NEC

ϕ50 μm InGaAs APD COAXIAL MODULE FOR 2.5 Gb/s FIBER OPTIC COMMUNICATIONS

NR8501 Series

FEATURES

- **SMALL DARK CURRENT:**
  I_D = 7 nA
- **HIGH SENSITIVITY:**
  S = 0.94 A/W at λ = 1310 nm, M = 1
  S = 0.96 A/W at λ = 1550 nm, M = 1
- **HIGH SPEED RESPONSE:**
  f_C = 2.5 GHz at M = 5
- **COAXIAL MODULE WITH SINGLE MODE FIBER (SMF) or GI-50 Fiber**
- **WITH SC CONNECTOR: Standard, FC connector: Option**
  (Refer to Ordering Information)

DESCRIPTION

The NR8501 Series are InGaAs avalanche photo diode (APD) coaxial modules with single mode fiber. They are designed for long wavelength 2.5 Gb/s optical communication systems and are ideal as a reciever for Synchronous Digital Hierarchy (SDH) system, STM-16 ITU-T recommendations.

ELECTRO-OPTICAL CHARACTERISTICS (T_C = 25°C, Unless otherwise specified)

PART NUMBER			NR8501 Series		
SYMBOLS	**PARAMETERS AND CONDITIONS**	**UNITS**	**MIN**	**TYP**	**MAX**
V_{BR}	Reverse Breakdown Voltage, I_D =100 μA	V	40	60	80
δ[1]	Temperature Coefficient of Reverse Breakdown Voltage	%/ºC		0.20	
I_D	Dark Current, V_R = V_{BR} x 0.9	nA		7	30
I_{DM}	Multiplied Dark Current, M = 2 to 10	nA		1	5
C_t	Terminal Capacitance, V_R = $V_{(BR)R}$ x 0.9, f = 1 MHz	pF		0.5	0.75
f_C	Cut-off Frequency, M = 5 M = 10 M = 30	GHz	2.5 2.5 1.0	3.0 3.0 1.2	
S	Responsivity, λ = 1310 nm, M = 1 λ = 1550 nm, M = 1	A/W	0.80 0.81	0.94 0.96	
M	Multiplication Factor, λ = 1310 nm, I_{PO} = 1.0 μA V_R = V (@I_D = 1 μA)		30	40	
x	Excess Noise Exponent, λ = 1310 nm, 1550 nm, I_{PO} =1.0 μA, M = 10, f = 35 MHz, B = 1 MHz			0.7	
F	Excess Noise Factor[2], λ = 1310 nm, 1550 nm, I_{PO} =1.0 μA, M = 10, f = 35 MHz, B = 1 MHz			5	
ORL	Optical Return Loss SMF GI-50 Fiber	dB	30 28		

Notes:

1. $\delta = \frac{V_{BR}(25°C+\Delta T°C)-V_{BR}(25°C)}{\Delta T°C \bullet V_{BR}(25°C)}$

2. $F = M^X$

ABSOLUTE MAXIMUM RATINGS[1]

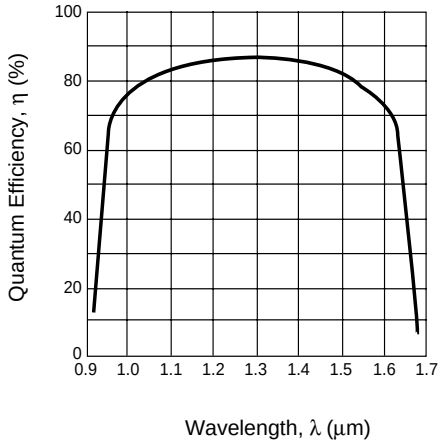
(T_C = 25°C, unless otherwise specified)

SYMBOLS	PARAMETERS	UNITS	RATINGS
I_F	Forward Current	mA	10
I_R	Reverse Current	mA	1.0
T_C	Operating Case Temp.	°C	-40 to +85
T_{STG}	Storage Temperature	°C	-40 to +85
T_{SLD}	Lead Soldering Temperature	°C	260 (10 sec.)
RH	Relative Humidity (noncondensing)	%	85

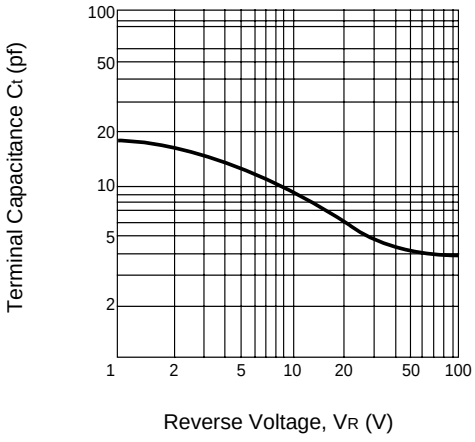
Note:
1. Operation in excess of any one of these parameters may result in permanent damage.

