



**NEC's  $\phi 50\mu\text{m}$   
InGaAs PIN-PD  
IN COAXIAL PACKAGE  
FOR 2.5 Gbp/s APPLICATIONS**

**NR7500 SERIES**

## FEATURES

- **SMALL DARK CURRENT:**  
 $I_D = 0.1 \text{ nA}$
- **HIGH SPEED RESPONSE:**  
 $f_c = 2.5 \text{ GHz MIN}$
- **HIGH SENSITIVITY:**  
 $S = 0.89 \text{ A/W}$  at  $\lambda = 1310 \text{ nm}$   
 $S = 0.94 \text{ A/W}$  at  $\lambda = 1550 \text{ nm}$
- **LOW OPERATING VOLTAGE:**  
 $V_R = 5 \text{ V}$
- **COAXIAL MODULE WITH SINGLE MODE FIBER (SMF)  
OR GI-50 FIBER**
- **WITH SC CONNECTOR:** Standard, FC connector: option  
(Refer to Ordering Information)

## DESCRIPTION

NEC's NR7500 Series is an InGaAs PIN photo diode (PIN-PD) coaxial module with optical fiber pigtail. This module is designed for long wavelength 2.5 Gb/s optical fiber communication systems and is ideal as a receiver for Synchronous Digital Hierarchy (SDH) system, STM-16, ITU-T recommendations.

## ELECTRO-OPTICAL CHARACTERISTICS ( $T_C = 40^\circ \text{C}$ to $+85^\circ \text{C}$ , unless otherwise specified)

| PART NUMBER |                                                                                                                     |             | NR7500 Series |      |     |
|-------------|---------------------------------------------------------------------------------------------------------------------|-------------|---------------|------|-----|
| SYMBOLS     | PARAMETERS AND CONDITIONS                                                                                           | UNITS       | MIN           | TYP  | MAX |
| $I_D$       | Dark Current, $V_R = 5 \text{ V}$ , $T_C = 25^\circ \text{C}$<br>$V_R = 5 \text{ V}$                                | nA          |               | 0.1  | 1.0 |
|             |                                                                                                                     |             |               |      | 20  |
| $C_t$       | Terminal Capacitance, $V_R = 5 \text{ V}$ , $f = 1 \text{ MHz}$ , $T_C = 25^\circ \text{C}$                         | pF          |               | 0.7  | 0.9 |
| S           | Sensitivity, $V_R = 5 \text{ V}$ , $\lambda = 1310 \text{ nm}$<br>$V_R = 5 \text{ V}$ , $\lambda = 1550 \text{ nm}$ | A/W         | 0.78          | 0.89 |     |
|             |                                                                                                                     |             | 0.80          | 0.94 |     |
| $f_c$       | Cut-off Frequency, $V_R = 5 \text{ V}$ , $T_C = 25^\circ \text{C}$                                                  | GHz         | 2.5           |      |     |
| ORL         | Optical Return Loss                                                                                                 | SMF         | 30            |      |     |
|             |                                                                                                                     | GI-50 Fiber | 28            |      |     |

