

**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.

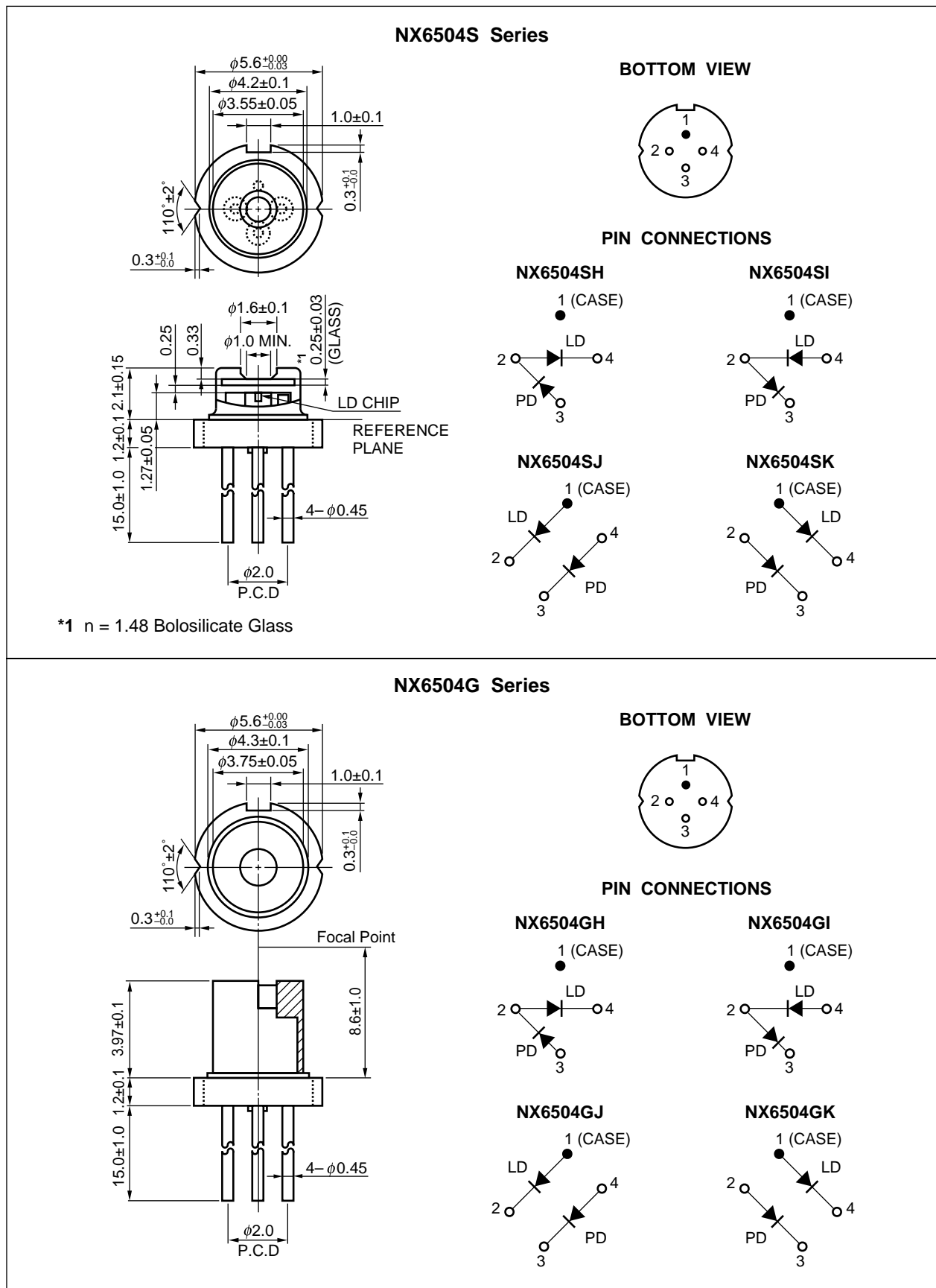
FEATURES

- Optical output power $P_o = 5.0 \text{ mW}$
- Low threshold current $I_{th} = 12 \text{ mA}$
- High speed $t_r, t_f = 0.5 \text{ ns MAX.}$
- SMSR 45 dB
- Wide operating temperature range $T_c = -10 \text{ to } +85^\circ\text{C}$
- InGaAs monitor PIN-PD
- CAN package $\phi 5.6 \text{ mm}$
- Based on Telcordia reliability

NX6504S Series**NX6504G Series**

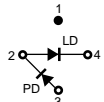
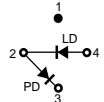

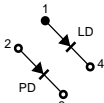
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Not all devices/types available in every country. Please check with local NEC Compound Semiconductor Devices representative for availability and additional information.

