



**NEC's $\phi 30 \mu\text{m}$
InGaAs APD IN COAXIAL PACKAGE
FOR FIBER OPTIC COMMUNICATION
AND OTDR APPLICATIONS**

NR8300FP-CC

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

NEC'S 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)

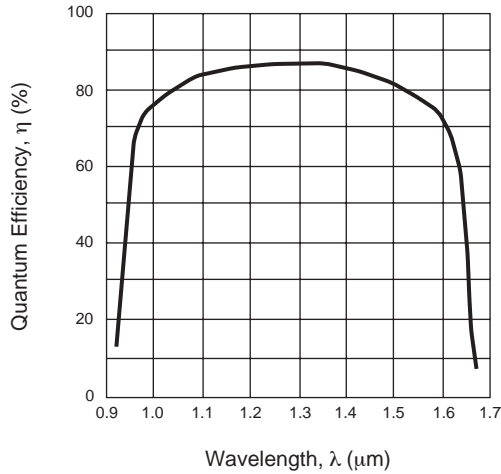
SYMBOLS	PARAMETERS	UNITS	RATINGS
I _F	Forward Current	mA	10
I _R	Reverse Current	mA	0.5
T _C	Operating Case Temp.	°C	-40 to +85
T _{STG}	Storage Temperature	°C	-40 to +85
T _{SOL}	Lead Soldering Temp.	°C	260 (10 sec.)
RH	Relative Humidity (noncondensing)	%	85

Note:

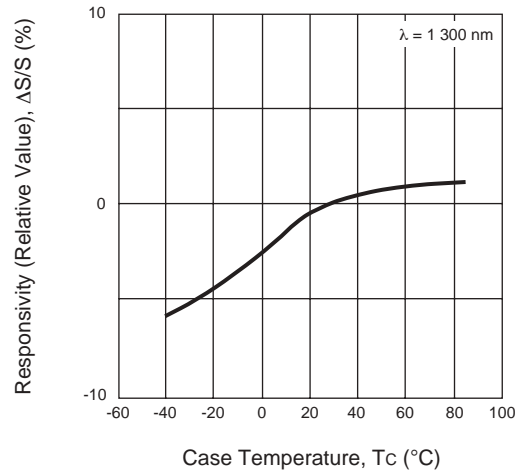
1. Operation in excess of any one of these parameters may result in permanent damage.

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

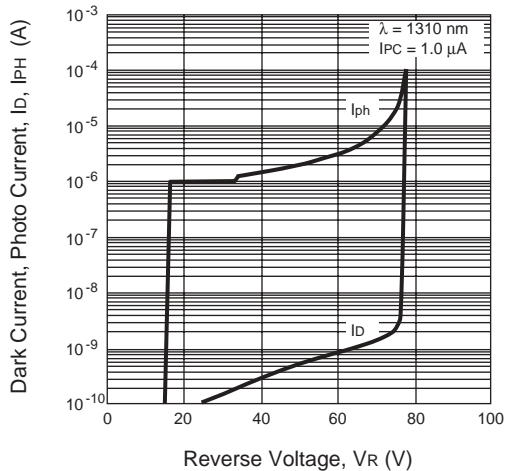
WAVELENGTH DEPENDENCE OF QUANTUM EFFICIENCY



