

**CEL**

# NEC's InGaAs PIN PD MODULE WITH INTERNAL PREAMPLIFIER FOR 10 Gb/s APPLICATIONS

**NR3470MU-CC****FEATURES**

- **InGaAs PIN PHOTO DIODE**
- **INTERNAL GaAs TRANSIMPEDANCE PREAMPLIFIER**
- **RECEIVER FOR 10 Gb/s TRANSMISSION**  
(STM-64, OC-192)
- **MINIMUM RECEIVER SENSITIVITY**  
 $P_r = -17$  dBm MAX
- **TRANSIMPEDANCE**  
 $Z_t = 58$  dB $\Omega$  MIN
- **17-PIN MINI-BUTTERFLY PACKAGE WITH SINGLE MODE FIBER**
- **AC COUPLED-DIFFERENTIAL OUTPUT**
- **WITH SC-UPC CONNECTOR**

**DESCRIPTION**

NEC's NR3470MU-CC is a 10 Gb/s PIN photo diode receiver in a 17-pin mini-butterfly package with an internal preamplifier. This module is ideal as a receiver for SONET OC-192 and Synchronous Digital Hierarchy (SDH) systems, STM-64, and ITU-T recommendations.

**ELECTRO-OPTICAL CHARACTERISTICS** ( $T_c = 25^\circ\text{C}$ ,  $V_{ss} = -5.2$  V,  $V_{pin} = +5$  V,  $\lambda = 1550$  nm, unless otherwise specified)

PART NUMBER			NR3470MU-CC			
SYMBOLS	PARAMETERS AND CONDITIONS		UNITS	MIN	TYP	MAX
$I_D$	Dark Current		nA		5	10
S	Sensitivity		A/W	0.75	0.80	
$P_r$	Minimum Receiver Sensitivity	PRBS = $2^{31} - 1$ , BER = $10^{-12}$	dBm		-18	-17
$P_o$	Overload	10.66 Gb/s, NRZ	dBm	0	+1	
$f_c$	Cut-off Frequency, $R_L = 50 \Omega$ , -3 dB		GHz	7.5	9.0	
$Z_t$	Transimpedance, $R_L = 50 \Omega$		dB $\Omega$	58	60	
$V_{ss}$	IC Supply Voltage		V	-5.46	-5.2	-4.94
$I_{ss}$	IC Supply Current		mA		90	130
ORL	Optical Return Loss		dB	27		

**NR3470MU-CC****ABSOLUTE MAXIMUM RATINGS<sup>1</sup>**(T<sub>c</sub> = 25°C, unless otherwise specified)

SYMBOLS	PARAMETERS	UNITS	RATINGS
I <sub>F</sub>	PIN PD Forward Current	mA	5
V <sub>R</sub>	PIN PD Reverse Voltage	V	20
I <sub>R</sub>	PIN PD Reverse Current	mA	2.0
V <sub>SS</sub>	IC Supply Voltage	V	-6 to 0
T <sub>C</sub>	Operating Case Temperature	°C	-5 to +75
T <sub>STG</sub>	Storage Temperature	°C	-40 to +85
T <sub>SLD</sub>	Lead Soldering Temperature (10 s)	°C	260

Note:

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

**ORDERING INFORMATION**

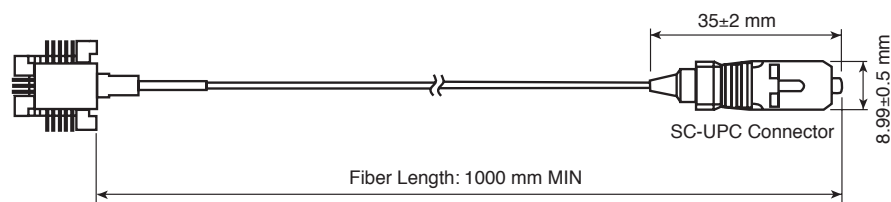
PART NUMBER	AVAILABLE CONNECTOR
NR3470MU-CC-AZ*	With SC-UPC Connector

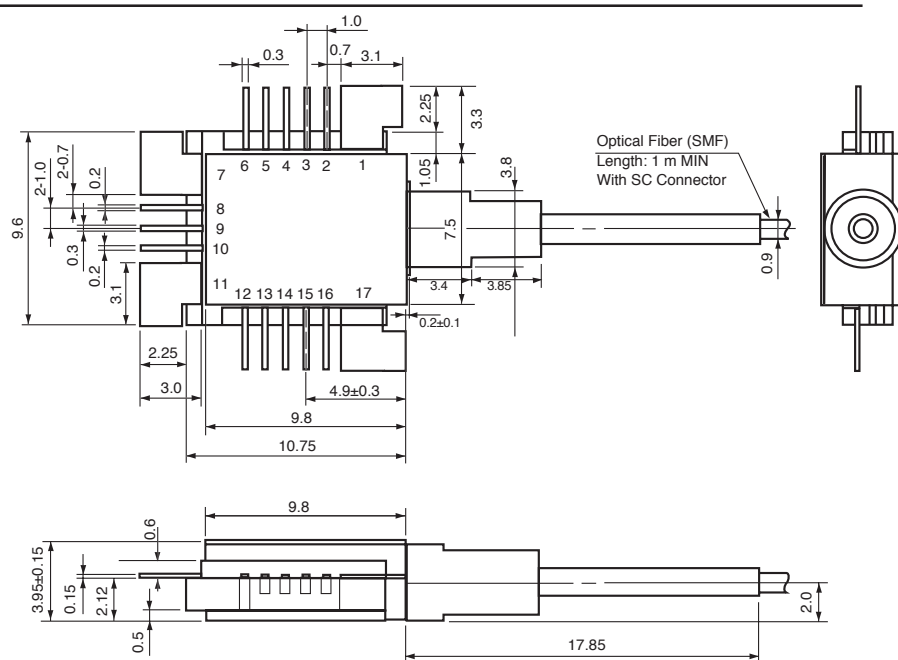
**\*NOTE:**

Please refer to the last page of this data sheet, "Compliance with EU Directives" for Pb-Free RoHS Compliance 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	1100 to 1270	nm
Minimum Fiber Bending Radius	30	mm
Fiber Length	1000 MIN	mm
Flammability	ULT1581 VW-1	



**OUTLINE DIMENSIONS** (Units in mm,  $\pm 0.2$  mm unless otherwise specified)**PIN CONNECTIONS**

PIN No.	SYMBOL	FUNCTION	PIN No.	SYMBOL	FUNCTION	PIN No.	SYMBOL	FUNCTION
1	GND	Ground (0.0V)	8	OUT	OUTPUT (INVERT)	15	NC	NC
2	Vpin	PIN PD CATHODE	9	GND	GROUND (0.0V)	16	NC	NC
3	NC	NC	10	OUT	OUTPUT (NON-INVERT)	17	GND	GROUND (0.0 V)
4	Vss	POWER SUPPLY (-5.2V)	11	GND	GROUND (0.0V)			
5	NC	NC	12	GND	GROUND (0.0V)			
6	GND	GROUND (0.0V)	13	NC	NC			
7	GND	GROUND (0.0V)	14	NC	NC			

## 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.

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**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 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.

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