PACKAGE DIMENSIONS (UNIT: mm)

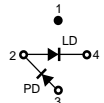
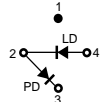

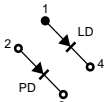


ORDERING INFORMATION

NX6504S Series

Part Number	Package	Pin Connections
NX6504SH	4-pin CAN with flat glass cap	
NX6504SI		
NX6504SJ		
NX6504SK		

NX6504G Series

Part Number	Package	Pin Connections
NX6504GH	4-pin CAN with aspherical lens cap	
NX6504GI		
NX6504GJ		
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	%

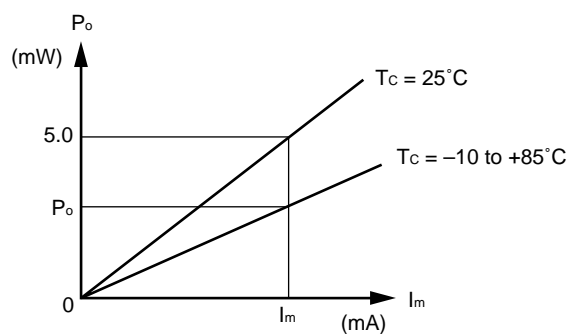
ELECTRO-OPTICAL CHARACTERISTICS ($T_C = 25^\circ\text{C}$, unless otherwise specified)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Operating Voltage	V_{op}	$P_o = 5.0 \text{ mW}$, $T_C = -10 \text{ to } +85^\circ\text{C}$		1.0	1.5	V
Threshold Current	I_{th}			12	25	mA
		$T_C = 85^\circ\text{C}$		35	50	
Threshold Output Power	P_{th}	$T_C = -10 \text{ to } +85^\circ\text{C}$, $I_F = I_{th}$			200	μW
Differential Efficiency	η_d		0.15	0.25		W/A
Temperature Dependence of Differential Efficiency	$\Delta\eta_d$	$\Delta\eta_d = 10 \log \frac{\eta_d (@ 85^\circ\text{C})}{\eta_d (@ 25^\circ\text{C})}$	-3.0	-1.5		dB
Peak Emission Wavelength	λ_p	$P_o = 5.0 \text{ mW}$, RMS (-20 dB) $T_C = -10 \text{ to } +85^\circ\text{C}$	1 530		1 570	nm
Side Mode Suppression Ratio	SMSR	$P_o = 5.0 \text{ mW}$, $T_C = -10 \text{ to } +85^\circ\text{C}$	30	45		dB
Vertical Beam Angle ^{*1}	θ_L	$P_o = 5.0 \text{ mW}$, FAHM ^{*2}		30	40	deg.
Lateral Beam Angle ^{*1}	θ_l	$P_o = 5.0 \text{ mW}$, 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	$V_R = 5 \text{ V}$, $P_o = 5.0 \text{ mW}$	200	600	1 000	μA
Monitor Dark Current	I_D	$V_R = 5 \text{ V}$		0.1	10	nA
		$V_R = 5 \text{ V}$, $T_C = -10 \text{ to } +85^\circ\text{C}$			500	
Monitor PD Terminal Capacitance	C_t	$V_R = 5 \text{ V}$, $f = 1 \text{ MHz}$		6	20	pF
Tracking Error ^{*3}	γ	$I_m = \text{const.} (@ P_o = 5.0 \text{ mW}, T_C = 25^\circ\text{C})$ $T_C = -10 \text{ to } +85^\circ\text{C}$	-1.0		1.0	dB

