

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
NR8360JP-BC

φ 30 μm InGaAs AVALANCHE PHOTO DIODE
14-PIN DIP MODULE WITH TEC

DESCRIPTION

The NR8360JP-BC is an InGaAs avalanche photodiode module with single mode fiber. A thermoelectric cooler is integrated enabling the temperature control of the APD chip. It is designed for long-reach optical communications and optical test instruments, especially OTDR.

FEATURES

- High quantum efficiency $\eta = 85\% @ \lambda = 1\ 310\ \text{nm}$
 $\eta = 80\% @ \lambda = 1\ 550\ \text{nm}$
- Small dark current $I_D = 2\ \text{nA}$
- High-speed response $f_c = 1.2\ \text{GHz} @ M = 20$
- Internal thermoelectric cooler
- Hermetically sealed 14-pin Dual In-line Package

<R> PACKAGE DIMENSIONS (UNIT: mm)

Heat dissipation Flange

**Optical Fiber (SMF)
Length: 1 m MIN.**

BOTTOM VIEW

PIN CONNECTIONS

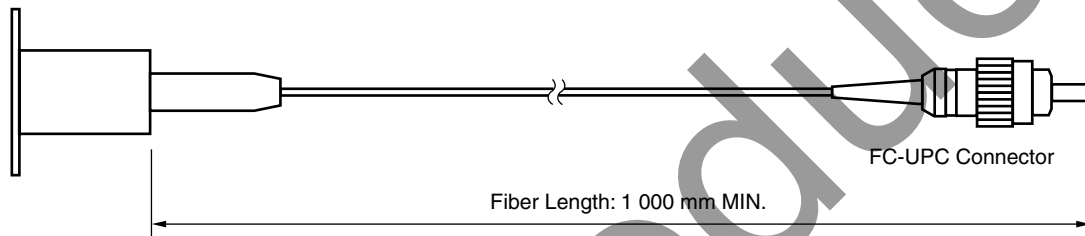
Pin No.	Function	Pin No.	Function
1	NC	8	Cooler Cathode
2	NC	9	Thermistor
3	NC	10	Case Ground
4	APD Cathode	11	APD Anode
5	Case Ground	12	NC
6	Thermistor	13	NC
7	Cooler Anode	14	NC

Caution In a typical application, the flange shall be mounted to a thermally conductive heat-sink properly. Improper thermal handling can cause permanent damage which is beyond reliability warranty.

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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
NR8360JP-BC	With FC-UPC Connector

ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Ratings	Unit
Forward Current	I _F	10	mA
Reverse Current	I _R	500	μA
Operating Case Temperature	T _C	-20 to +55	°C
Storage Temperature	T _{stg}	-40 to +85	°C
Lead Soldering Temperature	T _{slid}	260 (10 sec.)	°C
Cooler Current	I _C	1.0	A
Cooler Voltage	V _C	2.0	V

ELECTRO-OPTICAL CHARACTERISTICS (T_{APD} = 25°C, T_C = -20 to +55°C, unless otherwise specified)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Reverse Breakdown Voltage	V _{BR}	I _D = 100 μA	50	70	100	V
Temperature Coefficient of Reverse Breakdown Voltage	δ ¹			0.2		%/°C
Dark Current	I _D	V _R = V _{BR} × 0.9		5	10	nA
		V _R = V _{BR} × 0.9, T _C = 55°C, I _C = 0.8 A		2	5	
Multiplied Dark Current	I _{DM}	M = 2 to 10		0.2	2.0	nA
Terminal Capacitance	C _t	V _R = V _{BR} × 0.9, f = 1 MHz		1.0	1.7	pF
Cut-off Frequency	f _c	M = 10	1.0			GHz
		M = 20		1.2		
Quantum Efficiency	η	λ = 1 310 nm	70	85		%
		λ = 1 550 nm	65	80		
Sensitivity	S	λ = 1 310 nm	0.73	0.89		A/W
		λ = 1 550 nm		1.00		
Multiplication Factor	M	λ = 1 310 nm, I _{op} = 1.0 μA, V _R = V (@ I _D = 1 μA)	20	40		
Excess Noise Factor ²	x	λ = 1 310 nm, 1 550 nm, I _{op} = 1.0 μA,		0.7		
	F	M = 10, f = 35 MHz, B = 1 MHz		5		

*1
$$\delta = \frac{V_{BR}(25^\circ\text{C} + \Delta T^\circ\text{C}) - V_{BR}(25^\circ\text{C})}{\Delta T^\circ\text{C} \cdot V_{BR}(25^\circ\text{C})}$$

*2 $F = M^x$

ELECTRO-OPTICAL CHARACTERISTICS (T_{APD} = 25°C, T_C = -20 to +55°C, unless otherwise specified)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Thermistor Resistance	R		9.5	10.0	10.5	kΩ
B Constant	B		3 350	3 450	3 550	K
Cooler Current	I _c	ΔT = 45°C		0.6	0.8	A
Cooler Voltage	V _c	I _c = 0.8 A		1.1	1.5	V
Cooling Capacity	ΔT ⁻¹	I _c = 0.8 A	45			°C

*1 $\Delta T = |T_C - T_{APD}|$

EOL products

<R> REFERENCE

Document Name	Document No.
Opto-Electronics Devices Pamphlet	PX10160E

EOL products

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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.

EOL products