

## NDL5551P Series

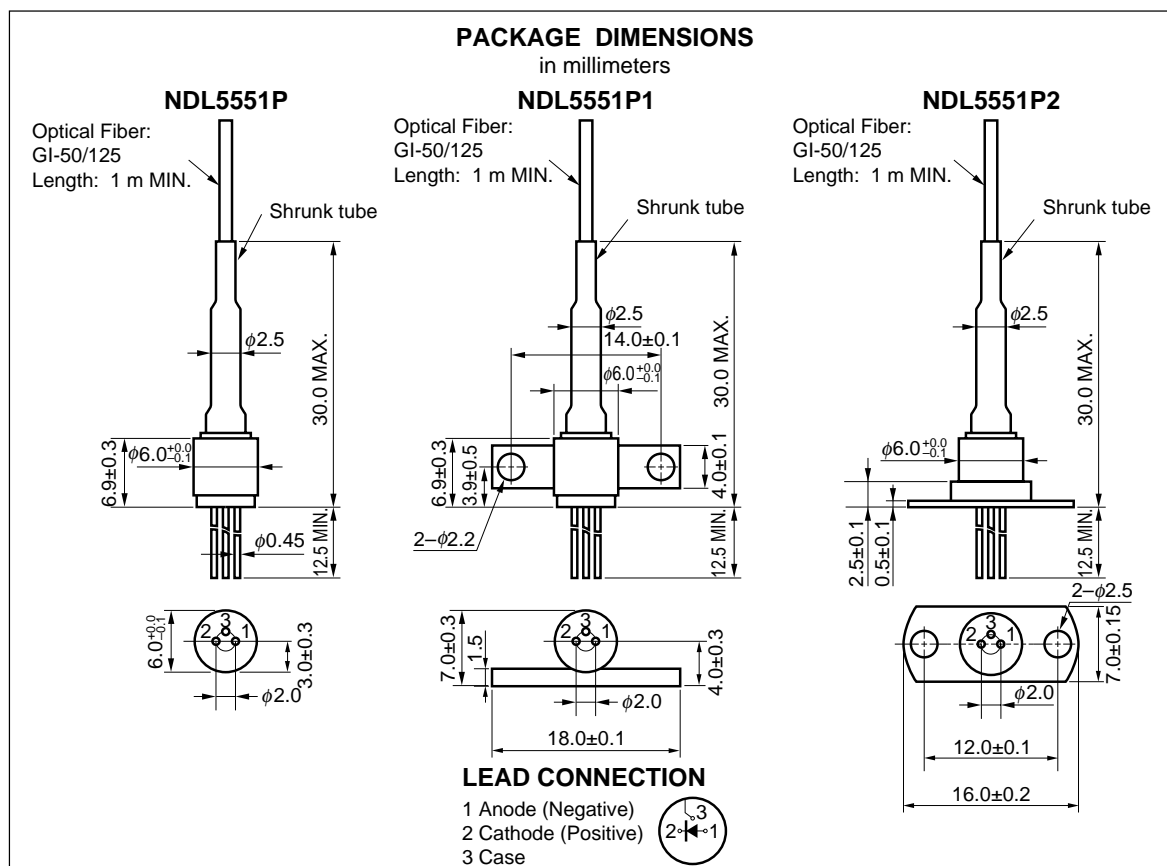
1 000 to 1 600 nm OPTICAL FIBER COMMUNICATIONS  
 $\phi 50 \mu\text{m}$  InGaAs AVALANCHE PHOTO DIODE MODULE

## DESCRIPTION

NDL5551P Series is InGaAs avalanche photo diode modules with multimode fiber. They are designed for detectors of long wavelength transmission systems and cover the wavelength range between 1 000 and 1 600 nm.

## FEATURES

- Smaller dark current  $I_D = 5 \text{ nA}$
- High quantum efficiency  $\eta = 90 \% @ \lambda = 1\,300 \text{ nm}, M = 1$   
 $\eta = 77 \% @ \lambda = 1\,550 \text{ nm}, M = 1$
- 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)
- NDL5551P1 and NDL5551P2 have a flange.



