

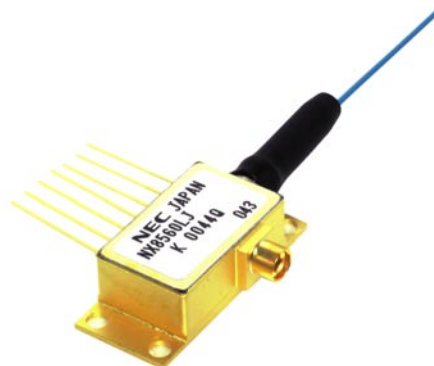


# NEC's EA MODULATOR INTEGRATED InGaAsP MQW DFB LASER DIODE IN BUTTERFLY PACKAGE WITH GPO CONNECTOR FOR 10 Gb/s DWDM APPLICATIONS

**NX8560LJ  
SERIES**

## FEATURES

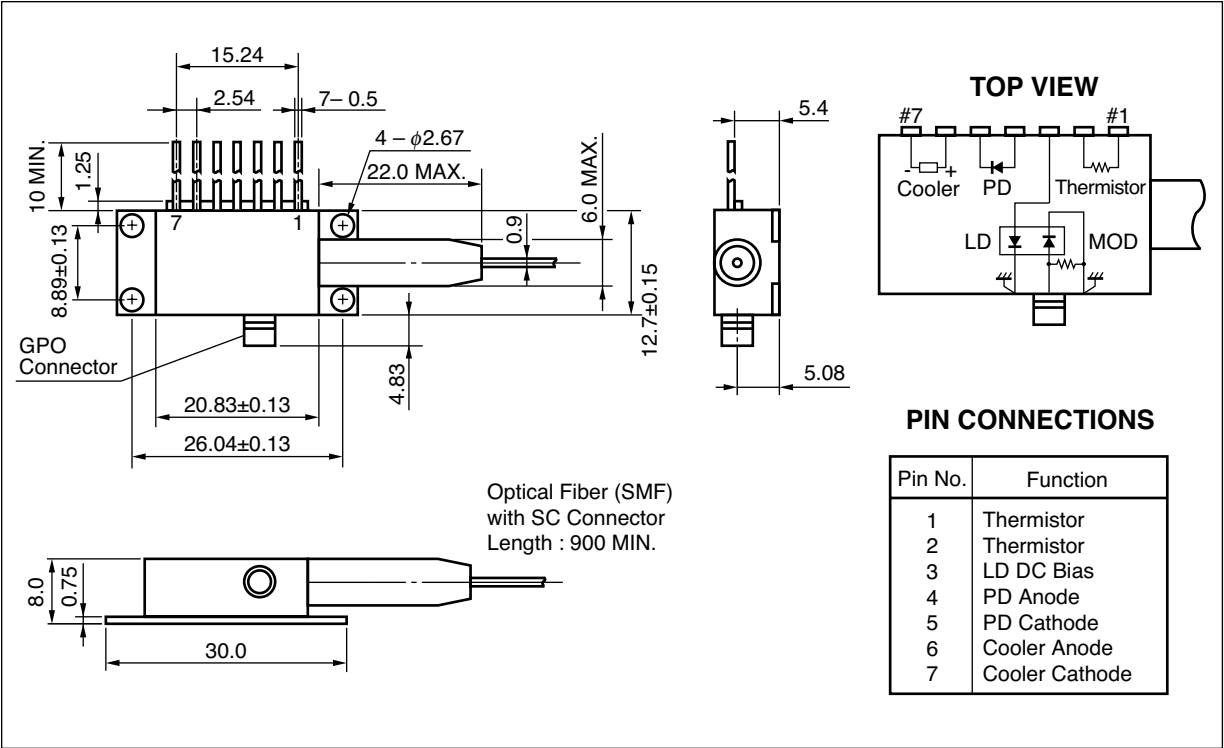
- INTEGRATED ELECTROABSORPTION MODULATOR
- UP TO 40 km TRANSMISSION CAPABILITY  
WITH STANDARD SINGLE MODE FIBER  
(dispersion 800 ps/nm)
- LOW MODULATION VOLTAGE
- 7-PIN BUTTERFLY PACKAGE WITH GPO™  
CONNECTOR
- AVAILABLE FOR DWDM WAVELENGTH  
BASED ON ITU-T RECOMMENDATION



