

## 1 310 nm OPTICAL CATV RETURN PATH APPLICATIONS InGaAsP MQW DFB LASER DIODE MODULE WITH ISOLATOR

### DESCRIPTION

The NDL7605P Series is a 1 310 nm uncooled isolated coaxial DFB laser diode. It is especially designed for optical CATV return path applications.

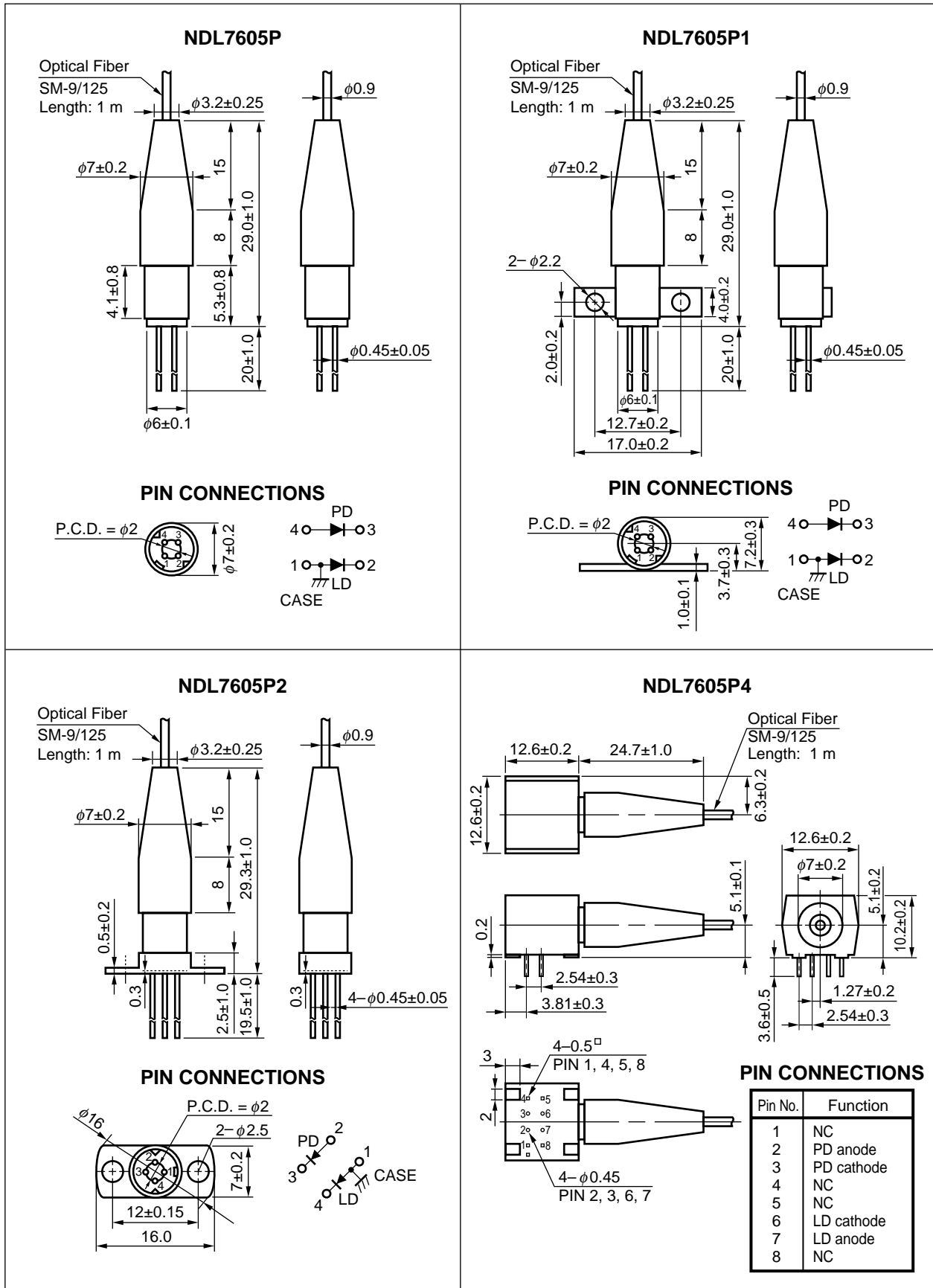
### FEATURES

- Low distortion
  - IMD2 = -50 dBc MAX.\*1 @ T<sub>c</sub> = 25 °C
  - IMD2 = -45 dBc MAX.\*1 @ T<sub>c</sub> = -40 to +85 °C
  - IMD3 = -60 dBc MAX.\*1 @ T<sub>c</sub> = -40 to +85 °C
- Output power P<sub>r</sub> = 2.0 mW
- Long wavelength λ<sub>p</sub> = 1 310 nm
- Internal InGaAs monitor PD and isolator
- Single mode fiber pigtail with FC-UPC, SC-UPC or SC-APC connector
- Wide operating temperature range T<sub>c</sub> = -40 to +85 °C

\*1 2-ch, Optical loss = 7 dB, OMI = 10 %/ch

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Not all devices/types available in every country. Please check with local NEC representative for availability and additional information.