The information in this document is subject to change without notice.

★ ORDERING INFORMATION

Part Number	Available Connector	
NDL5551P	Without Connector	no flange
NDL5551PC	With FC-PC Connector	
NDL5551PD	With SC-PC Connector	
NDL5551P1	Without Connector	flat mount flange
NDL5551P1C	With FC-PC Connector	
NDL5551P1D	With SC-PC Connector	
NDL5551P2	Without Connector	vertical flange
NDL5551P2C	With FC-PC Connector	
NDL5551P2D	With SC-PC Connector	

ABSOLUTE MAXIMUM RATINGS (T<sub>c</sub> = 25 °C)

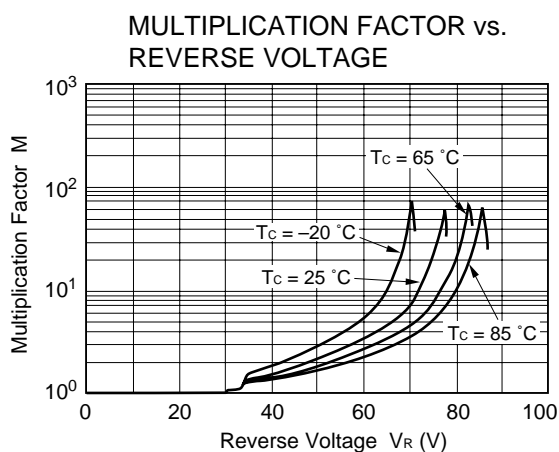
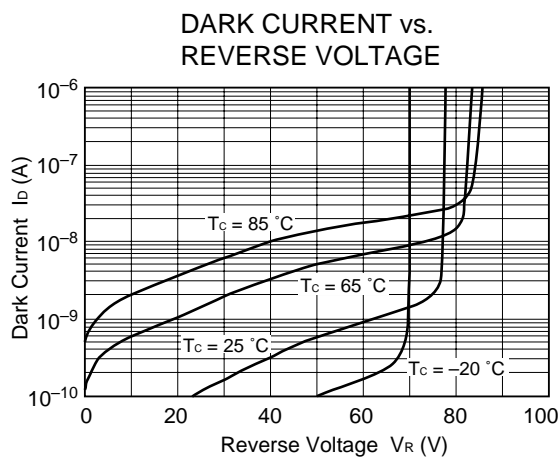
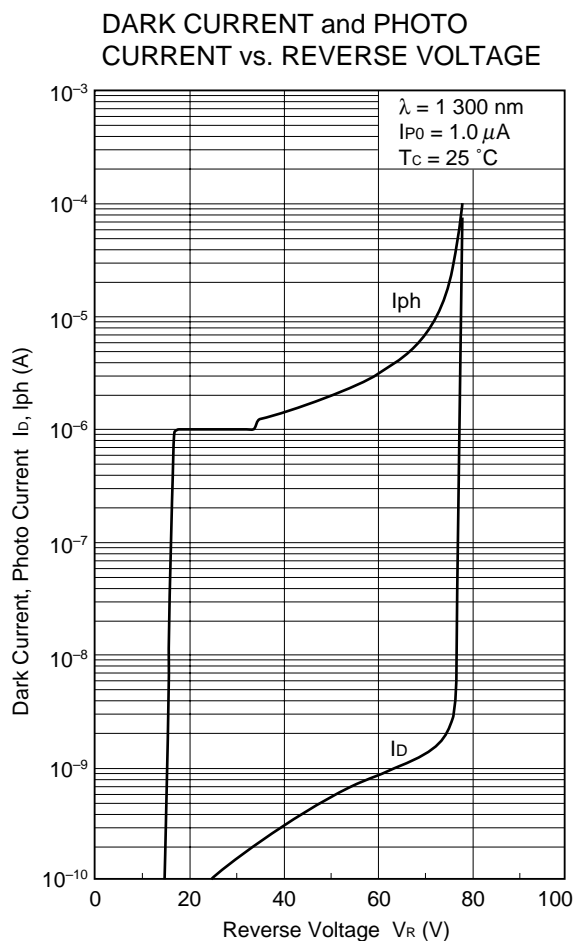
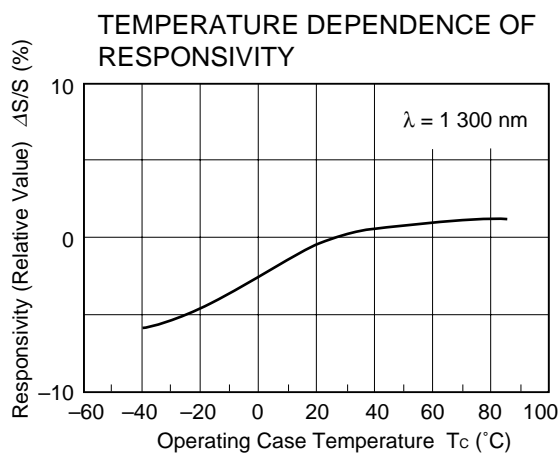
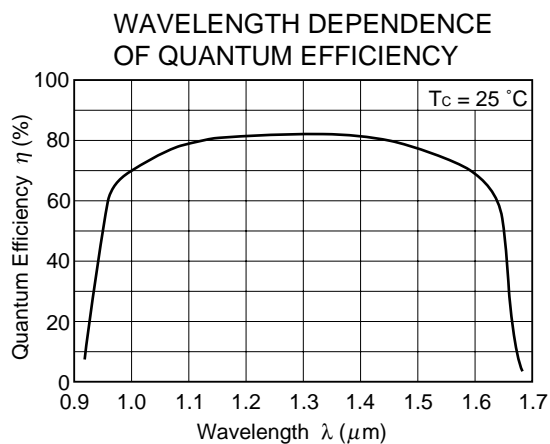
Parameter	Symbol	Ratings	Unit
Forward Current	I <sub>F</sub>	10	mA
Reverse Current	I <sub>R</sub>	0.5	mA
Operating Case Temperature	T <sub>c</sub>	−40 to +85	°C
Storage Temperature	T <sub>stg</sub>	−40 to +85	°C

