

**1 310 nm FOR 156 Mb/s, SHORT HAUL 622 Mb/s  
InGaAsP MQW-FP LASER DIODE****DESCRIPTION**

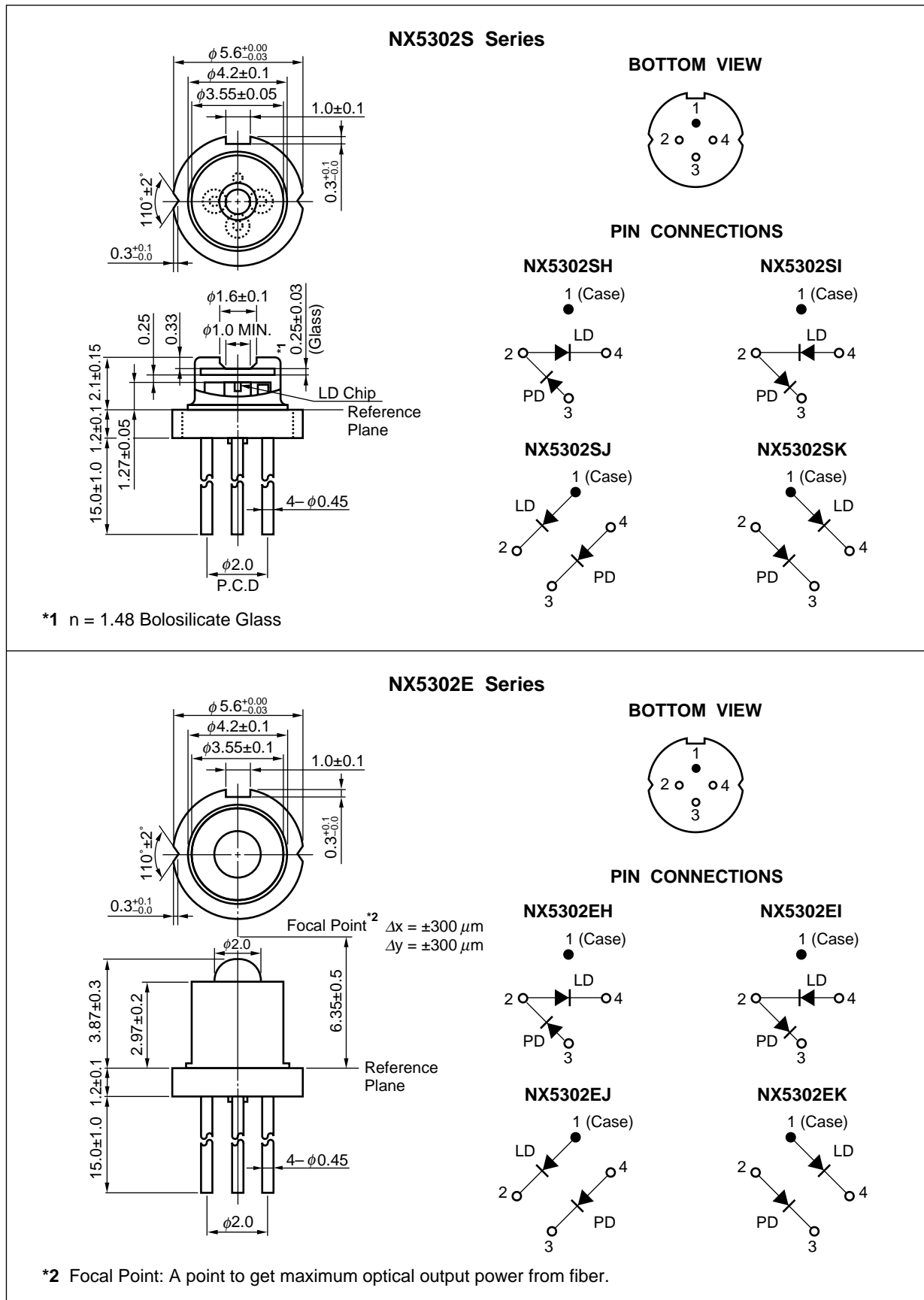
The NX5302 Series is a 1 310 nm Multiple Quantum Well (MQW) structured Fabry-Perot (FP) laser diodes with InGaAs monitor PIN-PD. These devices are ideal for Synchronous Digital Hierarchy (SDH) system, short haul and long haul STM-1, short haul STM-4, ITU-T recommendations.

