To our customers,

Old Company Name in Catalogs and Other Documents

On April 1st, 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 1st, 2010
Renesas Electronics Corporation

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

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DATA SHEET

Phase-out/Discontinued

LASER DIODE

NX5304 Series

1 310 nm FOR 156 Mb/s, 622 Mb/s, 1.25 Gb/s InGaAsP MQW-FP LASER DIODE

DESCRIPTION

The NX5304 Series is a 1 310 nm Multiple Quantum Well (MQW) structured Fabry-Perot (FP) laser diodes with InGaAs monitor PIN-PD. These devices are designed for 156 Mb/s: STM-1 (I-1, S-1.1, L-1.1), 622 Mb/s: STM-4 (I-4, S-4.1), Gigabit Ethernet application and ideal for Synchronous Digital Hierarchy (SDH) system.

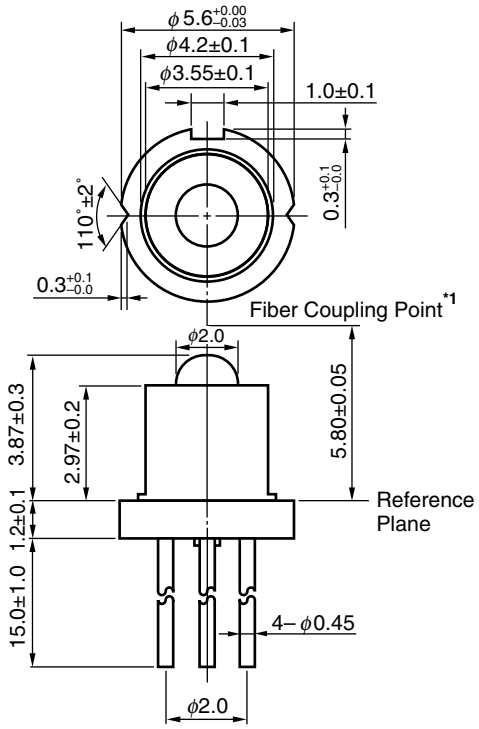
FEATURES

- Optical output power P_o = 5.0 mW
- Low threshold current I_{th} = 10 mA
- High speed t_r = 0.3 ns MAX.
  t_f = 0.3 ns MAX.
- Wide operating temperature range T_C = –40 to +85°C
- InGaAs monitor PIN-PD
- CAN package ϕ5.6 mm
- Fiber coupling point 5.8 mm
- Based on Telcordia reliability

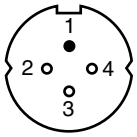
Document No. PL10429EJ02V0DS (2nd edition)
Date Published December 2003 CP(K)
Printed in Japan

The mark ★ shows major revised points.

PACKAGE DIMENSIONS (UNIT: mm)

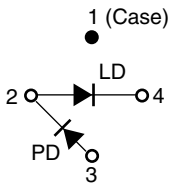


BOTTOM VIEW

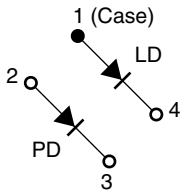


PIN CONNECTIONS

NX5304EH

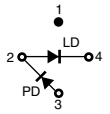
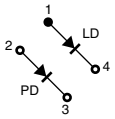


NX5304EK



***1** Recommendation of Fiber Coupling Conditions
Fiber : SMF with 8 degree angle-polished ferrule
Fiber coupling distance : 5.80±0.05 mm from reference plane.
Fiber coupling alignment : optimixed x, y, θ (Δx, Δy $\leq$ ±300 μm).

ORDERING INFORMATION

Part Number	Package	Pin Connections
NX5304EH	4-pin CAN with ball lens cap	
NX5304EK		

Remarks 1. The color of ball lens cap might be observed differently from our can package products.

