

To our customers,

Old Company Name in Catalogs and Other Documents

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Renesas Electronics website: <http://www.renesas.com>

April 1st, 2010
Renesas Electronics Corporation

Issued by: Renesas Electronics Corporation (<http://www.renesas.com>)

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PHOTO DIODE

NR7500 Series

$\phi 50 \mu\text{m}$ InGaAs PIN-PD COAXIAL MODULE FOR 2.5 Gb/s FIBEROPTIC COMMUNICATIONS

DESCRIPTION

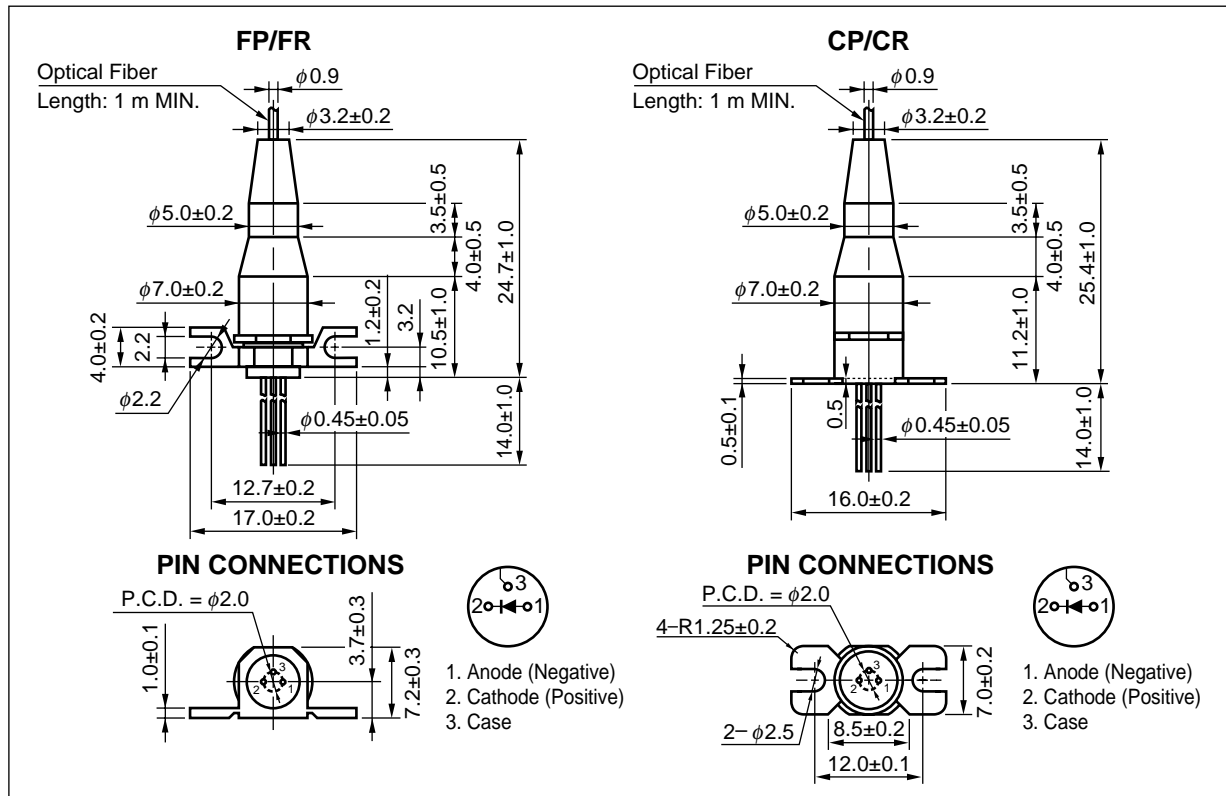
The NR7500 Series is an InGaAs PIN photo diode (PIN-PD) coaxial module with optical fiber pigtail. This module is designed for long wavelength 2.5 Gb/s optical communication systems and ideal as a receiver for Synchronous Digital Hierarchy (SDH) system, STM-16, ITU-T recommendations.

