

NEC

1000 to 1600 nm OPTICAL FIBER COMMUNICATIONS $\phi 50 \mu\text{m}$ InGaAs AVALANCHE PHOTO DIODE MODULE

NDL5551P SERIES

FEATURES

- **SMALLER DARK CURRENT:**
 $I_D = 5 \text{ nA}$
- **HIGH QUANTUM EFFICIENCY:**
 $\eta = 90\%$ at $\lambda = 1300 \text{ nm}$, $M = 1$
 $\eta = 77\%$ at $\lambda = 1550 \text{ nm}$, $M = 1$
- **HIGH SPEED RESPONSE:**
 $f_c = 1.2 \text{ GHz @ } M = 20$
- **DETECTING AREA SIZE:**
 $\phi 50 \mu\text{m}$
- **COAXIAL MODULE WITH MULTIMODE FIBER:**
GI-50/125

DESCRIPTION

The NDL5551P Series are InGaAs PIN photo diode modules with multimode fiber. They are designed for detectors of long wavelength transmission systems and cover the wavelength range between 1000 and 1600 nm.

ELECTRO-OPTICAL CHARACTERISTICS ($T_C = 25^\circ\text{C}$)

PART NUMBER			NDL5551P Series		
SYMBOLS	PARAMETERS AND CONDITIONS	UNITS	MIN	TYP	MAX
$V_{(BR)R}$	Reverse Breakdown Voltage, $I_D = 100 \mu\text{A}$	V	50	70	100
δ^1	Temperature Coefficient of Reverse Breakdown Voltage	%/°C		0.2	
I_D	Dark Current, $V_R = V_{(BR)R} \times 0.9$	nA		5	30
I_{DM}	Multiplied Dark Current, $M = 2$ to 10	nA		1	5
C_t	Terminal Capacitance, $V_R = V_{(BR)R} \times 0.9$, $f = 1 \text{ MHz}$	pF		0.4	0.75
f_c	Cut-off Frequency, $M = 10$ $M = 20$	GHz	1	1.5 1.2	
η	Quantum Efficiency, $\lambda = 1300 \text{ nm}$, $M = 1$ $\lambda = 1550 \text{ nm}$, $M = 1$	%	76 65	90 77	
S	Responsivity, $\lambda = 1300 \text{ nm}$ $\lambda = 1550 \text{ nm}$	A/W	0.8 0.81	0.94 0.96	
M	Multiplication Factor, $\lambda = 1300 \text{ nm}$, $I_{PO} = 1.0 \mu\text{A}$ $V_R = V$ (@ $I_D = 1 \mu\text{A}$)		30	40	
x	Excess Noise Exponent, $\lambda = 1300 \text{ nm}$, 1550 nm , $I_{PO} = 1.0 \mu\text{A}$, $M = 10$, $f = 35 \text{ MHz}$, $B = 1 \text{ MHz}$			0.7	
F	Excess Noise Factor, $\lambda = 1300 \text{ nm}$, 1550 nm , $I_{PO} = 1.0 \mu\text{A}$, $M = 10$, $f = 35 \text{ MHz}$, $B = 1 \text{ MHz}$			5	

Note:

$$1. \delta = \frac{V_{(BR)R < 25^\circ\text{C} + \Delta T^\circ\text{C} > - V_{(BR)R < 25^\circ\text{C} >}}{\Delta T^\circ\text{C} \cdot V_{(BR)R < 25^\circ\text{C} >}}$$

NDL5551P SERIES

ABSOLUTE MAXIMUM RATINGS¹

(T_C = 25°C, unless otherwise specified)

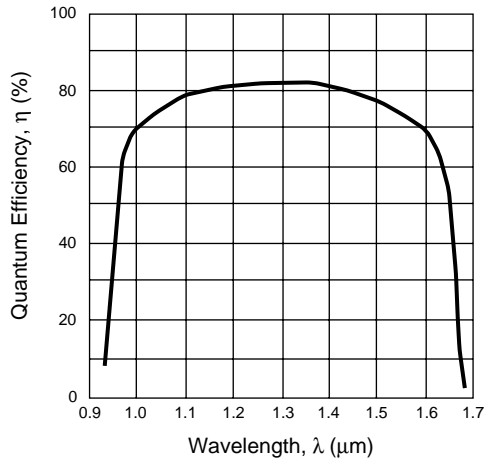
SYMBOLS	PARAMETERS	UNITS	RATINGS
I _F	Forward Current	mA	10
I _R	Reverse Current	mA	0.5
T _C	Operating Case Temp.	°C	-40 to +85
T _{STG}	Storage Temperature	°C	-40 to +85

