DATA SHEET

RECEIVER

NDL5522P

ϕ50 μm InGaAs AVALANCHE PHOTO DIODE FOR 2.5 Gb/s BUTTERFLY MODULE WITH INTERNAL PRE-AMPLIFIER

DESCRIPTION

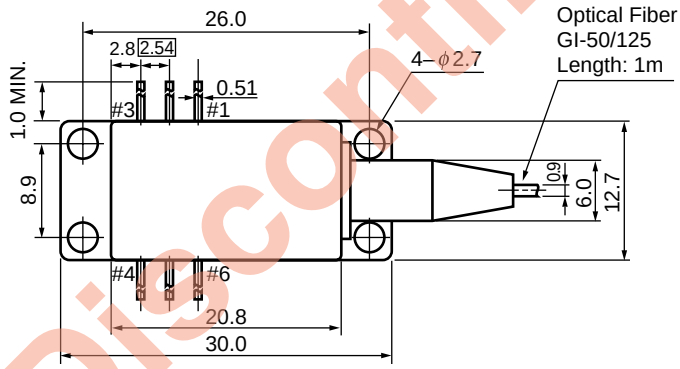
The NDL5522P is an InGaAs avalanche photo diode module with multimode fiber incorporating a silicon pre-amplifier IC. It is designed as an optical receiver for fiber optic communications systems such as SDH, SONET, digital video transmission. It is designed for STM-16 applications.

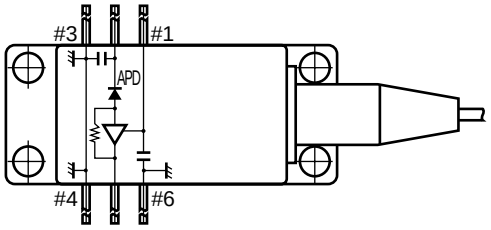
FEATURES

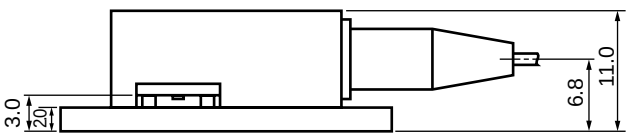
- Internal Si pre-amplifier IC
- High sensitivity $\overline{P}$ = –33 dBm TYP. @ 2.5 Gb/s, NRZ
- Wide dynamic range D_r = 24 dB TYP. @ 2.5 Gb/s, NRZ
- Output impedance 50 Ω
- Transimpedance 300 Ω
- Detecting area size ϕ50 μm
- GI-50/125 multimode fiber pigtail
- Hermetically sealed 6-pin butterfly package

PACKAGE DIMENSIONS

in millimeters







PIN CONNECTIONS

Pin No.	Function	Pin No.	Function
1	V_{CC} (–5.2 V)	4	Case Ground
2	APD Cathode	5	Signal Out
3	Case Ground	6	Case Ground

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

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The mark ★ shows major revised points.

★ ORDERING INFORMATION

Part Number	Available Connector
NDL5522P	Without Connector
NDL5522PC	With FC-PC Connector

