |

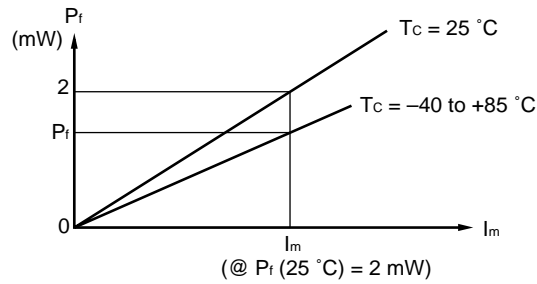
ABSOLUTE MAXIMUM RATINGS ($T_c = 25\text{ }^{\circ}\text{C}$, unless otherwise specified)

| Parameter | Symbol | Ratings | Unit |
|-----------------------------------|-----------|-------------|--------------------|
| Optical Output Power | P_r | 5.0 | mW |
| Forward Current of LD | I_F | $I_{th}+50$ | 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 | -40 to +85 | $^{\circ}\text{C}$ |
| Storage Temperature | T_{stg} | -40 to +85 | $^{\circ}\text{C}$ |
| Lead Soldering Temperature (10 s) | T_{sld} | 260 | $^{\circ}\text{C}$ |

ELECTRO-OPTICAL CHARACTERISTICS (T_C = -40 to +85 °C, unless otherwise specified)

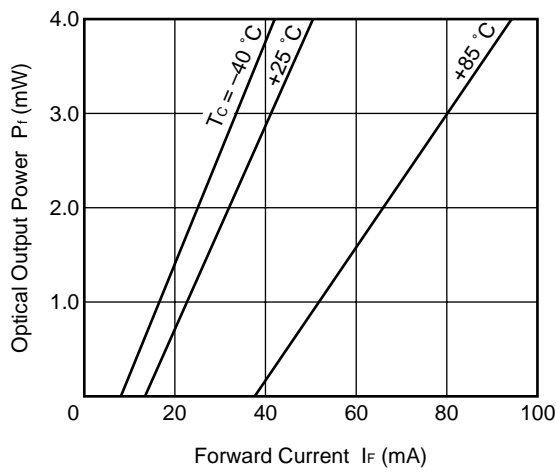
| Parameter | Symbol | Conditions | MIN. | TYP. | MAX. | Unit |
|--|-----------------|--|-------|-------|-------|-------|
| Forward Voltage | V _F | I _F = 30 mA | 0.9 | | 1.3 | V |
| Threshold Current | I _{th} | T _C = 25 °C | | 15 | | mA |
| | | T _C = 85 °C | | 35 | 50 | |
| Differential Efficiency form Fiber | η _d | T _C = 25 °C | 0.070 | 0.120 | | W/A |
| | | T _C = 85 °C | 0.035 | 0.075 | | |
| Temperature Dependence of Differential Efficiency from Fiber | Δη _d | Δη _d = 10 log $\frac{\eta_d(85\text{ °C})}{\eta_d(25\text{ °C})}$ | -3 | -2 | | dB |
| Peak Emission Wavelength | λ _p | P _f = 1 mW | 1 530 | 1 550 | 1 570 | nm |
| Side Mode Suppression Ratio | SMSR | P _f = 1 mW | 30 | | | dB |
| Rise Time | t _r | I _b = 0.9 × I _{th} | | | 0.5 | ns |
| Fall Time | t _f | I _b = 0.9 × I _{th} | | | 0.5 | ns |
| Monitor Current | I _m | V _R = 5 V, P _f = 2 mW | 300 | | 2 500 | μA |
| Monitor Dark Current | I _D | V _R = 5 V, T _C = 25 °C | | 0.1 | 5 | nA |
| Tracking Error | γ ^{*1} | I _m = const. (P _f = 2 mW, T _C = 25 °C) | | | 1.0 | dB |
| Relative Intensity Noise | RIN | Ref = -14 dB, P _f = 1 mW | | -140 | -130 | dB/Hz |

$$*1 \quad \gamma = \left| 10 \log \frac{P_f}{2.0 \text{ mW}} \right|$$

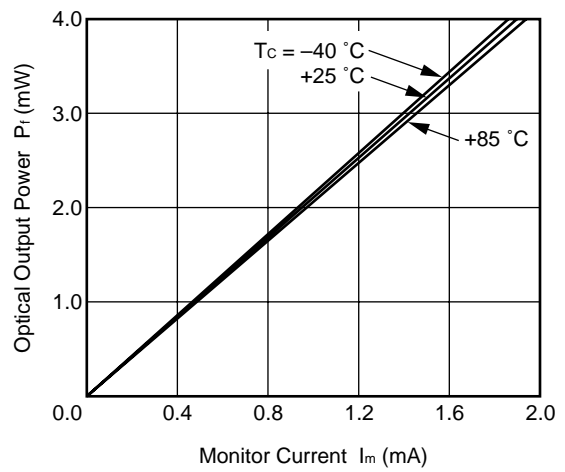


★ TYPICAL CHARACTERISTICS ($T_c = 25^\circ\text{C}$, unless otherwise specified)

