

To our customers,

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## Old Company Name in Catalogs and Other Documents

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On April 1<sup>st</sup>, 2010, NEC Electronics Corporation merged with Renesas Technology Corporation, and Renesas Electronics Corporation took over all the business of both companies. Therefore, although the old company name remains in this document, it is a valid Renesas Electronics document. We appreciate your understanding.

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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# NDL7603P Series

## 1 310 nm OPTICAL FIBER COMMUNICATIONS InGaAsP MQW-DFB LASER DIODE COAXIAL MODULE

### DESCRIPTION

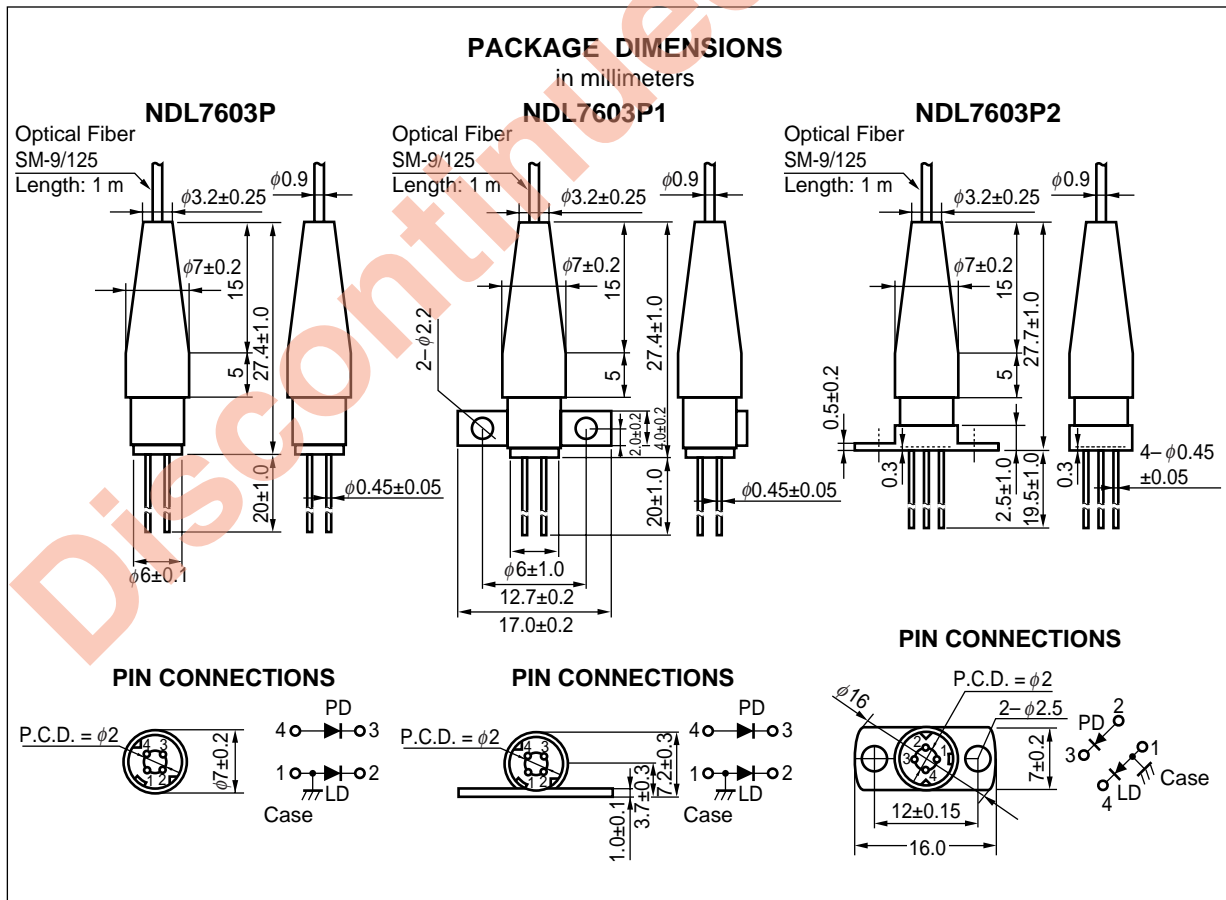
The NDL7603P Series is a 1 310 nm phase-shifted DFB (Distributed Feed-Back) laser diode module with single mode fiber. The Multiple Quantum Well (MQW) structure is adopted to achieve stable dynamic single longitudinal mode operation over wide temperature range of  $-40$  to  $+85$  °C.

