

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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**Phase-out/Discontinued**

LASER DIODE

# NX6306 Series

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

★ **DESCRIPTION**

The NX6306 Series is a 1 310 nm Multiple Quantum Well (MQW) structured Distributed Feed-Back (DFB) laser diode with InGaAs monitor PIN-PD. This device is ideal for Gigabit Ethernet and Synchronous Digital Hierarchy (SDH) system STM-1 (I-1, S-1.1, L-1.1), STM-4 (I-4, S-4.1, L-4.1), ITU-T recommendations.

**APPLICATION**

- 156 Mb/s : STM-1 (I-1, S-1.1, L-1.1)
- 622 Mb/s : STM-4 (I-4, S-4.1, L-4.1)
- ★ • 1.25 Gb/s : Gigabit Ethernet

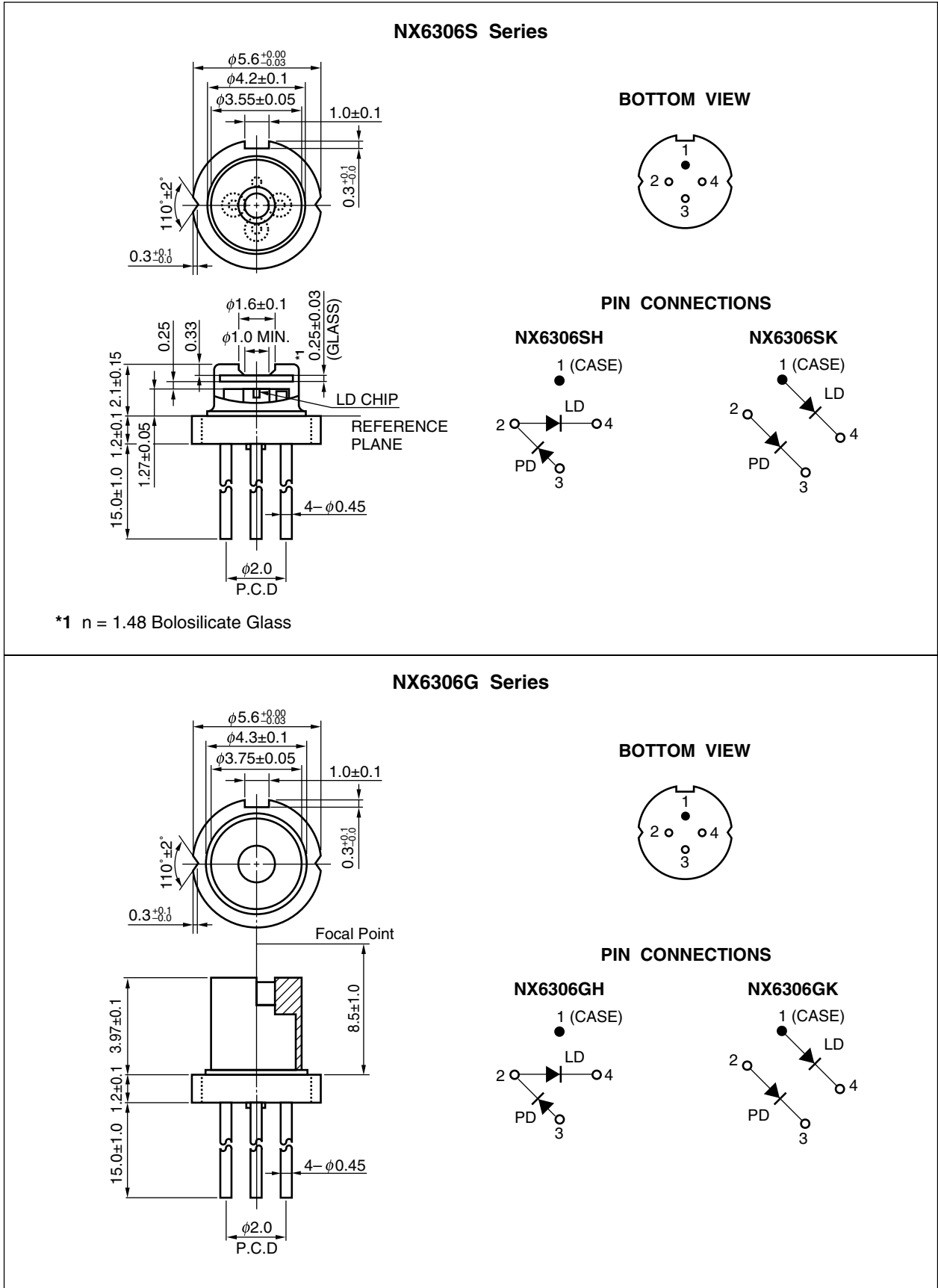
**FEATURES**

- |                                    |  |
|------------------------------------|--|
| • Optical output power             | $P_o = 5.0 \text{ mW}$                             |
| • Low threshold current            | $I_{th} = 10 \text{ mA @ } T_c = 25^\circ\text{C}$ |
| • High speed                       | $t_r, t_f = 0.5 \text{ ns MAX.}$                   |
| • Side mode suppression ratio      | $\text{SWSR} = 45 \text{ dB @ TYP.}$               |
| • Wide operating temperature range | $T_c = -40 \text{ to } +85^\circ\text{C}$          |
| • InGaAs monitor PIN-PD            |  |
