



# RECEIVER NR4510UR

## $\phi 50\ \mu\text{m}$ InGaAs APD RECEIVER FOR 2.5 Gb/s ROSA WITH INTERNAL PRE-AMPLIFIER

### DESCRIPTION

The NR4510UR is a InGaAs APD ROSA with an internal pre-amplifier in a receptacle type package designed for SFF/SFP transceiver with LC duplex receptacle. This device is ideal as a receiver for Synchronous Digital Hierarchy (SDH) system, STM-16, ITU-T recommendations.

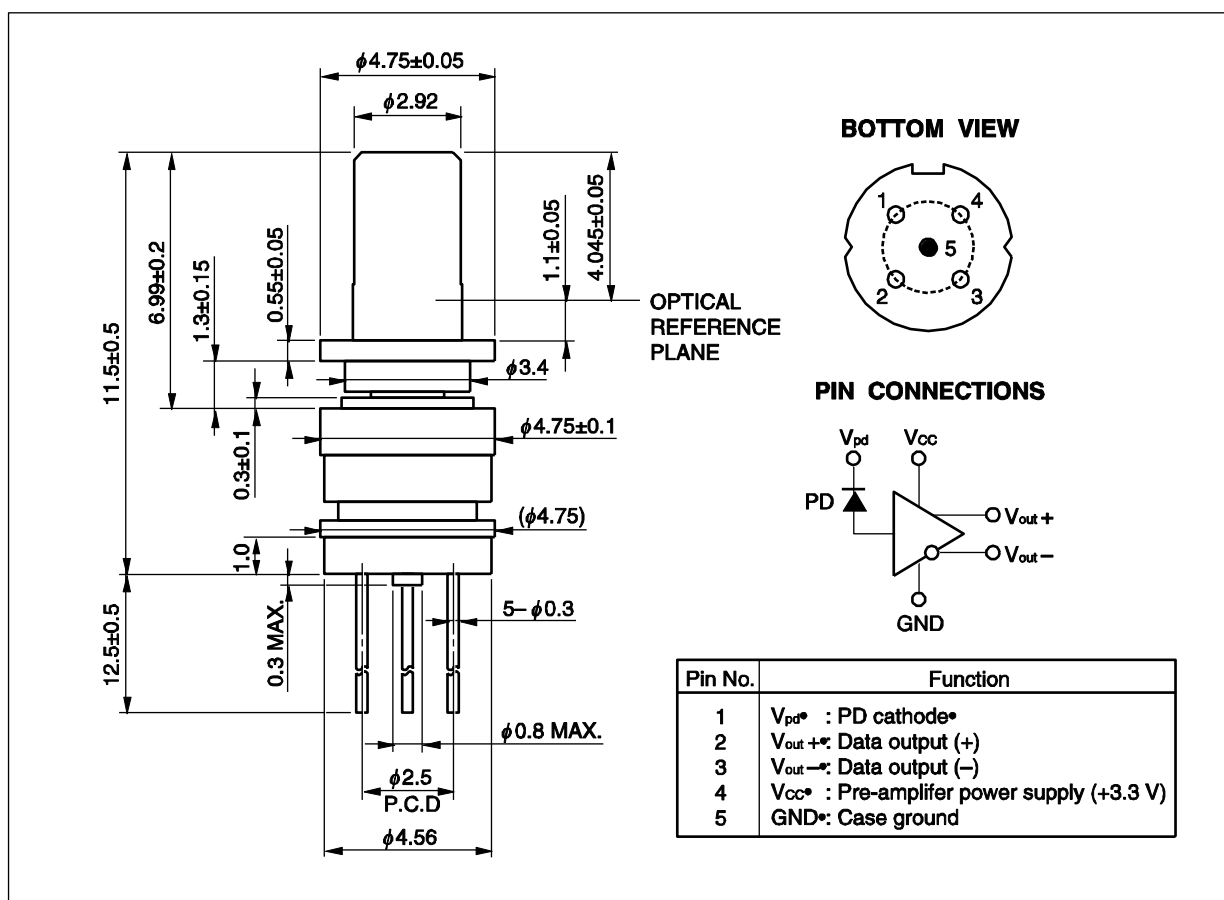
### FEATURES

- Internal pre-amplifier
- Minimum receiver sensitivity  $\bar{P}_r = -33\ \text{dBm}$
- Wide operating temperature range  $T_c = -40\ \text{to}\ +85^\circ\text{C}$
- $50\ \Omega$  differential output
- Small package  $\phi 4.6\ \text{mm}$  ROSA (Total length 12.0 mm MAX.)
- Based on Telcordia reliability



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PACKAGE DIMENSIONS (UNIT: mm)



## ORDERING INFORMATION

Part Number	Package
NR4510UR	$\phi$ 4.6 mm ROSA

## ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Ratings	Unit
Forward Current	$I_F$	10	mA
Reverse Current	$I_R$	1.5	mA
Supply Voltage	$V_{CC}$	4.5	V
Operating Case Temperature	$T_C$	-40 to +85	°C
Storage Temperature	$T_{stg}$	-40 to +85	°C
Lead Soldering Temperature	$T_{sld}$	350 (3 sec.)	°C
Relative Humidity (noncondensing)	RH	85	%

