DATA SHEET

NEC

LASER DIODE
NX6301 Series

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

DESCRIPTION

The NX6301 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 Synchronous Digital Hierarchy (SDH) system, STM-1, STM-4, ITU-T recommendations.

NX6301S Series

NX6301G Series

FEATURES

- Optical output power P_o = 5.0 mW
- Low threshold current I_{th} = 13 mA @ T_C = 25°C
- High speed t_r, t_f = 0.5 ns MAX.
- SMSR 40 dB
- Wide operating temperature range T_C = –40 to +85°C
- InGaAs monitor PIN-PD
- CAN package ϕ 5.6 mm
- Based on Telcordia reliability

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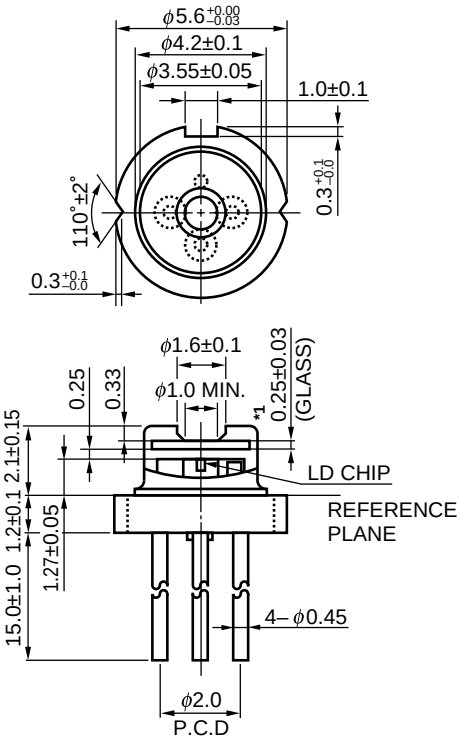
Date Published November 2002 CP(K)
Printed in Japan

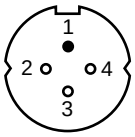
The mark ★ shows major revised points.

PACKAGE DIMENSIONS (UNIT: mm)

NX6301S Series

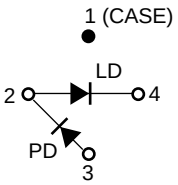


BOTTOM VIEW

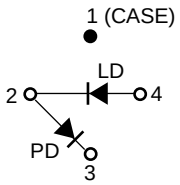


PIN CONNECTIONS

NX6301SH



NX6301SI



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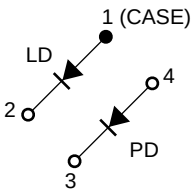
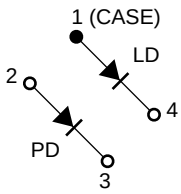


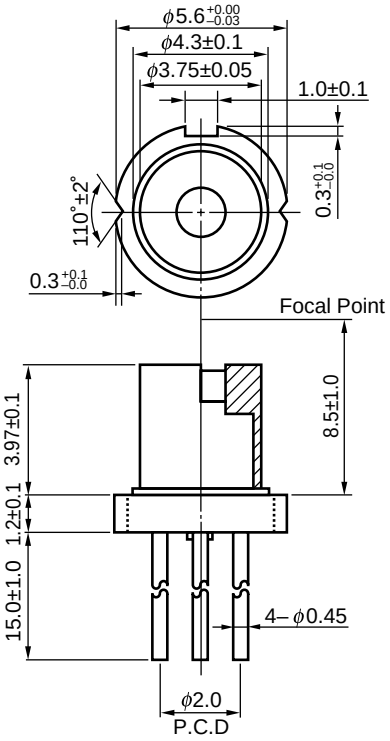
NX6301SK



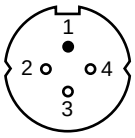
***1** n = 1.48 Bolosilicate Glass

★

NX6301G Series

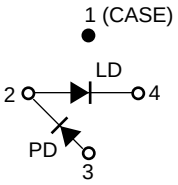


BOTTOM VIEW

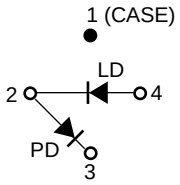


PIN CONNECTIONS

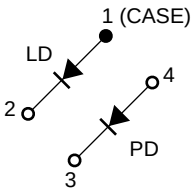
NX6301GH



NX6301GI



NX6301GJ



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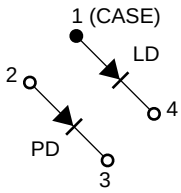
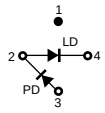
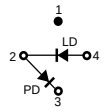
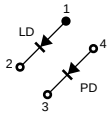
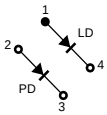
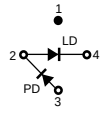
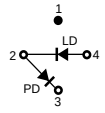
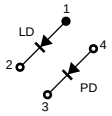
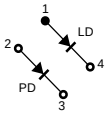