**FEATURES**

- Optical output power  $P_o = 5.0 \text{ mW}$
- Low threshold current  $I_{th} = 10 \text{ mA}$
- High speed  $t_r = 0.15 \text{ ns MAX.}$   
 $t_f = 0.3 \text{ ns MAX.}$
- 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

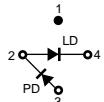
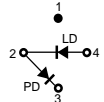

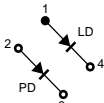
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Not all devices/types available in every country. Please check with local NEC Compound Semiconductor Devices representative for availability and additional information.

★ PACKAGE DIMENSIONS (UNIT: mm)

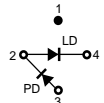
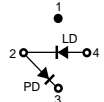

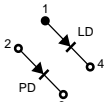


# ORDERING INFORMATION

## NX5302S Series

Part Number	Package	Pin Connections
NX5302SH	4-pin CAN with flat glass cap	
NX5302SI		
NX5302SJ		
NX5302SK		

## NX5302E Series

Part Number	Package	Pin Connections
NX5302EH	4-pin CAN with spherical lens cap	
NX5302EI		
NX5302EJ		
NX5302EK		

**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	$T_{slid}$	350 (3 sec.)	°C
Relative Humidity (noncondensing)	RH	85	%

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

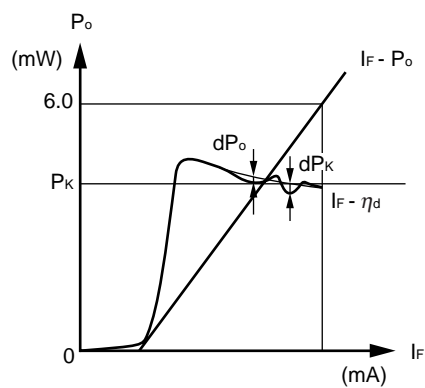
Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Operating Voltage	$V_{op}$	$P_o = 5.0 \text{ mW}$	—	1.1	1.3	V
Threshold Current	$I_{th}$		—	10	20	mA
		$T_C = 85^\circ\text{C}$	—	25	35	
Threshold Output Power	$P_{th}$	$T_C = -40 \text{ to } +85^\circ\text{C}$ , $I_F = I_{th}$	—	100	200	$\mu\text{W}$
Differential Efficiency	$\eta_d$		0.4	0.5	—	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
Center Wavelength	$\lambda_C$	$P_o = 5.0 \text{ mW}$ , RMS (-20 dB) $T_C = -40 \text{ to } +85^\circ\text{C}$	1 263	—	1 360	nm
Temperature Dependence of Center Wavelength	$\Delta\lambda/\Delta T$	$T_C = -40 \text{ to } +85^\circ\text{C}$	—	0.4	0.5	nm/°C
Spectral Width	$\sigma$	$P_o = 5.0 \text{ mW}$ , RMS (-20 dB) $T_C = -40 \text{ to } +85^\circ\text{C}$	—	1.0	2.5	nm
Vertical Beam Angle <sup>*1</sup>	$\theta_\perp$	$P_o = 5.0 \text{ mW}$ , FAHM <sup>*2</sup>	—	25	40	deg.
Lateral Beam Angle <sup>*1</sup>	$\theta_\parallel$	$P_o = 5.0 \text{ mW}$ , FAHM <sup>*2</sup>	—	20	35	deg.
Rise Time	$t_r$	10-90%	—	0.05	0.15	ns
Fall Time	$t_f$	90-10%	—	0.15	0.3	ns
★ Monitor Current	$I_m$	$V_R = 5 \text{ V}$ , $P_o = 5.0 \text{ mW}$	200	500	800	$\mu\text{A}$
Monitor Dark Current	$I_D$	$V_R = 5 \text{ V}$	—	0.1	10	nA
		$V_R = 5 \text{ V}$ , $T_C = -40 \text{ to } +85^\circ\text{C}$	—	—	500	
Monitor PD Terminal Capacitance	$C_t$	$V_R = 5 \text{ V}$ , $f = 1 \text{ MHz}$	—	6	20	pF
Kink (Refer to <b>DEFINITIONS</b> )	kink	$P_o = \text{Up to } 6.0 \text{ mW}$ , $T_C = -40 \text{ to } +85^\circ\text{C}$	-20	—	20	%
Tracking Error (Refer to <b>DEFINITIONS</b> )	$\gamma$	$I_m = \text{const.} (@ P_o = 5.0 \text{ mW}, T_C = 25^\circ\text{C})$ $T_C = -40 \text{ to } +85^\circ\text{C}$	-1.0	—	1.0	dB

