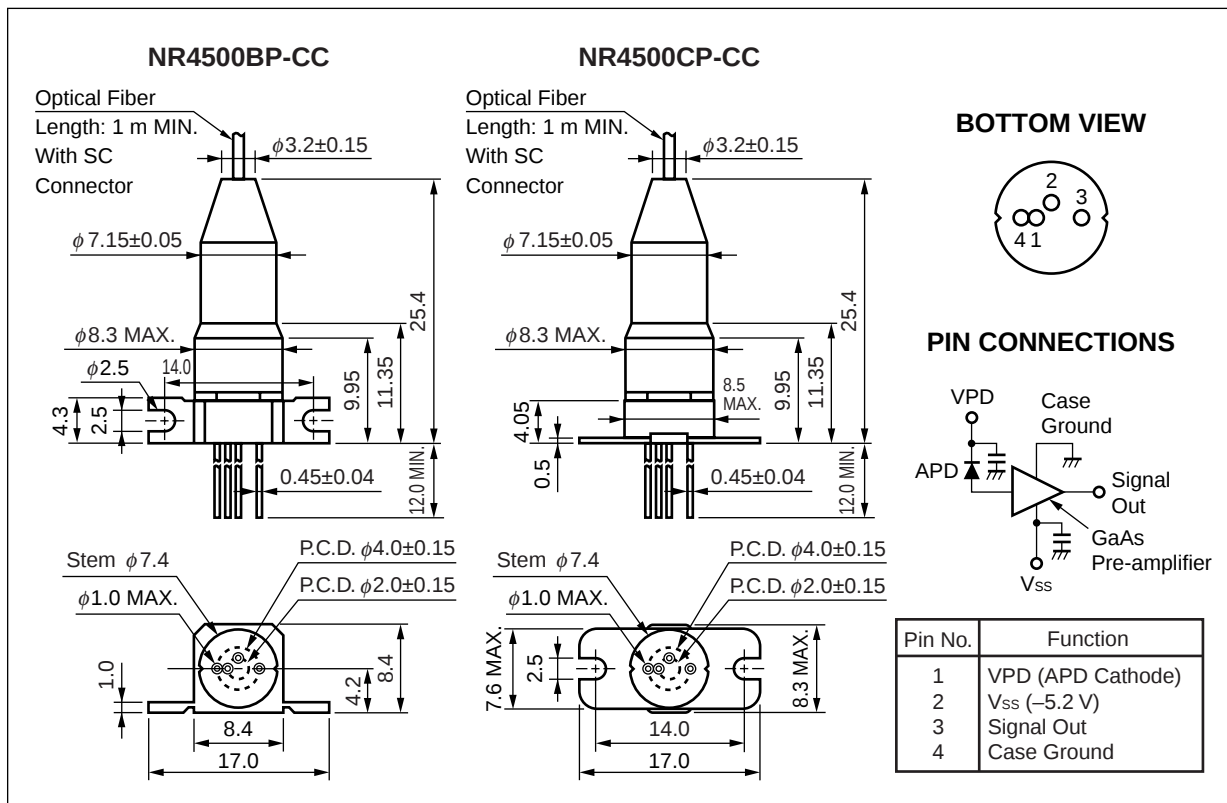


**$\phi 50 \mu\text{m}$ InGaAs APD RECEIVER FOR 2.5 Gb/s
COAXIAL MODULE WITH INTERNAL PRE-AMPLIFIER****DESCRIPTION**

The NR4500BP-CC and NR4500CP-CC are 2.5 Gb/s APD receiver in a coaxial module with an internal pre-amplifier. These modules are ideal as a receiver for Synchronous Digital Hierarchy (SDH) system, STM-16, ITU-T recommendations.

FEATURES

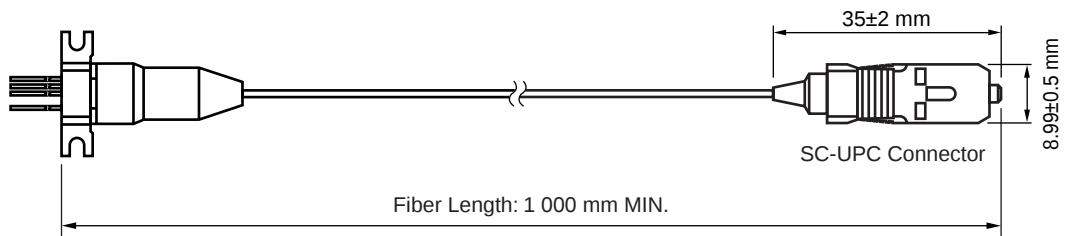
- APD with high performance GaAs pre-amplifier
- High data rate capability 2.5 Gb/s
- Receiver sensitivity $\bar{P}_{\text{Low}} = -32 \text{ dBm}$
- ★ • Operating case temperature range $T_c = 0 \text{ to } +85^\circ\text{C}$
- Single-end output
- Coaxial module with SC-UPC connector

PACKAGE DIMENSIONS (UNIT: mm)

The information in this document is subject to change without notice. Before using this document, please confirm that this is the latest version.
Not all devices/types available in every country. Please check with local NEC representative for availability and additional information.