PACKAGE DIMENSIONS (in millimeters)



**ORDERING INFORMATION**

| Part Number | Available Connector   | Flange Type       |
|-------------|-----------------------|-------------------|
| NDL7605PC   | With FC-UPC Connector | No Flange         |
| NDL7605PD   | With SC-UPC Connector |                   |
| NDL7605PX   | With SC-APC Connector |                   |
| NDL7605P1C  | With FC-UPC Connector | Flat Mount Flange |
| NDL7605P1D  | With SC-UPC Connector |                   |
| NDL7605P1X  | With SC-APC Connector |                   |
| NDL7605P2C  | With FC-UPC Connector | Vertical Flange   |
| NDL7605P2D  | With SC-UPC Connector |                   |
| NDL7605P2X  | With SC-APC Connector |                   |
| NDL7605P4C  | With FC-UPC Connector | Lead Bend         |
| NDL7605P4D  | With SC-UPC Connector |                   |
| NDL7605P4X  | With SC-APC Connector |                   |

**ABSOLUTE MAXIMUM RATINGS (T<sub>c</sub> = 25 °C, unless otherwise specified)**

| Parameter                         | Symbol            | Ratings              | Unit |
|-----------------------------------|-------------------|----------------------|------|
| Optical Output Power from Fiber   | P <sub>f</sub>    | 5                    | mW   |
| Forward Current of LD             | I <sub>F</sub>    | I <sub>th</sub> + 50 | mA   |
| Reverse Voltage of LD             | V <sub>R</sub>    | 2.0                  | V    |
| Forward Current of PD             | I <sub>F</sub>    | 10                   | mA   |
| Reverse Voltage of PD             | V <sub>R</sub>    | 15                   | V    |
| Operating Case Temperature        | T <sub>C</sub>    | -40 to +85           | °C   |
| Storage Temperature               | T <sub>stg</sub>  | -40 to +85           | °C   |
| Lead Soldering Temperature (10 s) | T <sub>slid</sub> | 260                  | °C   |

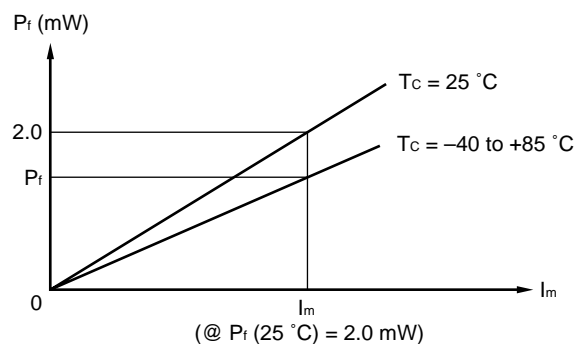
**ELECTRO-OPTICAL CHARACTERISTICS**

(T<sub>c</sub> = 25 °C, Optical Reflection ≤ -50 dB, unless otherwise specified)