## ELECTRO-OPTICAL CHARACTERISTICS

( $T_C = -40$  to  $+85^\circ\text{C}$ ,  $V_{CC} = 3.3$  V,  $\lambda = 1.31$   $\mu\text{m}$ ,  $1.55$   $\mu\text{m}$ , unless otherwise specified)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Reverse Break Down Voltage	$V_{BR}$	$I_D = 100$ $\mu\text{A}$	40	60	70	V
Temperature Coefficient of Reverse Breakdown Voltage	$\delta$		0.09		0.15	%/°C
Dark Current	$I_D$	$V_R = 0.9 V_{BR}$ , $T_C = 85^\circ\text{C}$			500	nA
Minimum Receiver Sensitivity	$\bar{P}_r$	2.48832 Gb/s, BER = $10^{-10}$ , PRBS = $2^{23}-1$ , ER = 10 dB, $\lambda = 1.31$ $\mu\text{m}$ , NRZ, AC-coupled, $M_{opt}$		-33	-30	dBm
Maximum Optical Input Power	$P_{ovl}$	2.48832 Gb/s, BER = $10^{-10}$ , PRBS = $2^{23}-1$ , ER = 10 dB, $\lambda = 1.31$ $\mu\text{m}$ , NRZ, AC-coupled, $M = 3$	-6	-5		dBm
Sensitivity	S	$M = 1$ , $\lambda = 1.31$ $\mu\text{m}$	0.80			A/W
		$M = 1$ , $\lambda = 1.55$ $\mu\text{m}$	0.88			
Cut-off Frequency	$f_c$	AC-coupled, $R_L = 50$ $\Omega$ , $M = 10$ , -3 dB Ref to 100 MHz	1.6	1.9		GHz
Optical Return Loss	ORL	SMF	27			dB
Transimpedance	$Z_i$	$f = 100$ MHz, $50$ $\Omega$ single-ended, AC-coupled $50$ $\Omega$ load	1.05	1.4		k $\Omega$
Supply Voltage	$V_{CC}$		3.15	3.3	3.45	V
Supply Current	$I_{CC}$				45	mA

**InGaAs APD/PD FAMILY**

Part Number	Absolute Maximum Ratings		Electro-Optical Characteristics (T <sub>c</sub> = 25°C)						Applications	Package
	T <sub>c</sub>  (°C)	T <sub>stg</sub>  (°C)	Detectin g  Area Size  (μm)	I <sub>b</sub>  (nA)  TYP.	f <sub>c</sub>  (GHz)  MIN.	S		V <sub>R</sub>  (V)		
						(A/W)	@λ  (nm)			
NR3470MU-CC	0 to +75	−40 to +85	ϕ 40	5	7.5	1.00	1 550	5	10 Gb/s: STM-64	17-pin mini-butterfly PD with an Internal pre-amplifier
NR3510UR	−40 to +85	−40 to +85	ϕ 50	0.1	1.8	0.80	1 310	3.3	2.5 Gb/s: STM-16	PIN ROSA with an Internal pre-amplifier
						0.85	1 550			
NR4270MU-CC	0 to +70	−40 to +85	ϕ 20	1.2 μA <sup>*1</sup>	7.0	0.63 <sup>*2</sup>	1 550	0.9 V <sub>BR</sub>	10 Gb/s: STM-64	17-pin mini-butterfly APD with an Internal pre-amplifier
NR4500BP-CC	0 to +85	−40 to +85	ϕ 50	−	2.5	0.94	1 310	0.9 V <sub>BR</sub>	2.5 Gb/s: STM-16	Coaxial APD with an Internal pre-amplifier
NR4500CP-CC						0.96	1 550			
NR4510UR	−40 to +85	−40 to +85	ϕ 50	−	1.6	0.80	1 310	0.9 V <sub>BR</sub>	2.5 Gb/s: STM-16	APD ROSA with an Internal pre-amplifier
						0.88	1 550			
NR7500 Series	−40 to +85	−40 to +85	ϕ 50	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	ϕ 80	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	ϕ 50	7	1	0.94	1 310	0.9 V <sub>BR</sub>	≤ 622 Mb/s: STM-4, STM-1	Coaxial APD
						0.96	1 550			
NR8501 Series	−40 to +85	−40 to +85	ϕ 50	7	2.5	0.94	1 310	0.9 V <sub>BR</sub>	2.5 Gb/s: STM-16	Coaxial APD
						0.96	1 550			

\*1 MAX.

\*2 MIN.

**REFERENCE**

Document Name	Document No.
OPTICAL SEMICONDUCTOR DEVICES FOR FIBEROPTIC COMMUNICATIONS SELECTION GUIDE	PL10161E
Opto-Electronics Devices Pamphlet	PX10160E

**Caution**

GaAs Products

This product uses gallium arsenide (GaAs).

GaAs vapor and powder are hazardous to human health if inhaled or ingested, so please observe the following points.

- Follow related laws and ordinances when disposing of the product. If there are no applicable laws and/or ordinances, dispose of the product as recommended below.
  1. Commission a disposal company able to (with a license to) collect, transport and dispose of materials that contain arsenic and other such industrial waste materials.
  2. Exclude the product from general industrial waste and household garbage, and ensure that the product is controlled (as industrial waste subject to special control) up until final disposal.
- Do not burn, destroy, cut, crush, or chemically dissolve the product.
- Do not lick the product or in any way allow it to enter the mouth.