NEC

# 1310 nm InGaAsP STRAINED MQW DC-PBH LASER DIODE COAXIAL MODULE WITH SINGLE MODE FIBER

# NDL7408P SERIES

## FEATURES

- **CENTER WAVELENGTH**
  $\lambda_C$ = 1310 nm
- **TWO TYPES OF OUTPUT POWER:**
  1.0 mW (NDL7408PK Series)
  0.2 mW (NDL7408PL Series)
- **LOW THRESHOLD CURRENT:**
  $I_{TH}$ = 12 mA TYP at $T_C$ = 25°C
- **HIGH CUT-OFF FREQUENCY**
  $f_C$ = 2.0 GHz
- **InGaAs MONITOR PIN-PD**
- **WIDE OPERATING TEMPERATURE RANGE:**
  -40 to +85°C
- **BASED ON BELLCORE TA-NWT-000983**

## DESCRIPTION

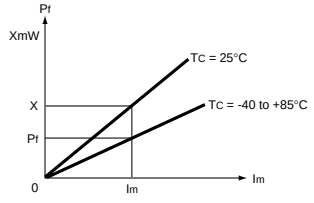
The NDL7408P Series is a 1310 nm laser diode coaxial module with single mode fiber. It has a strained Multiple Quantum Well (st-MQW) structure and a built-in InGaAs monitor photo diode. It is recommended for junction or access network systems. The series is available in two types of output power: 1.0 mW and 0.2 mW.

## ELECTRO-OPTICAL CHARACTERISTICS ($T_C$ = 25°C, unless otherwise specified)

| PART NUMBER<br>PACKAGE OUTLINE | | | NDL7408P Series | | |
|---|---|---|---|---|---|
| **SYMBOLS** | **PARAMETERS AND CONDITIONS** | **UNITS** | **MIN** | **TYP** | **MAX** |
| $V_{OP}$ | Operating Voltage[1] | V | | 1.1 | 1.3 |
| $I_{TH}$ | Threshold Current, | mA | | 10 | 25 |
| | $T_C$ = +85°C | | | 25 | 50 |
| $I_{MOD}$ | Modulation Current,<br>$P_f$ = 1.0 mW for NDL7408PK Series<br>$P_f$ = 0.2 mW for NDL7408PL Series | mA | | 15 | 30 |
| $\eta_D$ | Differential Efficiency from Fiber for NDL7408PK Series, $T_C$ = +85°C | W/A | 0.025 | 0.050 | |
| | | | 0.018 | 0.035 | |
| $\eta_D$ | Differential Efficiency from Fiber for NDL7408PL Series, $T_C$ = +85°C | W/A | 0.010 | 0.015 | |
| | | | 0.005 | 0.010 | |
| $\lambda_C$ | Center Emission Wavelength[1], RMS (-20 dB) | nm | 1290 | 1310 | 1330 |
| | $T_C$ = -40 to +85°C | | 1260 | | 1360 |
| $\Delta\lambda/\Delta T$ | Temperature Dependence of Center Emission Wavelength, $T_C$ = -40 to +85°C | nm/°C | | 0.4 | 0.5 |
| $\sigma$ | Spectral Width[1], RMS (-20 dB) | nm | | 1.3 | 2.5 |
| | $T_C$ = +85°C | | | 1.5 | 4 |
| $f_C$ | Cut-off Frequency, -3 dB | GHz | | 2.0 | |
| $t_r$ | Rise Time, 10 to 90% | ns | | 0.2 | 0.5 |
| $t_f$ | Fall Time, 90 to 10% | ns | | 0.3 | 0.5 |
| $I_m$ | Monitor Current of PD[1], $V_{RD}$ = 5 V | μA | 100 | 700 | |
| $I_D$ | Dark Current of PD, $V_{RD}$ = 5 V | nA | | 0.1 | 10 |
| $\gamma$ | Tracking Error[2], $I_m$ = const., $T_C$ = -40 to +85°C | dB | | 0.5 | 1.0 |