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

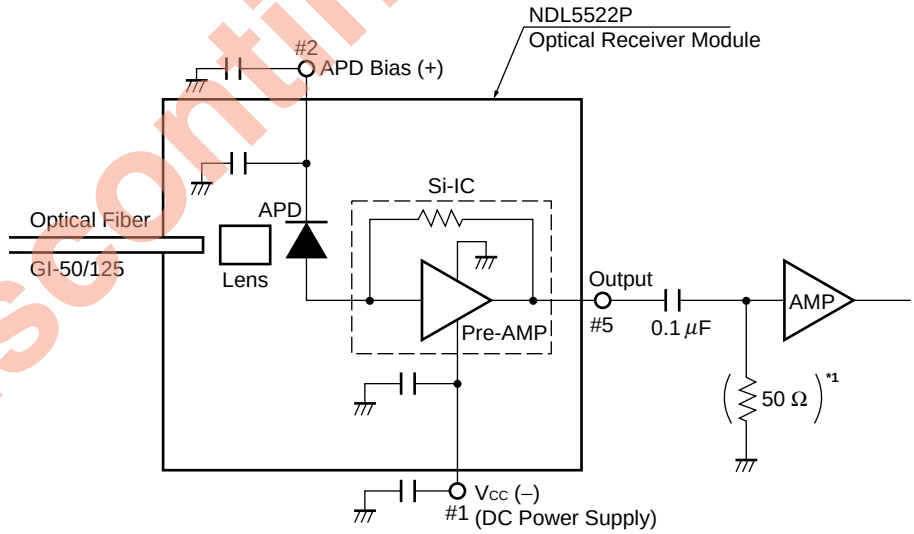
Parameter	Symbol	Ratings	Unit
Reverse Current	I_R	0.5	mA
Supply Voltage	V_{CC}	–6	V
Operating Case Temperature	T_C	–40 to +70	°C
Storage Temperature	T_{stg}	–40 to +85	°C
Lead Soldering Temperature (10 s)	T_{sld}	260	°C

ELECTRO-OPTICAL CHARACTERISTICS (T_C = 25 °C)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Reverse Breakdown Voltage	$V_{(BR)R}$	I_D = 100 μA	40	55	80	V
Temperature Coefficient of Reverse Breakdown Voltage	δ *1			0.2		%/°C
Dark Current	I_D	$V_R = V_{(BR)R} \times 0.9$		5	50	nA
Receiver Sensitivity	$\overline{P}$	2.488 Gb/s, NRZ, PN 2^{15}–1,		–33	–31	dBm
Dynamic Range	D_r	BER = 10^{-11}, Mark: 1/2 , λ = 1 310 nm	21	24		dB
Quantum Efficiency	η	λ = 1 310 nm	70	85		%
		λ = 1 550 nm		80		
★ Responsivity	S	λ = 1 310 nm, M = 1	0.73	0.89		A/W
		λ = 1 550 nm, M = 1		1.0		
Cut-off Frequency	f_C	M = 10, 3 dB down	2.5	4.0		GHz
Equivalent Input Noise Current	I_n	f = 2.5 GHz		9		pA/$\sqrt{Hz}$
Supply Voltage	V_{CC}			–5.2		V
Supply Current	I_{CC}	V_{CC} = –5.2 V		23		mA
Transimpedance	Z_t			300		Ω
Output Impedance	Z_{out}			50		Ω

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

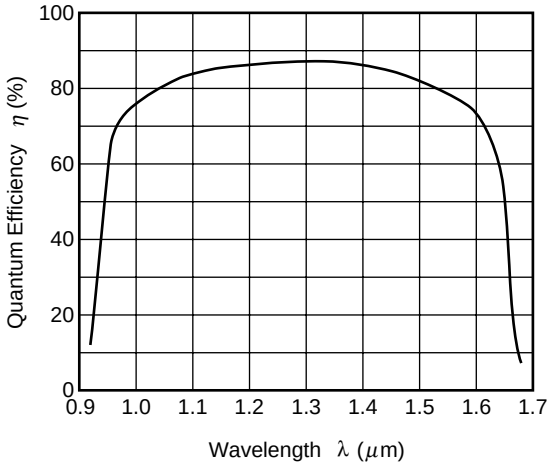
RECOMMENDED EXTERNAL CIRCUIT



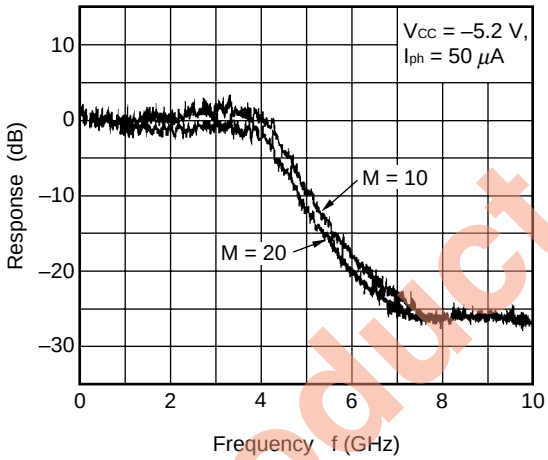
***1** If you amplifier input impedance is 50 Ω, the position 50 Ω resister is not necessary. Lead length should be as short as possible.