2. The hermetic test will be performed as AQL 1.0%.

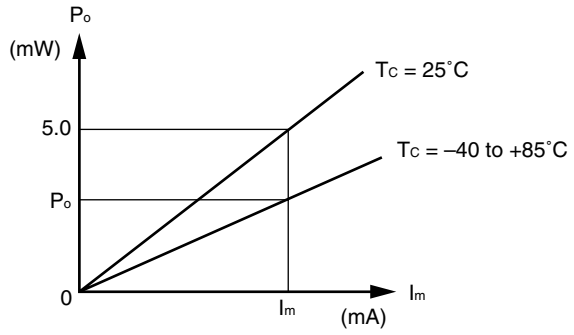
ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Ratings	Unit
Optical Output Power	P_o	10	mW
Forward Current of LD	I_F	150	mA
Reverse Voltage of LD	V_R	2.0	V
Forward Current of PD	I_F	10	mA
Reverse Voltage of PD	V_R	20	V
Operating Case Temperature	T_C	–40 to +85	°C
Storage Temperature	T_{stg}	–40 to +85	°C
Assembly Temperature	T_{asb}	150 (15 Hr)	°C
Lead Soldering Temperature	T_{sld}	350 (3 sec.)	°C
Relative Humidity (noncondensing)	RH	85	%

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

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Operating Voltage	V_{op}	P_o = 5.0 mW, T_C = –40 to +85°C		1.1	1.5	V
Threshold Current	I_{th}			10	15	mA
		T_C = 85°C		25	30	
Threshold Output Power	P_{th}	T_C = –40 to +85°C, $I_F = I_{th}$		100	200	μW
Differential Efficiency	η_d		0.32	0.4		W/A
Temperature Dependence of Differential Efficiency	$\Delta\eta_d$	$\Delta\eta_d = 10 \log \frac{\eta_d\ (@\ 85°C)}{\eta_d\ (@\ 25°C)}$	–3.0	–1.2		dB
Center Wavelength	λ_C	P_o = 5.0 mW, RMS (–20 dB) T_C = –40 to +85°C	1 263		1 360	nm
Temperature Dependence of Center Wavelength	$\Delta\lambda/\Delta T$	T_C = –40 to +85°C		0.4	0.5	nm/°C
Spectral Width	σ	P_o = 5.0 mW, RMS (–20 dB) T_C = –40 to +85°C		1.0	2.5	nm
Rise Time	t_r	10-90%		0.15	0.3	ns
Fall Time	t_f	90-10%		0.15	0.3	ns
Monitor Current	I_m	V_R = 5 V, P_o = 5.0 mW	200	500	800	μA
Monitor Dark Current	I_D	V_R = 5 V		0.1	10	nA
		V_R = 5 V, T_C = –40 to +85°C			500	
Monitor PD Terminal Capacitance	C_t	V_R = 5 V, f = 1 MHz		6	20	pF
Tracking Error*1	γ	I_m = const. (@ P_o = 5.0 mW, T_C = 25°C) T_C = –40 to +85°C	–1.0		1.0	dB

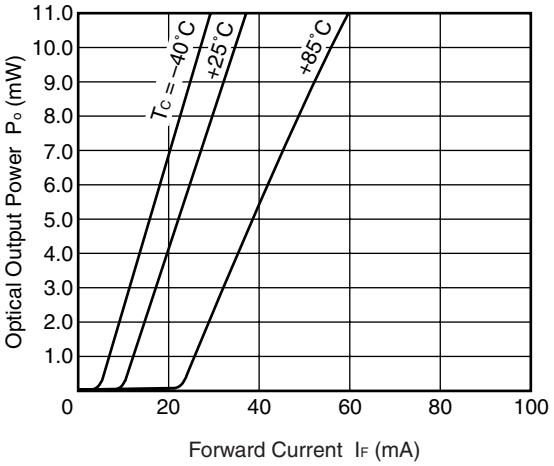
***1** Tracking Error: γ



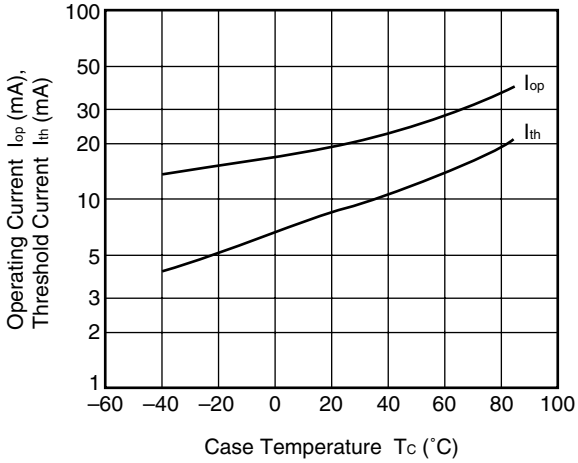
$$\gamma = \left| 10 \log \frac{P_o}{5.0} \right| [dB]$$