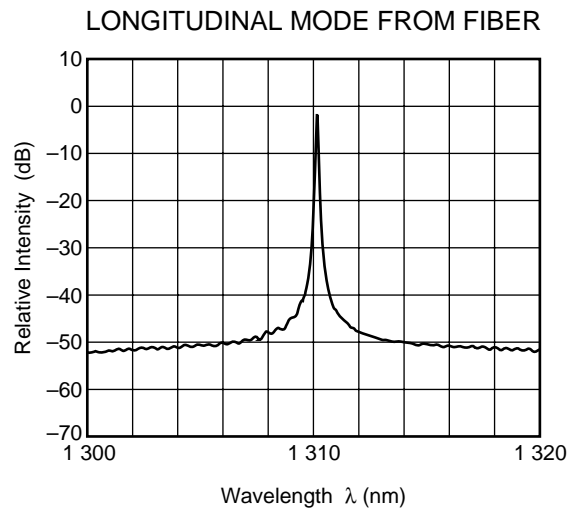
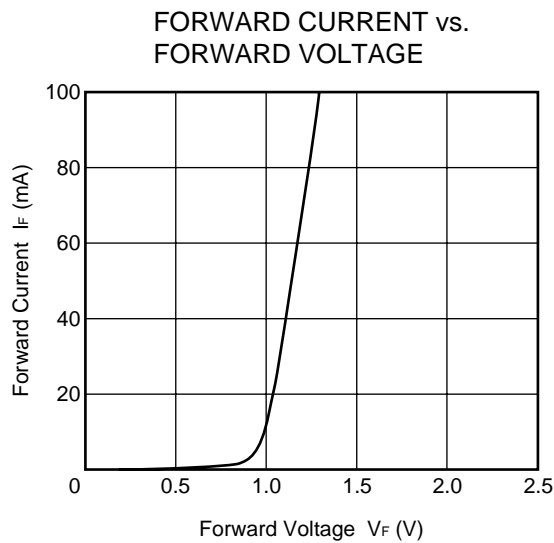
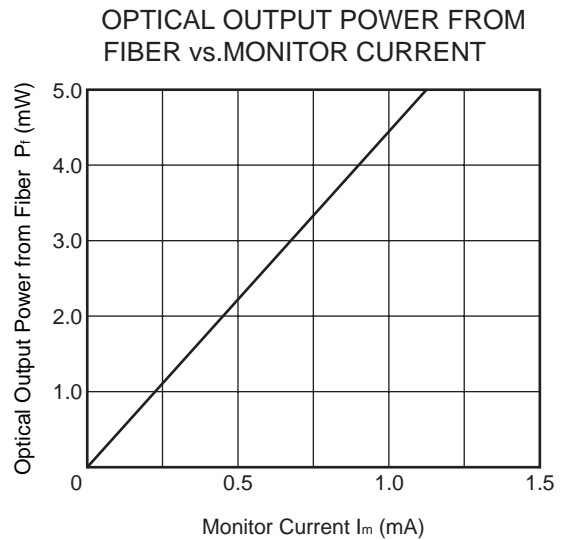
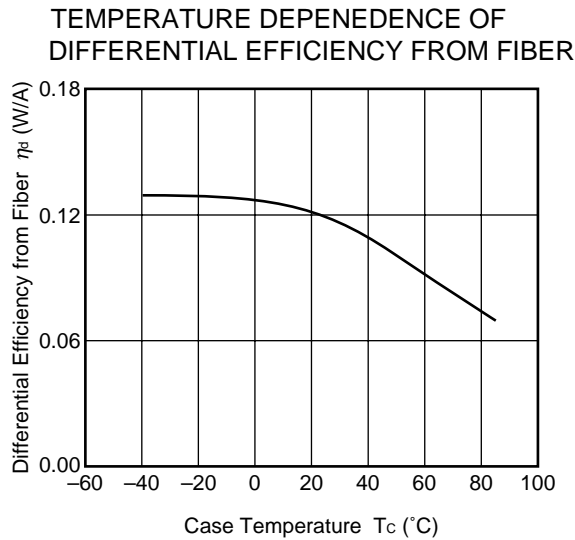
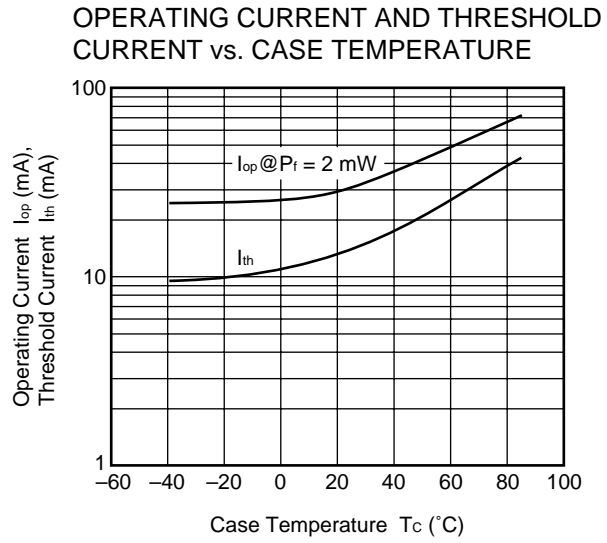
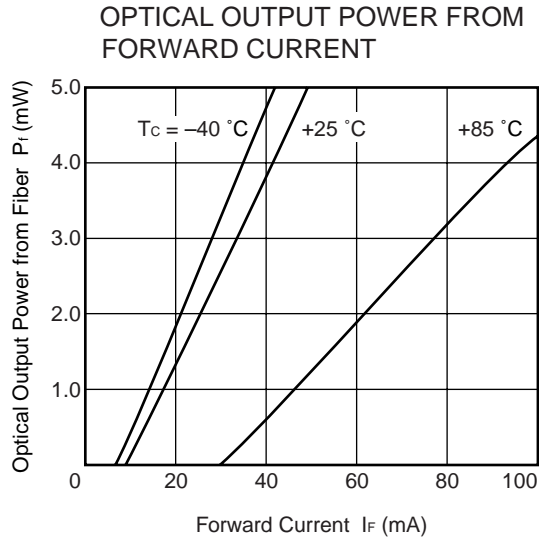
| Parameter  | Symbol          | Conditions   | MIN.  | TYP.  | MAX.  | Unit |
|--|-----------------|--|-------|-------|-------|------|
| Forward Voltage  | V <sub>F</sub>  | I <sub>F</sub> = 30 mA   | 0.9   | 1.1   | 1.3   | V    |
| Optical Output Power from Fiber                              | P <sub>f</sub>  | CW   |       | 2.0   |       | mW   |
| Threshold Current  | I <sub>th</sub> | CW   |       | 15    | 30    | mA   |
|  |                 | CW, T <sub>c</sub> = 85 °C   |       | 40    | 60    |      |
| Differential Efficiency from Fiber                           | η <sub>d</sub>  | P <sub>f</sub> = 2.0 mW  | 0.080 | 0.200 |       | W/A  |
| Temperature Dependence of Differential Efficiency from Fiber | Δη <sub>d</sub> | P <sub>f</sub> = 2.0 mW, η (85 °C) / η (25 °C)                                   | -3.0  |       |       | dB   |
| Peak Emission Wavelength                                     | λ <sub>p</sub>  | P <sub>f</sub> = 2.0 mW, RMS (-20 dB)  | 1 290 | 1 310 | 1 330 | nm   |