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

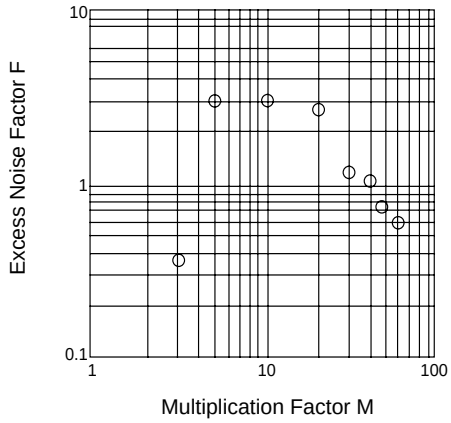
WAVELENGTH DEPENDENCE OF QUANTUM EFFICIENCY



TERMINAL CAPACITANCE vs. REVERSE VOLTAGE

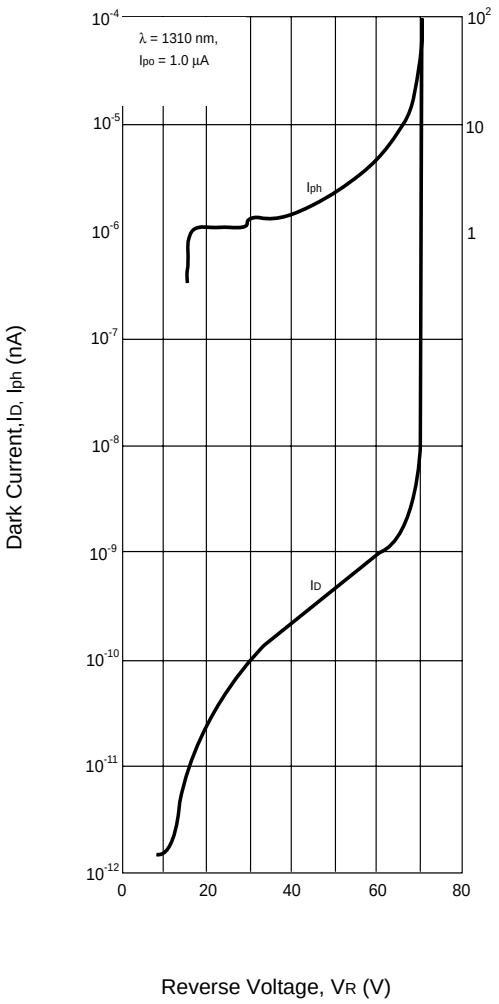


EXCESS NOISE FACTOR vs. MULTIPLICATION FACTOR

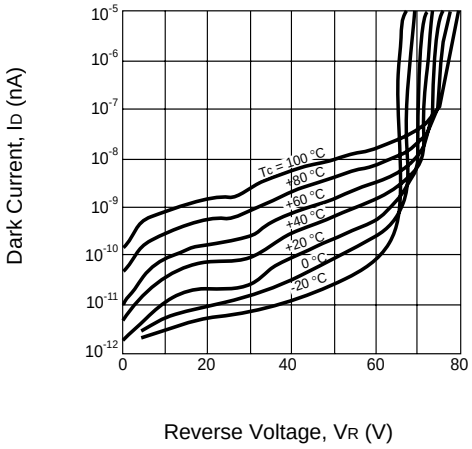


TYPICAL PERFORMANCE CURVES (T_C = 25°C, unless otherwise specified)

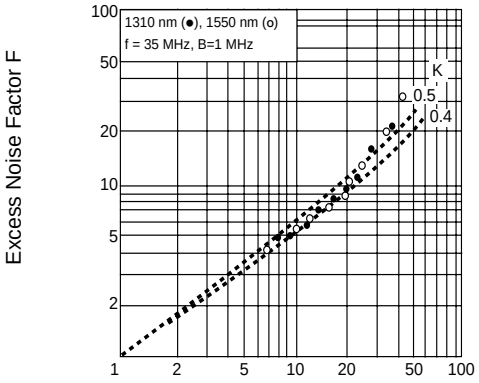
DARK CURRENT AND PHOTO CURRENT vs. REVERSE VOLTAGE



