DATA SHEET

NEC

LASER DIODE

NX6504 Series

1 550 nm FOR 156 Mb/s, 622 Mb/s
InGaAsP MQW-DFB LASER DIODE

DESCRIPTION

The NX6504 Series is a 1 550 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.

FEATURES

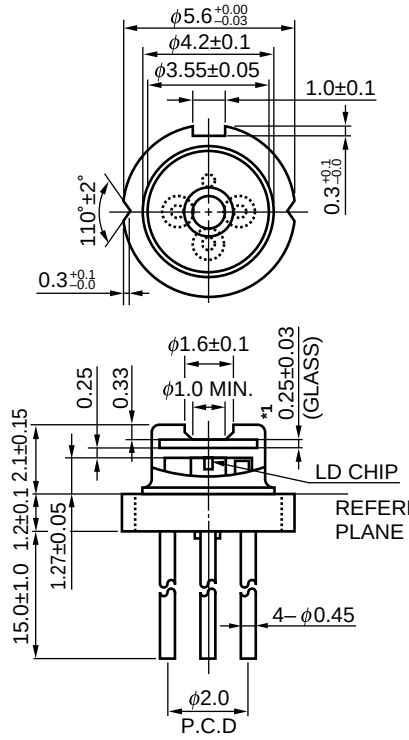
- Optical output power P_o = 5.0 mW
- Low threshold current I_{th} = 12 mA
- High speed t_r, t_f = 0.5 ns MAX.
- Side mode suppression ratio SMSR = 45 dB
- Wide operating temperature range T_C = –10 to +85°C
- InGaAs monitor PIN-PD
- CAN package ϕ5.6 mm
- Based on Telcordia reliability

Document No. PL10069EJ03V0DS (3rd edition)
Date Published January 2004 CP(K)
Printed in Japan

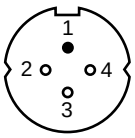
The mark ★ shows major revised points.

★ **PACKAGE DIMENSIONS (UNIT: mm)**

NX6504S Series

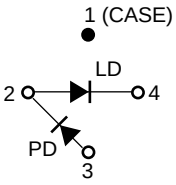


BOTTOM VIEW

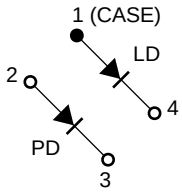


PIN CONNECTIONS

NX6504SH

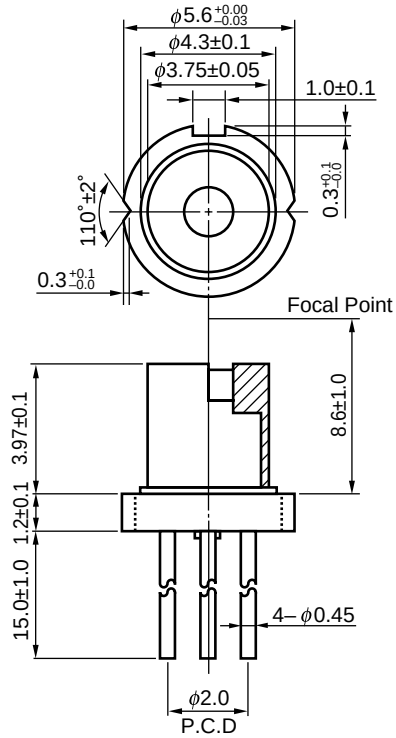


NX6504SK



1 n = 1.48 Bolosilicate Glass

NX6504G Series



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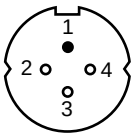
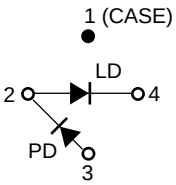
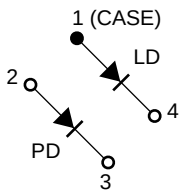


PIN CONNECTIONS

NX6504GH

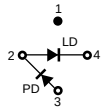
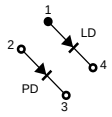


NX6504GK

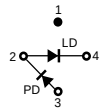
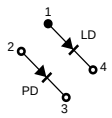


★ ORDERING INFORMATION

NX6504S Series

Part Number	Package	Pin Connections
NX6504SH	4-pin CAN with flat glass cap	
NX6504SK		

NX6504G Series

Part Number	Package	Pin Connections
NX6504GH	4-pin CAN with aspherical lens cap	
NX6504GK		

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	–10 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	%

