

1 000 to 1 600 nm OPTICAL FIBER COMMUNICATIONS φ30 μm InGaAs AVALANCHE PHOTO DIODE

DESCRIPTION

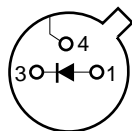
NDL5530 is an InGaAs avalanche photo diode especially designed for a detector of long wavelength optical fiber communications systems. It covers the wavelength range between 1 000 and 1 600 nm with high efficiency.

FEATURES

- Small dark current $I_D = 5 \text{ nA}$
- High quantum efficiency $\eta = 90 \% @ \lambda = 1\,300 \text{ nm}, M = 1$
 $\eta = 77 \% @ \lambda = 1\,550 \text{ nm}, M = 1$
- Cut-off frequency $f_c = 2.5 \text{ GHz MIN. @ } M = 10$
- Detecting area size $\phi 30 \mu\text{m}$

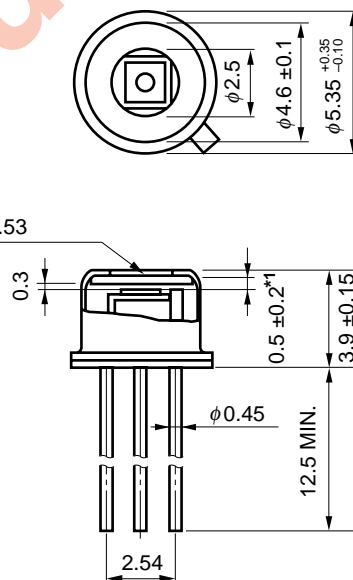
PACKAGE DIMENSIONS in millimeters

PIN CONNECTIONS



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

*1 Optical length



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

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

Parameter	Symbol	Ratings	Unit
Forward Current	I _F	10	mA
Reverse Current	I _R	0.5	mA
Operating Case Temperature	T _C	-40 to +85	°C
Storage Temperature	T _{stg}	-55 to +100	°C

