

To our customers,

Old Company Name in Catalogs and Other Documents

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

April 1st, 2010
Renesas Electronics Corporation

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

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PHOTO DIODE
NDL5405RA1, NDL5405RA2, NDL5405RA3

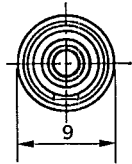
1 000 to 1 600 nm OPTICAL FIBER COMMUNICATIONS
φ 80 μm InGaAs PIN PHOTO DIODE RECEPTACLE MODULE

DESCRIPTION

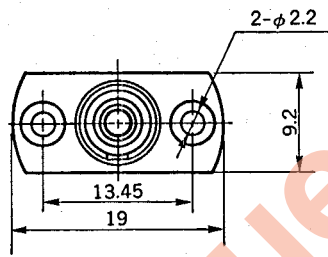
NDL5405RA1, NDL5405RA2, and NDL5405RA3 are InGaAs PIN Photo Diode receptacle module for FC-connector. They are designed for detectors of high-speed (up to 1.2 Gb/s) long-distance optical fiber communications systems. In addition, it incorporates microlens and YAG laser welding technique is utilized. This lens coupling system can achieve stable optical coupling over wide operating temperature range (-40 to +85 °C).

PACKAGE DIMENSIONS
in millimeters

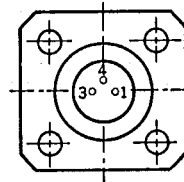
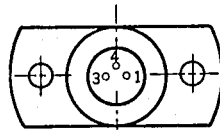
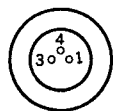
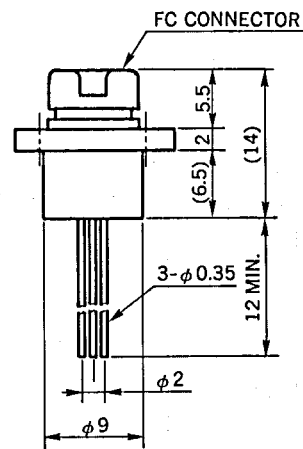
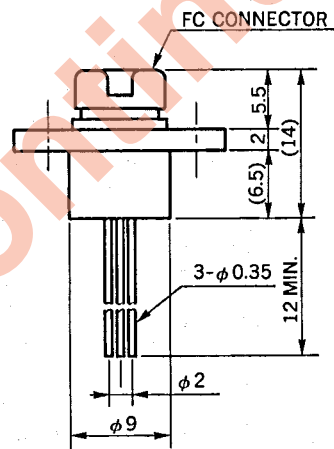
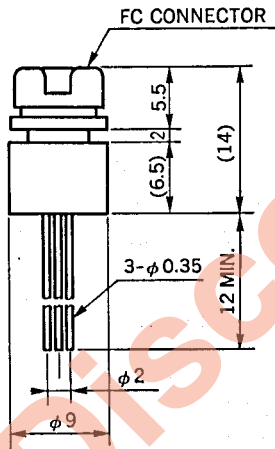
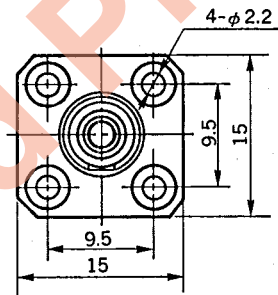
NDL5405RA1



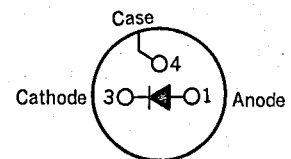
NDL5405RA2



NDL5405RA3



BOTTOM VIEW



FEATURES

- Receptacle module for FC-connector.
- Three flange variations.
 - NDL5405RA1: Without flange
 - NDL5405RA2: With oblong flange
 - NDL5405RA3: With square flange
- High sensitivity. $S = 0.73 \text{ A/W MIN.}$
- Small dark current. $I_D = 0.1 \text{ nA}$
- High speed response. $t_r, t_f = 0.3 \text{ ns}$
- Low operating voltage. $V_R = 5 \text{ V}$
- Detecting area size. $\phi 80 \mu\text{m}$

QUALITY GRADE

Part Number	Quality Grade
NDL5405RA1	Standard
NDL5405RA2	Standard
NDL5405RA3	Standard

Please refer to "Quality grade on NEC Semiconductor Devices" (Document number IEI-1209) published by NEC Corporation to know the specification of quality grade on the devices and its recommended applications.