*1 Applicable to only NX6504S Series

*2 FAHM: Full Angle at Half Maximum

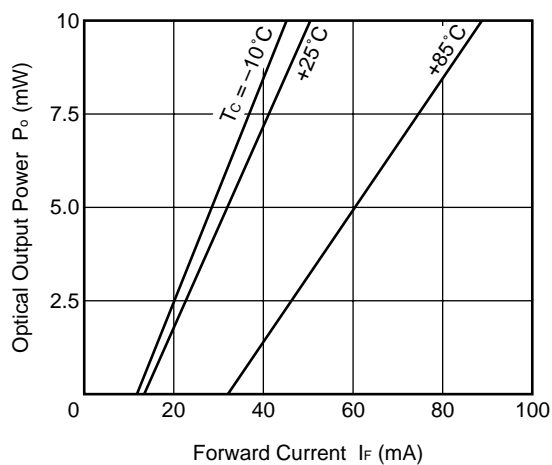
*3 Tracking Error: γ



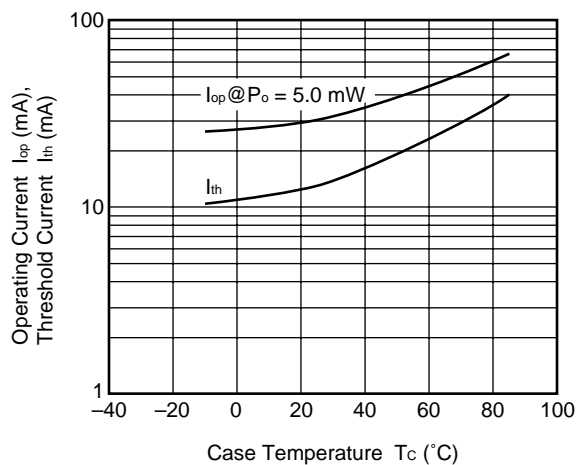
$$\gamma = \left| 10 \log \frac{P_o}{5.0} \right| [\text{dB}]$$

★ TYPICAL CHARACTERISTICS ($T_c = -10$ to $+85^\circ\text{C}$)

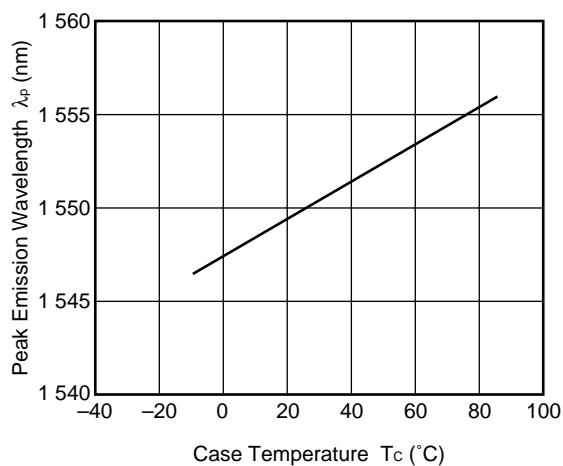
OPTICAL OUTPUT POWER vs.
FORWARD CURRENT



