

**φ80 μm InGaAs PIN-PD COAXIAL MODULE  
 FOR 622 Mb/s, 156 Mb/s FIBEROPTIC COMMUNICATIONS  
 AND EDFA MONITOR**

**DESCRIPTION**

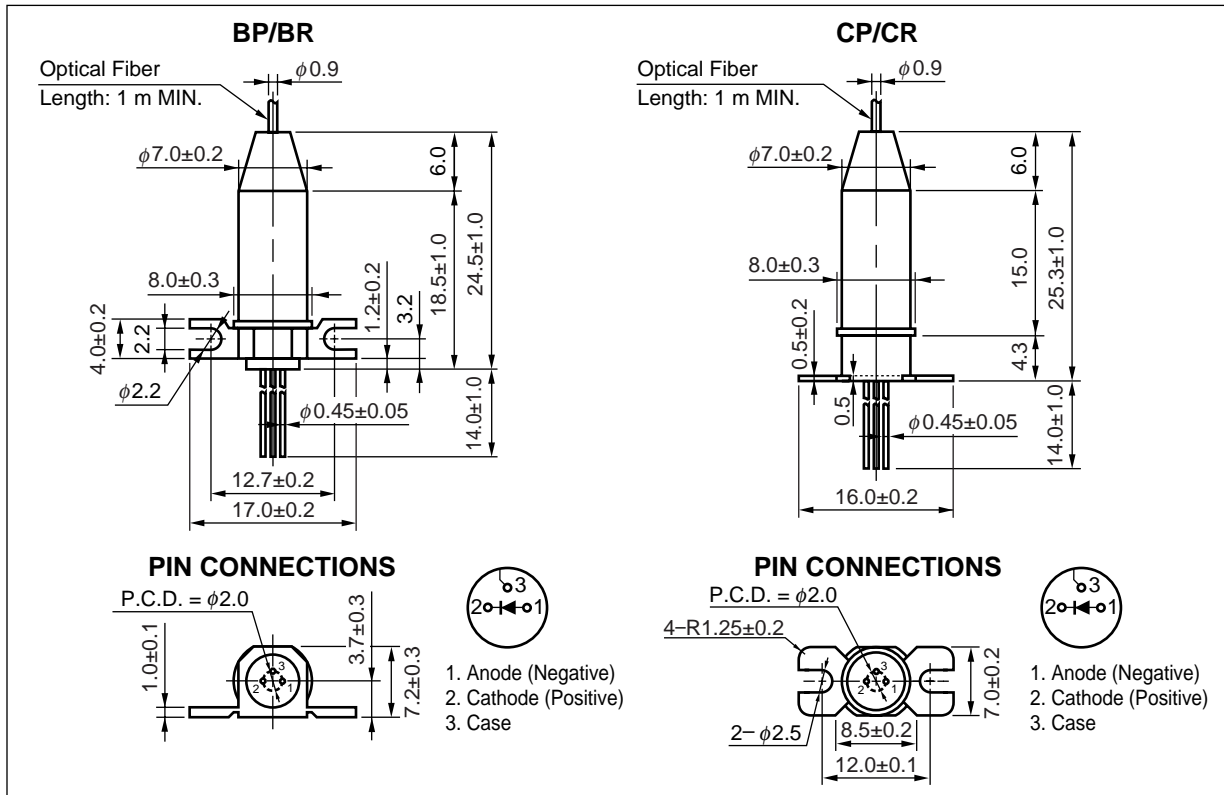
The NR7800 Series is an InGaAs PIN photo diode (PIN-PD) coaxial module with optical fiber pigtail. This module is designed for long wavelength optical communication systems and ideal as a receiver for Synchronous Digital Hierarchy (SDH) system, STM-4 and STM-1, ITU-T recommendations.

