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**φ30 μm InGaAs APD IN COAXIAL PACKAGE  
FOR FIBER OPTIC COMMUNICATION AND OTDR APPLICATIONS**

**FEATURES**

- **SMALL DARK CURRENT:**  
 $I_D = 5 \text{ nA}$
- **SMALL TERMINAL CAPACITANCE:**  
 $C_T = 0.35 \text{ pF}$  at  $0.9 V_{BR}$
- **HIGH QUANTUM EFFICIENCY:**  
 $\eta = 90\%$  at  $\lambda = 1310 \text{ nm}$ ,  $M = 1$   
 $\eta = 77\%$  at  $\lambda = 1550 \text{ nm}$ ,  $M = 1$
- **HIGH SPEED RESPONSE:**  
 $f_c = 2.5 \text{ GHz}$  at  $M = 10$
- **DETECTING AREA SIZE:**  
 $\phi 30 \mu\text{m}$
- **COAXIAL MODULE WITH SINGLE MODE FIBER (SM-9/125)**

**DESCRIPTION**

The NR8300FP-CC is an InGaAs avalanche photo diode module with single mode fiber. It is designed for optical test instruments, especially OTDR systems.

**ELECTRO-OPTICAL CHARACTERISTICS** ( $T_C = 25^\circ\text{C}$ , unless otherwise specified)

PART NUMBER			NR8300FP-CC		
SYMBOLS	PARAMETERS AND CONDITIONS	UNITS	MIN	TYP	MAX
$V_{BR}$	Reverse Breakdown Voltage, $I_D = 100 \mu\text{A}$	V	50	70	100
$\delta$	Temperature Coefficient of Reverse Breakdown Voltage <sup>1</sup>	%/ $^\circ\text{C}$		0.2	
$I_D$	Dark Current, $V_R = V_{BR} \times 0.9$	nA		5	25
$I_{DM}$	Multiplied Dark Current, $M = 2$ to $10$	nA		1	5
$C_t$	Terminal Capacitance, $V_R = V_{BR} \times 0.9$ , $f = 1 \text{ MHz}$	pF		0.35	0.60
$f_c$	Cut-off Frequency, $M = 10$	GHz	2.5		
$\eta$	Quantum Efficiency, $\lambda = 1310 \text{ nm}$ , $M = 1$ $\lambda = 1550 \text{ nm}$ , $M = 1$	%	76	90	
			65	77	
S	Responsivity, $\lambda = 1310 \text{ nm}$ , $M = 1$ $\lambda = 1550 \text{ nm}$ , $M = 1$	A/W	0.80	0.94	
			0.81	0.96	
M	Multiplication Factor, $\lambda = 1310 \text{ nm}$ , $I_{PO} = 1.0 \mu\text{A}$ , $V_R = V$ (at $I_D = 1 \mu\text{A}$ )	M	30	40	
X	Excess Noise Factor <sup>2</sup> , $\lambda = 1310 \text{ nm}$ , $1550 \text{ nm}$ , $I_{PO} = 1.0 \mu\text{A}$ , $M = 10$ , $f = 35 \text{ MHz}$ , $B = 1 \text{ MHz}$			0.7	
F				5	
ORL	Optical Return Loss, SMF	dB	30		

$$V_{BR} < 25^\circ\text{C} + \Delta T^\circ\text{C} > - V_{BR} < 25^\circ\text{C} >$$

Note: 1.  $\delta = \frac{V_{BR} < 25^\circ\text{C} + \Delta T^\circ\text{C} > - V_{BR} < 25^\circ\text{C} >}{\Delta T^\circ\text{C} > - V_{BR} < 25^\circ\text{C} >}$

2.  $F = M^X$

### ABSOLUTE MAXIMUM RATINGS<sup>1</sup>

(T<sub>C</sub> = 25°C, unless otherwise specified)