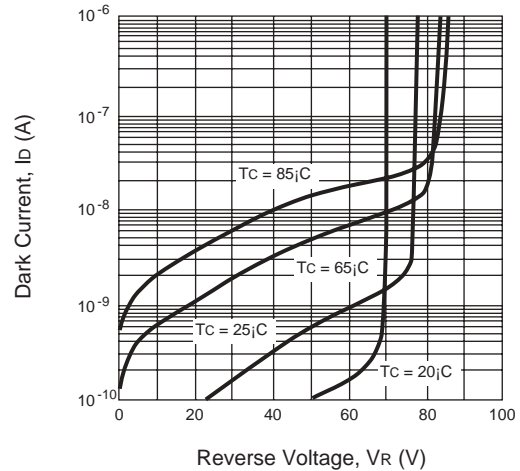
TEMPERATURE DEPENDENCE OF RESPONSIVITY



DARK CURRENT AND PHOTO CURRENT vs. REVERSE VOLTAGE

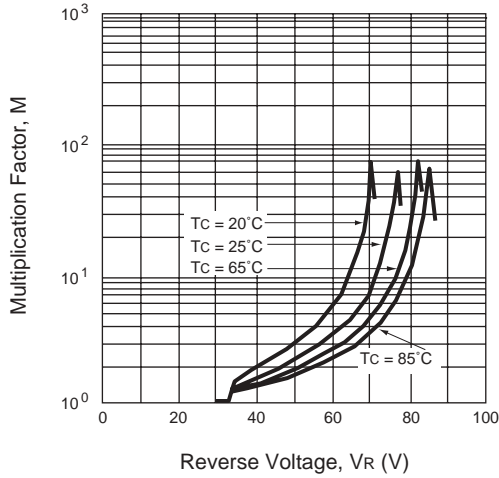


DARK CURRENT vs. REVERSE VOLTAGE

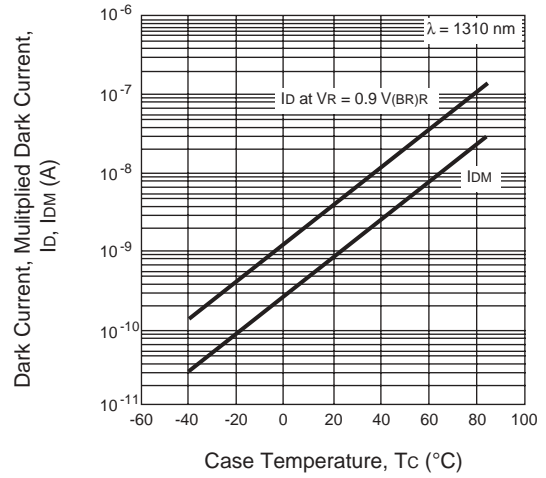


TYPICAL PERFORMANCE CURVES (T_C = 25°C)

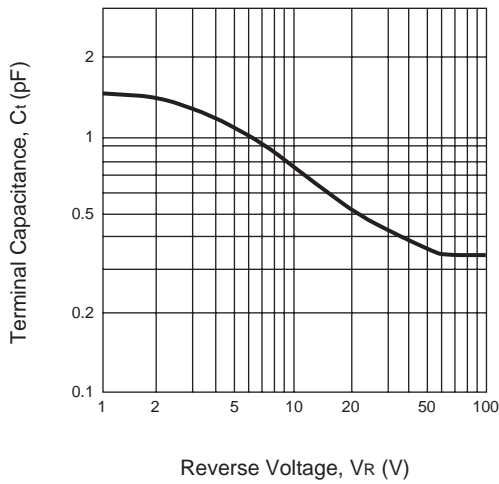
MULTIPLICATION FACTOR vs. REVERSE VOLTAGE



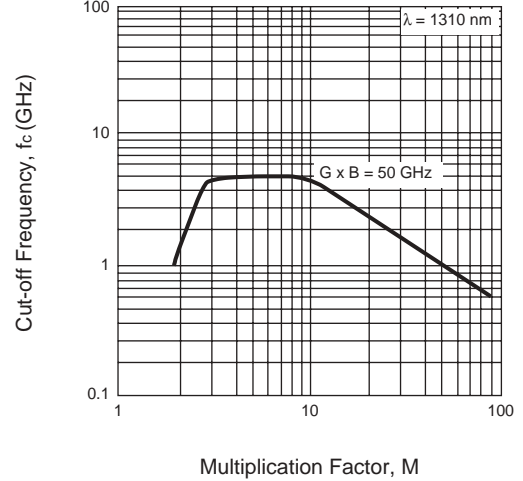
TEMPERATURE DEPENDENCE OF DARK CURRENT vs. MULTIPLIED DARK CURRENT



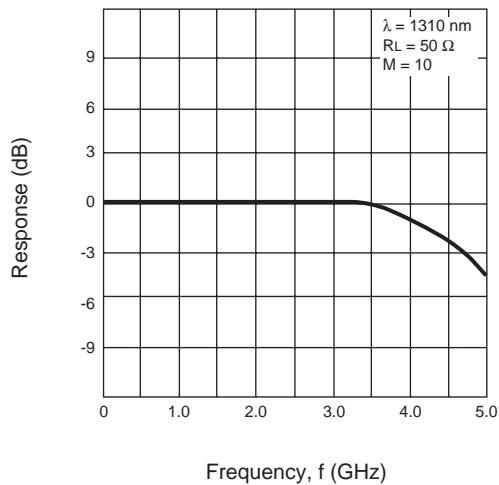
TERMINAL CAPACITANCE vs. REVERSE VOLTAGE