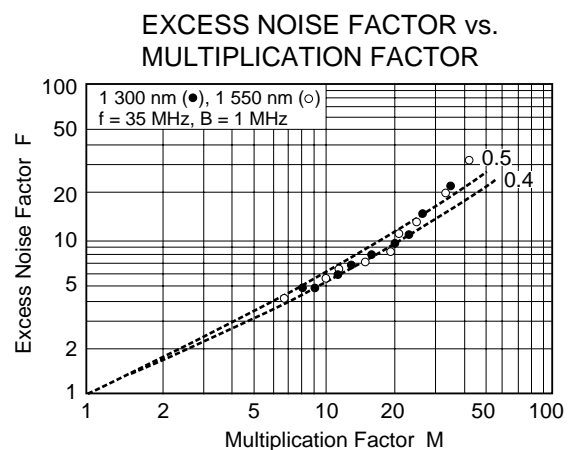
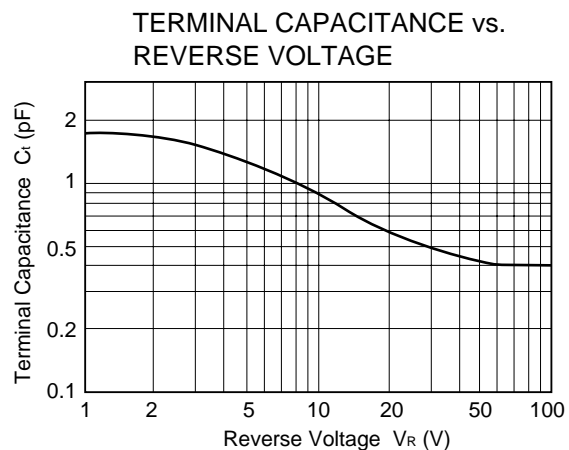
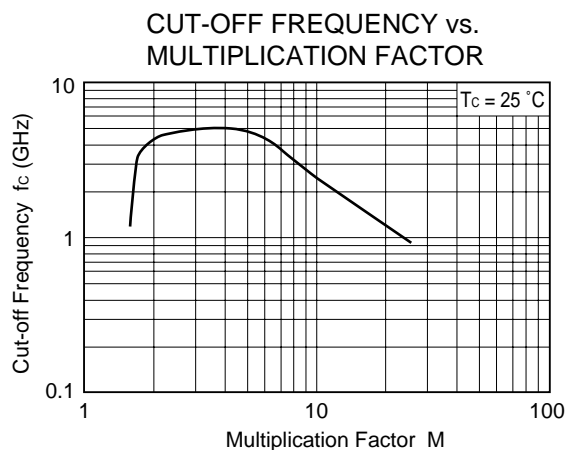
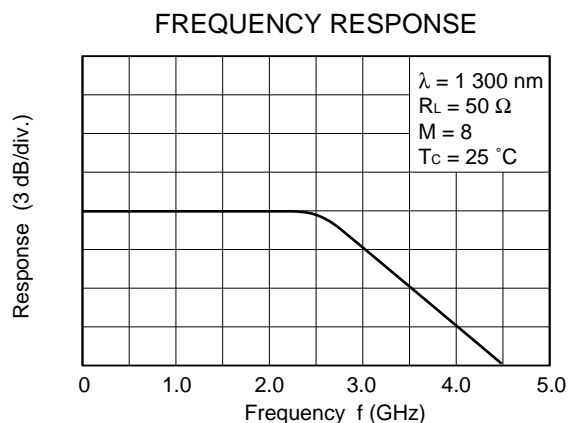
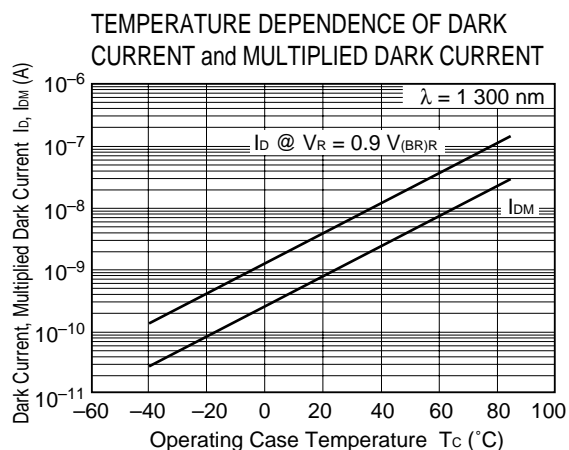
ELECTRO-OPTICAL CHARACTERISTICS (T<sub>c</sub> = 25 °C)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Reverse Breakdown Voltage	V <sub>(BR)R</sub>	I <sub>D</sub> = 100 μA	50	70	100	V
Temperature Coefficient of Reverse Breakdown Voltage	δ <sup>*1</sup>			0.2		%/°C
Dark Current	I <sub>D</sub>	V <sub>R</sub> = V <sub>(BR)R</sub> × 0.9		5	30	nA
Multiplied Dark Current	I <sub>DM</sub>	M = 2 to 10		1	5	nA
Terminal Capacitance	C <sub>t</sub>	V <sub>R</sub> = V <sub>(BR)R</sub> × 0.9, f = 1 MHz		0.4	0.75	pF
Cut-off Frequency	f <sub>c</sub>	M = 10	1	1.5		GHz
		M = 20		1.2		
Quantum Efficiency	η	λ = 1 300 nm, M = 1	76	90		%
		λ = 1 550 nm, M = 1	65	77		
Responsivity	S	λ = 1 300 nm, M = 1	0.8	0.94		A/W
		λ = 1 550 nm, M = 1	0.81	0.96		
Multiplication Factor	M	λ = 1 300 nm, I <sub>P0</sub> = 1.0 μA V <sub>R</sub> = V (@ I <sub>D</sub> = 1 μA)	30	40		
Excess Noise Exponent	x	λ = 1 300 nm, 1550 nm, I <sub>P0</sub> = 1.0 μA		0.7		
Excess Noise Factor	F	M = 10, f = 35 MHz, B = 1 MHz		5		