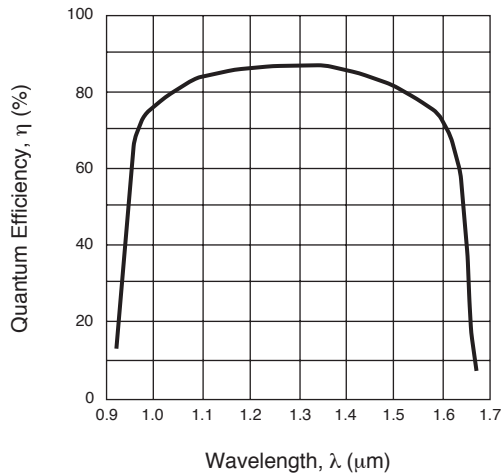
SYMBOLS	PARAMETERS	UNITS	RATINGS
I <sub>F</sub>	Forward Current	mA	10
I <sub>R</sub>	Reverse Current	mA	0.5
T <sub>C</sub>	Operating Case Temp.	°C	-40 to +85
T <sub>STG</sub>	Storage Temperature	°C	-40 to +85
T <sub>SOL</sub>	Lead Soldering Temp.	°C	260 (10 sec.)
RH	Relative Humidity (noncondensing)	%	85

Note:

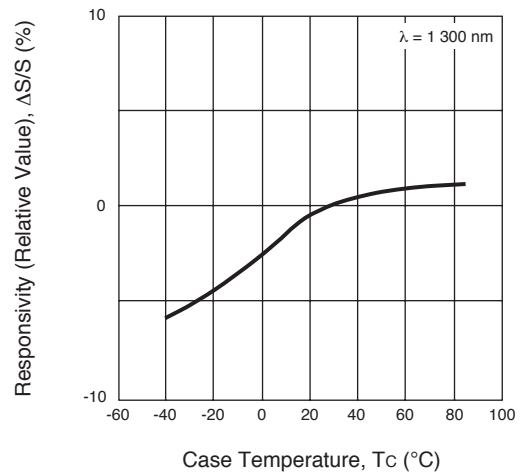
1. Operation in excess of any one of these parameters may result in permanent damage.

### TYPICAL PERFORMANCE CURVES (T<sub>C</sub> = 25°C, unless otherwise specified)

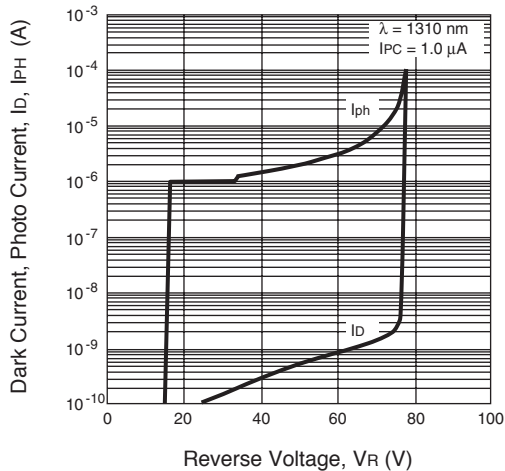
**WAVELENGTH DEPENDENCE OF QUANTUM EFFICIENCY**



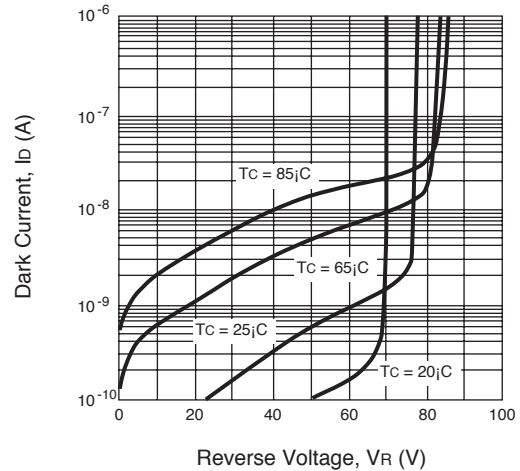
**TEMPERATURE DEPENDENCE OF RESPONSIVITY**



