

To our customers,

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## Old Company Name in Catalogs and Other Documents

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Renesas Electronics website: <http://www.renesas.com>

April 1<sup>st</sup>, 2010  
Renesas Electronics Corporation

Issued by: Renesas Electronics Corporation (<http://www.renesas.com>)

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### 1 300 nm OPTICAL FIBER COMMUNICATIONS

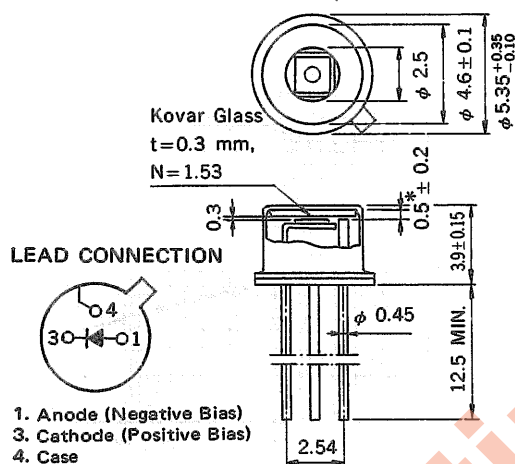
### $\phi$ 100 $\mu$ m GERMANIUM AVALANCHE PHOTO DIODE

#### DESCRIPTION

NDL5100 is a Germanium Avalanche Photo diode especially designed for a detector of long wavelength fiber transmission systems. It features small dark current and high response speed.

#### PACKAGE DIMENSIONS

in millimeters



#### FEATURES

- Small dark current.  $I_D = 0.2 \mu A$
- High sensitivity.  $\eta = 75 \% @ 1300 \text{ nm}$
- Short optical length.
- Hermetically sealed package.
- Detecting area size.  $\phi$  100  $\mu$ m

#### ABSOLUTE MAXIMUM RATINGS ( $T_a = 25^\circ \text{C}$ )

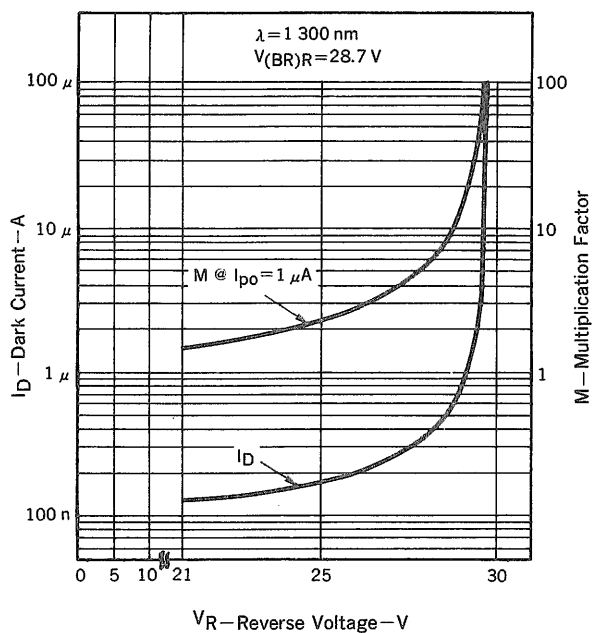
Forward Current	$I_F$	50	mA
Reverse Current	$I_R$	0.5	mA
Operating Case Temperature	$T_C$	-40 to +60	$^\circ \text{C}$
Storage Temperature	$T_{stg}$	-55 to +125	$^\circ \text{C}$

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

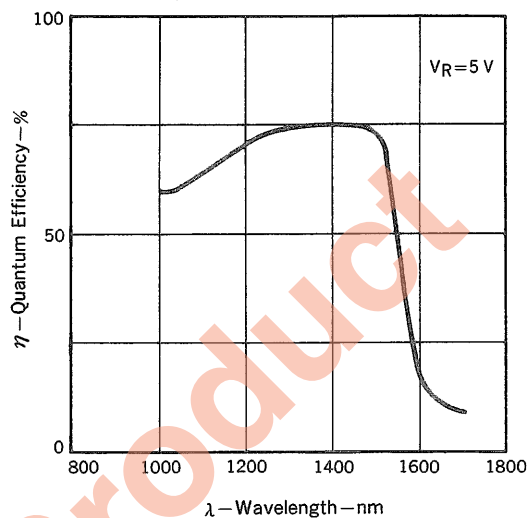
CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Reverse Breakdown Voltage	$V_{(BR)R}$	25		48	V	$I_D = 100 \mu A$
Dark Current	$I_D$		0.2	0.5	$\mu A$	$V_R = V_{(BR)R} \times 0.9$
Terminal Capacitance	$C_t$		2.0	3.0	pF	$V_R = 20 \text{ V}, f = 1.0 \text{ MHz}$
Quantum Efficiency	$\eta$	70	75		%	$\lambda = 1300 \text{ nm}$
Sensitivity	$S$	0.73	0.78		A/W	$\lambda = 1300 \text{ nm}$
Multiplication Factor	$M$	20	40			$\lambda = 1300 \text{ nm}, R_L = 100 \Omega$ $I_{po} = 1.0 \mu A, V_R = V (I_D = 10 \mu A)$
Rise Time	$t_r$		0.5	0.8	ns	$\lambda = 1300 \text{ nm}, M = 10$ $R_L = 50 \Omega, I_{po} = 10 \mu A, 10-90 \%$
Fall Time	$t_f$		0.5	0.8	ns	$\lambda = 1300 \text{ nm}, M = 10$ $R_L = 50 \Omega, I_{po} = 10 \mu A, 90-10 \%$
Excess Noise Factor	$x$		0.95			$\lambda = 1300 \text{ nm}, M = 10, I_{po} = 1.0 \mu A$ $f = 30 \text{ MHz}, B = 1.0 \text{ MHz}$