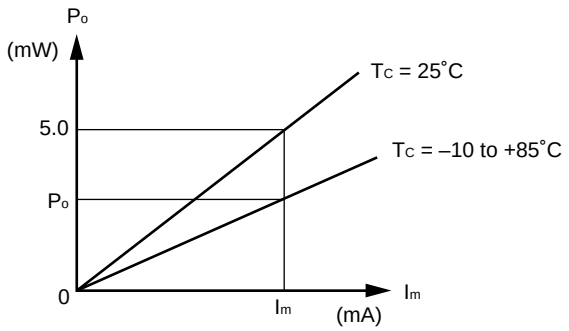
ELECTRO-OPTICAL CHARACTERISTICS (T_C = 25°C, unless otherwise specified)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Operating Voltage	V_{op}	P_o = 5.0 mW, T_C = –10 to +85°C		1.0	1.5	V
Threshold Current	I_{th}			12	25	mA
		T_C = 85°C		35	50	
Threshold Output Power	P_{th}	T_C = –10 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	–1.5		dB
Peak Emission Wavelength	λ_p	P_o = 5.0 mW, RMS (–20 dB) T_C = –10 to +85°C	1 530		1 570	nm
Side Mode Suppression Ratio	SMSR	P_o = 5.0 mW, T_C = –10 to +85°C	30	45		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%		0.2	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	10	nA
		V_R = 5 V, T_C = –10 to +85°C			500	
Monitor PD Terminal Capacitance	C_t	V_R = 5 V, f = 1 MHz		6	20	pF
Tracking Error[*3]	γ	I_m = const. (@ P_o = 5.0 mW, T_C = 25°C) T_C = –10 to +85°C	–1.0		1.0	dB

***1** Applicable to only NX6504S Series

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

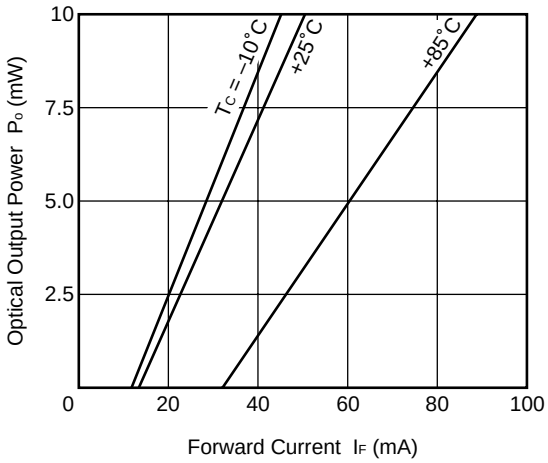
***3** Tracking Error: γ



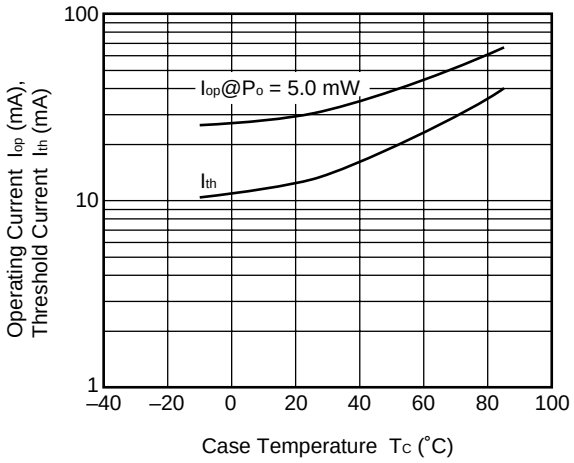
$$\gamma = \left| 10 \log \frac{P_o}{5.0} \right| \text{ [dB]}$$

TYPICAL CHARACTERISTICS (T_C = –10 to +85°C, unless otherwise specified)

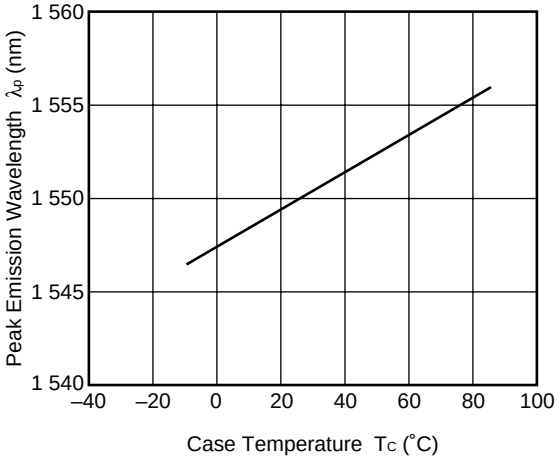
OPTICAL OUTPUT POWER vs. FORWARD CURRENT