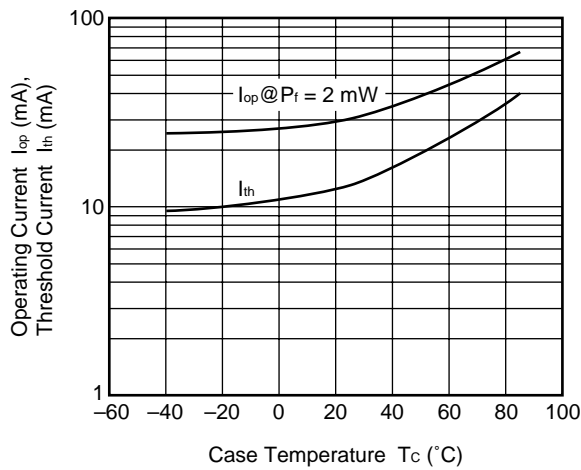
OPTICAL OUTPUT POWER vs.
FORWARD CURRENT



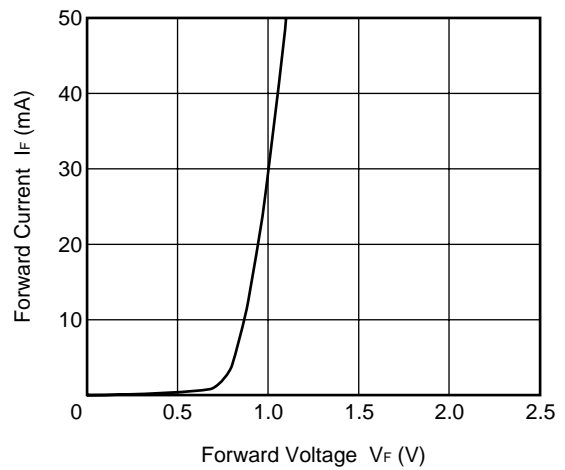
OPTICAL OUTPUT POWER vs.
MONITOR CURRENT



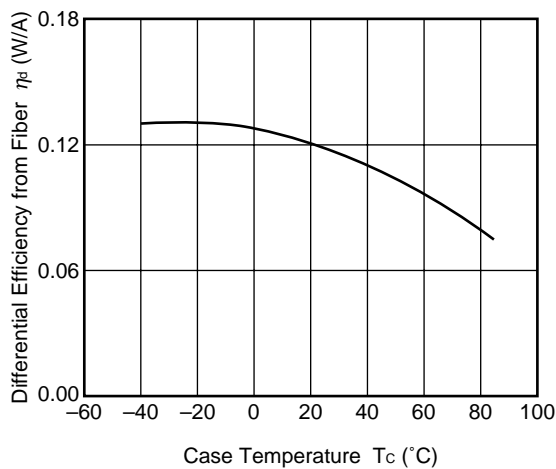
OPERATING CURRENT AND THRESHOLD
CURRENT vs. CASE TEMPERATURE