**FEATURES**

- Small dark current  $I_D = 0.1 \text{ nA}$
- High sensitivity  $S = 0.89 \text{ A/W @ } \lambda = 1\,310 \text{ nm}$   
 $S = 0.94 \text{ A/W @ } \lambda = 1\,550 \text{ nm}$
- Low operating voltage  $V_R = 5 \text{ V}$
- ★ • Coaxial module with SMF or GI-50 fiber
- ★ • With SC connector : standard, FC connector : option  
(Refer to **ORDERING INFORMATION**)

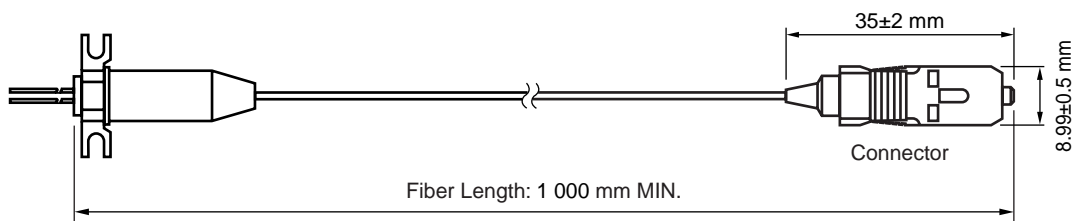
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 Not all devices/types available in every country. Please check with local NEC representative for availability and additional information.

★ PACKAGE DIMENSIONS (UNIT: mm)



★ OPTICAL FIBER CHARACTERISTICS

| Parameter                           | Specification  |               | Unit          |
|-------------------------------------|----------------|---------------|---------------|
|                                     | SMF            | GI-50 Fiber   |               |
| Mode Field Diameter                 | $9.5 \pm 1$    | —             | $\mu\text{m}$ |
| Core Diameter                       | —              | $50 \pm 3$    | $\mu\text{m}$ |
| Cladding Diameter                   | $125 \pm 2$    | $125 \pm 2$   | $\mu\text{m}$ |
| Maximum Cladding Noncircularity     | 2              | 2             | %             |
| Maximum Core/Cladding Concentricity | 1.6            | 4.0           | %             |
| Outer Diameter                      | $0.9 \pm 0.1$  | $0.9 \pm 0.1$ | mm            |
| Cut-off Wavelength                  | 1 100 to 1 270 | —             | nm            |
| Minimum Fiber Bending Radius        | 30             | 30            | mm            |
| Fiber Length                        | 1 000 MIN.     | 1 000 MIN.    | mm            |
| Flammability                        | UL1581 VW-1    |               |               |



★ **ORDERING INFORMATION**

| Part Number | Flange Type           | Fiber Type  | Available Connector <sup>*1</sup> |
|-------------|-----------------------|-------------|-----------------------------------|
| NR7800BP-BC | Flat Mount Flange     | SMF         | With FC-UPC Connector             |
| NR7800BP-CC |                       |             | With SC-UPC Connector             |
| NR7800BR-BB |                       | GI-50 Fiber | With FC-SPC Connector             |
| NR7800BR-CB |                       |             | With SC-SPC Connector             |
| NR7800CP-BC | Vertical Mount Flange | SMF         | With FC-UPC Connector             |
| NR7800CP-CC |                       |             | With SC-UPC Connector             |
| NR7800CR-BB |                       | GI-50 Fiber | With FC-SPC Connector             |
| NR7800CR-CB |                       |             | With SC-SPC Connector             |