FEATURES

- Small dark current $I_D = 0.1 \text{ nA}$
- High speed response $f_c = 2.5 \text{ GHz MIN.}$
- High sensitivity $S = 0.89 \text{ A/W @ } \lambda = 1310 \text{ nm}$
 $S = 0.94 \text{ A/W @ } \lambda = 1550 \text{ nm}$
- 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**)

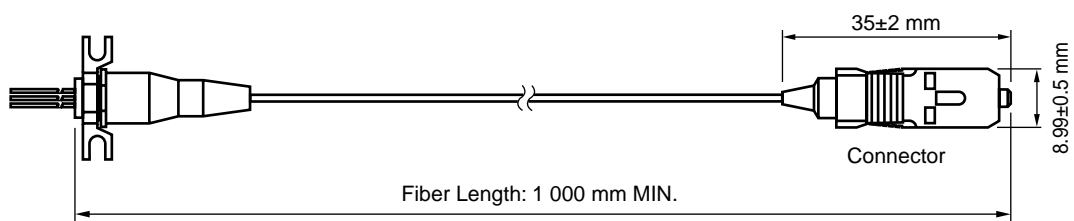
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★ PACKAGE DIMENSIONS (UNIT: mm)



OPTICAL FIBER CHARACTERISTICS

Parameter	Specification		Unit
	SMF	GI-50 Fiber	
Mode Field Diameter	9.5 ± 1	—	μm
Core Diameter	—	50 ± 3	μm
Cladding Diameter	125 ± 2	125 ± 2	μm
Maximum Cladding Noncircularity	2	2	%
Maximum Core/Cladding Concentricity	1.6	4.0	%
Outer Diameter	0.9 ± 0.1	0.9 ± 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 ^{*1}
★ NR7500FP-BC	Flat Mount Flange	SMF	With FC-UPC Connector
★ NR7500FP-CC			With SC-UPC Connector
★ NR7500FR-BB		GI-50 Fiber	With FC-SPC Connector
★ NR7500FR-CB			With SC-SPC Connector
NR7500CP-BC	Vertical Mount Flange	SMF	With FC-UPC Connector
NR7500CP-CC			With SC-UPC Connector
NR7500CR-BB		GI-50 Fiber	With FC-SPC Connector
NR7500CR-CB			With SC-SPC Connector

*1 SC Connector : standard

FC Connector : option

ABSOLUTE MAXIMUM RATINGS

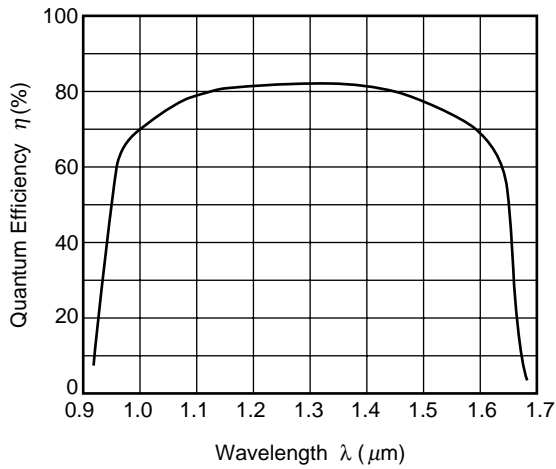
Parameter	Symbol	Ratings	Unit
Reverse Voltage	V_R	20	V
Forward Current	I_F	10	mA
Optical Input Power	P_{in}	8	mW
Operating Case Temperature	T_C	−40 to +85	°C
Storage Temperature	T_{stg}	−40 to +85	°C
Lead Soldering Temperature	T_{sld}	260 (10 sec.)	°C
Relative Humidity (noncondensing)	RH	85	%

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

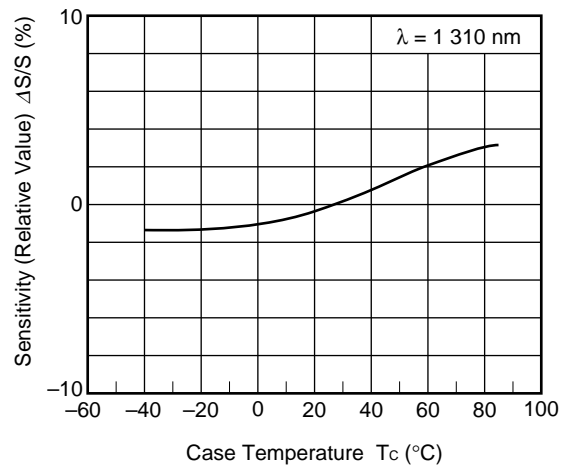
Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Dark Current	I_D	$V_R = 5\text{ V}$, $T_C = 25^{\circ}\text{C}$		0.1	1.0	nA
		$V_R = 5\text{ V}$			20	
Terminal Capacitance	C_t	$V_R = 5\text{ V}$, $f = 1\text{ MHz}$, $T_C = 25^{\circ}\text{C}$		0.7	0.9	pF
Sensitivity	S	$V_R = 5\text{ V}$, $\lambda = 1\ 310\text{ nm}$	0.78	0.89		A/W
		$V_R = 5\text{ V}$, $\lambda = 1\ 550\text{ nm}$	0.80	0.94		
Cut-off Frequency	f_c	$V_R = 5\text{ V}$, $T_C = 25^{\circ}\text{C}$	2.5			GHz
Optical Return Loss	ORL	SMF	30			dB
		GI-50 Fiber	28			