OPTICAL FIBER CHARACTERISTICS

Parameter	Specification	Unit
Mode Field Diameter	9.5±1	μm
Cladding Diameter	125±2	μm
Maximum Cladding Noncircularity	2	%
Maximum Core/Cladding Concentricity	1.6	%
Outer Diameter	0.9±0.1	mm
Cut-off Wavelength	1 100 to 1 270	nm
Minimum Fiber Bending Radius	30	mm
Fiber Length	1 000 MIN.	mm
Flammability	UL1581 VW-1	



ORDERING INFORMATION

Part Number	Flange Type	Available Connector
NR4500BP-CC	Flat Mount Flange	With SC-UPC Connector
NR4500CP-CC	Vertical Mount Flange	

ABSOLUTE MAXIMUM RATINGS

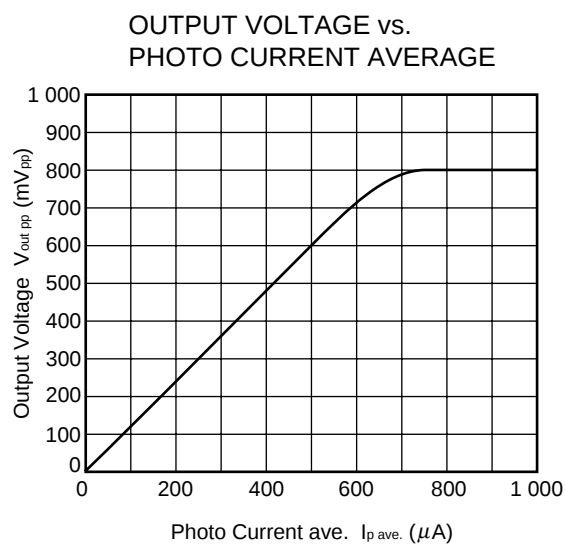
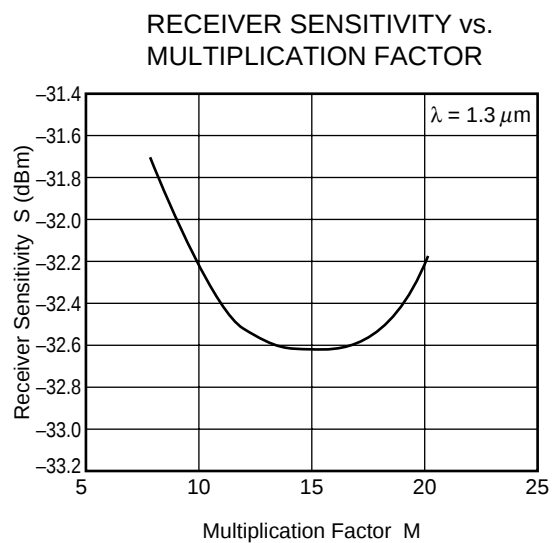
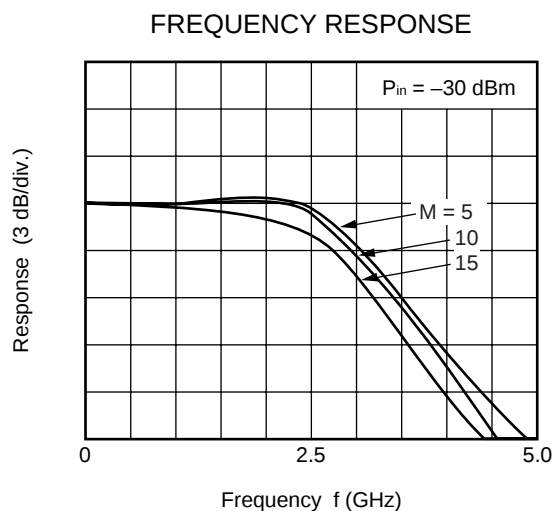
Parameter	Symbol	Ratings	Unit
Forward Current	I_F	10	mA
Reverse Current	I_R	1.0	mA
Supply Voltage	V_{SS}	-6.0	V
Operating Case Temperature	T_C	0 to +85	°C
Storage Temperature	T_{stg}	-40 to +85	°C
Lead Soldering Temperature	T_{slid}	260 (10 sec.)	°C
Relative Humidity (noncondensing)	RH	85	%