Note: 1. $P_f$ = 1.0 mW for NDL7408PK Series
$P_f$ = 0.2 mW for NDL7408PL Series

2. $\gamma = \left| 10 \log \frac{P_f}{XmW} \right|$




(at Pf (25°C) = XmW)
X = 1.0 mW at NDL7408PK Series
X = 0.2 mW at NDL7408PL Series

## ABSOLUTE MAXIMUM RATINGS[1]

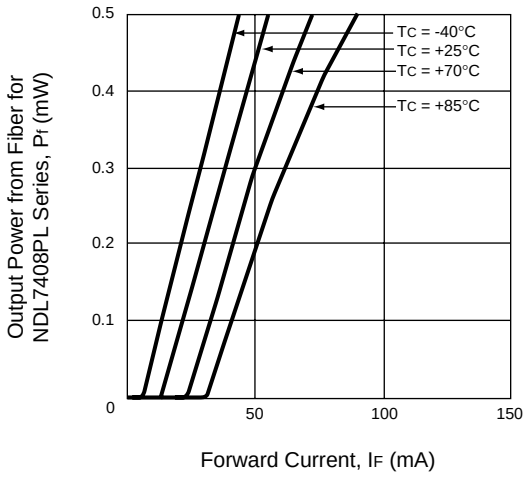
($T_C$ = 25°C, unless otherwise specified)

| SYMBOLS | PARAMETERS | UNITS | RATINGS |
|---|---|---|---|
| $I_F$ | Forward Current of LD | mA | $I_{TH}$ + 50 |
| $V_R$ | Reverse Voltage of LD | V | 2.0 |
| $I_F$ | Forward Current of PD | mA | 10 |
| $V_R$ | Reverse Voltage of PD | V | 20 |
| $T_C$ | Operating Case Temperature | °C | -40 to +85 |
| $T_{STG}$ | Storage Temperature | °C | -40 to +85 |
| $T_{SLD}$ | Lead Soldering Temperature (10 s) | °C | 260 |

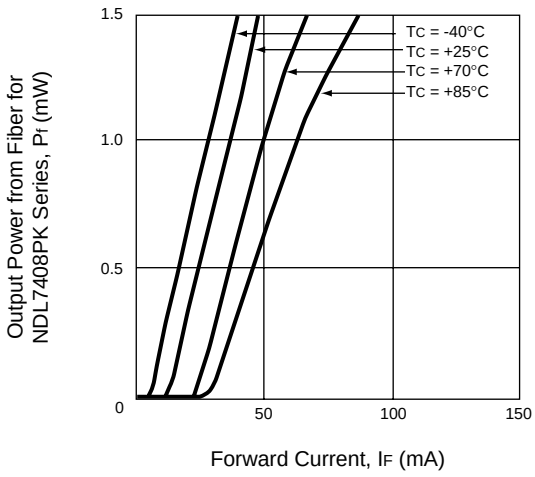
Note:
1. Operation in excess of any one of these parameters may result in permanent damage.

## TYPICAL PERFORMANCE CURVES ($T_C$ = -40 to +85°C)

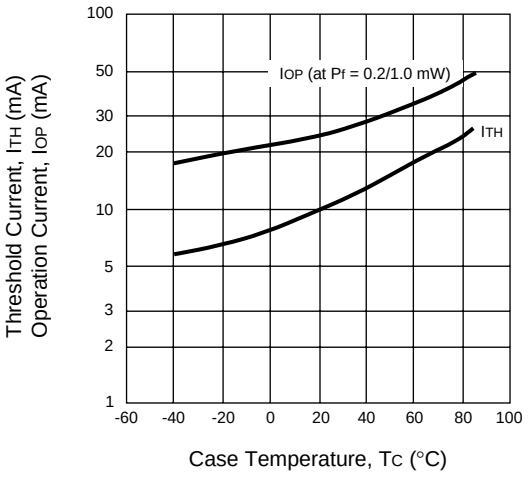
**OUTPUT POWER FROM FIBER vs. FORWARD CURRENT FOR NDL7408PL SERIES**