It is designed for all STM-1 and STM-4 applications.

### FEATURES

- Peak emission wavelength  $\lambda_p = 1\ 310$  nm
- Optical output power  $P_r = 2.0$  mW
- Wide operating temperature range  $T_c = -40$  to  $+85$  °C
- $\lambda/4$ -phase-shifted DFB
- Side Mode Suppression Ratio SMSR = 35 dB MIN.
- InGaAs monitor PIN-PD

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

**ORDERING INFORMATION**

Part Number	Available Connector	Flange Type
NDL7603P	Without Connector	No flange
NDL7603PC	With FC-PC Connector	
NDL7603PD	With SC-PC Connector	
NDL7603P1	Without Connector	Flat Mount Flange
NDL7603P1C	With FC-PC Connector	
NDL7603P1D	With SC-PC Connector	
NDL7603P2	Without Connector	Vertical Mount Flange
NDL7603P2C	With FC-PC Connector	
NDL7603P2D	With SC-PC Connector	

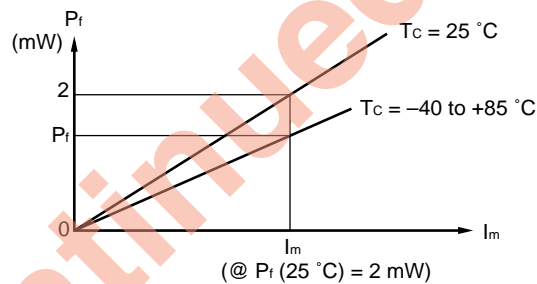
**ABSOLUTE MAXIMUM RATINGS (T<sub>c</sub> = 25 °C, unless otherwise specified)**

Parameter	Symbol	Ratings	Unit
Optical Output Power from Fiber	P <sub>f</sub>	5	mW
Forward Current of LD	I <sub>F</sub>	150	mA
Reverse Voltage of LD	V <sub>R</sub>	2	V
Forward Current of PD	I <sub>F</sub>	2	mA
Reverse Voltage of PD	V <sub>R</sub>	15	V
Operating Case Temperature	T <sub>c</sub>	-40 to +85	°C
Storage Temperature	T <sub>stg</sub>	-40 to +85	°C
Lead Soldering Temperature (10 s)	T <sub>slid</sub>	260	°C

ELECTRO-OPTICAL CHARACTERISTICS (T<sub>c</sub> = -40 to +85 °C, unless otherwise specified)

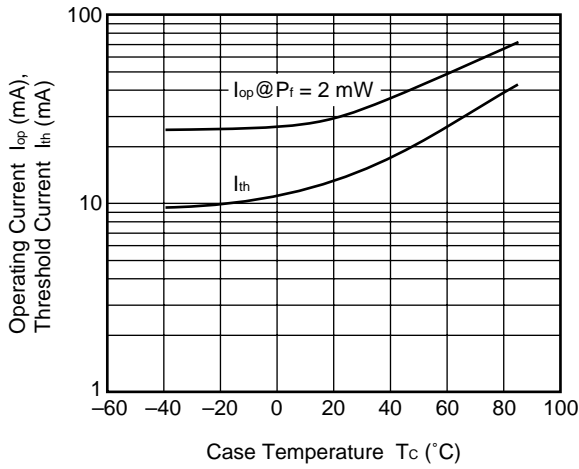
Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Forward Voltage	V <sub>F</sub>	I <sub>F</sub> = 30 mA	0.9		1.3	V
Threshold Current	I <sub>th</sub>	T <sub>c</sub> = 25 °C		15		mA
		T <sub>c</sub> = 85 °C		40	50	
Differential Efficiency form Fiber	η <sub>d</sub>	T <sub>c</sub> = 25 °C	0.070	0.120		W/A
		T <sub>c</sub> = 85 °C	0.035	0.070		
Temperature Dependence of Differential Efficiency from Fiber	Δη <sub>d</sub>	Δη <sub>d</sub> = 10 log $\frac{\eta_d(85\text{ °C})}{\eta_d(25\text{ °C})}$	-3	-2.5		dB
Peak Emission Wavelength	λ <sub>p</sub>	P <sub>f</sub> = 1 mW	1 290	1 310	1 330	nm
Side Mode Suppression Ratio	SMSR	P <sub>f</sub> = 1 mW	35			dB
Rise Time	t <sub>r</sub>	I <sub>b</sub> = 0.9 × I <sub>th</sub>			0.5	ns
Fall Time	t <sub>f</sub>	I <sub>b</sub> = 0.9 × I <sub>th</sub>			0.5	ns
Monitor Current	I <sub>m</sub>	V <sub>R</sub> = 5 V, P <sub>f</sub> = 2 mW	300		2 500	μA
Monitor Dark Current	I <sub>D</sub>	V <sub>R</sub> = 5 V, T <sub>c</sub> = 25 °C		0.1	5	nA
Tracking Error	γ <sup>-1</sup>	I <sub>m</sub> = const. (P <sub>f</sub> = 2 mW, T <sub>c</sub> = 25 °C)			1.0	dB
★ Relative Intensity Noise	RIN	Ref = -14 dB, P <sub>f</sub> = 1 mW, polarization worst case		-115		dB/Hz

