

**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
δ	Temperature Coefficient of Reverse Breakdown Voltage ¹	%/ $^\circ\text{C}$		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		
η	Quantum Efficiency, $\lambda = 1310 \text{ nm}$, $M = 1$ $\lambda = 1550 \text{ nm}$, $M = 1$	%	76 65	90 77	
S	Responsivity, $\lambda = 1310 \text{ nm}$, $M = 1$ $\lambda = 1550 \text{ nm}$, $M = 1$	A/W	0.80 0.81	0.94 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 ² , $\lambda = 1310 \text{ nm}$, 1550 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 RATINGS¹

(T_C = 25°C, unless otherwise specified)

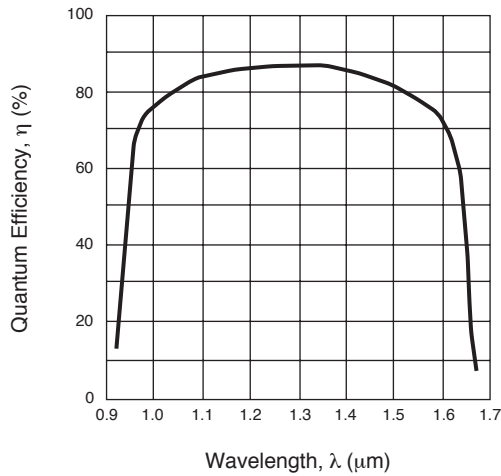
SYMBOLS	PARAMETERS	UNITS	RATINGS
I _F	Forward Current	mA	10
I _R	Reverse Current	mA	0.5
T _C	Operating Case Temp.	°C	-40 to +85
T _{STG}	Storage Temperature	°C	-40 to +85
T _{SOL}	Lead Soldering Temp.	°C	260 (10 sec.)
RH	Relative Humidity (noncondensing)	%	85

Note:

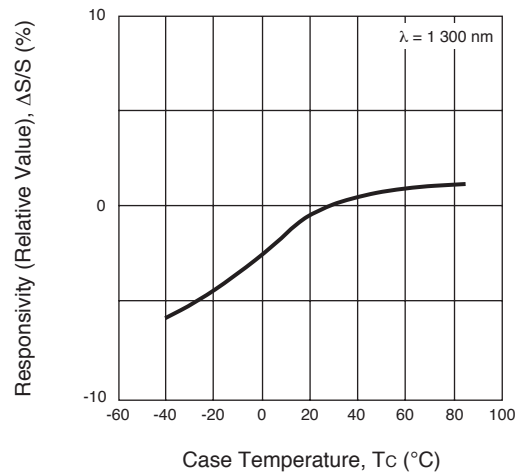
1. Operation in excess of any one of these parameters may result in permanent damage.

TYPICAL PERFORMANCE CURVES (T_C = 25°C, unless otherwise specified)

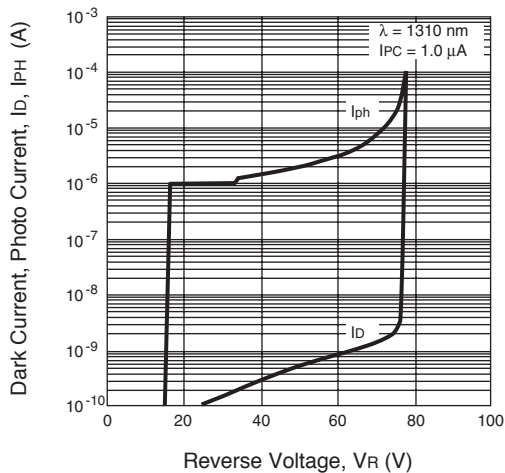
WAVELENGTH DEPENDENCE OF QUANTUM EFFICIENCY