Note:

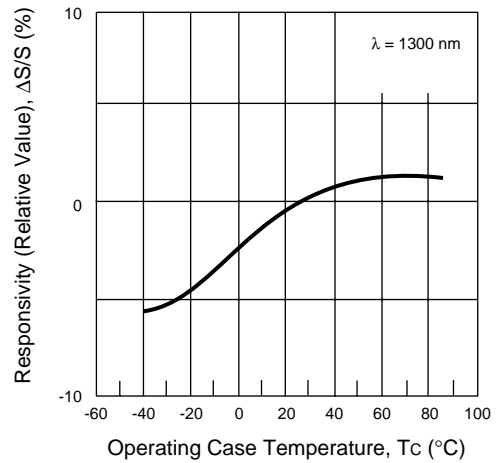
1. Operation in excess of any one of these parameters may result in permanent damage.

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

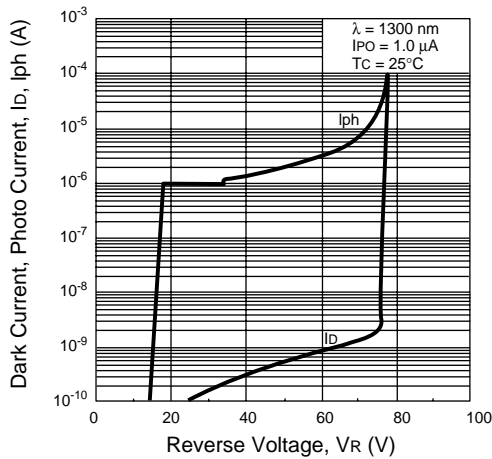
WAVELENGTH DEPENDENCE OF QUANTUM EFFICIENCY