| • CAN package                      | $\phi 5.6 \text{ mm}$                              |
| • Based on Telcordia reliability   |  |



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PACKAGE DIMENSIONS (UNIT: mm)



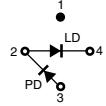
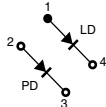
### NX6306G Series

**NX6306GH**

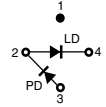
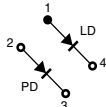
**NX6306GK**

**ORDERING INFORMATION**

**NX6306S Series**

Part Number	Package	Pin Connections
NX6306SH	4-pin CAN with flat glass cap	
NX6306SK		

**NX6306G Series**

Part Number	Package	Pin Connections
NX6306GH	4-pin CAN with aspherical lens cap	
NX6306GK		

**ABSOLUTE MAXIMUM RATINGS**

Parameter	Symbol	Ratings	Unit
Optical Output Power	P <sub>o</sub>	10	mW
Forward Current of LD	I <sub>F</sub>	150	mA
Reverse Voltage of LD	V <sub>R</sub>	2.0	V
Forward Current of PD	I <sub>F</sub>	10	mA
Reverse Voltage of PD	V <sub>R</sub>	20	V
Operating Case Temperature	T <sub>C</sub>	-40 to +85	°C
Storage Temperature	T <sub>stg</sub>	-40 to +85	°C
Assembly Temperature	T <sub>asb</sub>	150 (15 Hr)	°C
Lead Soldering Temperature	T <sub>slid</sub>	350 (3 sec.)	°C
Relative Humidity (noncondensing)	RH	85	%

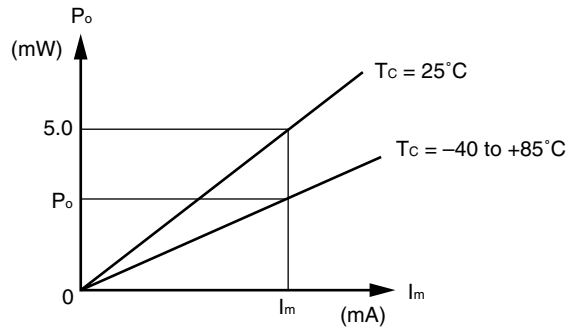
**ELECTRO-OPTICAL CHARACTERISTICS (T<sub>C</sub> = 25°C, unless otherwise specified)**