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

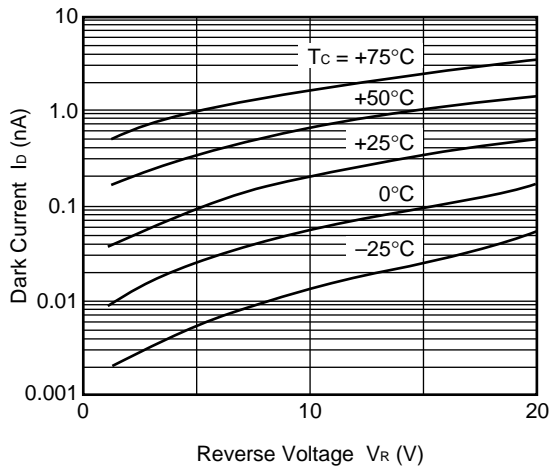
WAVELENGTH DEPENDENCE
OF QUANTUM EFFICIENCY



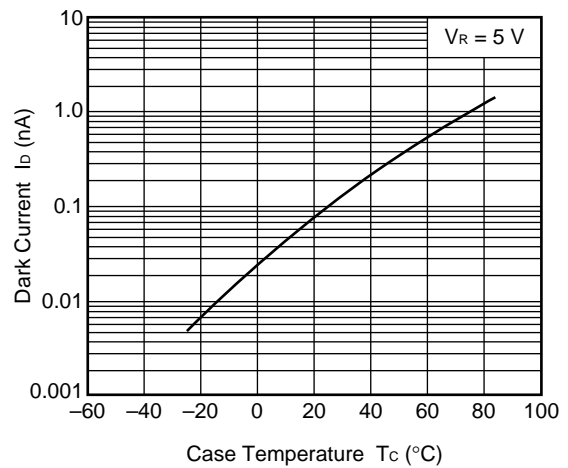
TEMPERATURE DEPENDENCE
OF SENSITIVITY



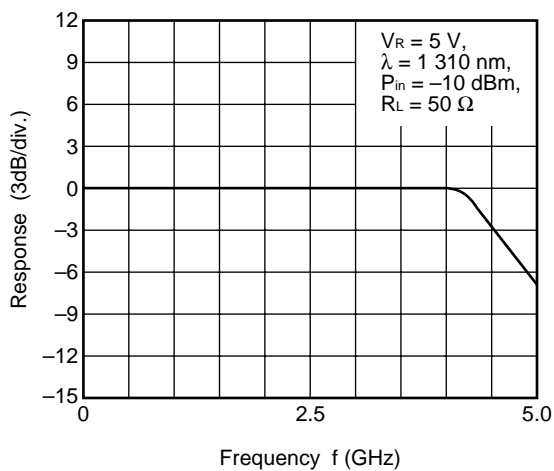
REVERSE VOLTAGE DEPENDENCE
OF DARK CURRENT



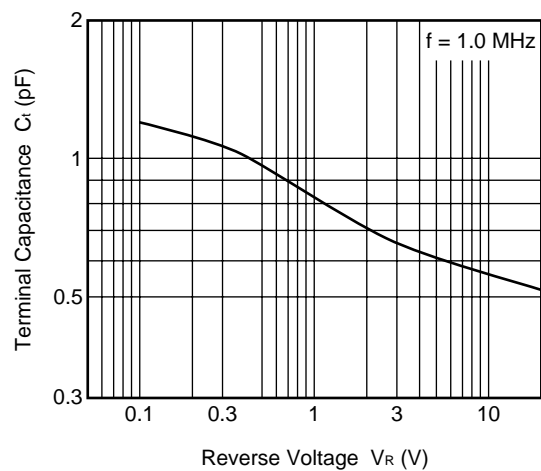
TEMPERATURE DEPENDENCE
OF DARK CURRENT



FREQUENCY RESPONSE



REVERSE VOLTAGE DEPENDENCE
OF TERMINAL CAPACITANCE



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 _D (nA)	f _c (GHz)	S (A/W)				V _R (V)
				TYP.	MIN.	TYP.	@λ (nm)			
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
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 ^{*1}	C11159E
Quality grades on NEC semiconductor devices ^{*1}	C11531E
SEMICONDUCTOR SELECTION GUIDE –Products and Packages– ^{*1}	X13769E

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M8E 00.4-0110

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<p>Caution Optical Fiber</p>	<p>A glass-fiber is attached on the product. Handle with care.</p> <ul style="list-style-type: none"> • When the fiber is broken or damaged, handle carefully to avoid injury from the damaged part or fragments.

►Business issue

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►Technical issue

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