ABSOLUTE MAXIMUM RATINGS<sup>1</sup>

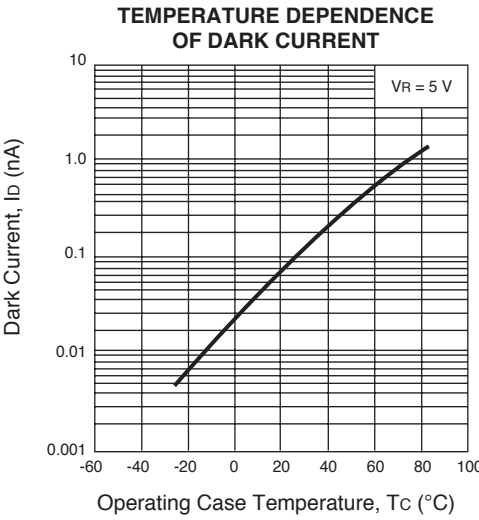
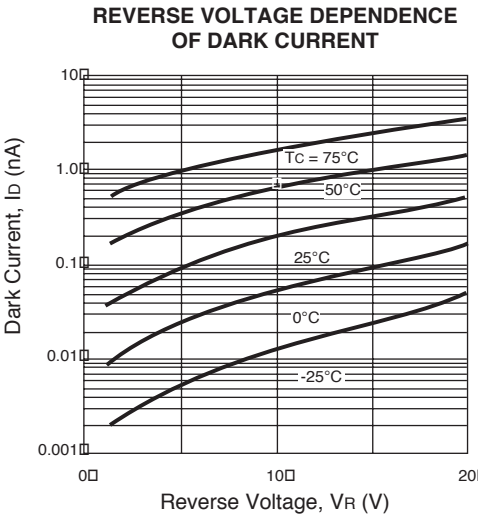
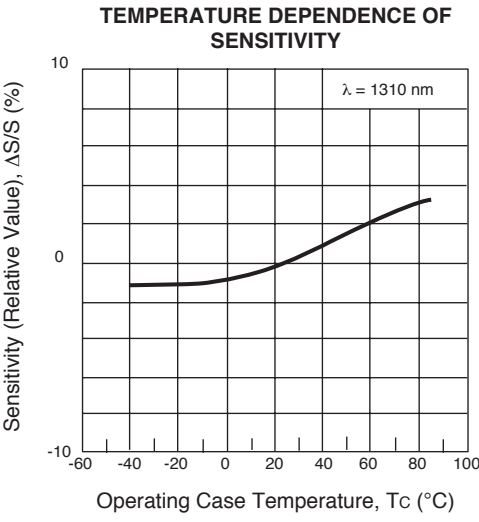
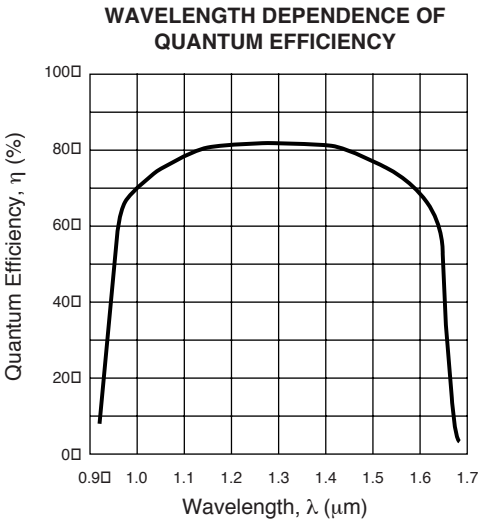
(T<sub>C</sub> = 25°C, unless otherwise specified)

| SYMBOLS          | PARAMETERS                        | UNITS | RATINGS       |
|------------------|-----------------------------------|-------|---------------|
| V <sub>R</sub>   | Reverse Voltage                   | V     | 20            |
| I <sub>F</sub>   | Forward Current                   | mA    | 10            |
| P <sub>IN</sub>  | Optical Input Power               | mW    | 8             |
| T <sub>C</sub>   | Operating Case Temp.              | °C    | -40 to +85    |
| T <sub>STG</sub> | Storage Temperature               | °C    | -40 to +85    |
| T <sub>SLD</sub> | Lead Soldering Temp.              | °C    | 260 (10 sec.) |
| RH               | Relative Humidity (noncondensing) | %     | 85            |

Note:

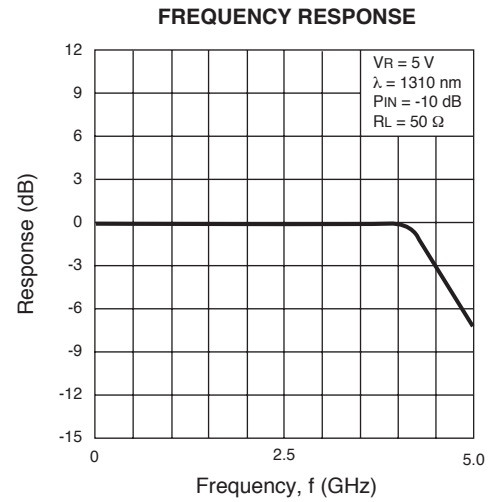
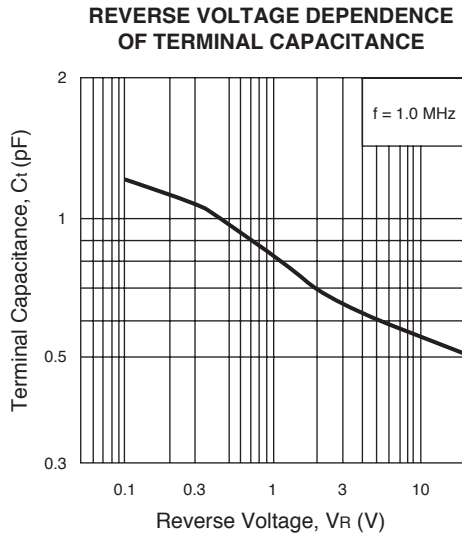
1. Operation in excess of any one of these parameters may result in permanent damage.

