DATA SHEET

NEC

PHOTO DIODE

NDL5421P Series

1 000 to 1 600 nm OPTICAL FIBER COMMUNICATIONS
ϕ50 μm InGaAs PIN PHOTO DIODE MODULE

DESCRIPTION

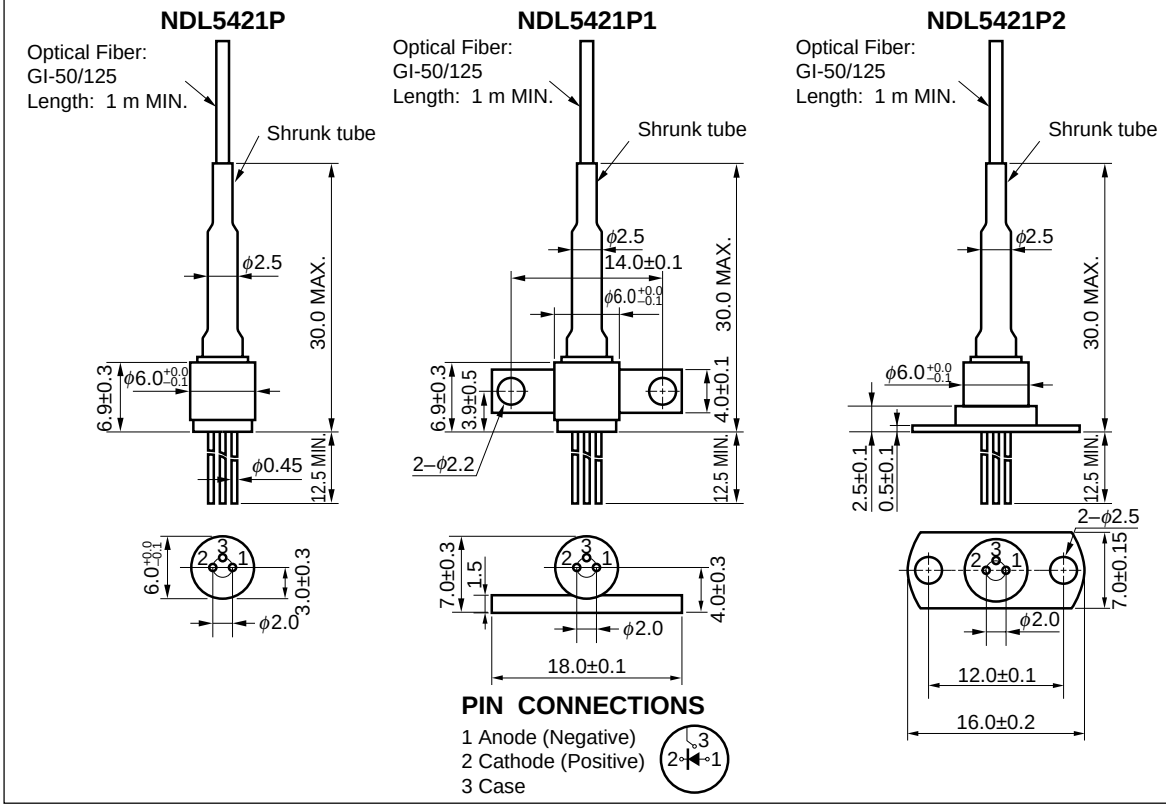
NDL5421P Series is an InGaAs PIN photo diode module with multimode fiber. It is designed for 2.5Gb/s optical fiber communication systems and covers the wavelength range between 1 000 and 1 600 nm with high efficiency.

FEATURES

- Small dark current I_D = 0.1 nA
- High quantum efficiency η = 86 % @ λ = 1 300 nm
  η = 75 % @ λ = 1 550 nm
- Detecting area size ϕ50 μm
- Low operating voltage V_R = 5 V
- Low terminal capacitance C_t = 0.7 pF @ f = 1.0 MHz, V_R = 5 V
- High speed response f_C = 2.5 GHz min.
- Coaxial module with multimode fiber (GI-50/125) or optional siglemode fiber (SM-9/125)

★

PACKAGE DIMENSIONS
in millimeters



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

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The mark ★ shows major revised points.