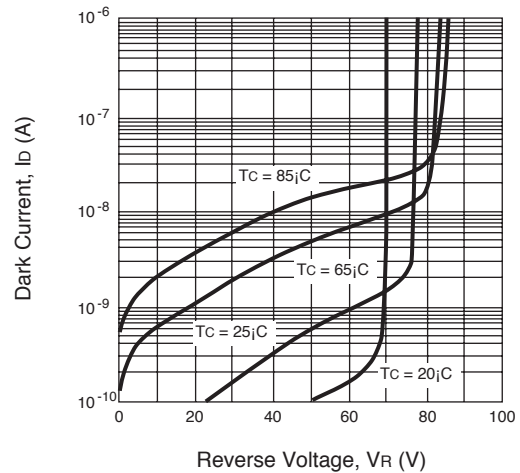
TEMPERATURE DEPENDENCE OF RESPONSIVITY



DARK CURRENT AND PHOTO CURRENT vs. REVERSE VOLTAGE

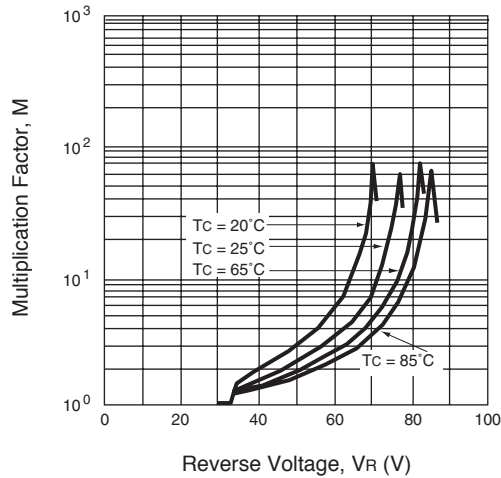


DARK CURRENT vs. REVERSE VOLTAGE

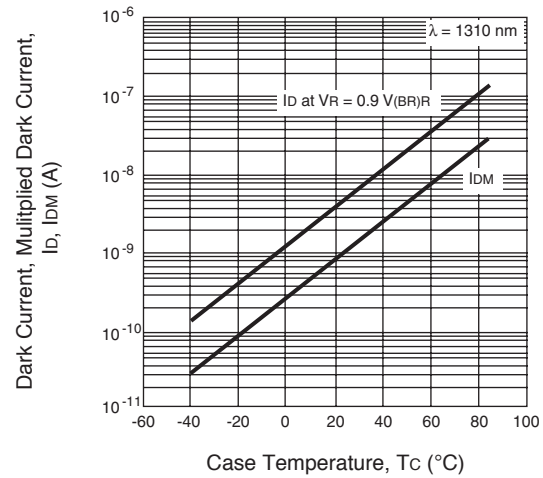


TYPICAL PERFORMANCE CURVES ($T_C = 25^\circ\text{C}$)

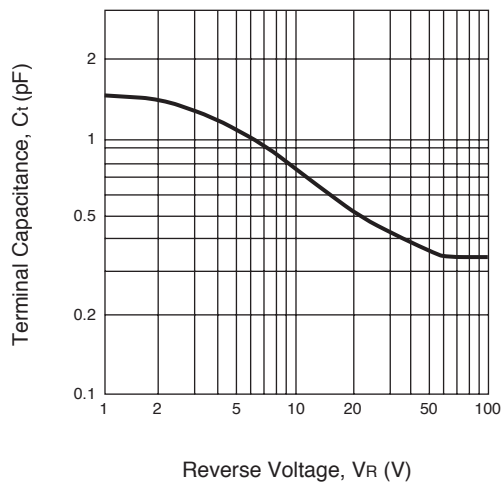
MULTIPLICATION FACTOR vs. REVERSE VOLTAGE