\*1  $\gamma = \left| 10 \log \frac{P_f}{2.0 \text{ mW}} \right|$

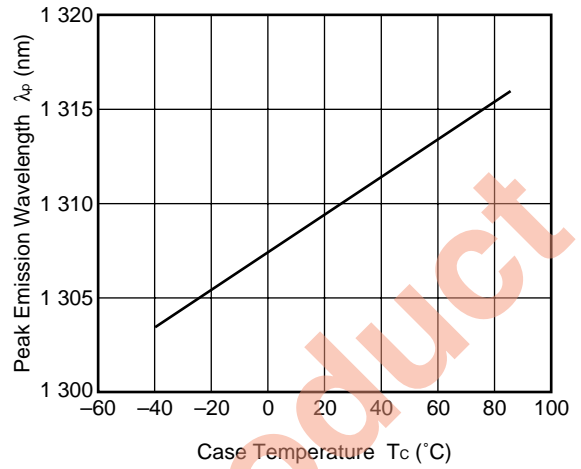


TYPICAL CHARACTERISTICS ( $T_c = 25\text{ }^\circ\text{C}$ , unless otherwise specified)

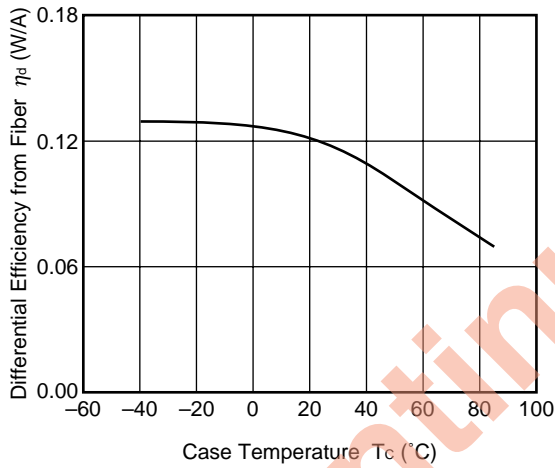
OPERATING CURRENT AND THRESHOLD CURRENT vs. CASE TEMPERATURE



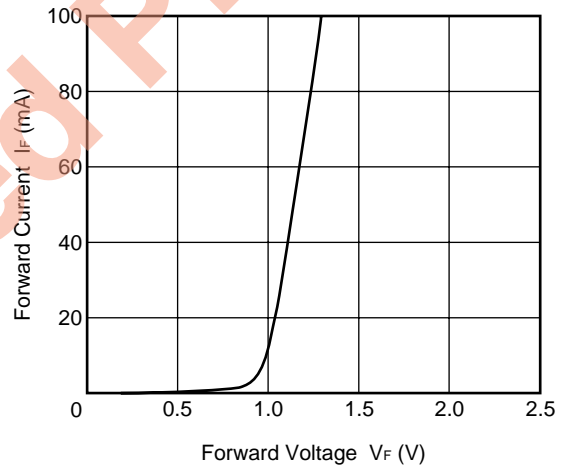
TEMPERATURE DEPENDENCE OF PEAK EMISSION WAVELENGTH