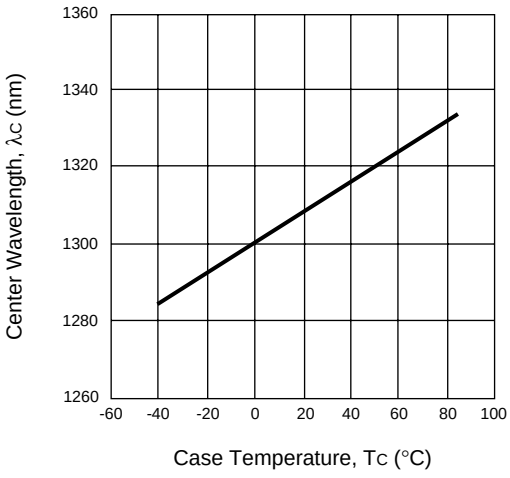

**OUTPUT POWER FROM FIBER vs. FORWARD CURRENT FOR NDL7408PK SERIES**




**THRESHOLD CURRENT AND OPERATION CURRENT vs. CASE TEMPERATURE**

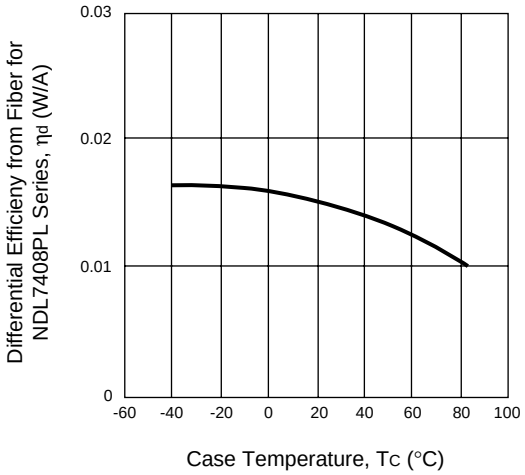



**TEMPERATURE DEPENDENCE OF CENTER WAVELENGTH FOR NDL7408P SERIES**

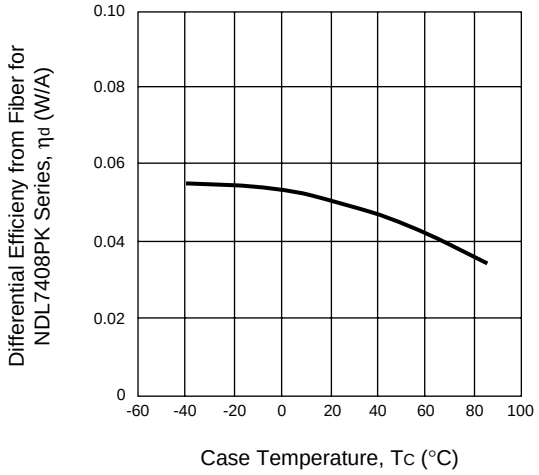


## TYPICAL PERFORMANCE CURVES (Tc = -40 to +85°C)

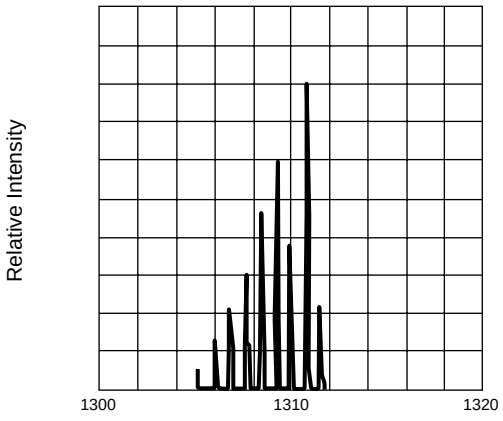
**TEMPERATURE DEPENDENCE OF DIFFERENTIAL EFFICIENCY FROM FIBER FOR NDL7408PL SERIES**