OPERATING CURRENT AND THRESHOLD
CURRENT vs. CASE TEMPERATURE

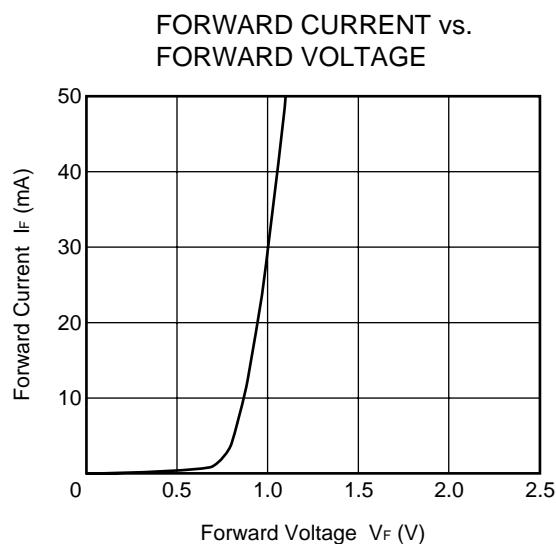
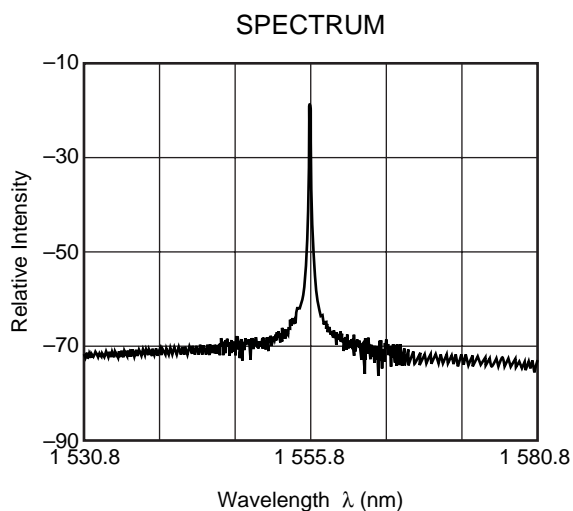
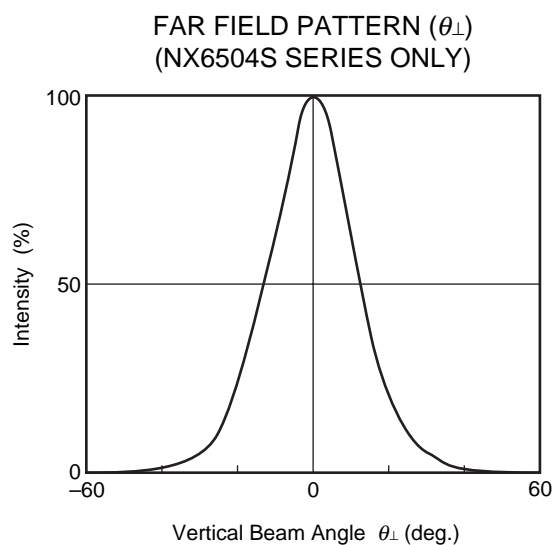
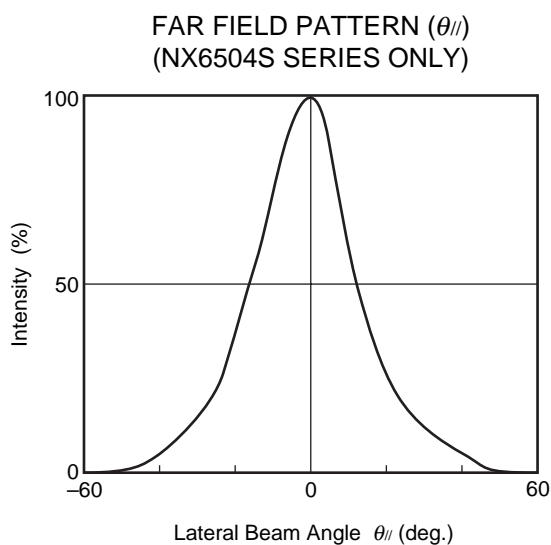


TEMPERATURE DEPENDENCE OF
PEAK EMISSION WAVELENGTH



Remark The graphs indicate nominal characteristics.

★ TYPICAL CHARACTERISTICS ($T_c = 25^\circ\text{C}$)



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

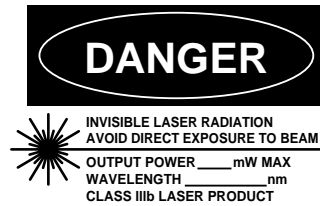
Document Name	Document No.
OPTICAL SEMICONDUCTOR DEVICES FOR FIBEROPTIC COMMUNICATIONS SELECTION GUIDE	PX10161E
Opto-Electronics Devices Pamphlet	PX10160E
NEC semiconductor device reliability/quality control system ^{*1}	C11159E
Quality grades on NEC semiconductor devices ^{*1}	C11531E
SEMICONDUCTOR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

^{*1} Published by NEC Corporation

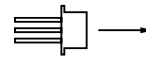
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M8E 00.4-0110

SAFETY INFORMATION ON THIS PRODUCT



SEMICONDUCTOR LASER



AVOID EXPOSURE-Invisible
Laser Radiation is emitted from
this aperture

<div data-bbox="177 533 296 580" data-label="Section-Header"> <p>Warning</p> </div> <div data-bbox="312 546 437 571" data-label="Text"> <p>Laser Beam</p> </div>	<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"> • Do not look directly into the laser beam. • Avoid exposure to the laser beam, any reflected or collimated beam.
<div data-bbox="177 698 296 745" data-label="Section-Header"> <p>Caution</p> </div> <div data-bbox="312 712 448 736" data-label="Text"> <p>GaAs Products</p> </div>	<p>The product contains gallium arsenide, GaAs. GaAs vapor and powder are hazardous to human health if inhaled or ingested.</p> <ul style="list-style-type: none"> • 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. <p>Follow related laws and ordinances for disposal. The product should be excluded from general industrial waste or household garbage.</p>

► Business issue

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► Technical issue

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