

To our customers,

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## Old Company Name in Catalogs and Other Documents

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

April 1<sup>st</sup>, 2010  
Renesas Electronics Corporation

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

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**Phase-out/Discontinued**

RECEIVER

# NR3470MU-CC

## InGaAs PIN-PD RECEIVER WITH SINGLE MODE FIBER INTERNAL PREAMPLIFIER FOR 10 Gb/s APPLICATIONS

### DESCRIPTION

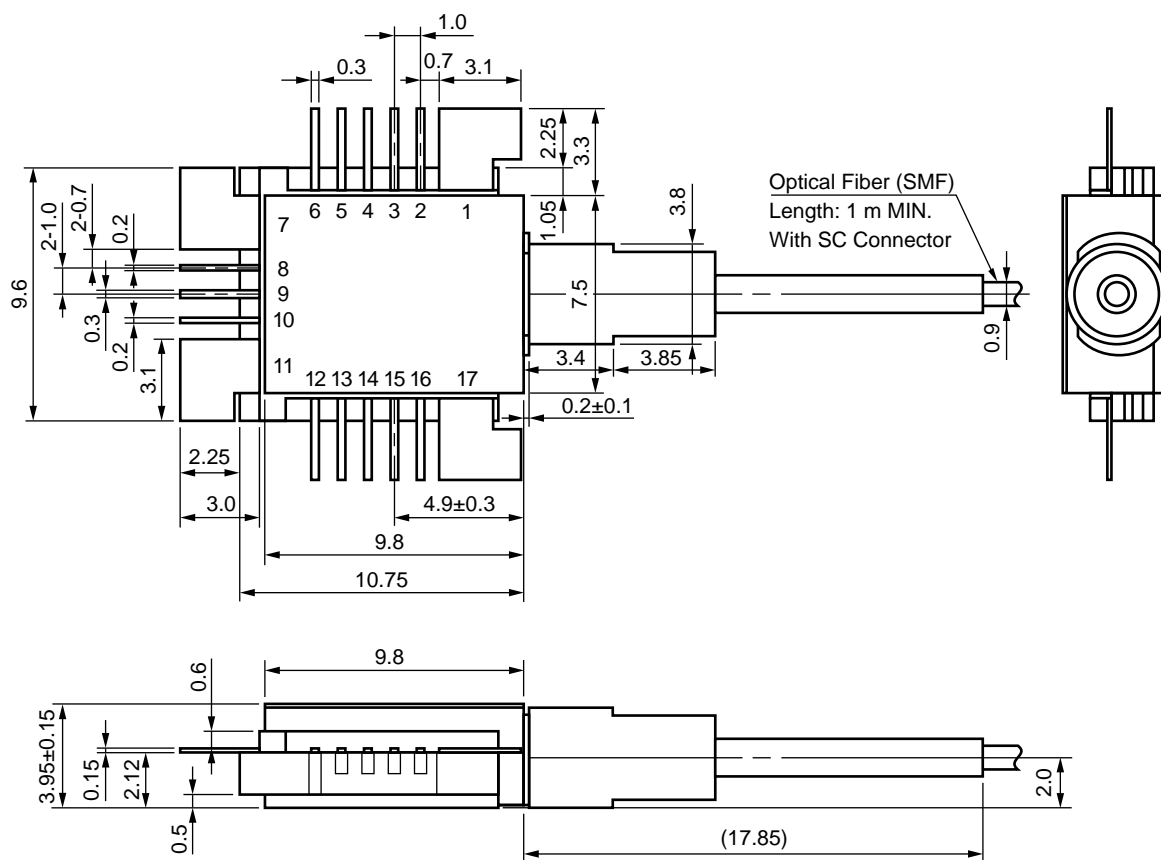
The NR3470MU-CC is a 10 Gb/s InGaAs PIN photo diode (PIN-PD) receiver in a 17-pin mini-butterfly package with an internal preamplifier. This module is ideal as a receiver for SONET OC-192 and Synchronous Digital Hierarchy (SDH) system, STM-64, ITU-T recommendations.

### 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  $Z_t = 60$  dB $\Omega$  MIN.
- 17-pin mini-butterfly package with single mode fiber
- AC coupled-differential output
- With SC-UPC connector

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Not all devices/types available in every country. Please check with local NEC Compound Semiconductor Devices representative for availability and additional information.