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

TYPICAL CHARACTERISTICS



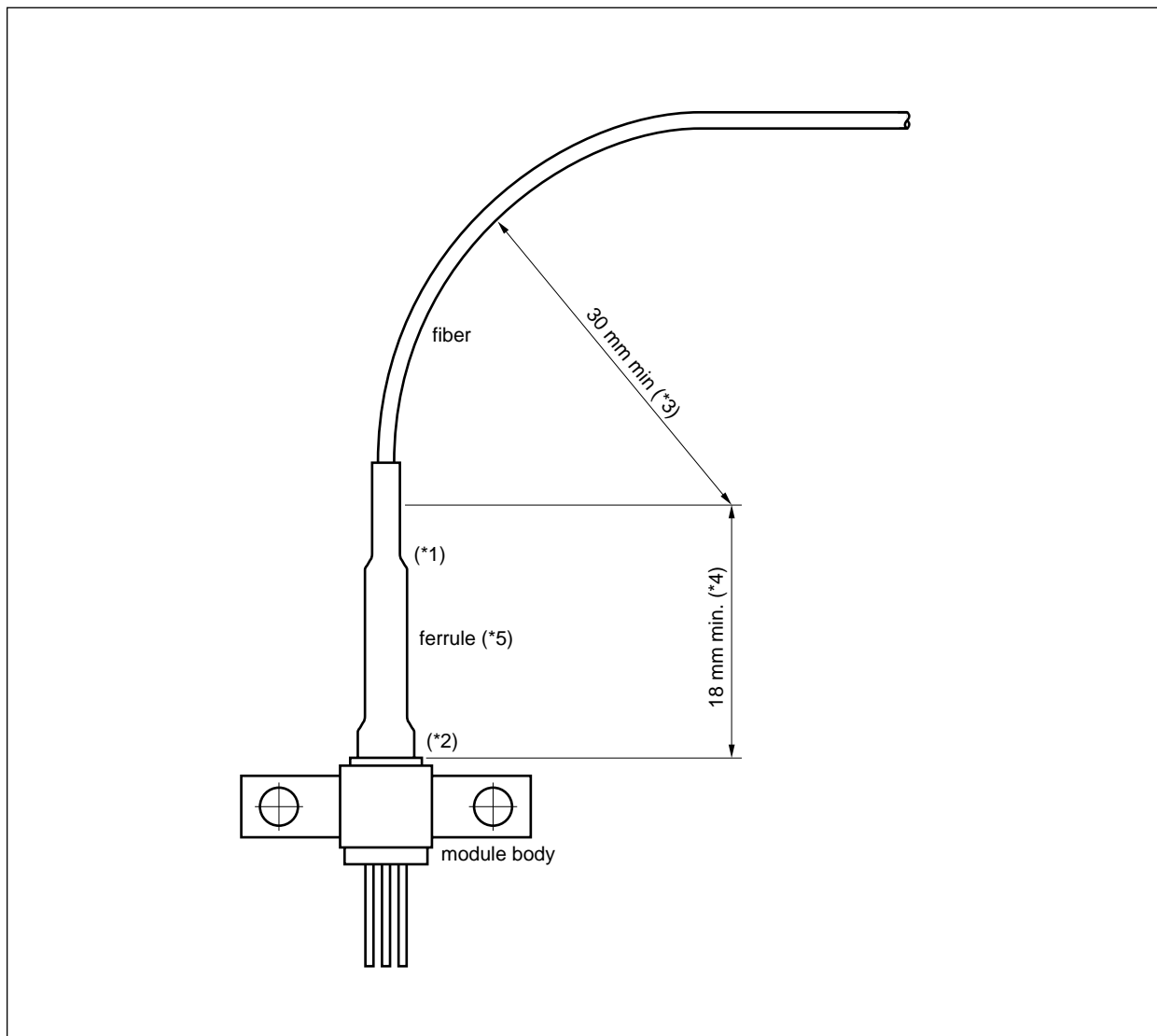


# HANDLING PRECAUTION for PD/APD MODULE



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).