\*1 Applicable to only NX5302S Series

\*2 FAHM: Full Angle at Half Maximum

# PARAMETER DEFINITIONS

## Kink : kink

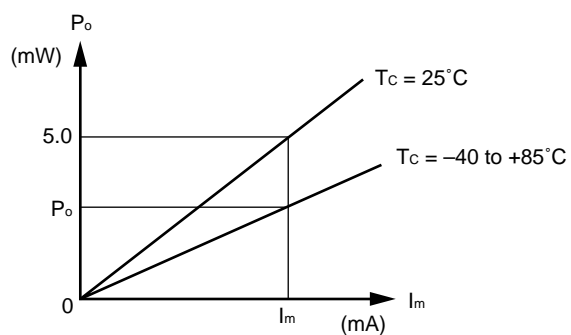


$$\text{kink} = \frac{|dP_k|}{P_k} \times 100 [\%]$$

$$dP_k = dP_o \text{ MAX.}$$

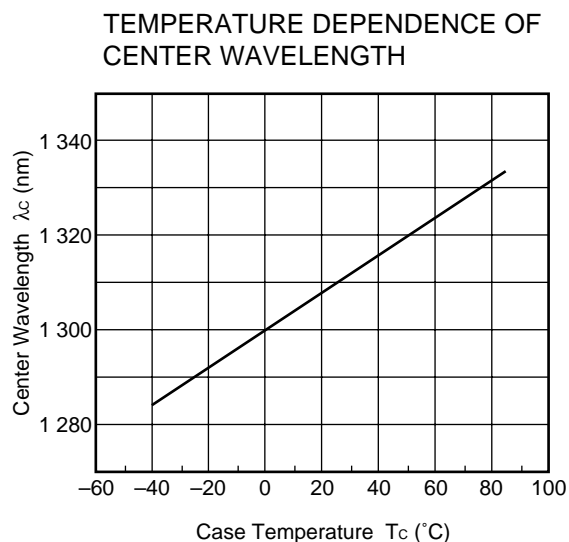
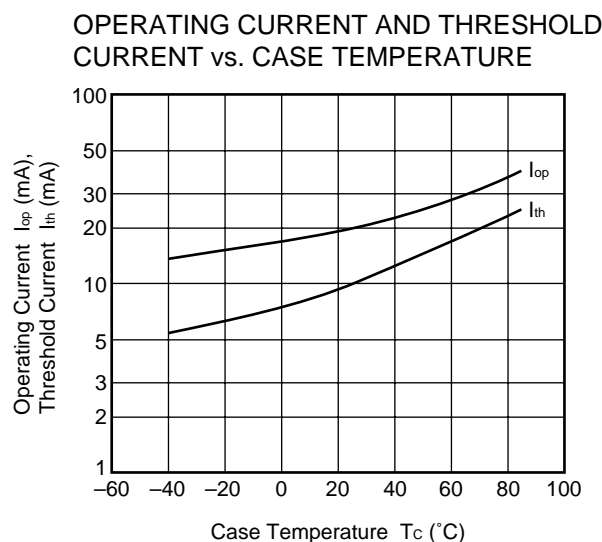
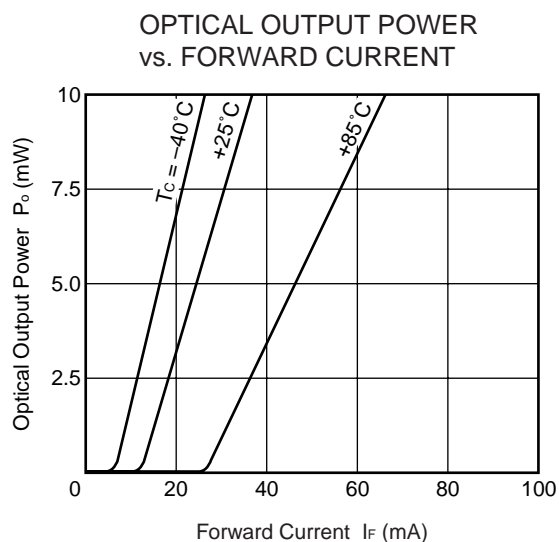
$$P_k \leq 6.0 \text{ (mW)}$$