DARK CURRENT vs. REVERSE VOLTAGE

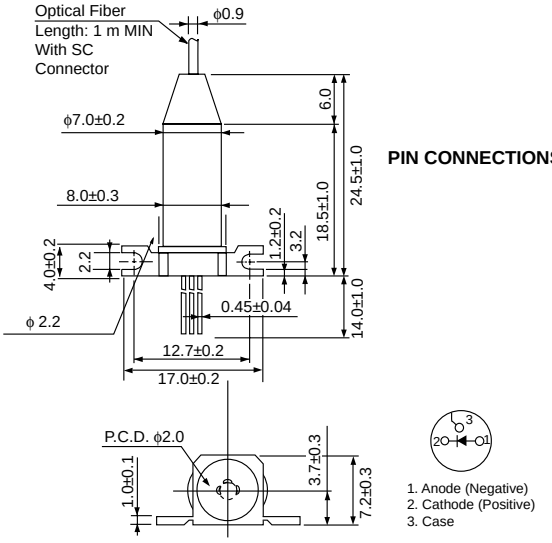


EXCESS NOISE FACTOR vs. MULTIPLICATION FACTOR



OUTLINE DIMENSIONS (Units in mm)

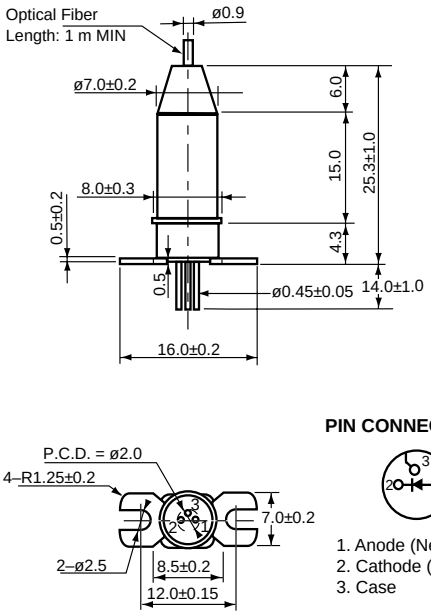
NR8501BP/BR



PIN CONNECTIONS

1. Anode (Negative)
2. Cathode (Positive)
3. Case

NR8501CP/CR

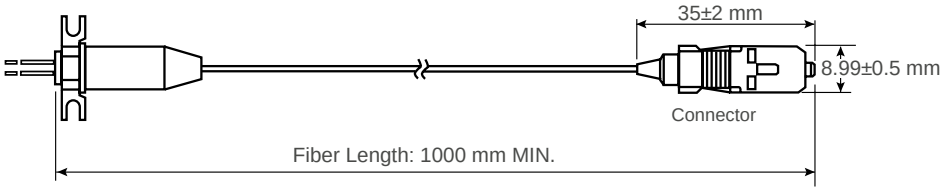


PIN CONNECTIONS

1. Anode (Negative)
2. Cathode (Positive)
3. Case

OPTICAL FIBER CHARACTERISTICS

PARAMETER	SPECIFICATION		UNITS
	SMF	GI-50 Fiber	
Mode Field Diameter	9.5±1	–	µm
Core Diameter	-	50±3	µm
Cladding Diameter	125±2	125±2	µm
Maximum Cladding Noncircularity	2	2	%
Maximum Core/Cladding Concentricity	1.6	4.0	%
Outer Diameter	0.9±0.1	0.9±0.1	mm
Cut-off Wavelength	1100 to 1270	-	nm
Minimum Fiber Bending Radius	30	30	mm
Fiber Length	1000 MIN	1000 MIN	mm
Flammability	UL1581 VW-1		



ORDERING INFORMATION

PART NUMBER	FLANGE TYPE	FIBER TYPE	AVAILABLE CONNECTOR
NR8501BP-BC	Flat Mount Flange	SMF	With FC-UPC Connector
NR8501BP-CC			With SC-UPC Connector
NR8501BR-BB		GI-50 Fiber	With FC-UPC Connector
NR8501BR-CB			With SC-UPC Connector
NR8501CP-BC	Vertical Mount	SMF	With FC-UPC Connector
NR8501CP-CC	Flange		With SC-UPC Connector
NR8501CR-BB		GI-50 Fiber	With FC-UPC Connector
NR8501CR-CB			With SC-UPC Connector