★ InGaAs APD/PD FAMILY

Features Packages	APD				PIN-PD		Remarks
	$\phi 30 \mu\text{m}$ (for 2.5 Gb/s)	$\phi 50 \mu\text{m}$ (for 2.5 Gb/s)	$\phi 50 \mu\text{m}$	$\phi 80 \mu\text{m}$	$\phi 50 \mu\text{m}$ (for 2.5 Gb/s)	$\phi 80 \mu\text{m}$	
TO-18 type Can	NDL5530	_____	NDL5500	NDL5510	_____	_____	3 pins
TO-18 type Can with Micro Lens	_____	_____	_____	_____	NDL5490L <sup>*3,4</sup>	NDL5405L	3 pins
Small Can $\phi 5.6 \mu\text{m}$	NDL5531	_____	_____	_____	NDL5490 <sup>*3,4</sup>	_____	
Chip on Carrier	NDL5530C	NDL5520C	NDL5500C	NDL5510C	_____	_____	
Receptacle Module	_____	_____	_____	_____	_____	NDL5471RC NDL5471RD	3 pins RC: FC receptacle RD: SC receptacle
Coaxial Module with MMF	_____	NDL5521P NDL5521P1 NDL5521P2	NDL5551P NDL5551P1 NDL5551P2 NDL5553P <sup>*1</sup> NDL5553P1 <sup>*1</sup> NDL5553P2 <sup>*1</sup>	NDL5561P <sup>*2</sup> NDL5561P1 <sup>*2</sup> NDL5561P2 <sup>*2</sup>	_____	NDL5461P NDL5461P1 NDL5461P2	P1, P2: With flange
Coaxial Module with SMF	_____	_____	NDL5553PS <sup>*1</sup> NDL5553P1S <sup>*1</sup> NDL5553P2S <sup>*1</sup>	_____	_____	NDL5481P <sup>*5</sup> NDL5481P1 <sup>*5</sup> NDL5481P2 <sup>*5</sup>	
14-pin DIP Module with TEC	_____	_____	NDL5506P NDL5506PS	_____	_____	_____	$\Delta T = 45 \text{ K}$ (@ $I_c = 1.1 \text{ A}$ ) PS: With SMF
6-pin BFY Module with MMF	_____	NDL5522P	_____	_____	NDL5422P	_____	With Pre-AMP

\*1 For OTDR

\*2 With GI-62.5/125

\*3 Under development

\*4 Internal pre-amplifier for 1Gb/s

\*5 For analog application (optical CATV)

**Remark** Modules are available with FC-PC connector or optional SC-PC connector.

**REFERENCE**

Document Name	Document No.
NEC semiconductor device reliability/quality control system	IEI-1205
Quality grade on NEC semiconductor devices	IEI-1209
Semiconductor device mounting technology manual	C10535E
Semiconductor device package manual	IEI-1213
Guide to quality assurance for semiconductor devices	MEI-1202
Semiconductor selection guide	X10679E

## CAUTION

**Within this device there exists GaAs (Gallium Arsenide) material which is a harmful substance if ingested. Please do not under any circumstance break the hermetic seal.**

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Special: Transportation equipment (automobiles, trains, ships, etc.), traffic control systems, anti-disaster systems, anti-crime systems, safety equipment and medical equipment (not specifically designed for life support)

Specific: Aircrafts, aerospace equipment, submersible repeaters, nuclear reactor control systems, life support systems or medical equipment for life support, etc.

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Anti-radioactive design is not implemented in this product.