**DARK CURRENT AND PHOTO CURRENT vs. REVERSE VOLTAGE**

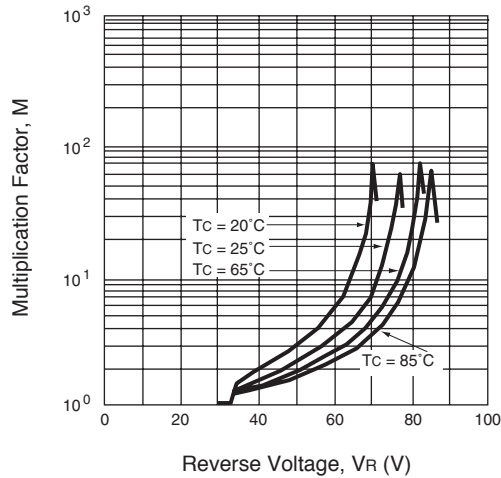


**DARK CURRENT vs. REVERSE VOLTAGE**

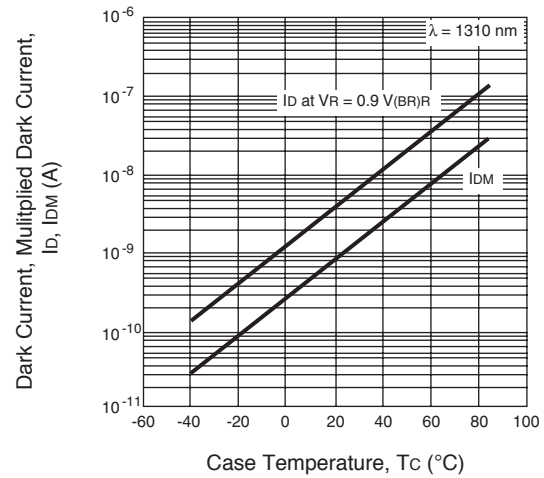


**TYPICAL PERFORMANCE CURVES** ( $T_C = 25^\circ\text{C}$ )

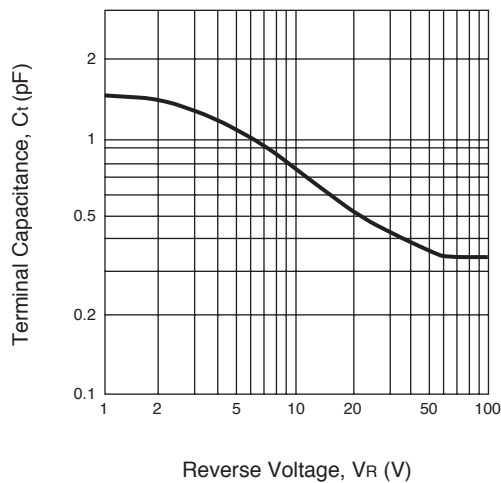
**MULTIPLICATION FACTOR vs. REVERSE VOLTAGE**



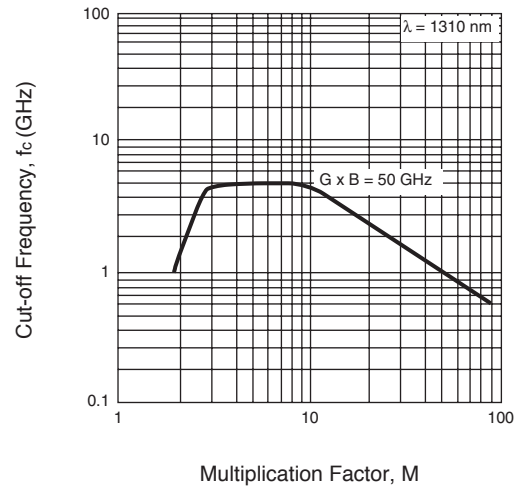
**TEMPERATURE DEPENDENCE OF DARK CURRENT vs. MULTIPLIED DARK CURRENT**



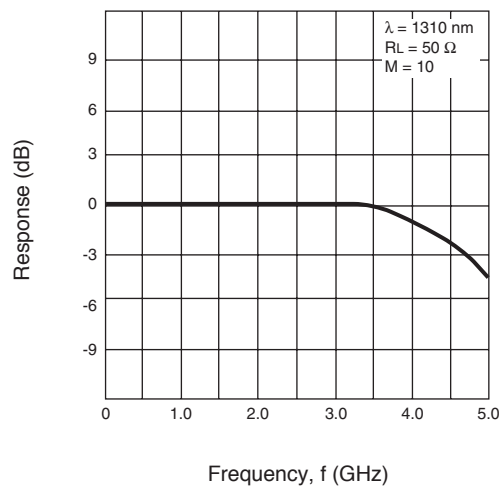
**TERMINAL CAPACITANCE vs. REVERSE VOLTAGE**