ORDERING INFORMATION

NX6301S Series

Part Number	Package	Pin Connections
NX6301SH	4-pin CAN with flat glass cap	
NX6301SI		
NX6301SJ		
NX6301SK		

NX6301G Series

Part Number	Package	Pin Connections
NX6301GH	4-pin CAN with aspherical lens cap	
NX6301GI		
NX6301GJ		
NX6301GK		

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
Lead Soldering Temperature	T_{sld}	350 (3 sec.)	°C
Relative Humidity (noncondensing)	RH	85	%

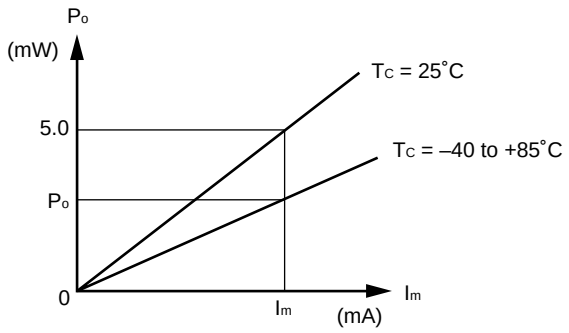
ELECTRO-OPTICAL CHARACTERISTICS (T_C = 25°C, unless otherwise specified)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Operating Voltage	V_{op}	P_o = 5.0 mW, T_C = –40 to +85°C		1.2	1.5	V
Threshold Current	I_{th}			13	25	mA
		T_C = 85°C		40	50	
Threshold Output Power	P_{th}	T_C = –40 to +85°C, I_F = I_{th}			200	μW
Differential Efficiency	η_d		0.15	0.25		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	–2.3		dB
★ Peak Emission Wavelength	λ_p	P_o = 5.0 mW, RMS (–20 dB), T_C = –40 to +85°C	1 280		1 335	nm
Side Mode Suppression Ratio	SMSR	P_o = 5.0 mW, T_C = –40 to +85°C	30	40		dB
Vertical Beam Angle[*1]	$\theta_\perp$	P_o = 5.0 mW, FAHM[*2]		30	40	deg.
Lateral Beam Angle[*1]	$\theta_{//}$	P_o = 5.0 mW, FAHM[*2]		25	35	deg.
Rise Time	t_r	10-90%		0.05	0.5	ns
Fall Time	t_f	90-10%		0.3	0.5	ns
★ Monitor Current	I_m	V_R = 5 V, P_o = 5.0 mW	200	600	1 000	μA
Monitor Dark Current	I_D	V_R = 5 V		0.1	50	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		1.0	20	pF
Tracking Error[*3]	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** Applicable to only NX6301S Series