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

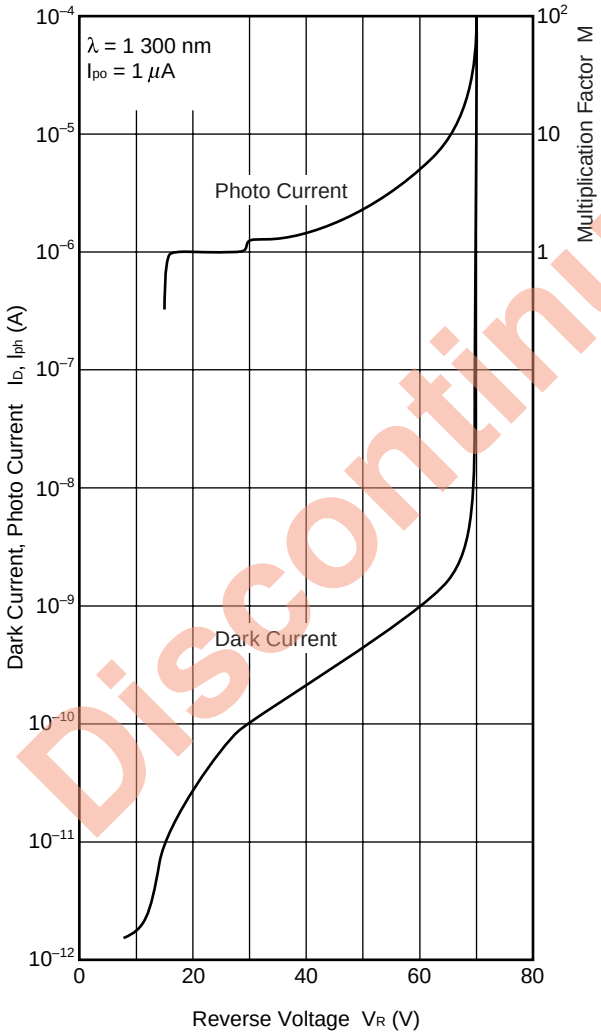
WAVELENGTH DEPENDENCE OF QUANTUM EFFICIENCY



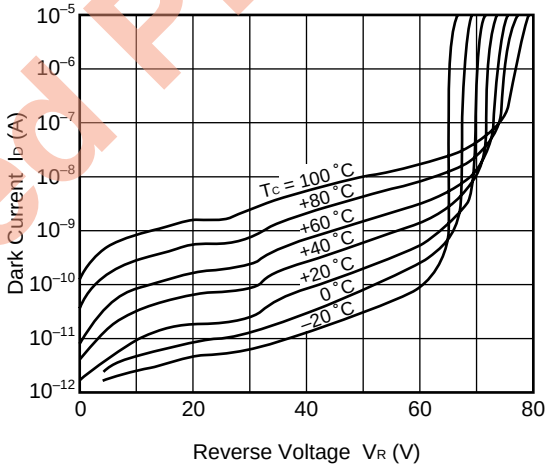
FREQUENCY RESPONSE



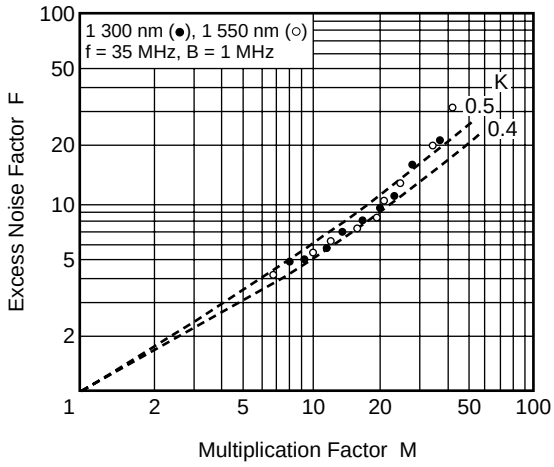
DARK CURRENT and PHOTO CURRENT vs. REVERSE VOLTAGE