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



Remark: The graphs indicate nominal characteristics.

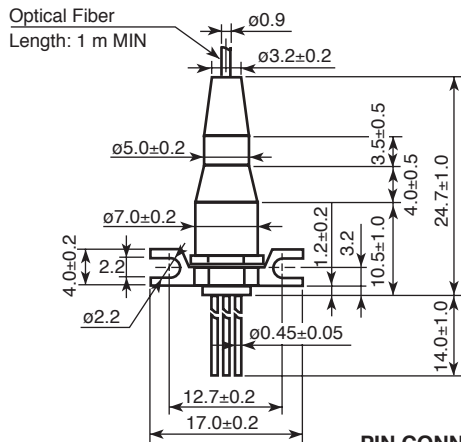
# TYPICAL PERFORMANCE CURVES (T<sub>C</sub> = 25°C, unless otherwise specified)



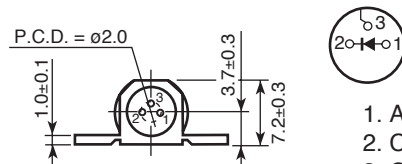
Remark: The graphs indicate nominal characteristics.

## OUTLINE DIMENSIONS (Units in mm)

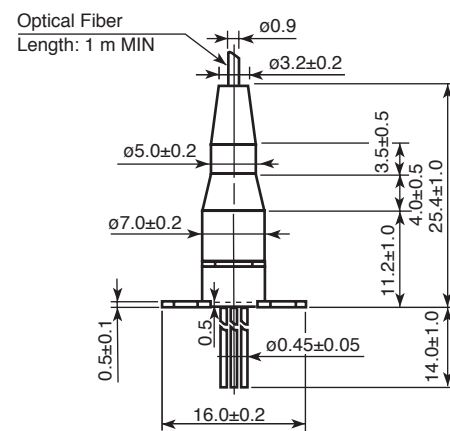
NR7500FP/FR



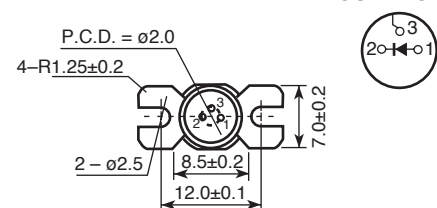
PIN CONNECTIONS



NR7500CP/CR

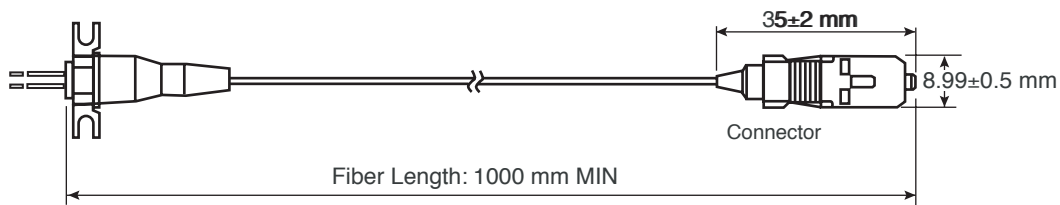


PIN CONNECTIONS



## OPTICAL FIBER CHARACTERISTICS

| PARAMETER                           | UNITS         | SPECIFICATION |              |
|-------------------------------------|---------------|---------------|--------------|
|                                     |               | SMF           | GI-50        |
| Mode Field Diameter                 | $\mu\text{m}$ | $9.5\pm 1$    | —            |
| Core Diameter                       | $\mu\text{m}$ | —             | $50\pm 3$    |
| Cladding Diameter                   | $\mu\text{m}$ | $125\pm 2$    | $125\pm 2$   |
| Maximum Cladding Noncircularity     | %             | 2             | 2            |
| Maximum Core/Cladding Concentricity | %             | 1.6           | 4.0          |
| Outer Diameter                      | mm            | $0.9\pm 0.1$  | $0.9\pm 0.1$ |
| Cut-off Wavelength                  | nm            | 1100 to 1270  | —            |
| Minimum Fiber Bending Radius        | mm            | 30            | 30           |
| Fiber Length                        | mm            | 1000 MIN      | 1000 MIN     |
| Flammability                        |               | UL1581 VW-1   |              |