\*1 SC Connector : standard  
 FC Connector : option

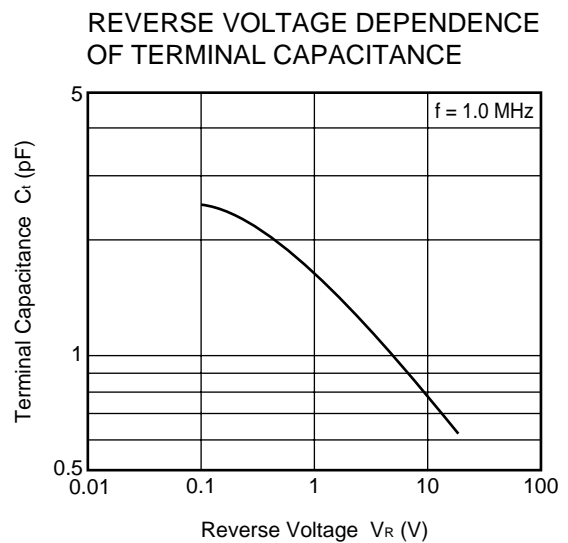
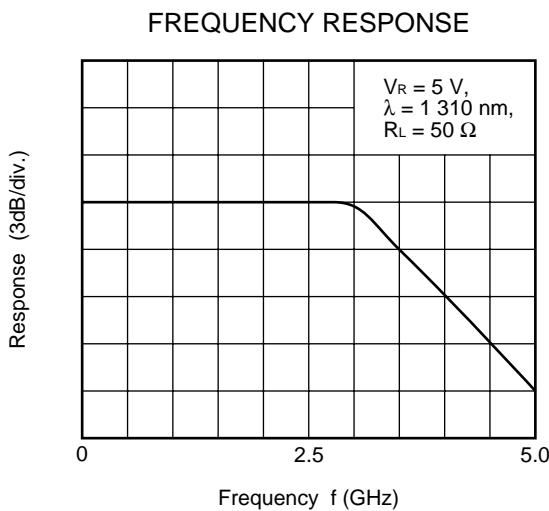
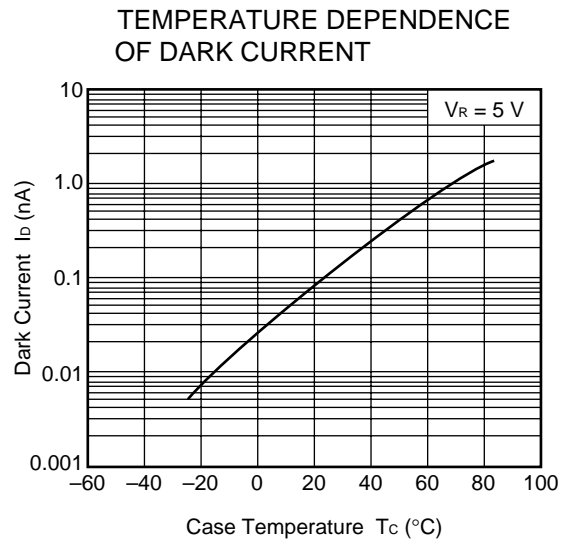
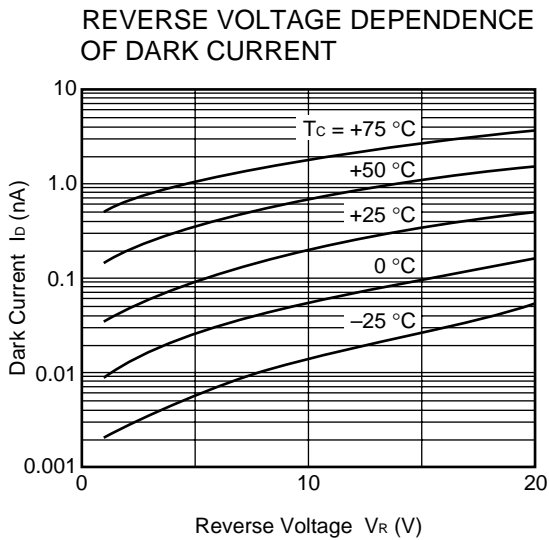
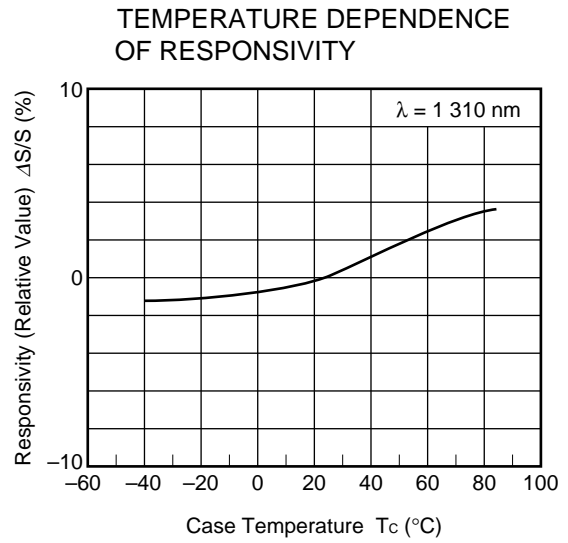
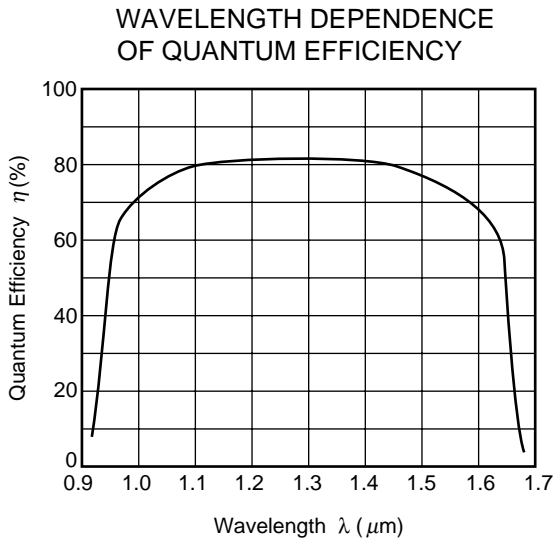
**ABSOLUTE MAXIMUM RATINGS**