## Tracking Error : $\gamma$



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

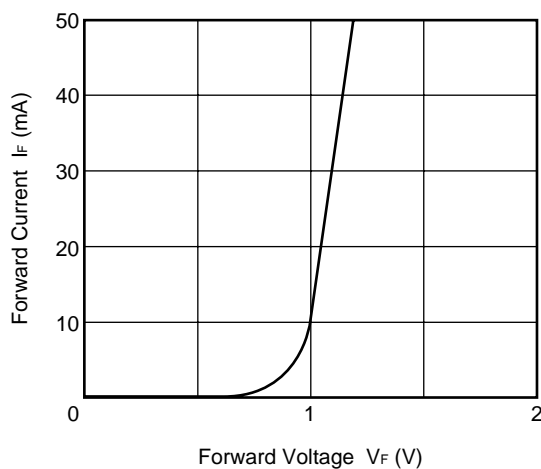
**TYPICAL CHARACTERISTICS ( $T_c = -40$  to  $+85^\circ\text{C}$ )**



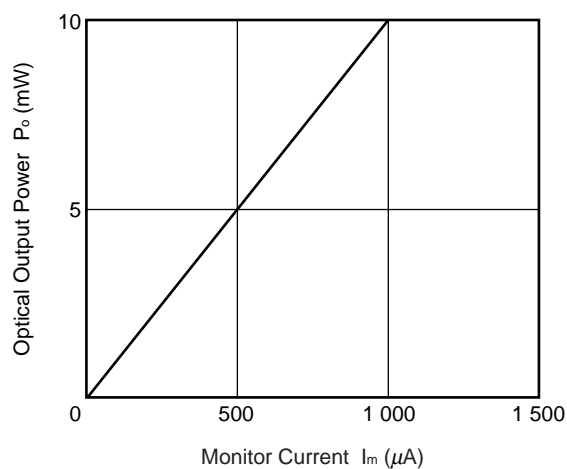
**Remark** The graphs indicate nominal characteristics.

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

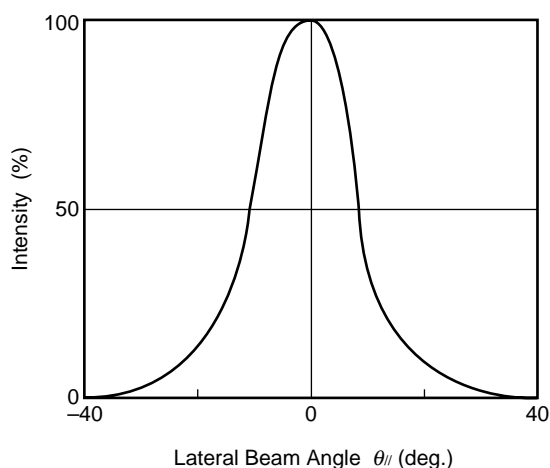
FORWARD CURRENT vs.  
FORWARD VOLTAGE



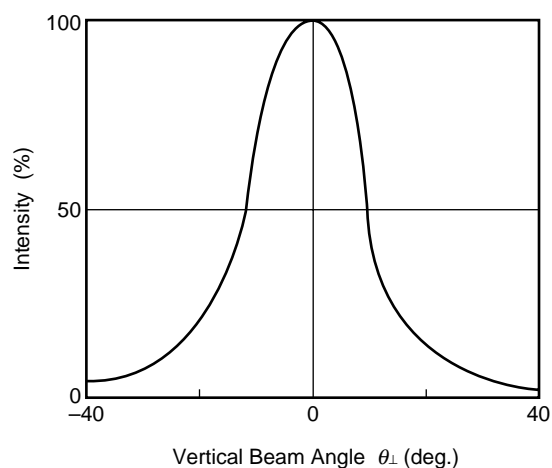
OPTICAL OUTPUT POWER  
vs. MONITOR CURRENT