PACKAGE DIMENSIONS (UNIT: mm, unless otherwise specified:  $\pm 0.2$  mm)

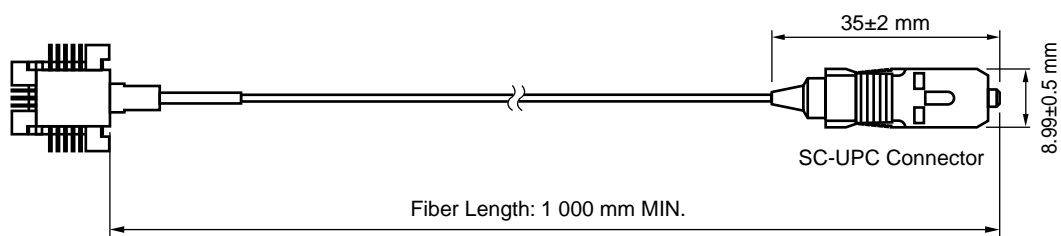


### PIN CONNECTIONS

Pin No.	Symbol	Function	Pin No.	Symbol	Function	Pin No.	Symbol	Function
1	GND	Ground (0.0 V)	7	GND	Ground (0.0 V)	13	NC	NC
2	V <sub>pin</sub>	PIN-PD Cathode	8	OUT	Output (Invert)	14	NC	NC
3	NC	NC	9	GND	Ground (0.0 V)	15	NC	NC
4	V <sub>ss</sub>	Power Supply (-5.2 V)	10	OUT	Output (Non Invert)	16	NC	NC
5	NC	NC	11	GND	Ground (0.0 V)	17	GND	Ground (0.0 V)
6	GND	Ground (0.0 V)	12	GND	Ground (0.0 V)			

# 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	Available Connector
NR3470MU-CC	With SC-UPC Connector

## ABSOLUTE MAXIMUM RATINGS (T<sub>c</sub> = 25°C, unless otherwise specified)

Parameter	Symbol	Ratings	Unit
PIN-PD Forward Current	I <sub>F</sub>	5	mA
PIN-PD Reverse Voltage	V <sub>R</sub>	20	V
PIN-PD Reverse Current	I <sub>R</sub>	2.0	mA
IC Supply Voltage	V <sub>SS</sub>	−6 to 0	V
Operating Case Temperature	T <sub>c</sub>	−5 to +75	°C
Storage Temperature	T <sub>stg</sub>	−40 to +85	°C
Lead Soldering Temperature	T <sub>slid</sub>	260 (10 sec.)	°C

- ★ **ELECTRO-OPTICAL CHARACTERISTICS (T<sub>c</sub> = 25°C, V<sub>pin</sub> = 5 V, V<sub>ss</sub> = −5.2 V, λ = 1 550 nm, unless otherwise specified)**

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Dark Current	I <sub>D</sub>			5	10	nA
Sensitivity	S		0.75	1.00		A/W
Minimum Receiver Sensitivity	P <sub>r</sub>	PRBS = 2 <sup>31</sup> −1, BER = 10 <sup>−12</sup> ,		−18	−17	dBm
Overload	P <sub>o</sub>	10.66 Gb/s, NRZ, T <sub>c</sub> = −5 to 75°C	0	1		dBm
Cut-off Frequency	f <sub>c</sub>	R <sub>L</sub> = 50 Ω, −3 dB, P <sub>in</sub> = −10 dBm	8.0	9.0		GHz
Transimpedance	Z <sub>t</sub>	R <sub>L</sub> = 50 Ω	60			dBΩ
IC Supply Voltage	V <sub>SS</sub>		−5.46	−5.2	−4.94	V
IC Supply Current	I <sub>SS</sub>			90	110	mA
Optical Return Loss	ORL		27			dB

InGaAs APD/PD FAMILY

★

Part Number	Absolute Maximum Ratings		Electro-Optical Characteristics (T <sub>C</sub> = 25°C)				V <sub>R</sub> (V)	Applications	Package
	T <sub>C</sub> (°C)	T <sub>stg</sub> (°C)	I <sub>D</sub> (nA)	f <sub>c</sub> (GHz)	S (A/W)	@λ			
			TYP.	MIN.	TYP.	(nm)			
NR3470MU-CC	−5 to +75	−40 to +85	5	8.0	1.00	1 550	5	10 Gb/s: STM-64	17-pin mini-butterfly PD with an Internal pre-amp
NR4270MU-CC	0 to +70	−40 to +85	0.8 μA <sup>*1</sup>	7.0	0.70	1 550	0.9V <sub>BR</sub>	10 Gb/s: STM-64	17-pin mini-butterfly APD with an Internal pre-amp
NR4500BP-CC	0 to +70	−40 to +85	−	2.5 <sup>*2</sup>	0.94	1 310	0.9V <sub>BR</sub>	2.5 Gb/s: STM-16	Coaxial APD with an Internal pre-amp
NR4500CP-CC					0.96	1 550			
NR7500 Series	−40 to +85	−40 to +85	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	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	7	1	0.94	1 310	0.9V <sub>BR</sub>	≤ 622 Mb/s: STM-4, STM-1	Coaxial APD
					0.96	1 550			
NR8501 Series	−40 to +85	−40 to +85	7	2.5	0.94	1 310	0.9V <sub>BR</sub>	2.5 Gb/s: STM-16	Coaxial APD
					0.96	1 550			

\*1 MAX.

\*2  $\overline{P}_{Low}$  and  $\overline{P}_{High}$  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 <sup>*1</sup>	C11159E
Quality grades on NEC semiconductor devices <sup>*1</sup>	C11531E
SEMICONDUCTOR SELECTION GUIDE –Products and Packages– <sup>*1</sup>	X13769E

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M8E 00.4-0110

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

► **Business issue**

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► **Technical issue**

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