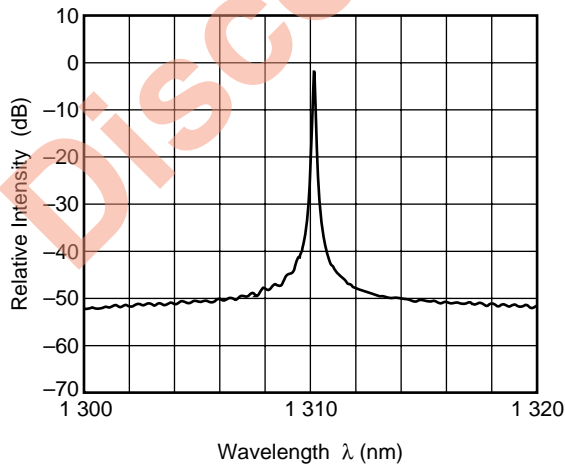
TEMPERATURE DEPENDENCE OF DIFFERENTIAL EFFICIENCY FROM FIBER



FORWARD CURRENT vs. FORWARD VOLTAGE



LONGITUDINAL MODE FROM FIBER



**Remark** The graphs indicate nominal characteristics.

★ DFB-LD FAMILY FOR TELECOM

Part Number	Absolute Maximum Ratings		Typical Characteristics			SDH Application	Package
	T <sub>c</sub> (°C)	T <sub>stg</sub> (°C)	I <sub>th</sub> (mA)	P <sub>r</sub> (mW)	λ <sub>c</sub> (nm)		
			TYP.	MIN.	TYP.		
NDL7603P Series	-40 to +85	-40 to +85	15	2	1 310	≤ STM-4 : 622 Mb/s	Coaxial
NDL7620P Series	0 to +70	-40 to +85	45 (MAX.)	2	1 310	≤ STM-16: 2.5 Gb/s	Coaxial
NDL7701P Series	-20 to +85	-40 to +85	15	2	1 550	≤ STM-4 : 622 Mb/s	Coaxial
NDL7705P Series	-40 to +85	-40 to +85	15	2	1 550	≤ STM-4 : 622 Mb/s	Coaxial
NDL7910P	-20 to +70	-40 to +85	7	0.5	1 550 <sup>*1</sup>	≤ STM-16: 2.5 Gb/s EA modulator integrate DFB-LD	BFY
NX8562LB	-20 to +65	-40 to +85	20	15	1 550	CW Light Source for external modulator	BFY
NX8563LB	-20 to +65	-40 to +85	20	10	ITU-T <sup>*2</sup>	CW Light Source for external modulator	BFY

\*1 Wavelength selectable for ITU-T standards upon request

\*2 Wavelength selectable for ITU-T standards

Discontinued Product

**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

Discontinued Product

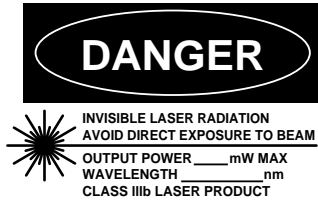


[MEMO]

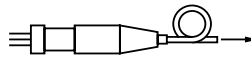
**Discontinued Product**

**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.**



**SEMICONDUCTOR LASER**



**AVOID EXPOSURE-Invisible Laser Radiation is emitted from this aperture**

**NEC Corporation**

NEC Building, 7-1, Shiba 5-chome, Minato-ku, Tokyo 108-01, Japan

Type number: \_\_\_\_\_

Manufactured: \_\_\_\_\_

Serial Number: \_\_\_\_\_

This product conforms to FDA regulations as applicable to standards 21 CFR Chapter 1. Subchapter J.

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NEC devices are classified into the following three quality grades:

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**Standard:** Computers, office equipment, communications equipment, test and measurement equipment, audio and visual equipment, home electronic appliances, machine tools, personal electronic equipment and industrial robots

**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.

The quality grade of NEC devices is "Standard" unless otherwise specified in NEC's Data Sheets or Data Books. If customers intend to use NEC devices for applications other than those specified for Standard quality grade, they should contact an NEC sales representative in advance.

Anti-radioactive design is not implemented in this product.