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★ ORDERING INFORMATION

Part Number	Available Connector	Description	
NDL5421P	Without Connector	GI-50/125	No Flange
NDL5421PC	With FC-PC Connector		
NDL5421PD	With SC-PC Connector		
NDL5421PS	Without Connector	SM-9/125	
NDL5421PSC	With FC-PC Connector		
NDL5421PSD	With SC-PC Connector		
NDL5421P1	Without Connector	GI-50/125	Flat Mount Flange
NDL5421P1C	With FC-PC Connector		
NDL5421P1D	With SC-PC Connector		
NDL5421P1S	Without Connector	SM-9/125	
NDL5421P1SC	With FC-PC Connector		
NDL5421P1SD	With SC-PC Connector		
NDL5421P2	Without Connector	GI-50/125	Vertical Flange
NDL5421P2C	With FC-PC Connector		
NDL5421P2D	With SC-PC Connector		
NDL5421P2S	Without Connector	SM-9/125	
NDL5421P2SC	With FC-PC Connector		
NDL5421P2SD	With SC-PC Connector		

ABSOLUTE MAXIMUM RATINGS (T_C = 25 °C, unless otherwise specified)

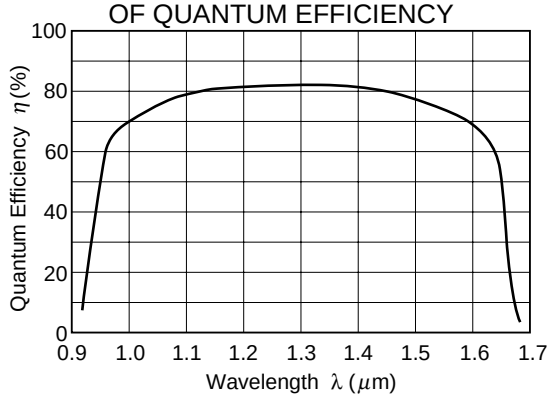
Parameter	Symbol	Ratings	Unit
Reverse Voltage	V_R	20	V
Forward Current	I_F	10	mA
Optical Input Power	P_{in}	8	mW
Operating Case Temperature	T_C	−40 to +85	°C
Storage Temperature	T_{stg}	−40 to +85	°C

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

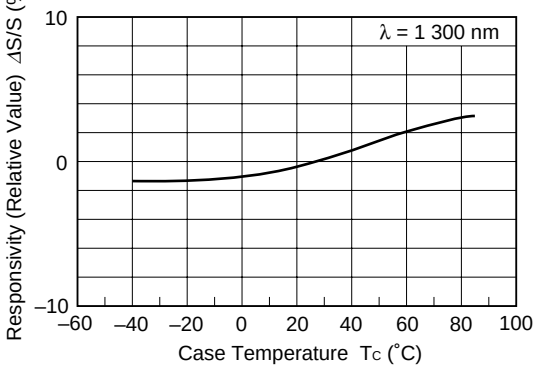
Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Dark Current	I_D	V_R = 5 V		0.1	1.0	nA
Terminal Capacitance	C_t	V_R = 5 V, f = 1.0 MHz		0.7	0.9	pF
Quantum Efficiency	η	λ = 1 300 nm	75	86		%
		λ = 1 550 nm	64	75		
Responsivity	S	λ = 1 300 nm	0.78	0.89		A/W
		λ = 1 550 nm	0.80	0.94		
Cut-off Frequency	f_C	V_R = 5 V, R_L = 50 Ω, λ = 1 300 nm	2.5			GHz

TYPICAL CHARACTERISTICS (T_C = 25 °C, unless otherwise specified) ★

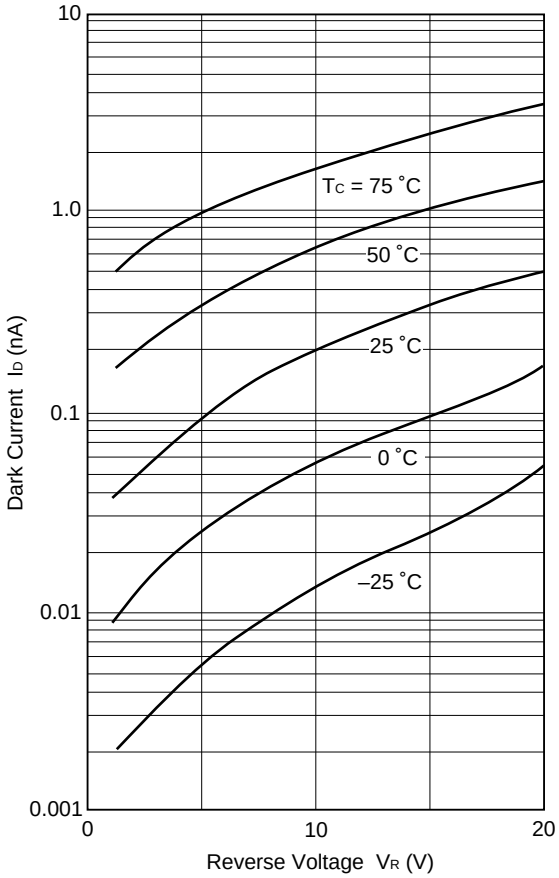
WAVELENGTH DEPENDENCE OF QUANTUM EFFICIENCY