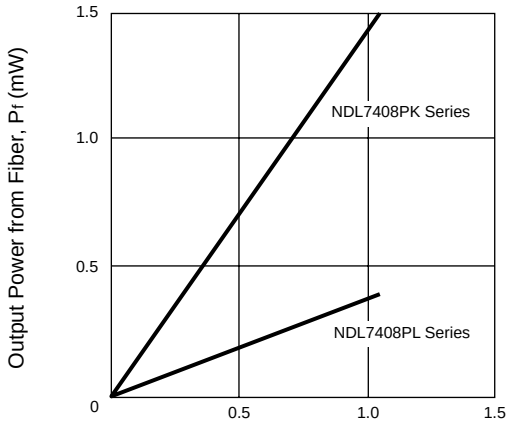

**TEMPERATURE DEPENDENCE OF DIFFERENTIAL EFFICENCY FROM FIBER FOR NDL7408PK SERIES**



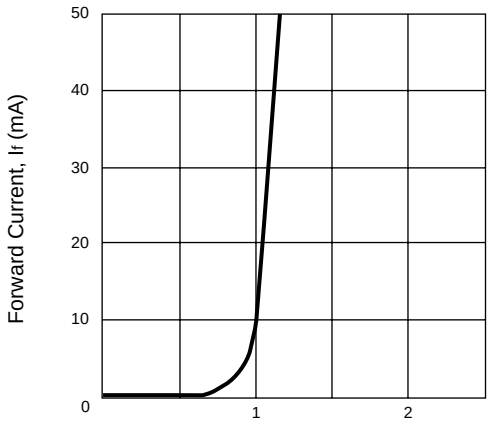

**LONGITUDINAL MODE FROM FIBER FOR NDL7408P SERIES**



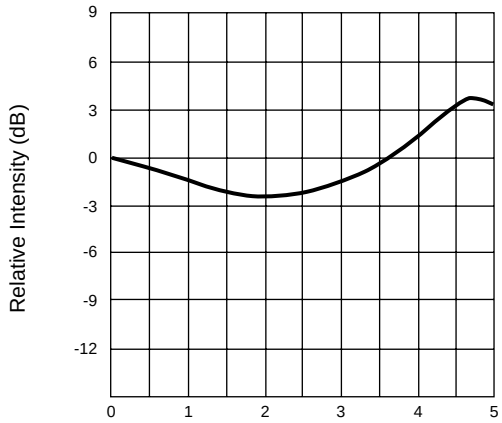

**OUTPUT POWER FROM FIBER vs. LD MONITOR CURRENT**




**FORWARD CURRENT vs. FORWARD VOLTAGE FOR NDL7408P SERIES**

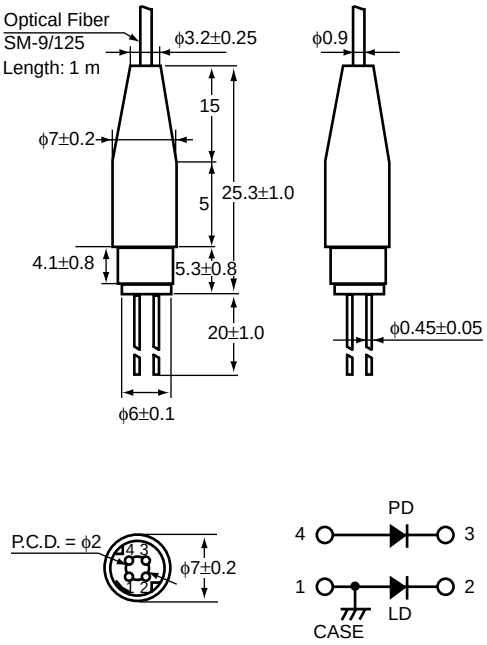



**FREQUENCY RESPONSE (Pf = 0.2/1.0 (mW))**

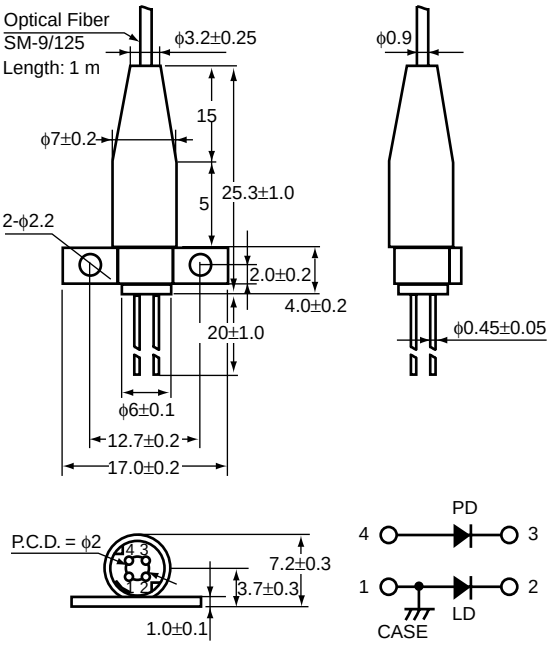


## OUTLINE DIMENSIONS (Units in mm)

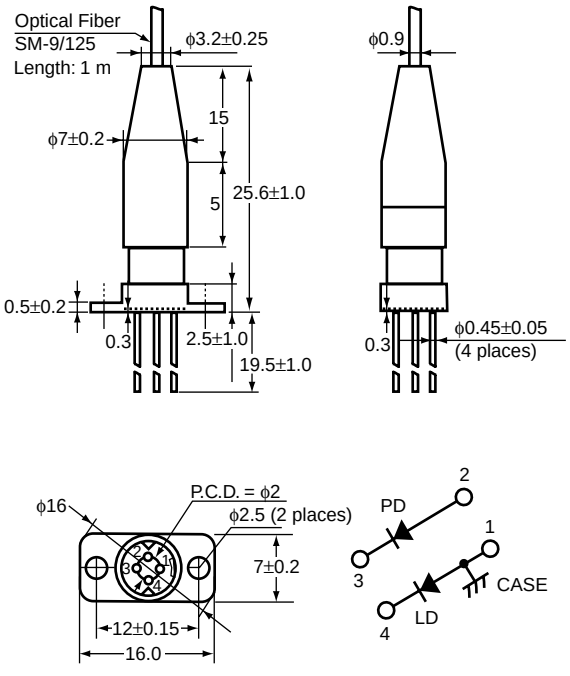
**NDL7408P**



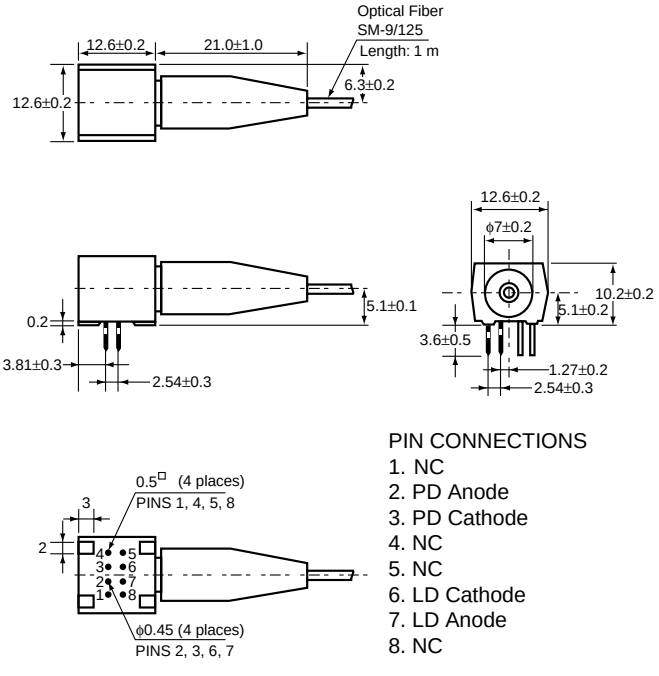

**NDL7408P1**




**NDL7408P2**

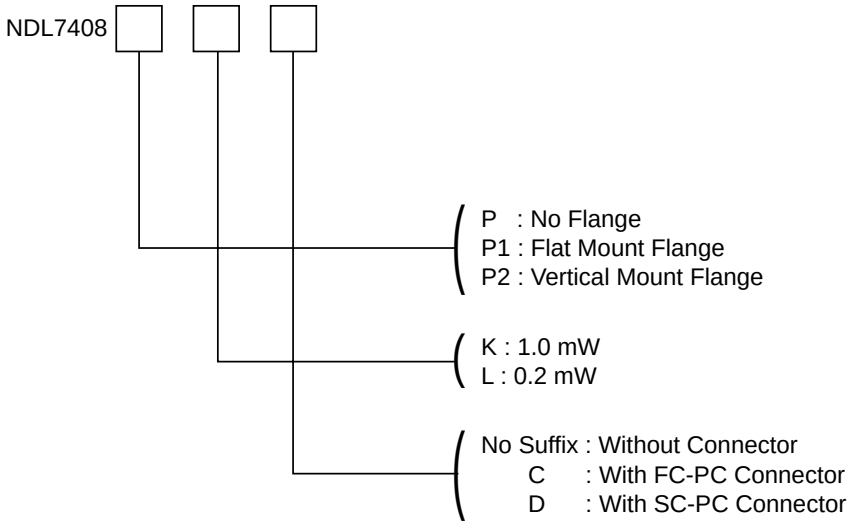