OPERATING CURRENT AND THRESHOLD CURRENT vs. CASE TEMPERATURE



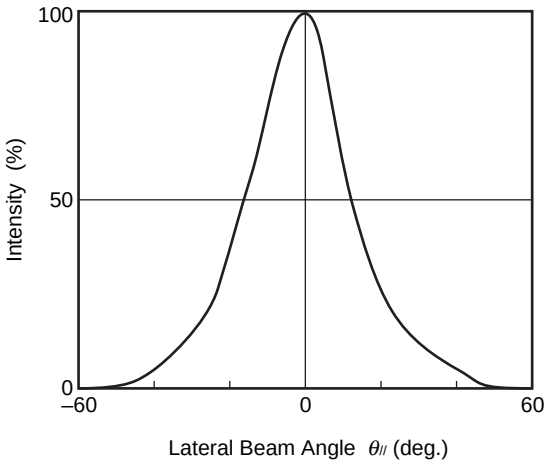
TEMPERATURE DEPENDENCE OF PEAK EMISSION WAVELENGTH



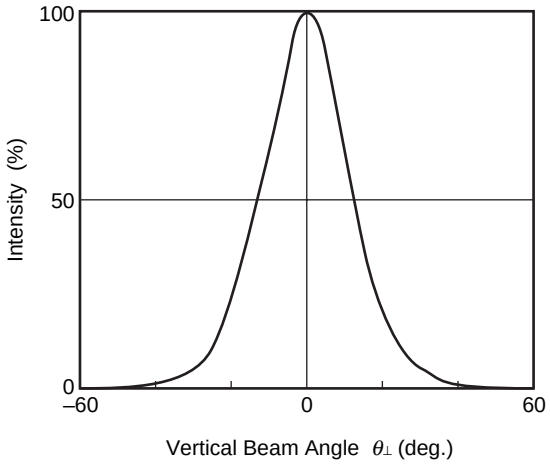
Remark The graphs indicate nominal characteristics.

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

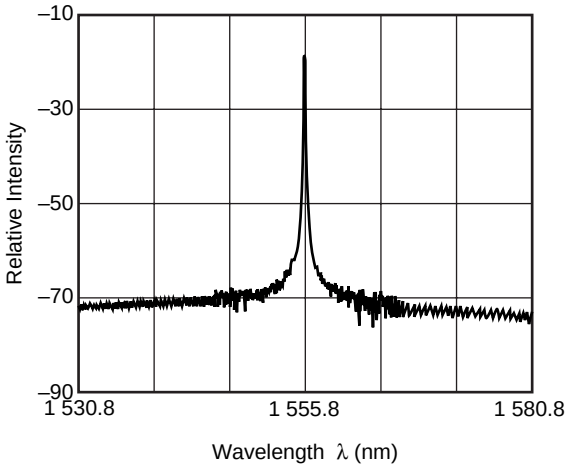
FAR FIELD PATTERN ($\theta_{//}$)
(NX6504S SERIES ONLY)



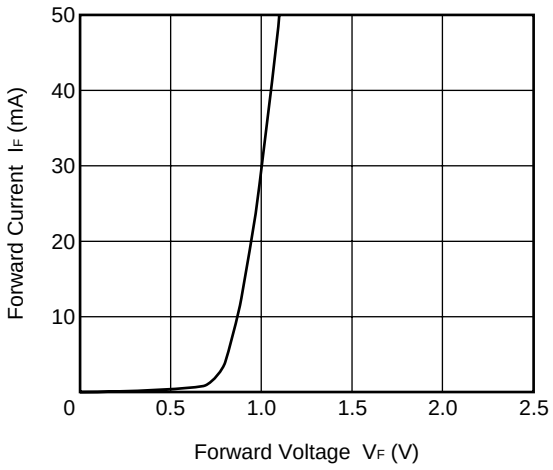
FAR FIELD PATTERN ($\theta_{\perp}$)
(NX6504S SERIES ONLY)



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 (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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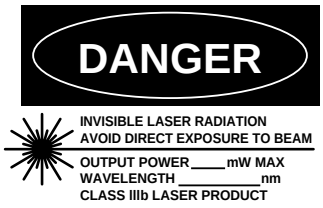
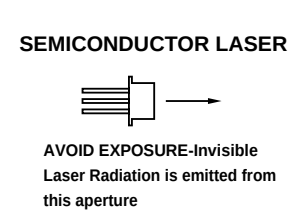
M8E 00.4-0110

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	This product uses gallium arsenide (GaAs). GaAs vapor and powder are hazardous to human health if inhaled or ingested, so please observe the following points. • Follow related laws and ordinances when disposing of the product. If there are no applicable laws and/or ordinances, dispose of the product as recommended below. 1. Commission a disposal company able to (with a license to) collect, transport and dispose of materials that contain arsenic and other such industrial waste materials. 2. Exclude the product from general industrial waste and household garbage, and ensure that the product is controlled (as industrial waste subject to special control) up until final disposal. • Do not burn, destroy, cut, crush, or chemically dissolve the product. • Do not lick the product or in any way allow it to enter the mouth.

▶**For further information, please contact**

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