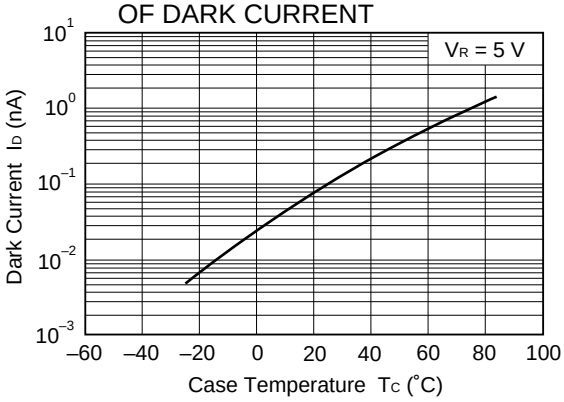
TEMPERATURE DEPENDENCE OF RESPONSIVITY



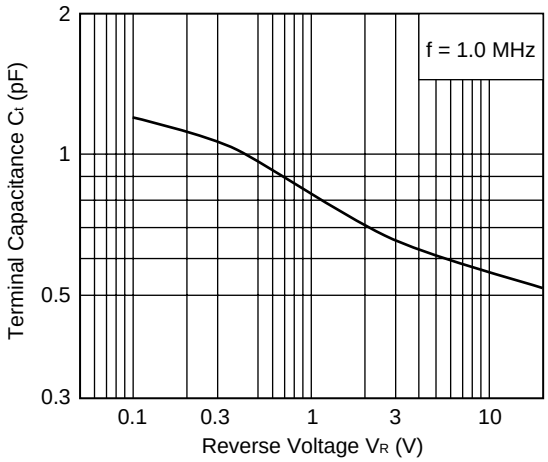
REVERSE VOLTAGE DEPENDENCE OF DARK CURRENT