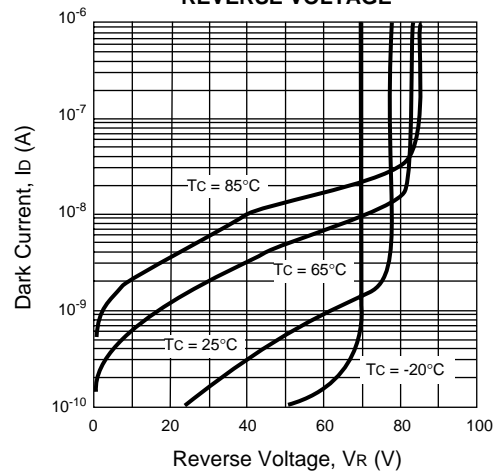
TEMPERATURE DEPENDENCE OF RESPONSIVITY



DARK CURRENT AND PHOTO CURRENT VS. REVERSE VOLTAGE

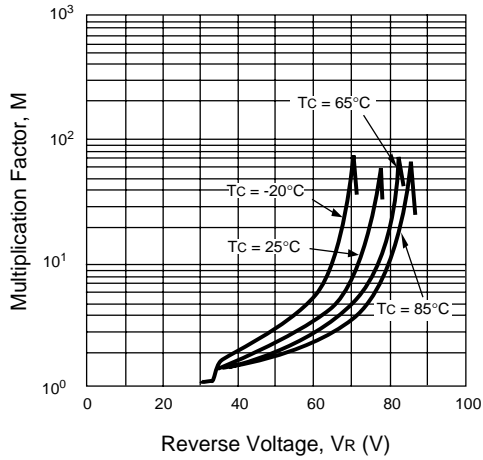


DARK CURRENT vs. REVERSE VOLTAGE

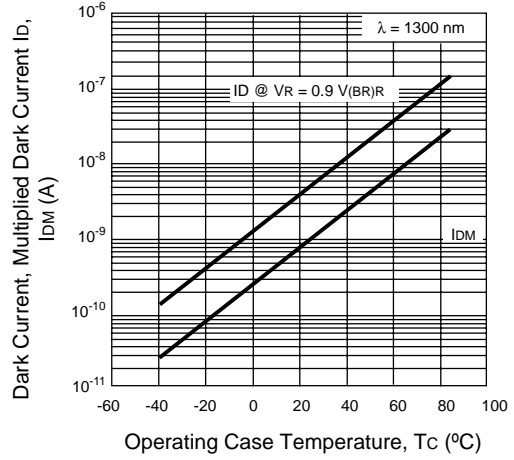


TYPICAL PERFORMANCE CURVES ($T_c = 25^\circ\text{C}$, unless otherwise specified)

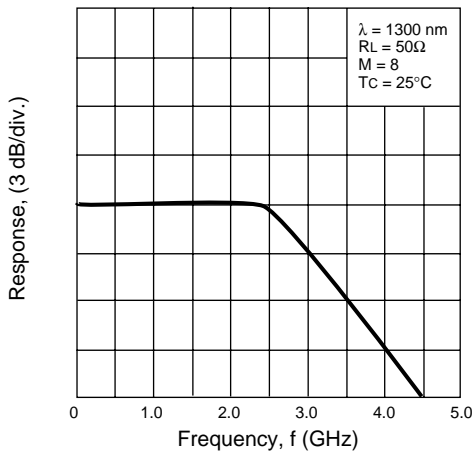
MULTIPLICATION FACTOR vs. REVERSE VOLTAGE



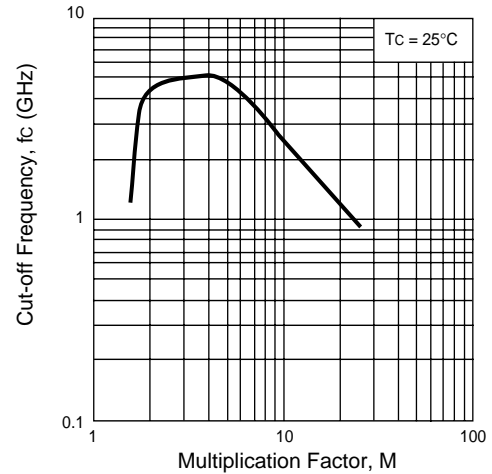
TEMPERATURE DEPENDENCE OF DARK CURRENT and MULTIPLIED DARK CURRENT



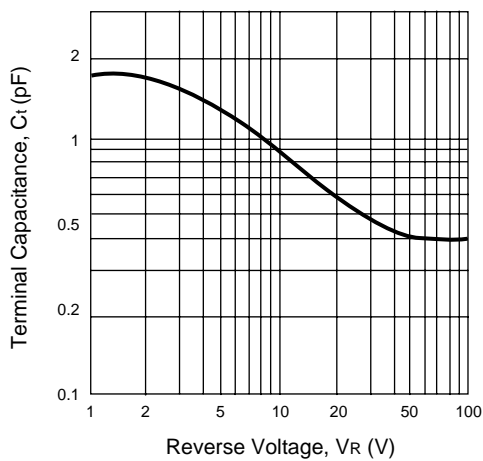
FREQUENCY RESPONSE



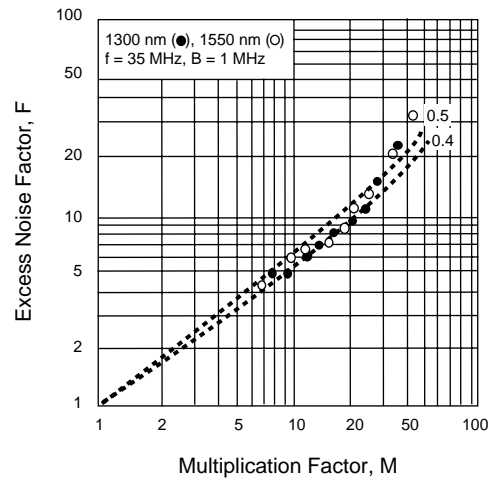
CUT-OFF FREQUENCY vs. MULTIPLICATION FACTOR