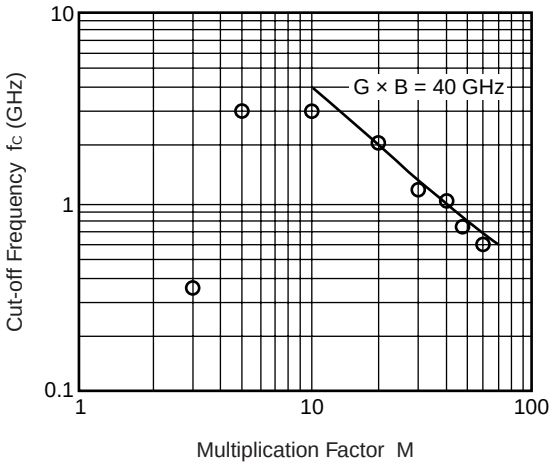
DARK CURRENT vs. REVERSE VOLTAGE



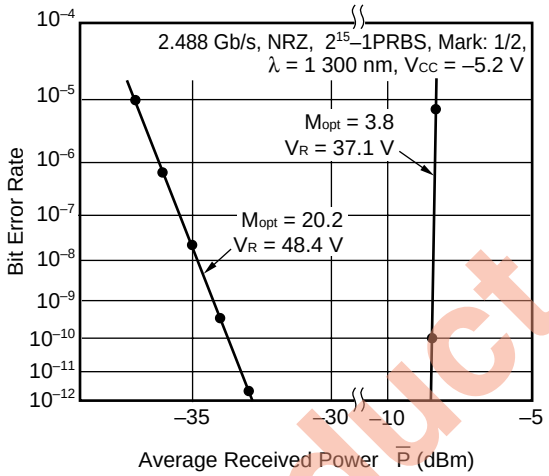
EXCESS NOISE FACTOR vs. MULTIPLICATION FACTOR