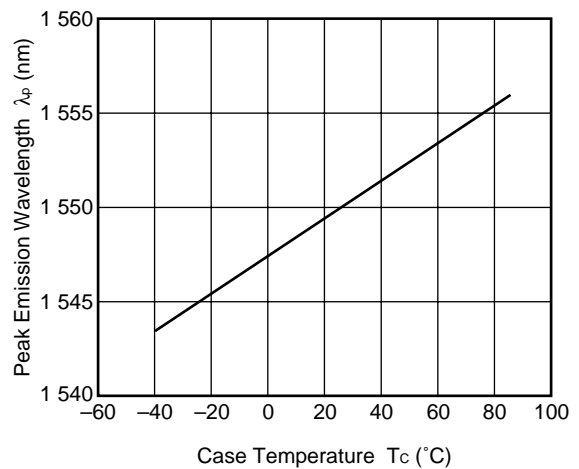
FORWARD CURRENT vs.
FORWARD VOLTAGE



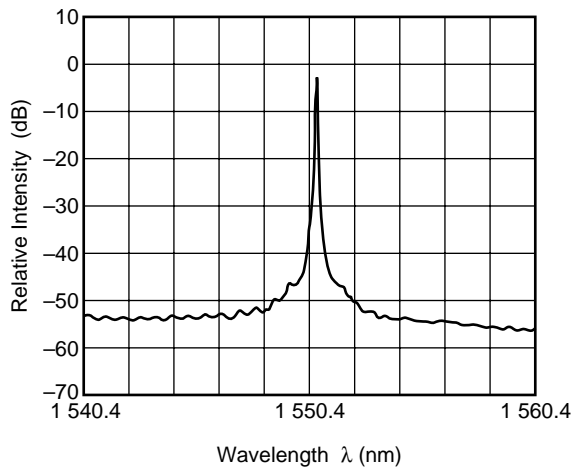
TEMPERATURE DEPENDENCE OF
DIFFERENTIAL EFFICIENCY FROM FIBER



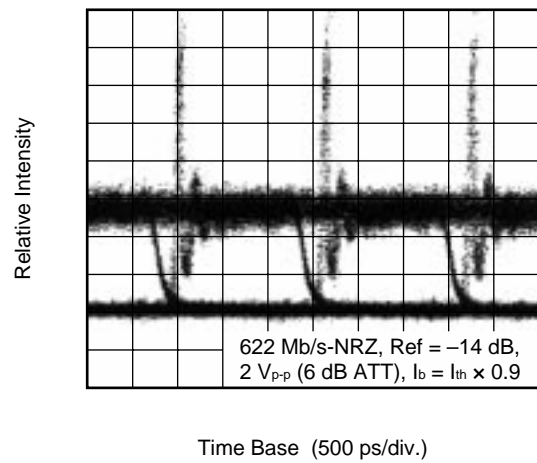
TEMPERATURE DEPENDENCE OF
PEAK EMISSION WAVELENGTH



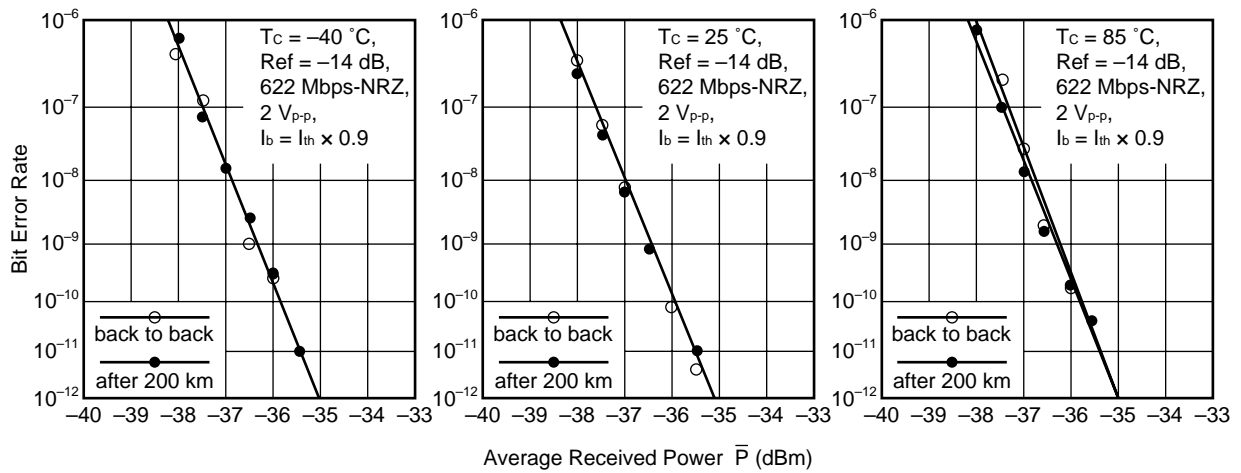
LONGITUDINAL MODE FROM FIBER



EYE DIAGRAM



ERROR RATE CHARACTERISTICS



★ DFB-LD FAMILY FOR TELECOM

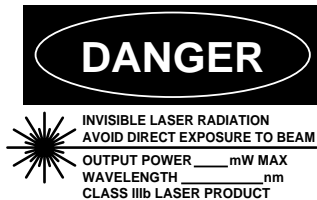
| Part Number | Absolute Maximum Ratings | | Typical Characteristics | | | SDH Application | Package |
|-----------------|--------------------------|--------------------------|-------------------------|------------------------|------------------------|---|---------|
| | T _c (°C) | T _{stg} (°C) | I _{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 | 20 | 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 |
| NDL7740PA | −20 to +65 | −40 to +85 | 40 | 20 (TYP.) | 1 550 | ≤ STM-16: 2.5 Gb/s CW Light Source for external modulator | BFY |
| NDL7910P | −20 to +65 | −40 to +70 | 7 | 3 (TYP.) | 1 550 | ≤ STM-16: 2.5 Gb/s EA modulator integrate DFB-LD | 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 |
| Guide to quality assurance for semiconductor devices | MEI-1202 |
| Semiconductor selection guide | X10679E |

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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Standard: Computers, office equipment, communications equipment, test and measurement equipment, audio and visual equipment, home electronic appliances, machine tools, personal electronic equipment and industrial robots

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)

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Anti-radioactive design is not implemented in this product.