TERMINAL CAPACITANCE vs. REVERSE VOLTAGE



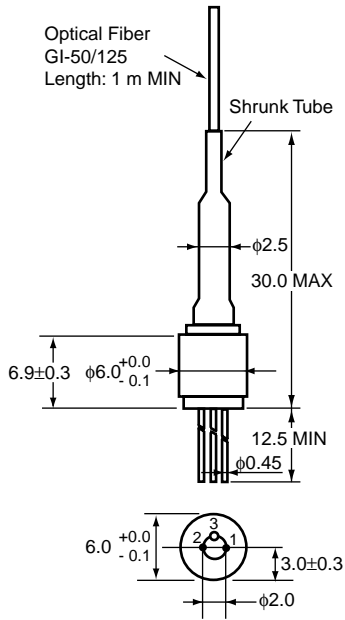
EXCESS NOISE FACTOR vs. MULTIPLICATION FACTOR



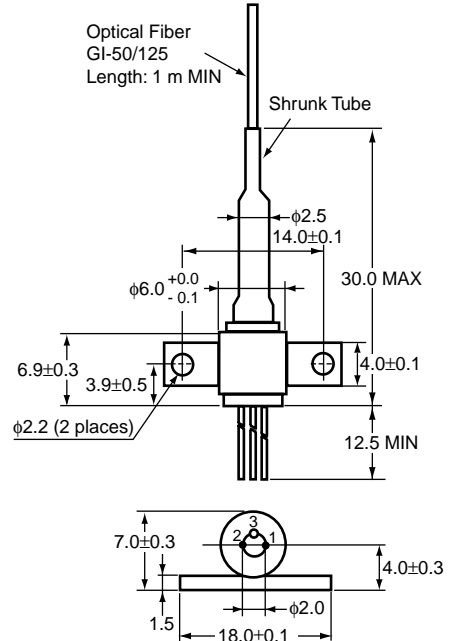
NDL5551P SERIES

OUTLINE DIMENSIONS (Units in mm)

NDL5551P



NDL5551P1

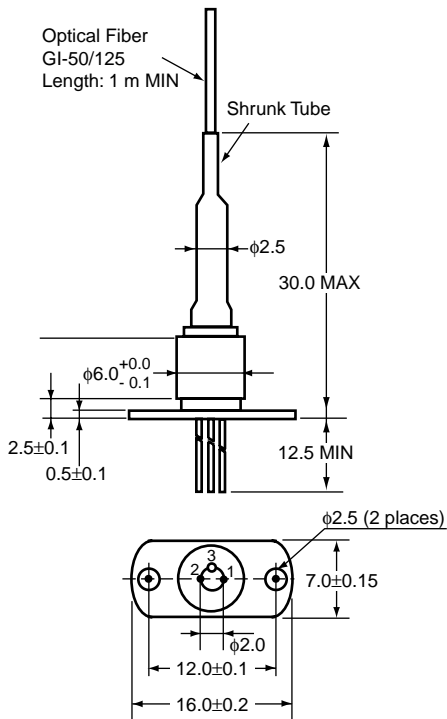


PIN CONNECTIONS

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



NDL5551P2



ORDERING INFORMATION

PART NUMBER	AVAILABLE CONNECTOR	DESCRIPTION
NDL5551P	Without Connector	No Flange
NDL5551PC	With FC-PC Connector	Flange
NDL5551PD	With SC-PC Connector	
NDL5551P1	Without Connector	Flat Mount
NDL5551P1C	With FC-PC Connector	Flange
NDL5551P1D	With SC-PC Connector	
NDL5551P2	Without Connector	Vertical Flange
NDL5551P2C	With FC-PC Connector	Vertical Flange
NDL5551P2D	With SC-PC Connector	

HANDLING PRECAUTION FOR PD/APD MODULE

The NEC PD/APD module has heat shrink tubing to protect the ferrule edge (*1) and the junction between the ferrule and the module body (*2). In order to avoid breaking the fiber and/or optical coupling degradation, NEC recommends the following handling precautions:

- 1. Do not make the fiber bend radius less than 30 mm (*3).
- 2. Do not bend the fiber within the 18 mm section from the module body (*4).
- 3. Do not stress the ferrule with a lateral force exceeding 500 g (*5).