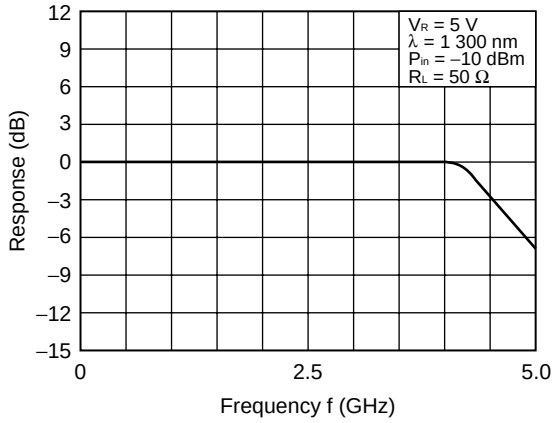
TEMPERATURE DEPENDENCE OF DARK CURRENT



REVERSE VOLTAGE DEPENDENCE OF TERMINAL CAPACITANCE



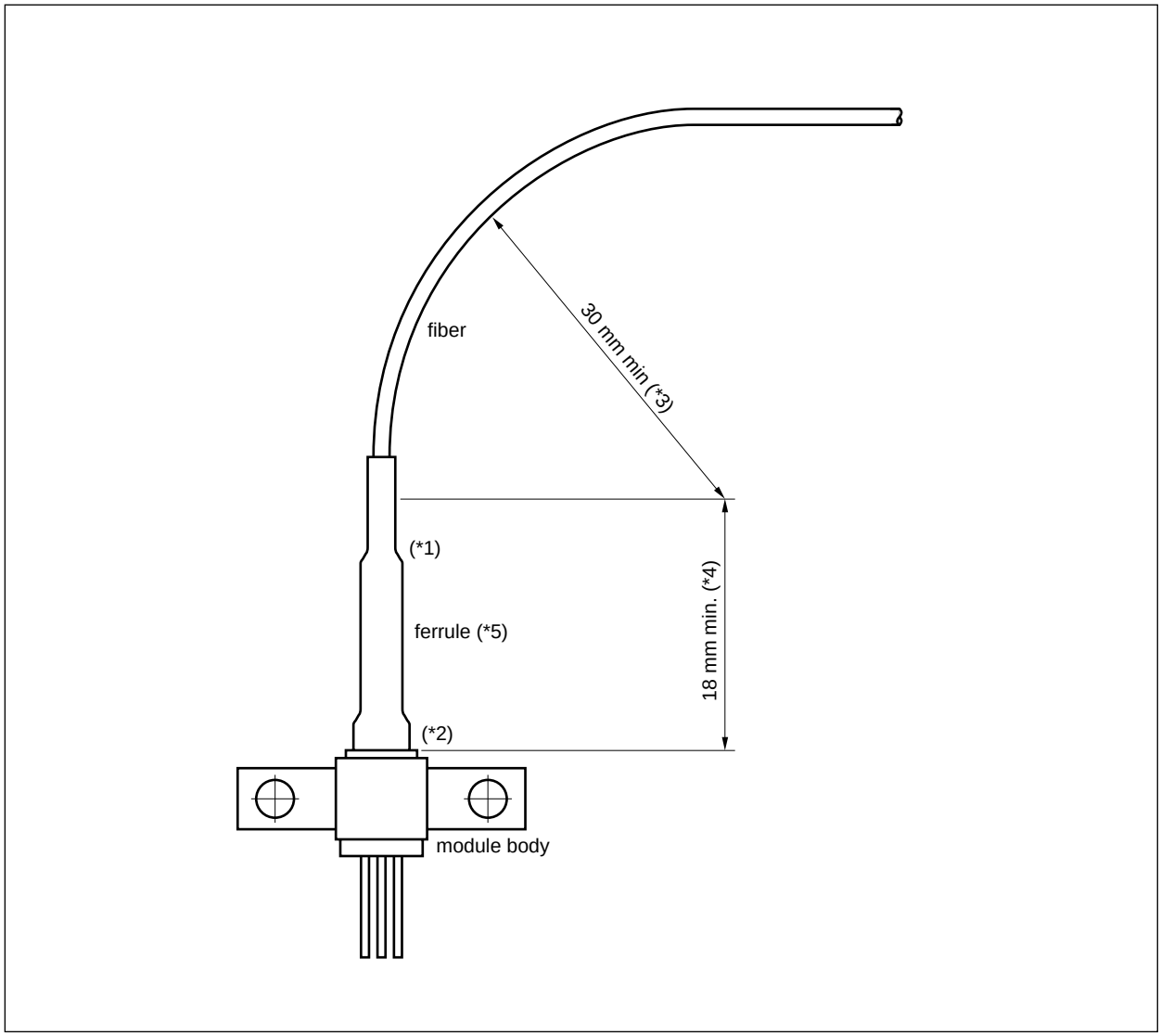
FREQUENCY RESPONSE



HANDLING PRECAUTION for PD/APD MODULE

The NEC PD/PAD 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
	ϕ30 μm (for 2.5 Gb/s)	ϕ50 μm (for 2.5 Gb/s)	ϕ50 μm	ϕ80 μm	ϕ50 μm (for 2.5 Gb/s)	ϕ80 μm	
TO-18 type Can	NDL5530	———	NDL5500	NDL5510	———	———	3 pins
TO-18 type Can with Micro Lens	———	———	———	———	NDL5490L[*3,4]	NDL5405L	3 pins
Small Can ϕ5.6 μm	NDL5531	———	———	———	NDL5490[*3,4]	———	
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[*1] NDL5553P1[*1] NDL5553P2[*1] NDL5590P NDL5590P1 NDL5590P2	NDL5561P[*2] NDL5561P1[*2] NDL5561P2[*2]	NDL5421P NDL5421P1 NDL5421P2	NDL5461P NDL5461P1 NDL5461P2	P1, P2: With flange NDL5590P Series: With Pre-AMP
Coaxial Module with SMF	NDL5531P NDL5531P1 NDL5531P2	———	NDL5553PS[*1] NDL5553P1S[*1] NDL5553P2S[*1]	———	———	NDL5481P[*5] NDL5481P1[*5] NDL5481P2[*5]	
14-pin DIP Module with TEC		———	NDL5506P NDL5506PS	———	———	———	ΔT = 45 K (@ Ic = 1.1 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	LEI-1201
Quality grade on NEC semiconductor devices	IEI-1209
Semiconductor device mounting technology manual	C10535E
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 circumstances 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.

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