TYPICAL CHARACTERISTICS ( $T_a = 25^\circ\text{C}$ )

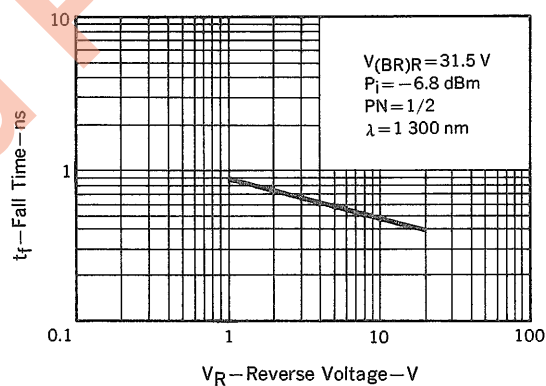
DARK CURRENT, MULTIPLICATION FACTOR vs. REVERSE VOLTAGE



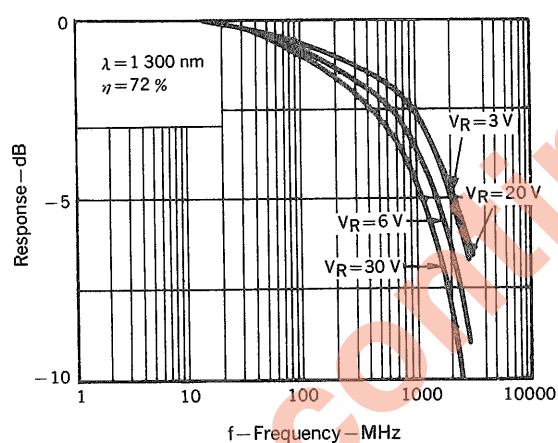
QUANTUM EFFICIENCY vs. WAVELENGTH



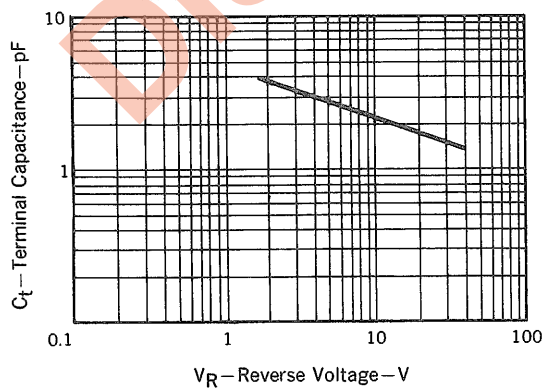
FALL TIME vs. REVERSE VOLTAGE



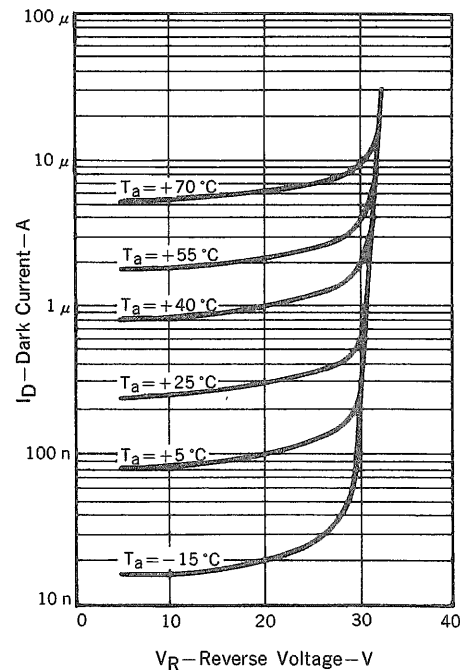
FREQUENCY RESPONSE



TERMINAL CAPACITANCE vs. REVERSE VOLTAGE



DARK CURRENT vs. REVERSE VOLTAGE



## Ge APD/PD FAMILY

FEATURES		APD		PIN-PD	REMARKS	
		$\phi$ 100 $\mu\text{m}$	$\phi$ 30 $\mu\text{m}$	$\phi$ 240 $\mu\text{m}$		
PACKAGES						
TO-18 TYPE CAN		NDL5100	NDL5102	NDL5200		
CHIP ON CARRIER		NDL5100C	NDL5102C	—		
COAXIAL MODULE WITH MULTI MODE FIBER (MMF)		NDL5100P*	—	—		
COAXIAL MODULE WITH SINGLE MODE FIBER (SMF)		—	NDL5102P*	—		
MAIN CHARACTERISTICS ( $T_a = 25^\circ\text{C}$ )					UNIT	CONDITIONS
BREAKDOWN VOLTAGE	$V_{(BR)R}$	29	35	—	V	$I_D = 100 \mu\text{A}$
QUANTUM EFFICIENCY	$\eta$	75	75	75	%	$\lambda = 1300 \text{ nm}$
DARK CURRENT	$I_D$	200	80	500	nA	$V = V_{op}$
RISE TIME	$t_r$	0.5	0.3	3	ns	10–90 %
FALL TIME	$t_f$	0.5	0.3	5	ns	90–10 %

\* A module with flange is also available.

[MEMO]

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