★ **TYPICAL CHARACTERISTICS (T_C = –40 to +85°C, unless otherwise specified)**

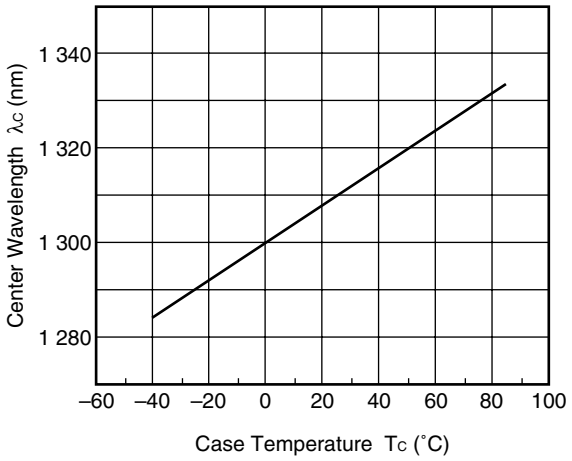
OPTICAL OUTPUT POWER vs. FORWARD CURRENT



OPERATING CURRENT AND THRESHOLD CURRENT vs. CASE TEMPERATURE



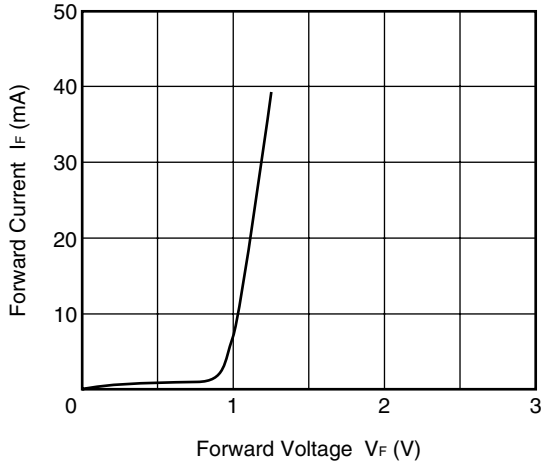
TEMPERATURE DEPENDENCE OF CENTER WAVELENGTH



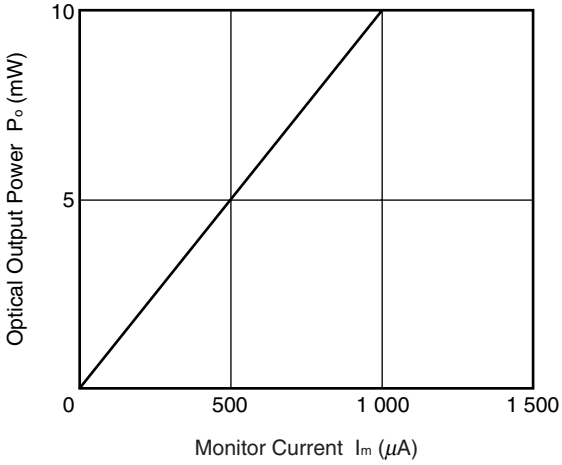
Remark The graphs indicate nominal characteristics.