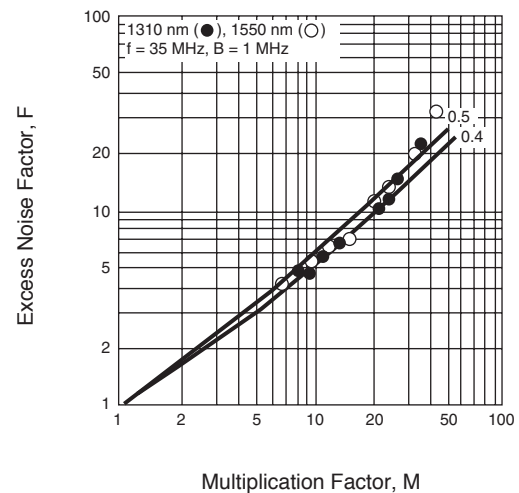
**CUT-OFF FREQUENCY vs. MULTIPLICATION FACTOR**



**FREQUENCY RESPONSE**



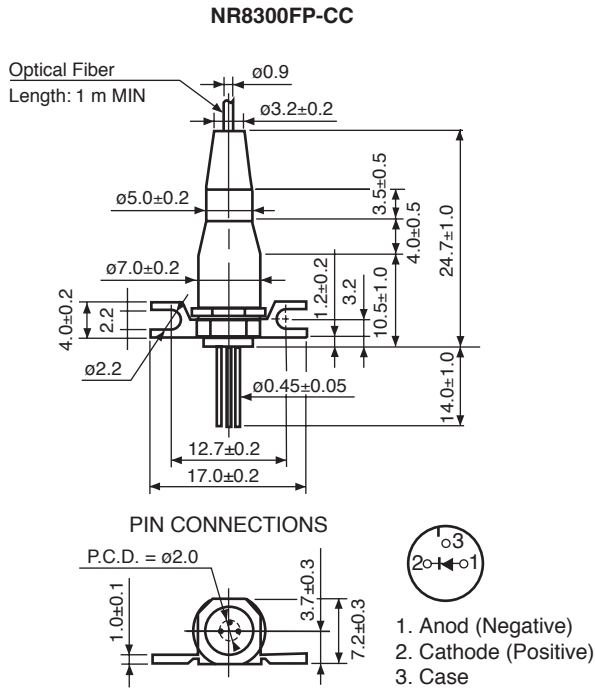
**EXCESS NOISE FACTOR vs. MULTIPLICATION FACTOR**



Remark: The graphs indicate nominal characteristics.



**OUTLINE DIMENSIONS** (Units in mm)



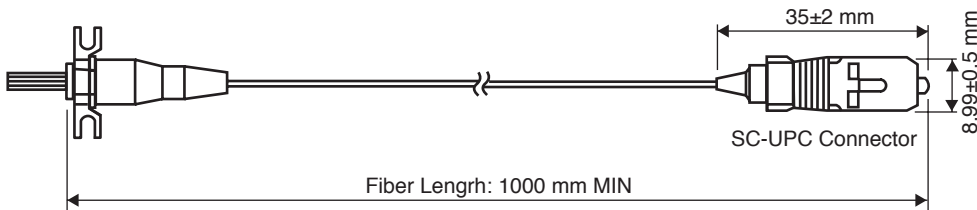
**ORDERING INFORMATION**

Part Number	Flange Type	Fiber Type	Available Connector
NR8300FP-CC-AZ*	Flat Mount Flange	SMF	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	$9.5 \pm 1$	$\mu\text{m}$
Core Diameter	—	$\mu\text{m}$
Cladding Diameter	$125 \pm 2$	$\mu\text{m}$
Maximum Cladding Noncircularity	2	%
Maximum Core/Cladding Concentricity	1.6	%
Outer Diameter	$0.9 \pm 0.1$	mm
Cut-off Wavelength	1100 to 1270	nm
Minimum Fiber Bending Radius	30	mm
Fiber Length	1000 Min.	mm
Flammability	UL1581 VW-1	



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