CUT-OFF FREQUENCY vs.
MULTIPLICATION FACTOR



ERROR RATE CHARACTERISTICS

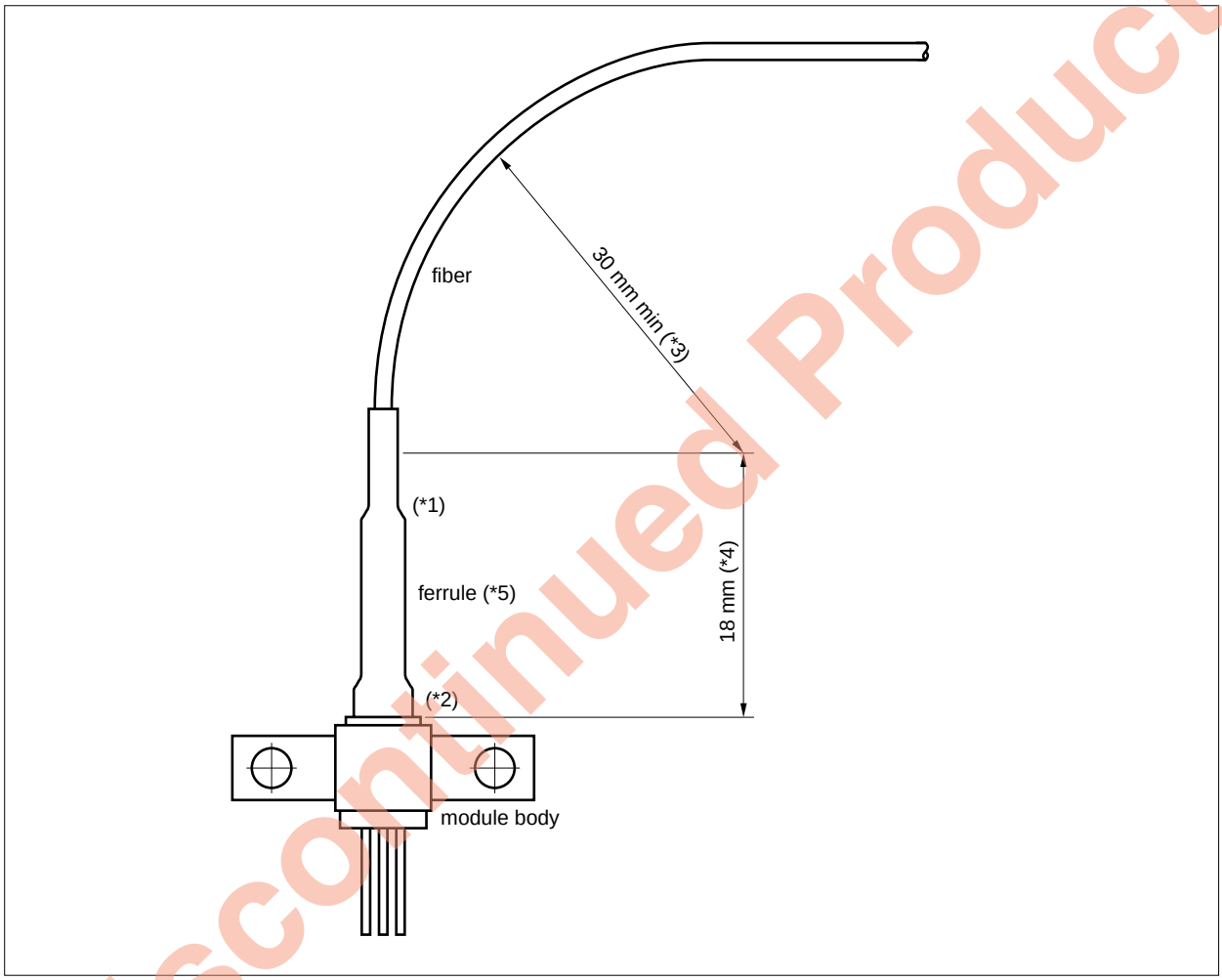


Remark The graphs indicate nominal characteristics.

★ 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
	ϕ 30 μm (for 2.5 Gb/s)	ϕ 50 μm (for 2.5 Gb/s)	ϕ 50 μm	ϕ 80 μm	ϕ 50 μm (for 2.5 Gb/s)	ϕ 80 μm	ϕ 120 μm	
TO-18 type CAN	NDL5530	–	NDL5500	NDL5510	–	–	–	3 pins
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 NDL5592P NDL5592P1 NDL5592P2	–	NDL5553PS[*1] NDL5553P1S[*1] NDL5553P2S[*1]	–	–	NDL5481P[*3] NDL5481P1[*3] NDL5481P2[*3]	–	P1, P2: With flange NDL5592P Series: With Pre-AMP
14-pin DIP Module with TEC	–	–	NDL5506P NDL5506PS	NDL5516P NDL5516PC	–	–	–	ΔT = 45 K (@ I_C = 1.1 A) PS: With SMF
6-pin BFY Module with MMF	–	NDL5522P	–	–	NDL5422P	–	–	With Pre-AMP
8-pin Mini-DIL with SMF	–	–	–	–	–	–	NDL8800P	

***1** For OTDR

***2** With GI-62.5/125

***3** For analog application (optical CATV)

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

REFERENCE

Document Name	Document No.
NEC semiconductor device reliability/quality control system	C11159E
Quality grades on NEC semiconductor devices	C11531E
Semiconductor device mounting technology manual	C10535E
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.

The export of this product from Japan is prohibited without governmental license. To export or re-export this product from a country other than Japan may also be prohibited without a license from that country. Please call an NEC sales representative.

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