| Side Mode Suppression Ratio                                  | SMSR            | P <sub>f</sub> = 2.0 mW  | 30    |       |       | dB   |
| 2nd Order Inter-modulation Distortion                        | IMD2            | *1   |       |       | -50   | dBc  |
|  |                 | *1, T <sub>c</sub> = -40 to +85 °C   |       |       | -45   |      |
| 3rd Order Inter-modulation Distortion                        | IMD3            | *1, T <sub>c</sub> = -40 to +85 °C   |       |       | -60   | dBc  |
| Carrier to Noise Ratio                                       | CNR             | *1, T <sub>c</sub> = -40 to +85 °C   | 52    |       |       | dB   |
| Monitor Current  | I <sub>m</sub>  | V <sub>R</sub> = 5 V, P <sub>f</sub> = 2.0 mW                                    | 100   | 500   | 1 000 | μA   |
| Dark Current   | I <sub>D</sub>  | V <sub>R</sub> = 5 V   |       | 0.1   | 10    | nA   |
| Tracking Error   | γ <sup>2</sup>  | I <sub>m</sub> = const., P <sub>f</sub> = 2.0 mW, T <sub>c</sub> = -40 to +85 °C |       |       | 1.5   | dB   |
| Optical Isolation  | ISO             |  | 30    |       |       | dB   |