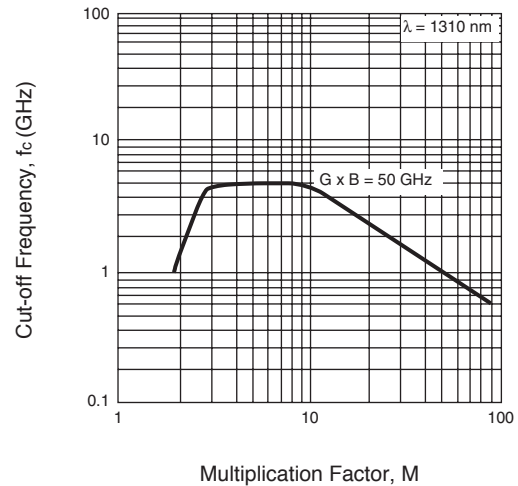
TEMPERATURE DEPENDENCE OF DARK CURRENT vs. MULTIPLIED DARK CURRENT



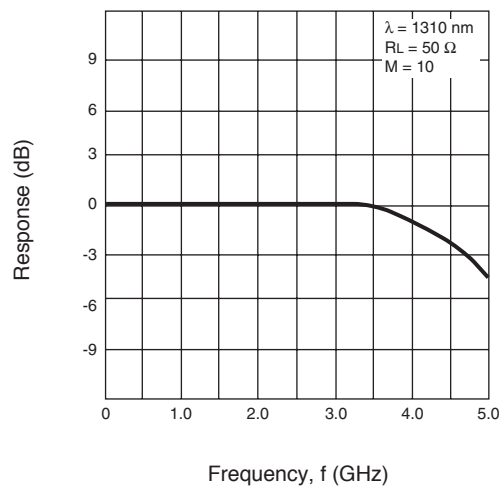
TERMINAL CAPACITANCE vs. REVERSE VOLTAGE



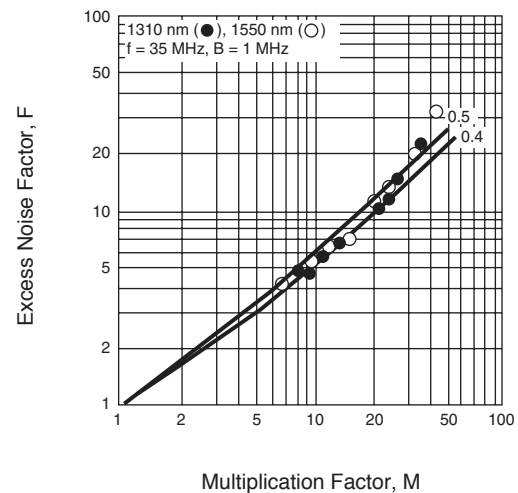
CUT-OFF FREQUENCY vs. MULTIPLICATION FACTOR



FREQUENCY RESPONSE

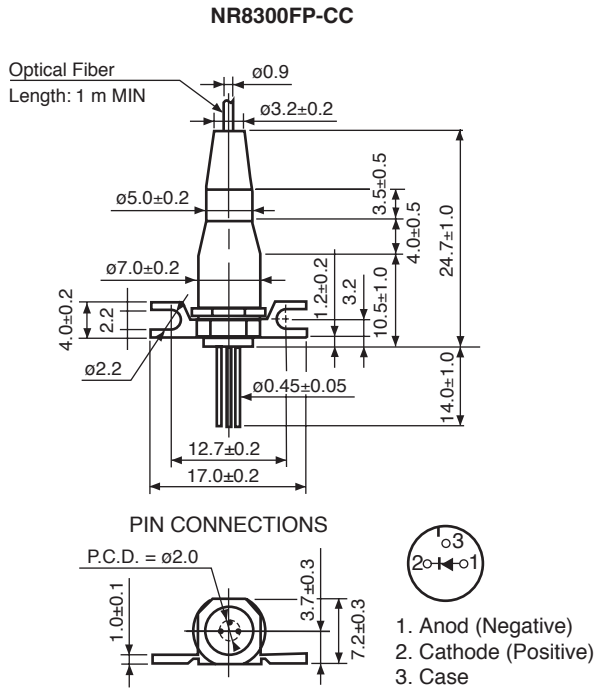


EXCESS NOISE FACTOR vs. MULTIPLICATION FACTOR



Remark: The graphs indicate nominal characteristics.

OUTLINE DIMENSIONS (Units in mm)



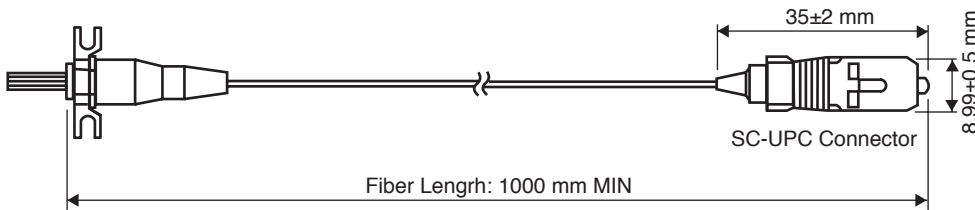
ORDERING INFORMATION

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 ± 1	μm
Core Diameter	—	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	UL1581 VW-1	



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