***2** FAHM: Full Angle at Half Maximum

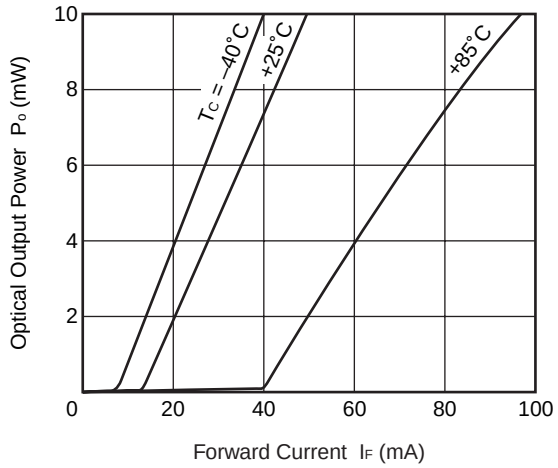
***3** Tracking Error: γ



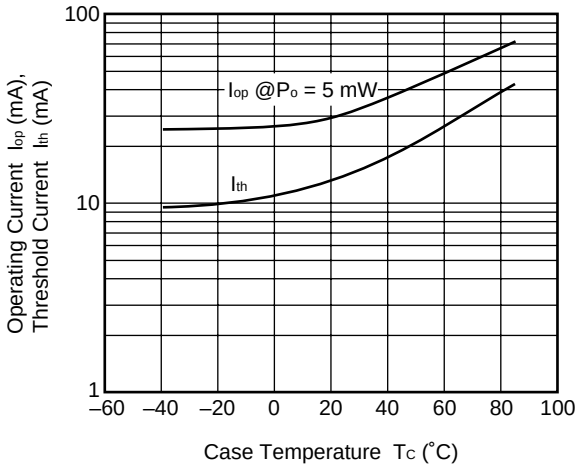
$$\gamma = \left| 10 \log \frac{P_o}{5.0} \right| \text{[dB]}$$

★ TYPICAL CHARACTERISTICS (T_C = –40 to +85°C)

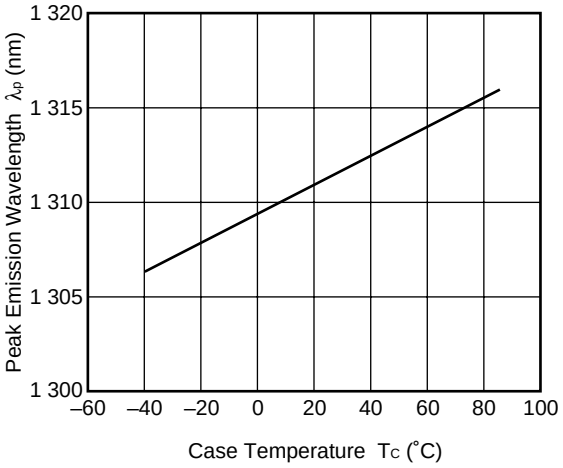
OPTICAL OUTPUT POWER vs. FORWARD CURRENT



OPERATING CURRENT AND THRESHOLD CURRENT vs. CASE TEMPERATURE



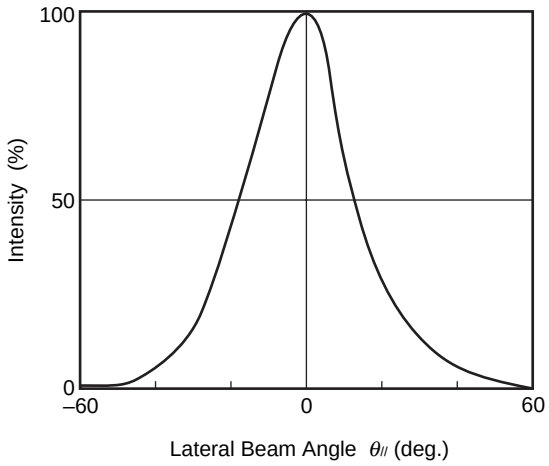
TEMPERATURE DEPENDENCE OF PEAK EMISSION WAVELENGTH



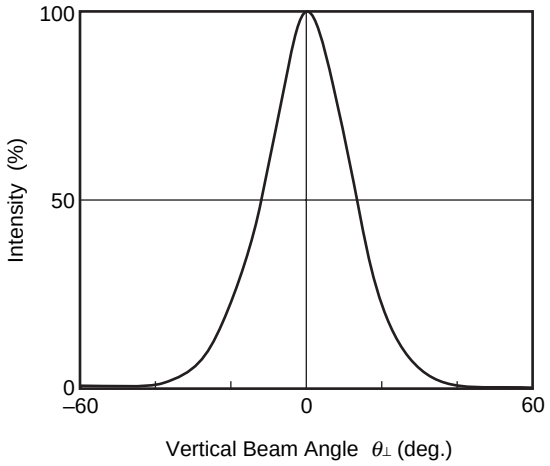
Remark The graphs indicate nominal characteristics.