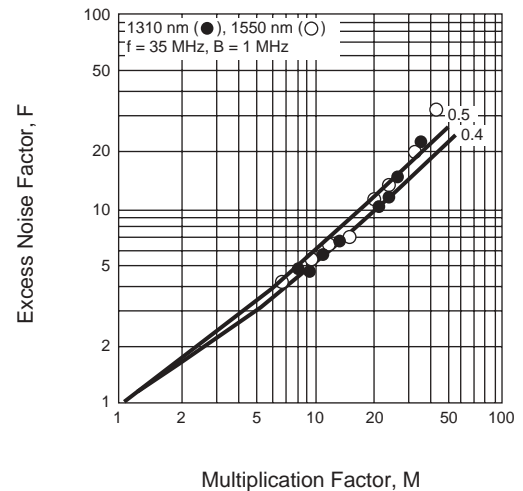
CUT-OFF FREQUENCY vs. MULTIPLICATION FACTOR



FREQUENCY RESPONSE

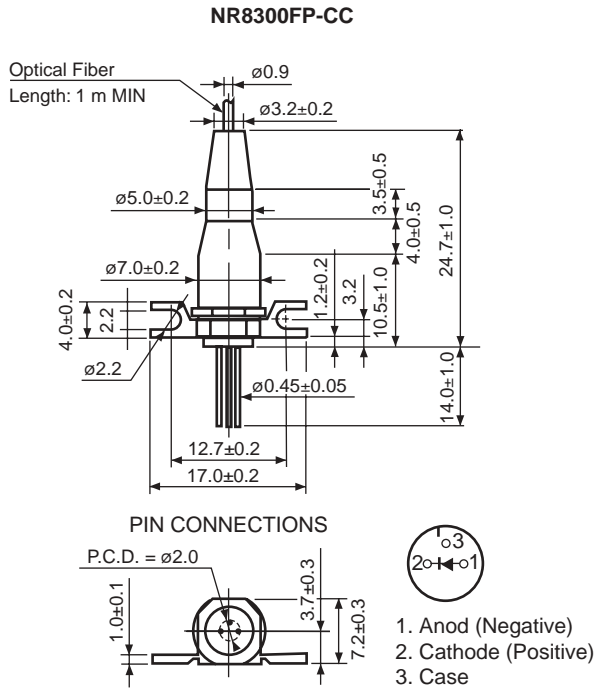


EXCESS NOISE FACTOR vs. MULTIPLICATION FACTOR



Remark: The graphs indicate nominal characteristics.

OUTLINE DIMENSIONS (Units in mm)

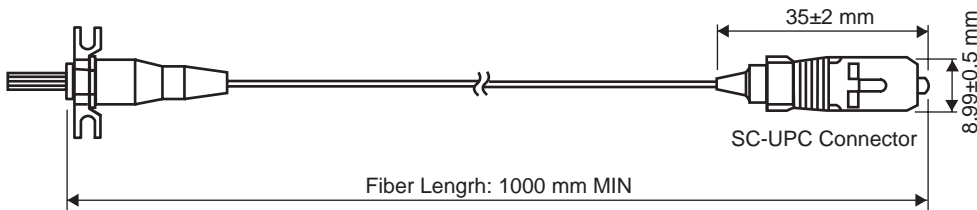


ORDERING INFORMATION

Part Number	Flange Type	Fiber Type	Available Connector
NR8300FP-CC	Flat Mount Flange	SMF	With SC-UPC Connector

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	



Life Support Applications

These NEC products are not intended for use in life support devices, appliances, or systems where the malfunction of these products can reasonably be expected to result in personal injury. The customers of CEL using or selling these products for use in such applications do so at their own risk and agree to fully indemnify CEL for all damages resulting from such improper use or sale.

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