**NDL7408P4**




PIN CONNECTIONS
1. NC
2. PD Anode
3. PD Cathode
4. NC
5. NC
6. LD Cathode
7. LD Anode
8. NC

## ORDERING INFORMATION




| PART NUMBER | RANKS | | DESCRIPTION |
|---|---|---|---|
| NDL7408PK | M | 1.0 mW | Without Connector |
| NDL7408PKC | | No Flange | With FC-PC Connector |
| NDL7408PKD | | | With SC-PC Connector |
| NDL7408P1K | M | 1.0 mW | Without Connector |
| NDL74081KC | | Flat Mount Flange | With FC-PC Connector |
| NDL7408P1KD | | | With SC-PC Connector |
| NDL7408P2K | M | 1.0 mW | Without Connector |
| NDL74082KC | | Vertical Flange | With FC-PC Connector |
| NDL7408P2KD | | | With SC-PC Connector |
| NDL7408P4K | M | 1.0 mW | Without Connector |
| NDL7408P4KC | | 8-pin DIP | With FC-PC Connector |
| NDL7408P4KD | | | With SC-PC Connector |
| NDL7408PL | N | 0.2 mW | Without Connector |
| NDL7408PLC | | No Flange | With FC-PC Connector |
| NDL7408PLD | | | With SC-PC Connector |
| NDL7408P1L | N | 0.2 mW | Without Connector |
| NDL7408P1LC | | Flat Mount Flange | With FC-PC Connector |
| NDL7408P1LD | | | With SC-PC Connector |
| NDL7408P2L | N | 0.2 mW | Without Connector |
| NDL7408P2LC | | Vertical Flange | With FC-PC Connector |
| NDL7408P2LD | | | With SC-PC Connector |
| NDL7408P4L | N | 0.2 mW | Without Connector |
| NDL7408P4LC | | 8-pin DIP | With FC-PC Connector |
| NDL7408P4LD | | | With SC-PC Connector |