## DESCRIPTION

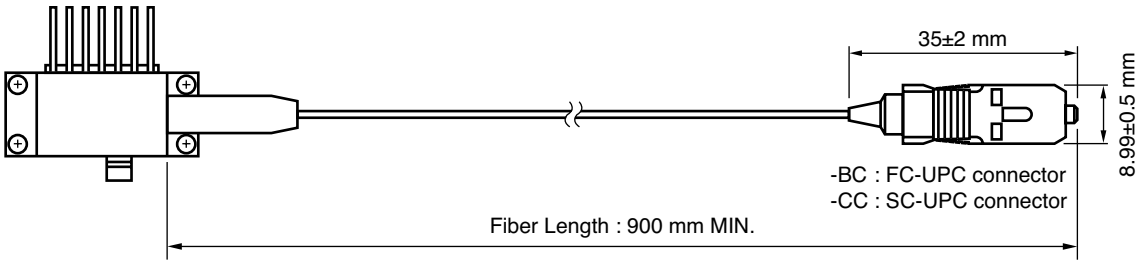
NEC's NX8560LJ Series are an Electro-Absorption (EA) Modulator integrated, 1550 nm Multiple Quantum Well (MQW) structured Distributed Feed-Back (DFB) laser diodes. It is capable of transmitting up to 40 km for 10 Gb/s applications by using standard fiber dispersion 800 ps/nm and is available for Dense Wavelength Multiplexing (DWDM) wavelength based on ITU-T recommendations.

PACKAGE DIMENSIONS (Units in mm)



OPTICAL FIBER CHARACTERISTICS

PARAMETER	SPECIFICATION	UNIT
Mode Field Diameter	9.3±0.5	μm
Cladding Diameter	125±1	μm
Tight Buffer Diameter	900±100	μm
Cut-off Wavelength	< 1 270	nm
Attenuation 1 525 to 1 575 nm	< 0.3	dB/km
Minimum Fiber Bending Radius	30	mm
Fiber Length	900 MIN.	mm
Flammability	UL1581 VW-1	



## ORDERING INFORMATION

PART NUMBER	PACKAGE
NX8560LJ-AZ *	7-Pin Butterfly Package with GPO™ Connector

NX8560LJ □□□-□□

CC : SC-UPC connector (standard)  
BC : FC-UPC connector (option)

Without wavelength code : Wavelength 1528 to 1550 nm  
With wavelength code : Refer to Table A

### \*NOTE:

Please refer to the last page of this data sheet, "Compliance with EU Directives" for Pb-Free RoHS Compliance Information.

**Table A: DWDM wavelength base on ITU-T recommendations (@ T<sub>LD</sub> = T<sub>set</sub>)**

Wavelength Code	ITU-T Wavelength <sup>1</sup> (nm)	Frequency (THz)	Wavelength Code	ITU-T Wavelength <sup>1</sup> (nm)	Frequency (THz)
287	1528.77	196.10	501	1550.11	193.40
295	1529.55	196.00	509	1550.91	193.30
303	1530.33	195.90	517	1551.72	193.20
311	1531.11	195.80	525	1552.52	193.10
318	1531.89	195.70	533	1553.32	193.00
326	1532.68	195.60	541	1554.13	192.90
334	1533.46	195.50	549	1554.94	192.80
342	1534.25	195.40	557	1555.74	192.70
350	1535.03	195.30	565	1556.55	192.60
358	1535.82	195.20	573	1557.36	192.50
366	1536.60	195.10	581	1558.17	192.40
373	1537.39	195.00	589	1558.98	192.30
381	1538.18	194.90	597	1559.79	192.20
389	1538.97	194.80	606	1560.60	192.10
397	1539.76	194.70	614	1561.41	192.00
405	1540.55	194.60	622	1562.23	191.90
413	1541.35	194.50	630	1563.04	191.80
421	1542.14	194.40			
429	1542.93	194.30			
437	1543.73	194.20			
445	1544.52	194.10			
453	1545.32	194.00			
461	1546.11	193.90			
469	1546.91	193.80			
477	1547.71	193.70			
485	1548.51	193.60			
493	1549.31	193.50			

