

# PRELIMINARY DATA SHEET

# NEC

# PHOTO DIODE NR8360JP-BC

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

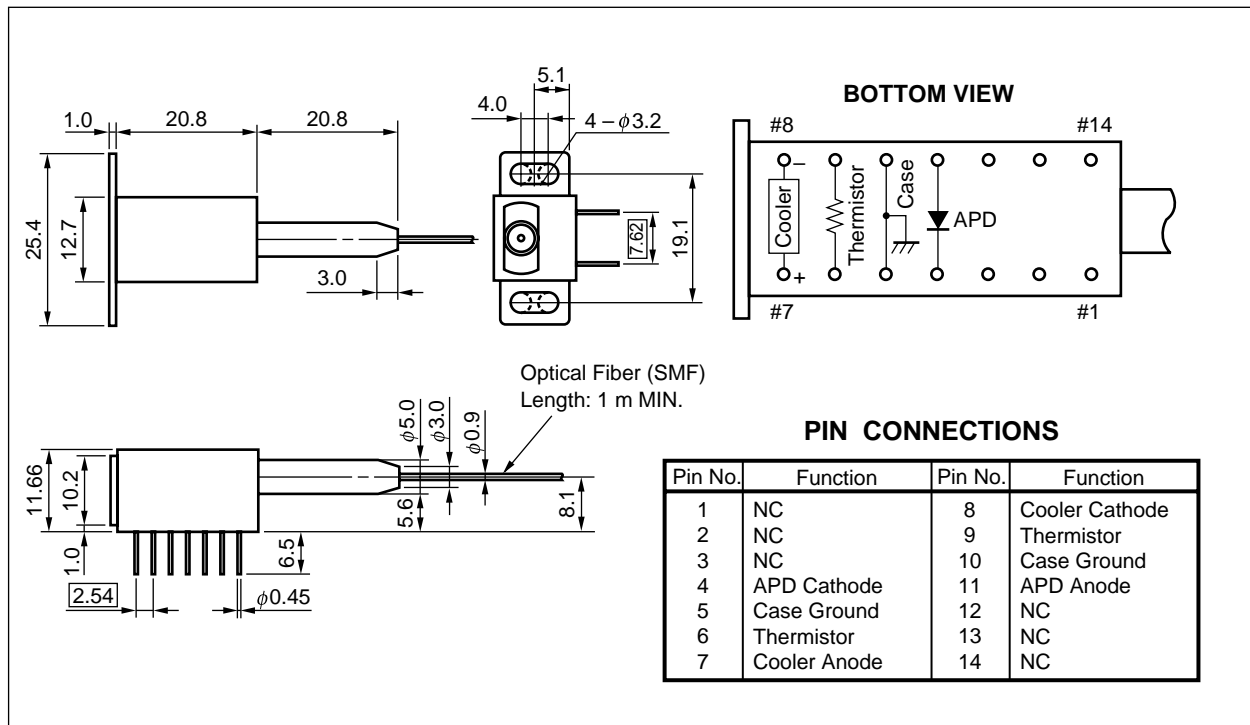
### DESCRIPTION

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

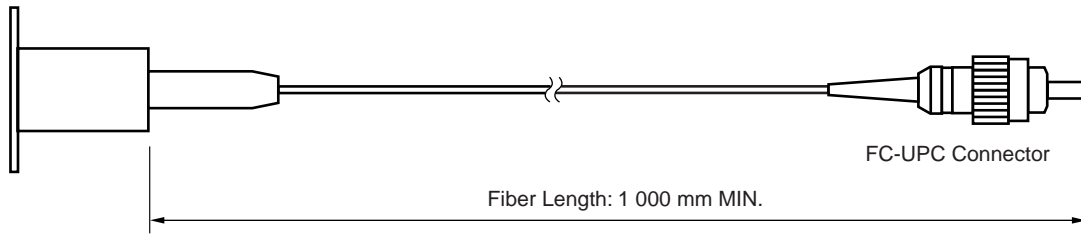
### PACKAGE DIMENSIONS (UNIT: mm)



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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 <sub>F</sub>	10	mA
Reverse Current	I <sub>R</sub>	500	μA
Operating Case Temperature	T <sub>C</sub>	-20 to +55	°C
Storage Temperature	T <sub>stg</sub>	-40 to +85	°C
Lead Soldering Temperature	T <sub>slid</sub>	260 (10 sec.)	°C
Cooler Current	I <sub>C</sub>	1.0	A
Cooler Voltage	V <sub>C</sub>	2.0	V

**ELECTRO-OPTICAL CHARACTERISTICS (T<sub>APD</sub> = 25 °C, T<sub>C</sub> = -20 to +55 °C, unless otherwise specified)**

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Reverse Breakdown Voltage	V <sub>BR</sub>	I <sub>D</sub> = 100 μA	50	70	100	V
Temperature Coefficient of Reverse Breakdown Voltage	δ <sup>*1</sup>			0.2		%/°C
Dark Current	I <sub>D</sub>	V <sub>R</sub> = V <sub>BR</sub> × 0.9		5	10	nA
		V <sub>R</sub> = V <sub>BR</sub> × 0.9, T <sub>C</sub> = 55 °C, I <sub>C</sub> = 0.8 A		2	5	
Multiplied Dark Current	I <sub>DM</sub>	M = 2 to 10		0.2	2.0	nA
Terminal Capacitance	C <sub>t</sub>	V <sub>R</sub> = V <sub>BR</sub> × 0.9, f = 1 MHz		1.0	1.7	pF
Cut-off Frequency	f <sub>c</sub>	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 <sub>op</sub> = 1.0 μA, V <sub>R</sub> = V (@ I <sub>D</sub> = 1 μA)	20	40		
Excess Noise Factor <sup>*2</sup>	x	λ = 1 310 nm, 1 550nm, I <sub>op</sub> = 1.0 μA, M = 10, f = 35 MHz, B = 1 MHz		0.7		
	F			5		

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

\*2  $F = M^x$

**ELECTRO-OPTICAL CHARACTERISTICS (T<sub>APD</sub> = 25 °C, T<sub>C</sub> = -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 <sub>c</sub>	ΔT = 45 °C		0.6	0.8	A
Cooler Voltage	V <sub>c</sub>	I <sub>c</sub> = 0.8 A		1.1	1.5	V
Cooling Capacity	ΔT <sup>-1</sup>	I <sub>c</sub> = 0.8 A	45			°C

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

**REFERENCE**

Document Name	Document No.
NEC semiconductor device reliability/quality control system	C11159E
Quality grades on NEC semiconductor devices	C11531E
Semiconductor device mounting technology manual	C10535E
SEMICONDUCTOR SELECTION GUIDE Products & Packages (CD-ROM)	X13769X

[MEMO]

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