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

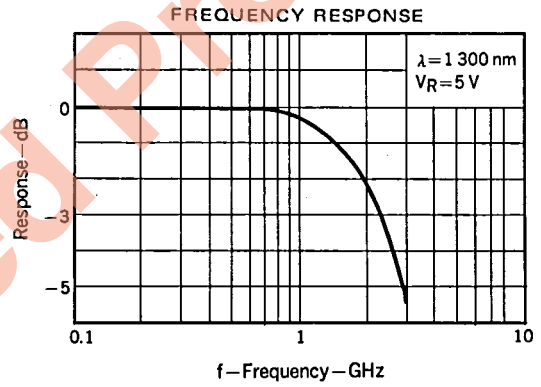
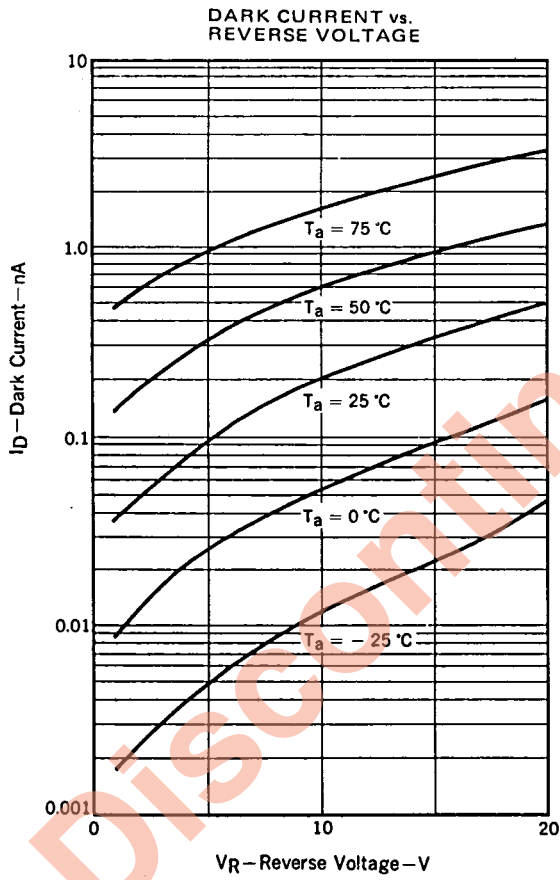
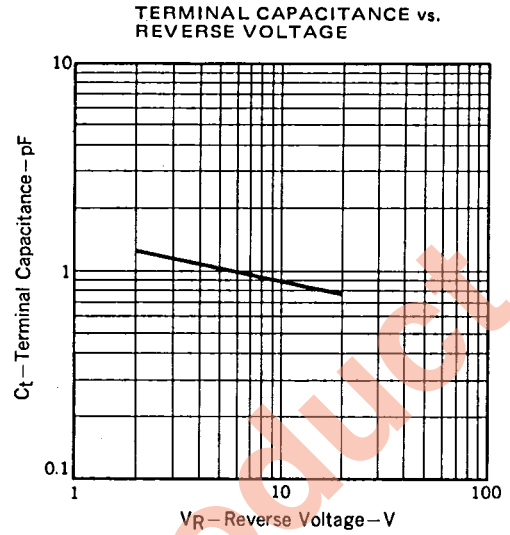
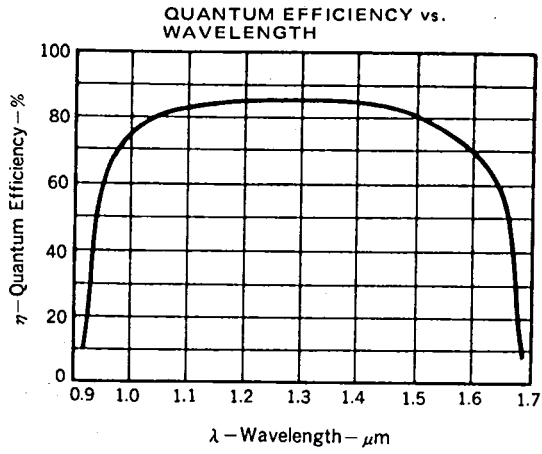
Reverse Voltage	V_R	20	V
Forward Current	I_F	10	mA
Reverse Current	I_R	0.5	mA
Operating Case Temperature	T_C	-40 to +85	$^\circ\text{C}$
Storage Temperature	T_{stg}	-40 to +90	$^\circ\text{C}$