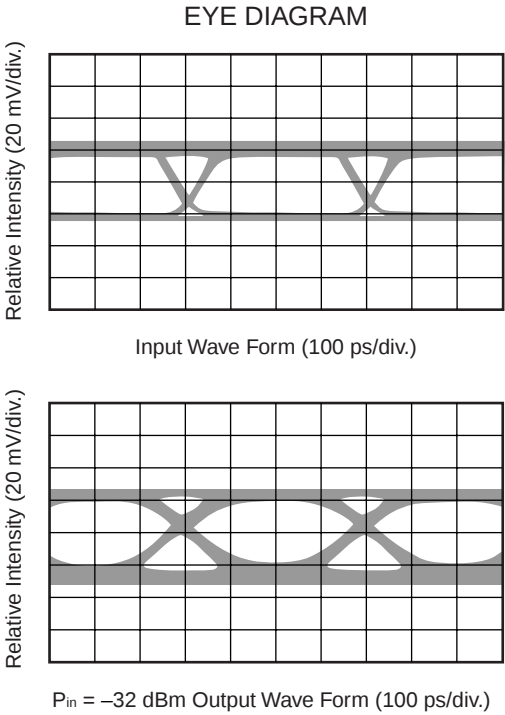
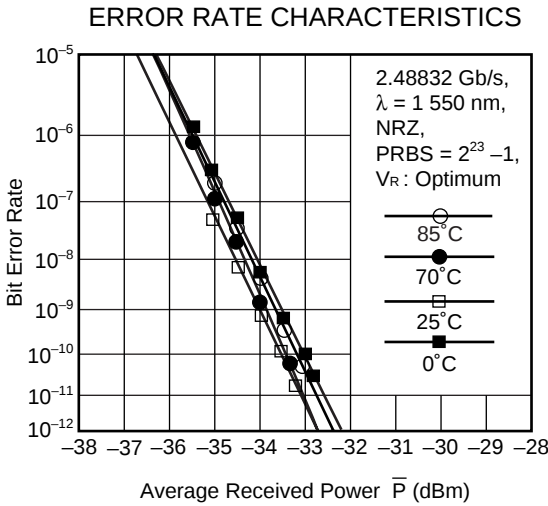
ELECTRO-OPTICAL CHARACTERISTICS

($T_C = 25^\circ\text{C}$, $V_{SS} = -5.2\text{ V}$, $\lambda = 1\ 310/1\ 550\text{ nm}$, unless otherwise specified)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Reverse Break Down Voltage	V_{BR}	$I_D = 100\ \mu\text{A}$	40	60	80	V
Temperature Coefficient of Reverse Breakdown Voltage	δ	$T_C = 0\text{ to }+85^\circ\text{C}$	0.15		0.22	%/°C
Receiver Sensitivity	$\overline{P}_{Low}$	2.48832 Gb/s, BER = 10^{-10} , PRBS = $2^{23}-1$, Mark = 1/2, NRZ, M (V_R) is set at optimum value $T_C = 0\text{ to }+85^\circ\text{C}$		-32	-31	dBm
Maximum Optical Input Power	$\overline{P}_{High}$	2.48832 Gb/s, BER = 10^{-10} , PRBS = $2^{23}-1$, Mark = 1/2, NRZ, M (V_R) is set at optimum value $T_C = 0\text{ to }+85^\circ\text{C}$	-7			dBm
Sensitivity	S	M = 1, $\lambda = 1\ 310\text{ nm}$ M = 1, $\lambda = 1\ 550\text{ nm}$	0.80 0.81	0.94 0.96		A/W
Cut-off Frequency	f_c	AC coupling, $R_L = 50\ \Omega$, $P_{in} = -30\text{ dBm}$, M = 10, -3 dB from 3 MHz	1.8			GHz
Optical Return Loss	ORL		30			dB
Trans Impedance	Z_i	AC coupling, $R_L = 50\ \Omega$, $f = 100\text{ MHz}$, $P_{in} \leq -20\text{ dBm}$	400	600		Ω
Supply Voltage	V_{SS}		-5.46	-5.20	-4.96	V
Supply Current	I_{SS}				45	mA

★ TYPICAL CHARACTERISTICS (T_c = 25°C)





Remark The graphs indicate nominal characteristics.