| Parameter                         | Symbol    | Ratings       | Unit |
|-----------------------------------|-----------|---------------|------|
| Reverse Voltage                   | $V_R$     | 20            | V    |
| Forward Current                   | $I_F$     | 10            | mA   |
| Optical Input Power               | $P_{in}$  | 8             | mW   |
| Operating Case Temperature        | $T_c$     | -40 to +85    | °C   |
| Storage Temperature               | $T_{stg}$ | -40 to +85    | °C   |
| Lead Soldering Temperature        | $T_{sld}$ | 260 (10 sec.) | °C   |
| Relative Humidity (noncondensing) | RH        | 85            | %    |

**ELECTRO-OPTICAL CHARACTERISTICS (T<sub>c</sub> = -40 to +85 °C, unless otherwise specified)**

| Parameter                              | Symbol          | Conditions  | MIN. | TYP. | MAX. | Unit |
|--|-----------------|---|------|------|------|------|
| Dark Current                           | I <sub>D</sub>  | V <sub>R</sub> = 5 V, T <sub>C</sub> = 25 °C                        |      | 0.1  | 1.0  | nA   |
|  |                 | V <sub>R</sub> = 5 V  |      |      | 20   |      |
| Terminal Capacitance                   | C <sub>t</sub>  | V <sub>R</sub> = 5 V, f = 1 MHz, T <sub>C</sub> = 25 °C             |      | 1.0  | 1.5  | pF   |
| Sensitivity                            | S               | V <sub>R</sub> = 5 V, λ = 1 310 nm                                  | 0.78 | 0.89 |      | A/W  |
|  |                 | V <sub>R</sub> = 5 V, λ = 1 550 nm                                  | 0.80 | 0.94 |      |      |
| Temperature Dependence of Sensitivity  | ΔS <sub>t</sub> | V <sub>R</sub> = 5 V, λ = 1 550 nm                                  | -5   |      | 5    | %    |
| Polarization Dependence of Sensitivity | ΔS <sub>p</sub> | V <sub>R</sub> = 5 V, λ = 1 550 nm, T <sub>C</sub> = 25 °C          | -2.5 |      | 2.5  | %    |
| Wavelength Dependence of Sensitivity   | ΔS <sub>w</sub> | V <sub>R</sub> = 5 V, λ = 1 520 to 1 560 nm, T <sub>C</sub> = 25 °C | -2.5 |      | 2.5  | %    |
| Cut-off Frequency                      | f <sub>c</sub>  | V <sub>R</sub> = 5 V, T <sub>C</sub> = 25 °C                        | 2.5  |      |      | GHz  |
| ★ Optical Return Loss                  | ORL             | SMF   | 30   |      |      | dB   |
|  |                 | GI-50 Fiber   | 28   |      |      |      |