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

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Dark Current	I_D		0.1	5.0	nA	$V_R = 5 \text{ V}$
Terminal Capacitance	C_t		1.0	1.5	pF	$V_R = 5 \text{ V}, f = 1.0 \text{ MHz}$
Quantum Efficiency	η	70	85		%	$\lambda = 1310 \text{ nm}$
			80			$\lambda = 1550 \text{ nm}$
Sensitivity	S	0.73	0.89		A/W	$\lambda = 1310 \text{ nm}$
			1.00			$\lambda = 1550 \text{ nm}$
Rise, Fall Time	t_r, t_f		0.3	1.0	ns	$V_R = 5 \text{ V}, \lambda = 1310 \text{ nm}, R_L = 50 \Omega, 10 - 90 \%$

NOTE: NDL5405RA series are available for both singlemode fiber and multimode fiber (GI-50/125).
 Repeatability = $\pm 5 \%$ MAX. @ 500-time plug in and off.

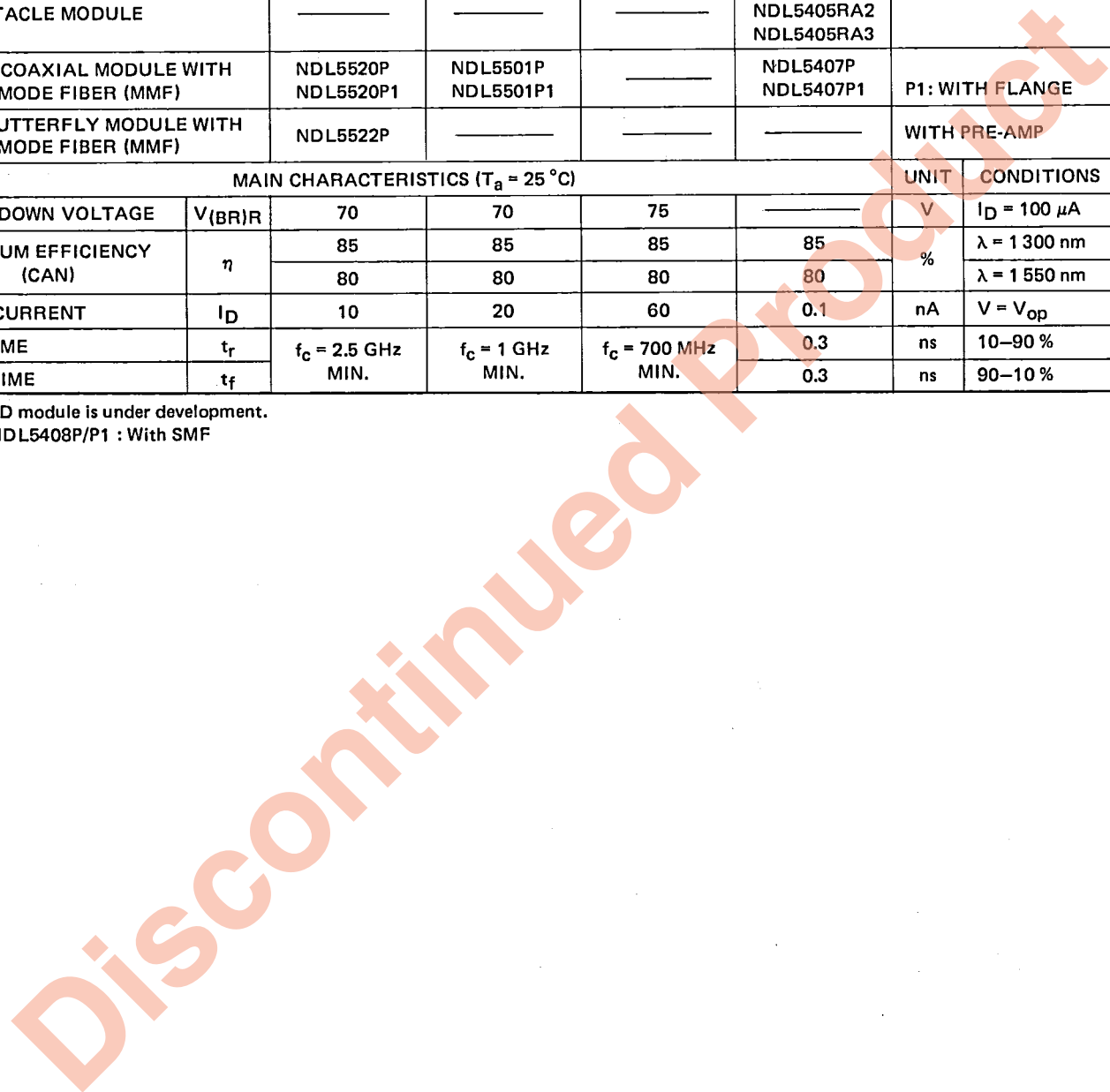
TYPICAL CHARACTERISTICS ($T_a = 25^\circ\text{C}$)