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Operating Voltage	V <sub>op</sub>	P <sub>o</sub> = 5.0 mW, T <sub>C</sub> = -40 to +85°C		1.1	1.6	V
Threshold Current	I <sub>th</sub>			10	20	mA
		T <sub>C</sub> = 85°C		30	40	
Threshold Output Power	P <sub>th</sub>	T <sub>C</sub> = -40 to +85°C, I <sub>F</sub> = I <sub>th</sub>		100	200	μW
Differential Efficiency	η <sub>d</sub>	(Flat glass type: NX6306S Series)	0.2	0.35		W/A
		(Aspherical lens type: NX6306G Series)	0.2	0.3		W/A
Temperature Dependence of Differential Efficiency	Δη <sub>d</sub>	$\Delta\eta_d = 10 \log \frac{\eta_d (@ 85^\circ\text{C})}{\eta_d (@ 25^\circ\text{C})}$	-3.0	-2.5		dB
Peak Emission Wavelength	λ <sub>p</sub>	P <sub>o</sub> = 5.0 mW, RMS (-20 dB), T <sub>C</sub> = -40 to +85°C	1 280		1 335	nm
Side Mode Suppression Ratio	SMSR	P <sub>o</sub> = 5.0 mW, RMS (-20 dB), T <sub>C</sub> = -40 to +85°C	30	45		dB
Vertical Beam Angle <sup>*1</sup>	θ <sub>v</sub>	P <sub>o</sub> = 5.0 mW, FAHM <sup>*2</sup>		35	40	deg.
Lateral Beam Angle <sup>*1</sup>	θ <sub>l</sub>	P <sub>o</sub> = 5.0 mW, FAHM <sup>*2</sup>		30	35	deg.
Rise Time	t <sub>r</sub>	10-90%			0.5	ns
Fall Time	t <sub>f</sub>	90-10%			0.5	ns
Monitor Current	I <sub>m</sub>	V <sub>R</sub> = 5 V, P <sub>o</sub> = 5.0 mW	200	600	1 000	μA
Monitor Dark Current	I <sub>d</sub>	V <sub>R</sub> = 5 V		0.1	10	nA
		V <sub>R</sub> = 5 V, T <sub>C</sub> = -40 to +85°C			500	
Monitor PD Terminal Capacitance	C <sub>t</sub>	V <sub>R</sub> = 5 V, f = 1 MHz		6	20	pF
Tracking Error <sup>*3</sup>	γ	I <sub>m</sub> = const. (@ P <sub>o</sub> = 5.0 mW, T <sub>C</sub> = 25°C) T <sub>C</sub> = -40 to +85°C	-1.0		1.0	dB

\*1 Applicable to only NX6306S Series

\*2 FAHM: Full Angle at Half Maximum

\*3 Tracking Error:  $\gamma$



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

**LD CAN PACKAGES FAMILY FOR OPTICAL FIBER COMMUNICATIONS**

Part Number	Absolute Maximum Ratings		Electro-Optical Characteristics (T <sub>c</sub> = 25°C)				Application	Package
	T <sub>c</sub> (°C)	T <sub>stg</sub> (°C)	I <sub>th</sub> (mA)	P <sub>o</sub> (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 <sub>p</sub> -3 <sup>*1</sup>	λ <sub>p</sub> +3 <sup>*1</sup>	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<sub>p</sub> = 1 470, 1 490, 1 510, 1 530, 1 550, 1 570, 1 590, 1 610 nm

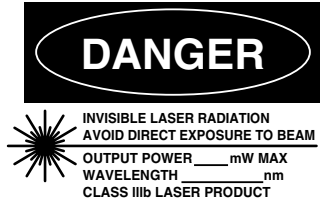
REFERENCE

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

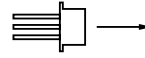
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M8E 00.4-0110

**SAFETY INFORMATION ON THIS PRODUCT**



**SEMICONDUCTOR LASER**



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

<p><b>Warning</b> Laser Beam</p>	<p>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.</p> <ul style="list-style-type: none"> <li>• Do not look directly into the laser beam.</li> <li>• Avoid exposure to the laser beam, any reflected or collimated beam.</li> </ul>
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