



NEC's  
Ø50 µm InGaAs APD ROSA WITH  
INTERNAL PRE-AMPLIFIER  
FOR 2.5 GB/s APPLICATIONS

NR4510UR

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**DESCRIPTION**

NEC's 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.

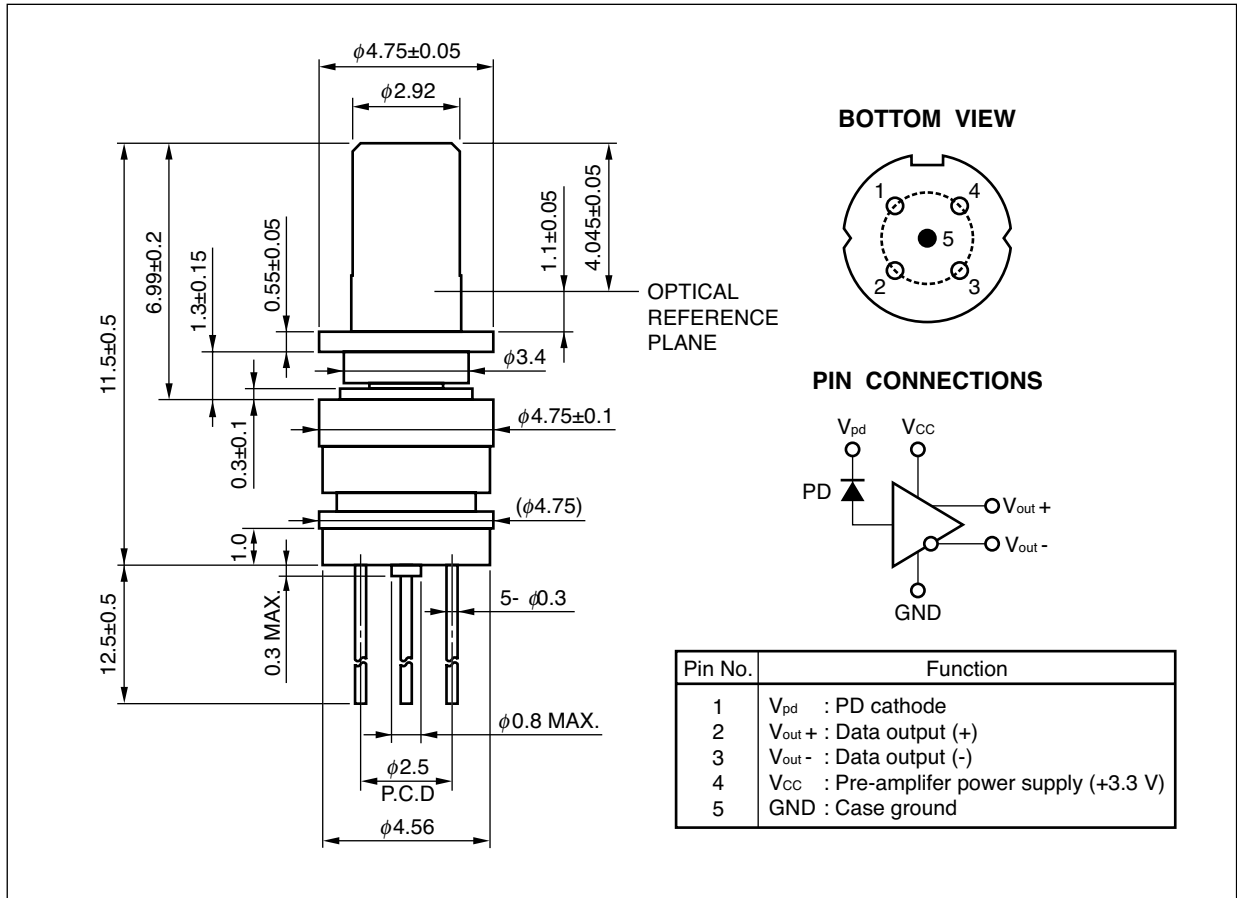


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**FEATURES**

- **INTERNAL PRE-AMPLIFIER**
- **MINIMUM RECEIVER SENSITIVITY**  
 $\bar{P}_r = -33$  dBm
- **WIDE OPERATING TEMPERATURE RANGE**  
 $T_c = -40$  to  $+85^\circ\text{C}$
- **50 Ω DIFFERENTIAL OUTPUT**
- **SMALL PACKAGE**  
 $\phi$  4.6 mm ROSA (Total length 12.0 mm MAX.)
- **BASED ON TELCORDIA RELIABILITY**

PACKAGE DIMENSIONS (UNIT:mm)



## ORDERING INFORMATION

PART NUMBER	PACKAGE
NR4510UR-AZ*	φ 4.6 mm ROSA

### \*NOTE:

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

## 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	$P_r$	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	$Z_t$	$f = 100$ 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

### 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

04/19/2004

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 per RoHS	Concentration Limit per RoHS (values are not yet fixed)	Concentration contained 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.