InGaAs APD/PD FAMILY

FEATURES		APD			PIN-PD	REMARKS	
		ϕ 50 μ m	ϕ 50 μ m	ϕ 80 μ m	ϕ 80 μ m		
PACKAGES							
TO-18 TYPE CAN			NDL5500	NDL5510	NDL5405	3PIN	
CHIP ON CARRIER		NDL5520C	NDL5500C	NDL5510C	NDL5405C		
TO-18 TYPE CAN WITH MICRO LENS		_____	_____	_____	NDL5405L	3PIN	
RECEPTACLE MODULE		_____	_____	_____	NDL5405RA1 NDL5405RA2 NDL5405RA3		
SMALL COAXIAL MODULE WITH MULTI-MODE FIBER (MMF)		NDL5520P NDL5520P1	NDL5501P NDL5501P1	_____	NDL5407P NDL5407P1	P1: WITH FLANGE	
6-PIN BUTTERFLY MODULE WITH MULTI-MODE FIBER (MMF)		NDL5522P	_____	_____	_____	WITH PRE-AMP	
MAIN CHARACTERISTICS ($T_a = 25^\circ\text{C}$)						UNIT	CONDITIONS
BREAKDOWN VOLTAGE	$V_{(BR)R}$	70	70	75	_____	V	$I_D = 100 \mu\text{A}$
QUANTUM EFFICIENCY (CAN)	η	85	85	85	85	%	$\lambda = 1300 \text{ nm}$
		80	80	80	80		$\lambda = 1550 \text{ nm}$
DARK CURRENT	I_D	10	20	60	0.1	nA	$V = V_{op}$
RISE TIME	t_r	$f_c = 2.5 \text{ GHz}$ MIN.	$f_c = 1 \text{ GHz}$ MIN.	$f_c = 700 \text{ MHz}$ MIN.	0.3	ns	10-90 %
FALL TIME	t_f				0.3	ns	90-10 %

InGaAs PD module is under development.
NDL5408P/P1 : With SMF



Discontinued Product

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Application examples recommended by NEC Corporation

Standard: Data processing and office equipment, Communication equipment (terminal, mobile), Test and Measurement equipment, Audio and Video equipment, Other consumer products, etc.

Special: Automotive and Transportation equipment, Communication equipment (trunk line), Train and Traffic control devices, industrial robots, Burning control systems, antidisaster systems, anticrime systems etc.