★ TYPICAL CHARACTERISTICS (T_C = 25°C)

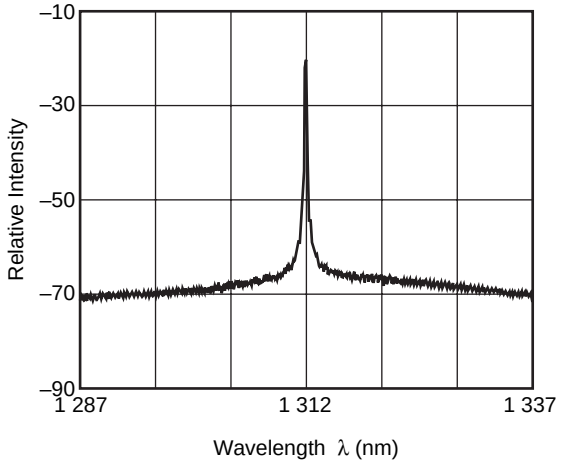
FAR FIELD PATTERN ($\theta_{//}$)
(NX6301S SERIES ONLY)



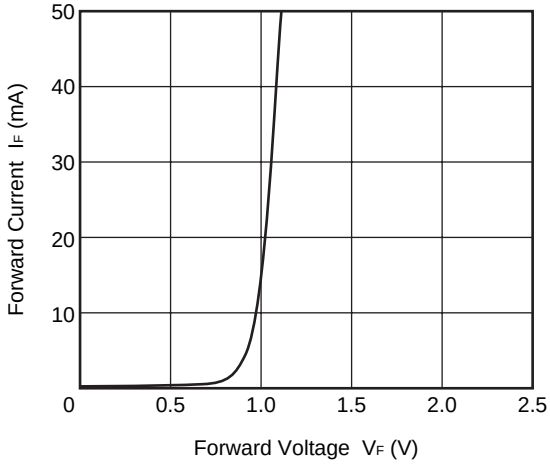
FAR FIELD PATTERN ($\theta_{\perp}$)
(NX6301S SERIES ONLY)



SPECTRUM



FORWARD CURRENT vs.
FORWARD VOLTAGE



Remark The graphs indicate nominal characteristics.

LD CAN PACKAGES FAMILY FOR OPTICAL FIBER COMMUNICATIONS

Part Number	Absolute Maximum Ratings		Electro-Optical Characteristics				Application	Package
			@T_C = 25°C	@T_C				
	T_C (°C)	T_{stg} (°C)	I_{th} (mA)	P_o (mW)	λ (nm)			
			TYP.	TYP.	MIN.	MAX.		
NX5302 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)	
★ 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)	
★ NX5307 Series	−40 to +85	−40 to +85	10	10	1 266	1 360	2.5 Gb/s: STM-16	CAN
NX6301 Series	−40 to +85	−40 to +85	13	5	1 280	1 335	156 Mb/s: STM-1	CAN
							622 Mb/s: STM-4	
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	

REFERENCE

Document Name	Document No.
OPTICAL SEMICONDUCTOR DEVICES FOR FIBEROPTIC COMMUNICATIONS SELECTION GUIDE	PX10161E
Opto-Electronics Devices Pamphlet	PX10160E
NEC semiconductor device reliability/quality control system[*1]	C11159E
Quality grades on NEC semiconductor devices[*1]	C11531E
SEMICONDUCTOR SELECTION GUIDE –Products and Packages–[*1]	X13769E

***1** Published by NEC Corporation

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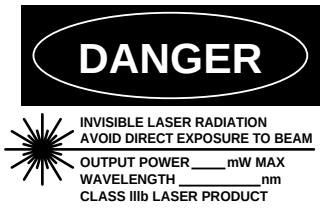
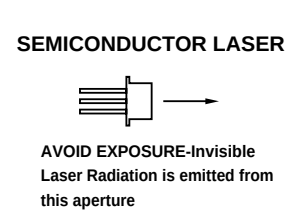
M8E 00.4-0110

SAFETY INFORMATION ON THIS PRODUCT





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.
Caution GaAs Products	The product contains gallium arsenide, GaAs. GaAs vapor and powder are hazardous to human health if inhaled or ingested. • Do not destroy or burn the product. • Do not cut or cleave off any part of the product. • Do not crush or chemically dissolve the product. • Do not put the product in the mouth. Follow related laws and ordinances for disposal. The product should be excluded from general industrial waste or household garbage.

▶**Business issue**

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▶**Technical issue**

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