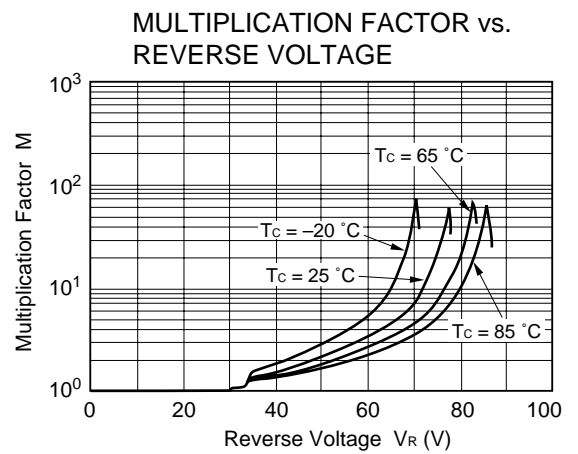
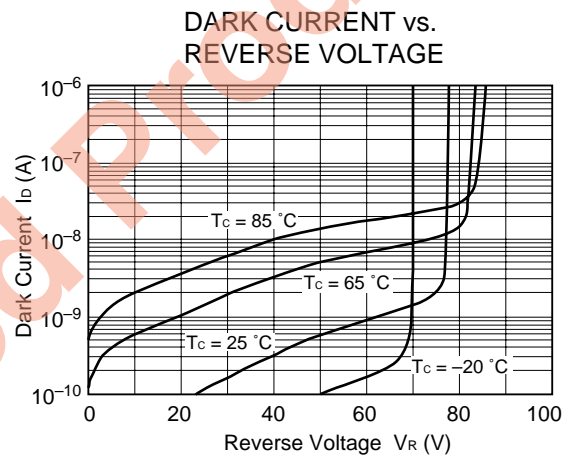
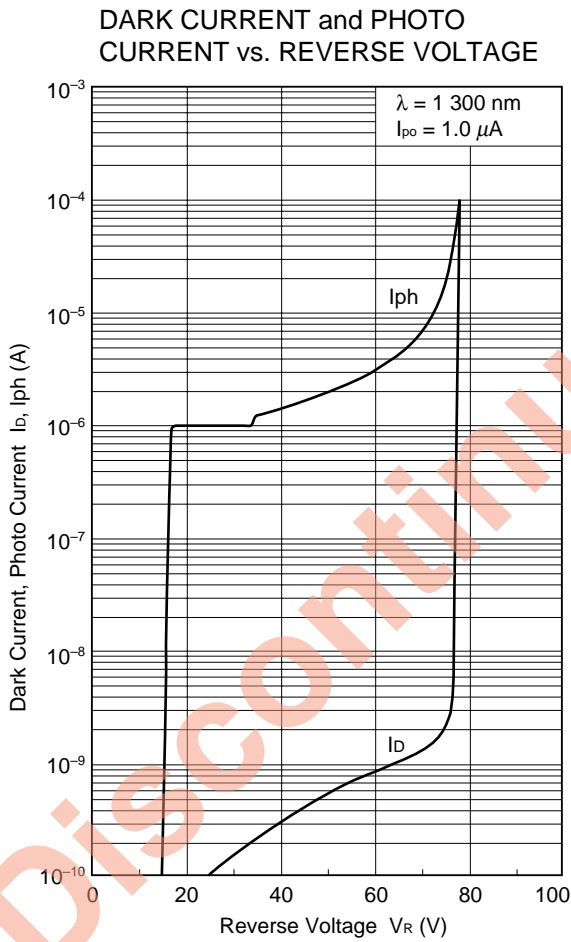
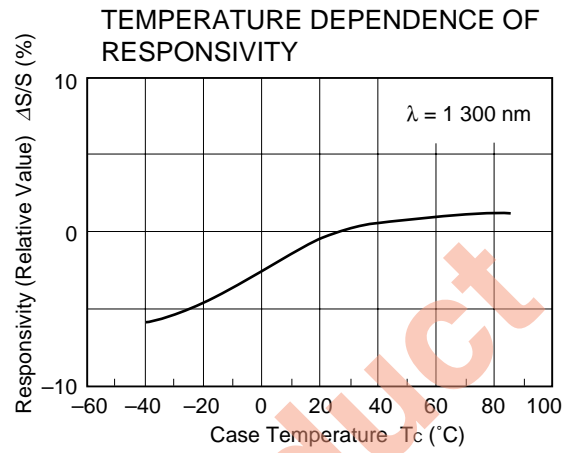
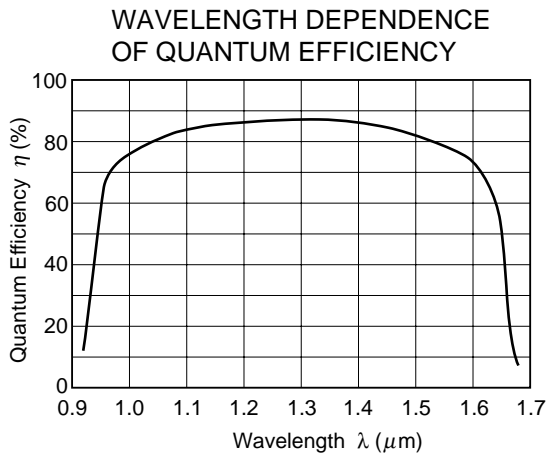
ELECTRO-OPTICAL CHARACTERISTICS (T_c = 25 °C, unless otherwise specified)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Reverse Breakdown Voltage	V _{(BR)R}	I _D = 100 μA	50	70	100	V
Temperature Coefficient of Reverse Breakdown Voltage	δ ^{*1}	T _c = -40 to +85 °C		0.2		%/°C
Dark Current	I _D	V _R = V _{(BR)R} × 0.9		5	25	nA
Multiplied Dark Current	I _{DM}	M = 2 to 10		1	5	nA
Terminal Capacitance	C _t	V _R = V _{(BR)R} × 0.9, f = 1 MHz		0.35	0.60	pF
Cut-off Frequency	f _c	M = 5	2.5			GHz
		M = 10	2.5			
		M = 30	1.0	1.7		
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	0.80	0.94		A/W
		λ = 1 550 nm, M = 1	0.81	0.96		
Multiplication Factor	M	λ = 1 550 nm, I _{po} = 1.0 μA, V _R = V (@ I _D = 1 μA)	30	40		
Excess Noise Factor ^{*2}	x	λ = 1 300 nm, 1 550 nm, I _{po} = 1.0 μA		0.7		
	F		M = 10, f = 35 MHz, B = 1 MHz		5	
Effective Detecting Area Size	φE	M = 10, 80 % of Peak	20		30	μm