InGaAs APD/PD FAMILY

★

Part Number	Absolute Maximum Ratings		Electro-Optical Characteristics (T _c = 25°C)						Applications	Package
	T _c (°C)	T _{stg} (°C)	Detect- ing Area Size (μm)	I _b (nA) TYP.	f _c (GHz) MIN.	S (A/W)		V _R (V)		
						@λ (nm)	TYP.			
NR4500BP-CC NR4500CP-CC	0 to +85	−40 to +85	ϕ50	−	2.5 ^{*1}	0.94	1 310	0.9V _{BR}	2.5 Gb/s: STM-16	Coaxial APD with an Internal pre-amp
						0.96	1 550			
NR7500 Series	−40 to +85	−40 to +85	ϕ50	0.1	2.5	0.89	1 310	5	2.5 Gb/s: STM-16	Coaxial PD
						0.94	1 550			
NR7800 Series	−40 to +85	−40 to +85	ϕ80	0.1	2.5	0.89	1 310	5	≤ 622 Mb/s: STM-4, STM-1	Coaxial PD
						0.94	1 550			
NR8500 Series	−40 to +85	−40 to +85	ϕ50	7	1	0.94	1 310	0.9V _{BR}	≤ 622 Mb/s: STM-4, STM-1	Coaxial APD
						0.96	1 550			
NR8501 Series	−40 to +85	−40 to +85	ϕ50	7	2.5	0.94	1 310	0.9V _{BR}	2.5 Gb/s: STM-16	Coaxial APD
						0.96	1 550			

*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

Caution	GaAs Products	The product contains gallium arsenide, GaAs. GaAs vapor and powder are hazardous to human health if inhaled or ingested. • Do not destroy or burn the product. • Do not cut or cleave off any part of the product. • Do not crush or chemically dissolve the product. • Do not put the product in the mouth. Follow related laws and ordinances for disposal. The product should be excluded from general industrial waste or household garbage.
Caution	Optical Fiber	A glass-fiber is attached on the product. Handle with care. • When the fiber is broken or damaged, handle carefully to avoid injury from the damaged part or fragments.

The export of this product from Japan is prohibited without governmental license. To export or re-export this product from a country other than Japan may also be prohibited without a license from that country. Please call an NEC sales representative.

- **The information in this document is current as of August, 2001. The information is subject to change without notice. For actual design-in, refer to the latest publications of NEC's data sheets or data books, etc., for the most up-to-date specifications of NEC semiconductor products. Not all products and/or types are available in every country. Please check with an NEC sales representative for availability and additional information.**
 - No part of this document may be copied or reproduced in any form or by any means without prior written consent of NEC. NEC assumes no responsibility for any errors that may appear in this document.
 - NEC does not assume any liability for infringement of patents, copyrights or other intellectual property rights of third parties by or arising from the use of NEC semiconductor products listed in this document or any other liability arising from the use of such products. No license, express, implied or otherwise, is granted under any patents, copyrights or other intellectual property rights of NEC or others.
 - Descriptions of circuits, software and other related information in this document are provided for illustrative purposes in semiconductor product operation and application examples. The incorporation of these circuits, software and information in the design of customer's equipment shall be done under the full responsibility of customer. NEC assumes no responsibility for any losses incurred by customers or third parties arising from the use of these circuits, software and information.
 - While NEC endeavours to enhance the quality, reliability and safety of NEC semiconductor products, customers agree and acknowledge that the possibility of defects thereof cannot be eliminated entirely. To minimize risks of damage to property or injury (including death) to persons arising from defects in NEC semiconductor products, customers must incorporate sufficient safety measures in their design, such as redundancy, fire-containment, and anti-failure features.
 - NEC semiconductor products are classified into the following three quality grades:
 "Standard", "Special" and "Specific". The "Specific" quality grade applies only to semiconductor products developed based on a customer-designated "quality assurance program" for a specific application. The recommended applications of a semiconductor product depend on its quality grade, as indicated below. Customers must check the quality grade of each semiconductor product before using it in a particular application.
 "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)
 "Specific": Aircraft, aerospace equipment, submersible repeaters, nuclear reactor control systems, life support systems and medical equipment for life support, etc.
- The quality grade of NEC semiconductor products is "Standard" unless otherwise expressly specified in NEC's data sheets or data books, etc. If customers wish to use NEC semiconductor products in applications not intended by NEC, they must contact an NEC sales representative in advance to determine NEC's willingness to support a given application.
- (Note)
- (1) "NEC" as used in this statement means NEC Corporation and also includes its majority-owned subsidiaries.
 (2) "NEC semiconductor products" means any semiconductor product developed or manufactured by or for NEC (as defined above).