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

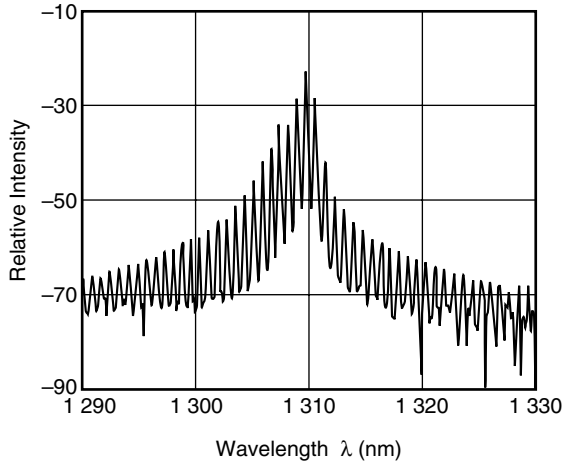
FORWARD CURRENT vs.
FORWARD VOLTAGE



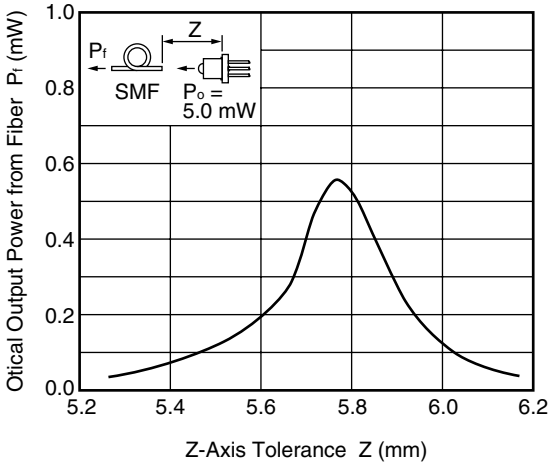
OPTICAL OUTPUT POWER
vs. MONITOR CURRENT



SPECTRUM



TOLERANCE OF FIBER
COUPLING DISTANCE (Z)



Remark The graphs indicate nominal characteristics.

LD CAN PACKAGES FAMILY FOR OPTICAL FIBER COMMUNICATIONS

Part Number	Absolute Maximum Ratings		Electro-Optical Characteristics (T_C = 25°C)				Application	Package
	T_C (°C)	T_{stg} (°C)	I_{th} (mA)	P_o (mW)	λ (nm)			
			TYP.	TYP.	MIN.	MAX.		
NX5304 Series	–40 to +85	–40 to +85	10	5	1 263	1 360	156 Mb/s: STM-1 (I-1, S-1.1, L-1.1)	CAN
							622 Mb/s: STM-4 (I-4, S-4.1)	
							1.25 Gb/s: GbE	
NX5306 Series	–40 to +85	–40 to +85	10	5	1 263	1 360	156 Mb/s: STM-1 (I-1, S-1.1, L-1.1)	CAN
							622 Mb/s: STM-4 (I-4, S-4.1)	
							1.25 Gb/s: GbE	
NX5307 Series	–40 to +85	–40 to +85	10	10	1 266	1 360	2.5 Gb/s: STM-16	CAN
NX5501 Series	–20 to +85	–40 to +85	8	5	1 480	1 580	For FTTH	CAN
NX5504 Series	–20 to +85	–40 to +85	8	5	1 480	1 580	For FTTH	CAN
NX6306 Series	–40 to +85	–40 to +85	10	5	1 280	1 335	156 Mb/s: STM-1 (I-1, S-1.1, L-1.1)	CAN
							622 Mb/s: STM-4 (I-4, S-4.1, L-4.1)	
							1.25 Gb/s: GbE	
NX6307 Series	–20 to +85	–40 to +85	10	7	1 280	1 335	2.5 Gb/s: STM-16 (S-16.1, L-16.1)	CAN
NX6504 Series	–10 to +85	–40 to +85	12	5	1 530	1 570	156 Mb/s: STM-1	CAN
							622 Mb/s: STM-4	
NX6508 Series	0 to +70	–40 to +85	10	5	λ_p–3 *1	λ_p+3 *1	For CWDM	CAN
★ NX6509 Series	–20 to +85	–40 to +85	10	5	1 530	1 570	2.5 Gb/s: STM-16 (L-16.2)	CAN

***1** λ_p = 1 470, 1 490, 1 510, 1 530, 1 550, 1 570, 1 590, 1 610 nm

REFERENCE

Document Name	Document No.
OPTICAL SEMICONDUCTOR DEVICES FOR FIBEROPTIC COMMUNICATIONS SELECTION GUIDE	PL10161E
Opto-Electronics Devices Pamphlet	PX10160E

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M8E 00.4-0110

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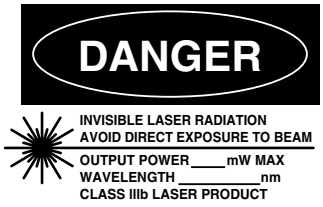
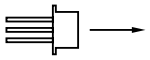


SEMICONDUCTOR LASER



AVOID EXPOSURE-Invisible Laser Radiation is emitted from this aperture

Warning Laser Beam	A laser beam is emitted from this diode during operation. The laser beam, visible or invisible, directly or indirectly, may cause injury to the eye or loss of eyesight. • Do not look directly into the laser beam. • Avoid exposure to the laser beam, any reflected or collimated beam.
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