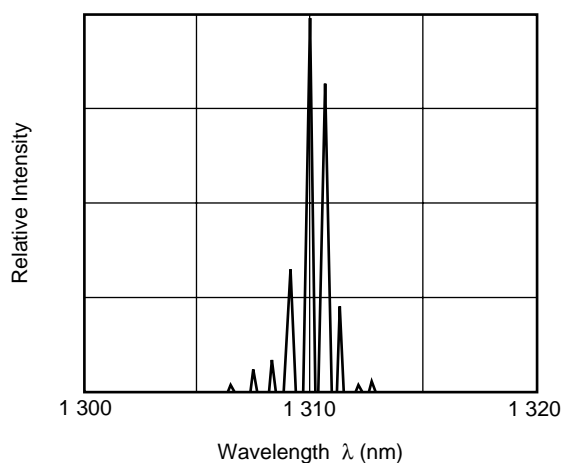
FAR FIELD PATTERN ( $\theta_{//}$ )  
(NX5302S SERIES ONLY)



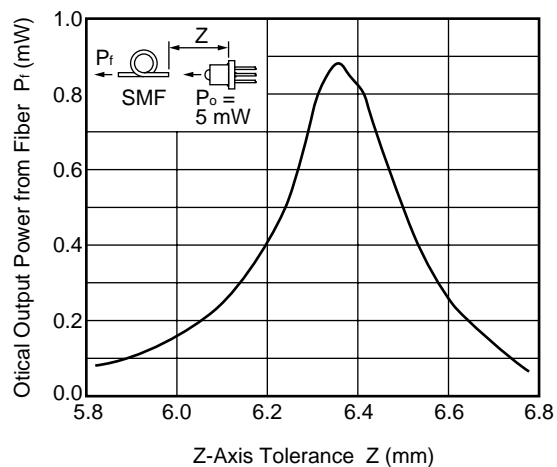
FAR FIELD PATTERN ( $\theta_{\perp}$ )  
(NX5302S SERIES ONLY)



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				Application	Package
			@T <sub>c</sub> = 25°C	@T <sub>c</sub>				
	T <sub>c</sub> (°C)	T <sub>sig</sub> (°C)	I <sub>th</sub> (mA)	P <sub>o</sub> (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)	
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**

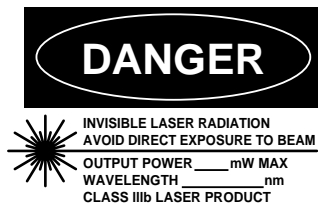
Document Name	Document No.
Optical semiconductor devices for fiberoptic communications Selection Guide	P12480E
Opto-Electronics Devices Pamphlet	P13623E
Opto-Electronics Devices (CD-ROM)	P12944X
NEC semiconductor device reliability/quality control system <sup>*1</sup>	C11159E
Quality grades on NEC semiconductor devices <sup>*1</sup>	C11531E
SEMICONDUCTOR SELECTION GUIDE –Products and Packages– <sup>*1</sup>	X13769E

<sup>\*1</sup> Published by NEC Corporation

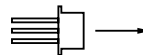
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M8E 00.4-0110

SAFETY INFORMATION ON THIS PRODUCT



SEMICONDUCTOR LASER



AVOID EXPOSURE-Invisible  
Laser Radiation is emitted from  
this aperture

<b>Warning</b>	Laser Beam	<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>
<b>Caution</b>	GaAs Products	<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"> <li>• Do not destroy or burn the product.</li> <li>• Do not cut or cleave off any part of the product.</li> <li>• Do not crush or chemically dissolve the product.</li> <li>• Do not put the product in the mouth.</li> </ul> <p>Follow related laws and ordinances for disposal. The product should be excluded from general industrial waste or household garbage.</p>

► Business issue

**NEC Compound Semiconductor Devices, Ltd.**

5th Sales Group, Sales Division TEL: +81-3-3798-6372 FAX: +81-3-3798-6783 E-mail: salesinfo@csd-nec.com

**NEC Compound Semiconductor Devices Hong Kong Limited**

Hong Kong Head Office TEL: +852-3107-7303 FAX: +852-3107-7309  
Taipei Branch Office TEL: +886-2-8712-0478 FAX: +886-2-2545-3859  
Korea Branch Office TEL: +82-2-528-0301 FAX: +82-2-528-0302

**NEC Electron Devices European Operations** <http://www.nec.de/>

TEL: +49-211-6503-101 FAX: +49-211-6503-487

**California Eastern Laboratories, Inc.** <http://www.cel.com/>

TEL: +1-408-988-3500 FAX: +1-408-988-0279

► Technical issue

**NEC Compound Semiconductor Devices, Ltd.** <http://www.csd-nec.com/>

Sales Engineering Group, Sales Division  
E-mail: techinfo@csd-nec.com FAX: +81-44-435-1918