TYPICAL CHARACTERISTICS (T<sub>c</sub> = 25 °C, unless otherwise specified)



**Remark** The graphs indicate nominal characteristics.

★ InGaAs APD/PD FAMILY

| Part Number                | Absolute Maximum Ratings |                          | Electro-Optical Characteristics (T <sub>c</sub> = 25 °C) |                        |                         |            |            |                       | Applications                | Package                                 |
|----------------------------|--------------------------|--------------------------|--|------------------------|-------------------------|------------|------------|-----------------------|-----------------------------|---|
|                            | T <sub>c</sub><br>(°C)   | T <sub>stg</sub><br>(°C) | Detect-<br>ing Area<br>Size<br>(μm)                      | I <sub>b</sub><br>(nA) | f <sub>c</sub><br>(GHz) | S<br>(A/W) |            | V <sub>R</sub><br>(V) |                             |   |
|                            |                          |                          |  | TYP.                   | MIN.                    | TYP.       | @λ<br>(nm) |                       |                             |   |
| NR4500BP-CC<br>NR4500CP-CC | 0 to +70                 | -40 to +85               | φ50  | -                      | 2.5 <sup>*1</sup>       | 0.94       | 1 310      | 0.9V <sub>BR</sub>    | 2.5 Gb/s:<br>STM-16         | Coaxial APD with<br>an Internal pre-amp |
| NR7500 Series              | -40 to +85               | -40 to +85               | φ50  | 0.1                    | 2.5                     | 0.89       | 1 310      | 5                     | 2.5 Gb/s:<br>STM-16         | Coaxial PD                              |
| NR7800 Series              | -40 to +85               | -40 to +85               | φ80  | 0.1                    | 2.5                     | 0.89       | 1 310      | 5                     | ≤ 622 Mb/s:<br>STM-4, STM-1 | Coaxial PD                              |
| NR8500 Series              | -40 to +85               | -40 to +85               | φ50  | 7                      | 1                       | 0.94       | 1 310      | 0.9V <sub>BR</sub>    | ≤ 622 Mb/s:<br>STM-4, STM-1 | Coaxial APD                             |
| NR8501 Series              | -40 to +85               | -40 to +85               | φ50  | 7                      | 2.5                     | 0.94       | 1 310      | 0.9V <sub>BR</sub>    | 2.5 Gb/s:<br>STM-16         | Coaxial APD                             |

\*1  $\bar{P}_{Low}$  and  $\bar{P}_{High}$  are specified at 2.5 Gb/s

★ REFERENCE

| Document Name   | Document No. |
|---|--------------|
| Optical semiconductor devices for fiberoptic communications Selection Guide | P12480E      |
| Opto-Electronics Devices Pamphlet   | P13623E      |
| Opto-Electronics Devices (CD-ROM)   | P12944X      |
| NEC semiconductor device reliability/quality control system                 | C11159E      |
| Quality grades on NEC semiconductor devices                                 | C11531E      |
| SEMICONDUCTOR SELECTION GUIDE –Products and Packages–                       | X13769E      |

**SAFETY INFORMATION ON THIS PRODUCT**

|                                     |   |
|-------------------------------------|---|
| <p><b>Caution</b> GaAs Products</p> | <p>The product contains gallium arsenide, GaAs.<br/>GaAs vapor and powder are hazardous to human health if inhaled or ingested.</p> <ul style="list-style-type: none"> <li>• Do not destroy or burn the product.</li> <li>• Do not cut or cleave off any part of the product.</li> <li>• Do not crush or chemically dissolve the product.</li> <li>• Do not put the product in the mouth.</li> </ul> <p>Follow related laws and ordinances for disposal. The product should be excluded from general industrial waste or household garbage.</p> |
| <p><b>Caution</b> Optical Fiber</p> | <p>A glass-fiber is attached on the product. Handle with care.</p> <ul style="list-style-type: none"> <li>• When the fiber is broken or damaged, handle carefully to avoid injury from the damaged part or fragments.</li> </ul>  |

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