## ORDERING INFORMATION

| PART NUMBER     | FLANGE TYPE       | FIBER TYPE  | AVAILABLE CONNECTOR <sup>1</sup> |
|-----------------|-------------------|-------------|----------------------------------|
| NR7500FP-BC-AZ* | Flat mount Flange | SMF         | With FC-UPC Connector            |
| NR7500FP-CC-AZ* |                   |             | With SC-UPC Connector            |
| NR7500FR-BB-AZ* |                   | GI-50 Fiber | With FC-SPC Connector            |
| NR7500FR-CB-AZ* |                   |             | With SC-SPC Connector            |
| NR7500CP-BC-AZ* | Vertical Mount    | SMF         | With FC-UPC Connector            |
| NR7500CP-CC-AZ* |                   |             | With SC-UPC Connector            |
| NR7500CR-BB-AZ* |                   | GI-50 Fiber | With FC-SPC Connector            |
| NR7500CR-CB-AZ* |                   |             | With SC-SPC Connector            |

Note:

1. SC Connector: standard  
FC Connector: option

**\*NOTE:**

Please refer to the last page of this data sheet, "Compliance with EU Directives" for Pb-Free RoHS Compliance Information.

## Life Support Applications

These NEC products are not intended for use in life support devices, appliances, or systems where the malfunction of these products can reasonably be expected to result in personal injury. The customers of CEL using or selling these products for use in such applications do so at their own risk and agree to fully indemnify CEL for all damages resulting from such improper use or sale.

**CEL** California Eastern Laboratories, Your source for NEC RF, Microwave, Optoelectronic, and Fiber Optic Semiconductor Devices.

4590 Patrick Henry Drive • Santa Clara, CA 95054-1817 • (408) 988-3500 • FAX (408) 988-0279 • [www.cel.com](http://www.cel.com)

DATA SUBJECT TO CHANGE WITHOUT NOTICE

02/24/2003

**NEC**  
A Business Partner of NEC Compound Semiconductor Devices, Ltd.

Subject: Compliance with EU Directives

CEL certifies, to its knowledge, that semiconductor and laser products detailed below are compliant with the requirements of European Union (EU) Directive 2002/95/EC Restriction on Use of Hazardous Substances in electrical and electronic equipment (RoHS) and the requirements of EU Directive 2003/11/EC Restriction on Penta and Octa BDE.

CEL Pb-free products have the same base part number with a suffix added. The suffix –A indicates that the device is Pb-free. The –AZ suffix is used to designate devices containing Pb which are exempted from the requirement of RoHS directive (\*). In all cases the devices have Pb-free terminals. All devices with these suffixes meet the requirements of the RoHS directive.

This status is based on CEL's understanding of the EU Directives and knowledge of the materials that go into its products as of the date of disclosure of this information.

| Restricted Substance<br>per RoHS | Concentration Limit per RoHS<br>(values are not yet fixed) | Concentration contained<br>in CEL devices |     |
|----------------------------------|------------------------------------------------------------|-------------------------------------------|-----|
|                                  |                                                            | -A                                        | -AZ |
| Lead (Pb)                        | < 1000 PPM                                                 | Not Detected                              | (*) |
| Mercury                          | < 1000 PPM                                                 | Not Detected                              |     |
| Cadmium                          | < 100 PPM                                                  | Not Detected                              |     |
| Hexavalent Chromium              | < 1000 PPM                                                 | Not Detected                              |     |
| PBB                              | < 1000 PPM                                                 | Not Detected                              |     |
| PBDE                             | < 1000 PPM                                                 | Not Detected                              |     |

If you should have any additional questions regarding our devices and compliance to environmental standards, please do not hesitate to contact your local representative.

Important Information and Disclaimer: Information provided by CEL on its website or in other communications concerning the substance content of its products represents knowledge and belief as of the date that it is provided. CEL bases its knowledge and belief on information provided by third parties and makes no representation or warranty as to the accuracy of such information. Efforts are underway to better integrate information from third parties. CEL has taken and continues to take reasonable steps to provide representative and accurate information but may not have conducted destructive testing or chemical analysis on incoming materials and chemicals. CEL and CEL suppliers consider certain information to be proprietary, and thus CAS numbers and other limited information may not be available for release.

In no event shall CEL's liability arising out of such information exceed the total purchase price of the CEL part(s) at issue sold by CEL to customer on an annual basis.

See CEL Terms and Conditions for additional clarification of warranties and liability.