\*1 Conditions: P<sub>f</sub> = 2.0 mW, T<sub>c</sub> = 25 °C, 2 channel unmodulated carriers 13 MHz and 19 MHz,  
Optical Reflection = -50 dB, Optical Loss = 7 dB, OMI = 10 %/ch

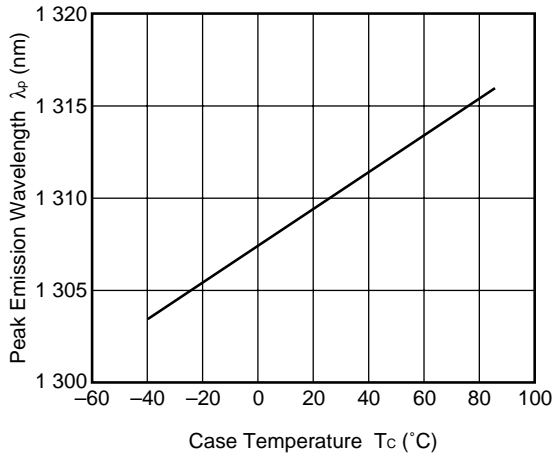
\*2  $\gamma = \left| 10 \log \frac{P_f}{2.0 \text{ mW}} \right|$



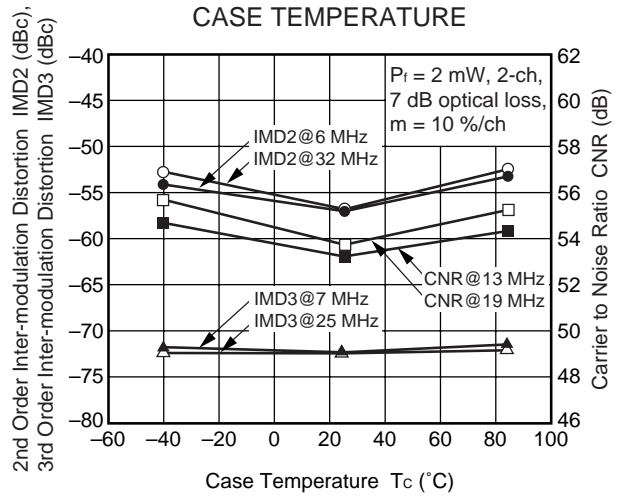
★ TYPICAL CHARACTERISTICS ( $T_c = 25\text{ }^\circ\text{C}$ , unless otherwise specified)



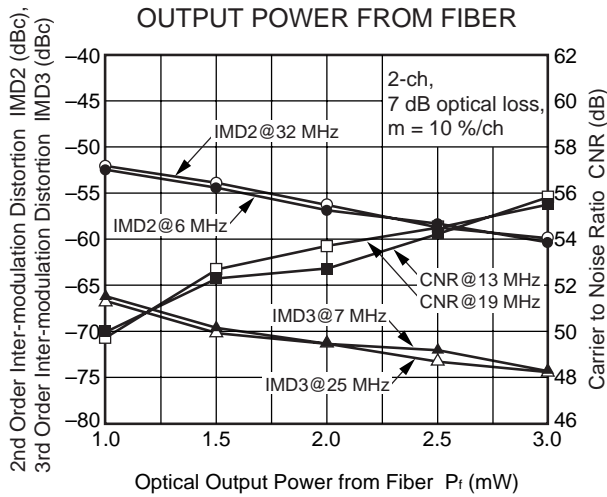
TEMPERATURE DEPENDENCE OF PEAK EMISSION WAVELENGTH



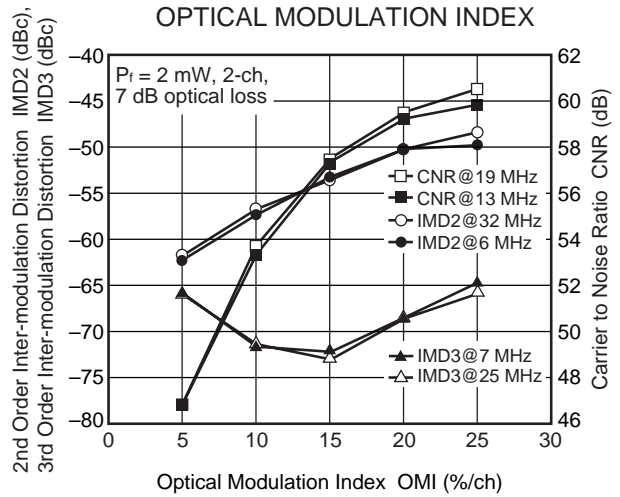
IMD2, IMD3, CNR vs. CASE TEMPERATURE



IMD2, IMD3, CNR vs. OPTICAL OUTPUT POWER FROM FIBER



IMD2, IMD3, CNR vs. OPTICAL MODULATION INDEX



**Remark** The graphs indicate nominal characteristics.

★ **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      |
| SEMICONDUCTORS SELECTION GUIDE Products & Packages (CD-ROM) | X13769X      |

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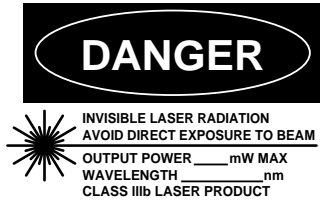


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CAUTION

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.

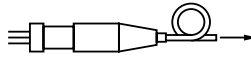


**DANGER**

INVISIBLE LASER RADIATION  
AVOID DIRECT EXPOSURE TO BEAM

OUTPUT POWER \_\_\_\_\_ mW MAX  
WAVELENGTH \_\_\_\_\_ nm  
CLASS IIIb LASER PRODUCT

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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