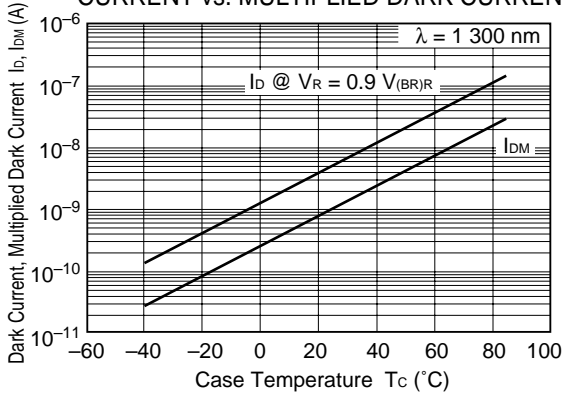
$$*1 \delta = \frac{V_{(BR)R} < 25 \text{ °C} + \Delta T \text{ °C} > - V_{(BR)R} < 25 \text{ °C} >}{\Delta T \text{ °C} \cdot V_{(BR)R} < 25 \text{ °C} >}$$

$$*2 F = M^x$$

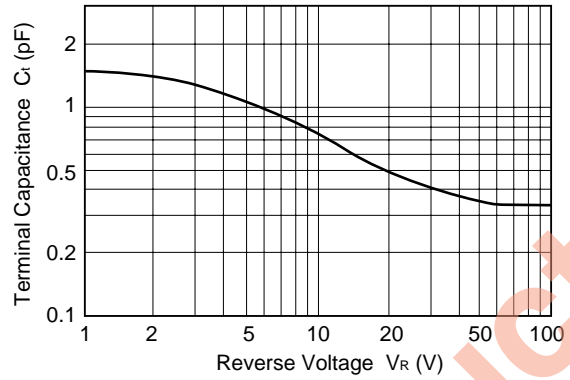
TYPICAL CHARACTERISTICS (T_c = 25 °C, unless otherwise specified) ★



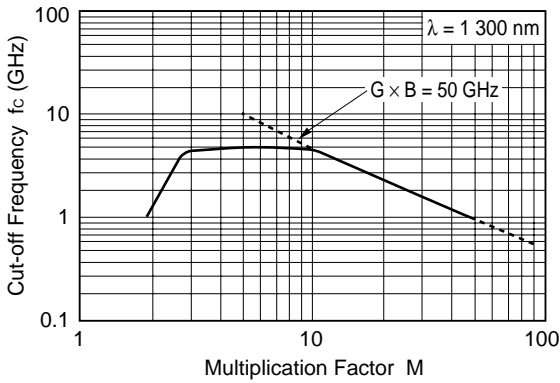
TEMPERATURE DEPENDENCE OF DARK CURRENT vs. MULTIPLIED DARK CURRENT



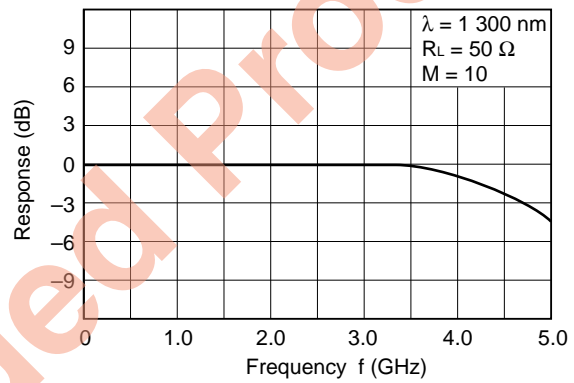
TERMINAL CAPACITANCE vs. REVERSE VOLTAGE



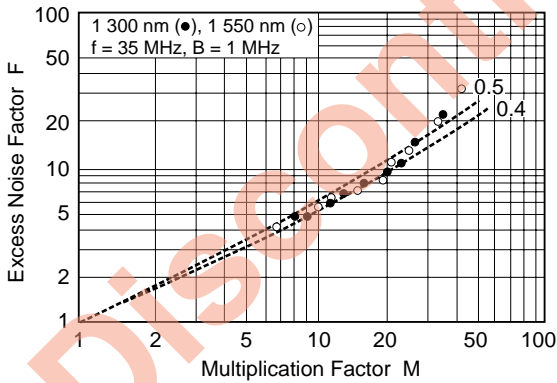
CUT-OFF FREQUENCY vs. MULTIPLICATION FACTOR



FREQUENCY RESPONSE



EXCESS NOISE FACTOR vs. MULTIPLICATION FACTOR



InGaAs APD/PD FAMILY



Features Packages	APD				PIN-PD		Remarks
	ϕ 30 μ m (for 2.5 Gb/s)	ϕ 50 μ m (for 2.5 Gb/s)	ϕ 50 μ m	ϕ 80 μ m	ϕ 50 μ m (for 2.5 Gb/s)	ϕ 80 μ m	
TO-18 type Can	NDL5530	—	NDL5500	NDL5510	—	—	3 pins
TO-18 type Can with Micro Lens	—	—	—	—	NDL5490L ^{*3,4}	NDL5405L	3 pins
Small Can ϕ 5.6 μ m	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	—	—	—	$\Delta T = 45$ K (@ $I_c = 1.1$ 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 1 Gb/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 grades 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

Discontinued Product

[MEMO]

Discontinued Product

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)

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Anti-radioactive design is not implemented in this product.