**ABSOLUTE MAXIMUM RATINGS**

PARAMETER	SYMBOL	RATINGS	UNIT
Optical Output Power from Fiber	$P_f$	10	mW
Forward Current of LD	$I_{FLD}$	150	mA
Reverse Voltage of LD	$V_{RLD}$	2.0	V
Forward Voltage of Modulator	$V_{FEA}$	1	V
Reverse Voltage of Modulator	$V_{REA}$	4	V
Forward Current of PD	$I_{FPD}$	1	mA
Reverse Voltage of PD	$V_{RPD}$	10	V
Cooler Current	$I_C$	1.5	A
Cooler Voltage	$V_C$	2.5	V
Operating Case Temperature	$T_C$	-20 to +70	°C
Storage Temperature	$T_{stg}$	-40 to +85	°C
Lead Soldering Temperature	$T_{sld}$	350 (3 sec.)	°C

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

PARAMETER	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNIT
Laser Set Temperature	$T_{set}$	*1	20		35	°C
Operating Current	$I_{op}$		50	60	80	mA
Modulation Center Voltage	$V_{center}$		-2.0		-0.5	V
Modulation Voltage	$V_{mod}$			2.0	3.0	V
Forward Voltage of LD	$V_{FLD}$	$I_{FLD} = I_{op}$			2.0	V
Threshold Current	$I_{th}$			7	20	mA
Optical Output Power from Fiber	$P_f$	Under modulation <sup>2</sup> , Single channel	-3	-2		dBm
		Under modulation <sup>2</sup> , DWDM wavelength based on ITU-T recommendations	-1			
Peak Emission Wavelength	$\lambda_p$	$I_{FLD} = I_{op}$ , $V_{EA} = 0$ V, $T_{LD} = T_{set}$	1 528	ITU-T <sup>3</sup>	1 565	nm
Side Mode Suppression Ratio	SMSR	$I_{FLD} = I_{op}$ , $V_{EA} = 0$ V	30	> 37		dB
Extinction Ratio	ER	Under modulation <sup>2</sup>	10	> 11		dB
Rise Time	$t_r$	20-80%, Under modulation <sup>2</sup>			40	ps
Fall Time	$t_f$	80-20%, Under modulation <sup>2</sup>			40	ps
Dispersion Penalty	DP	40 km SMF under modulation <sup>2,4</sup>			2.0	dB
Optical Isolation	$I_s$		23			dB
Input Return Loss	$S_{11}$	$I_{FLD} = I_{op}$ , $V_{EA} = -1$ V, $f = 130$ MHz to 5 GHz		-10	-8	dB
		$I_{FLD} = I_{op}$ , $V_{EA} = -1$ V, $f = 5$ to 10 GHz		-8	-5	

\*1 NX8560LJ Series :  $T_{set}$  is a certain point between 20 and 35°C

NX8560LJxxx Series :  $T_{set}$  is set at a certain point between 20 and 35°C for ITU-T grid wavelength

\*2 40 km SMF under modulation, 9.95328 Gb/s, PRBS 2<sup>23</sup>-1,  $V_{EA} = V_{center} \pm 1/2V_{mod}$ ,  $I_{FLD} = I_{op}$ , NEC Test System

$V_{center}$  : a certain point between -2.0 and -0.5 V

$V_{mod}$  : a certain point 3 V or below

$I_{op}$  : a certain point between 50 and 80 mA

\*3 Available for DWDM wavelengths based on ITU-T recommendations (100 GHz grid).

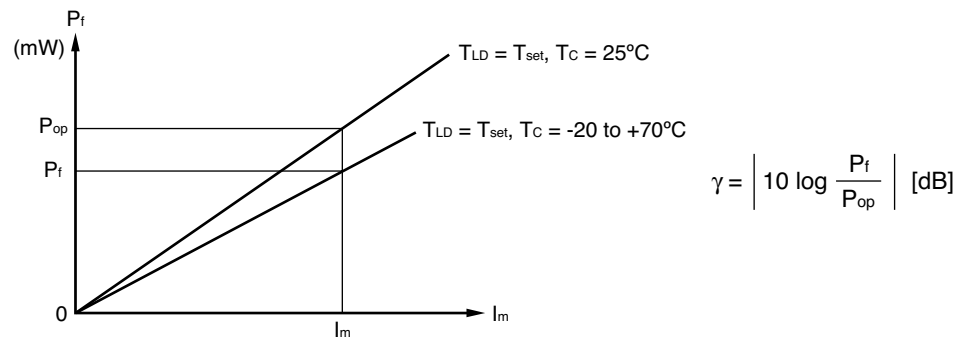
Please refer to **ORDERING INFORMATION**.

\*4 BER = 10<sup>-10</sup>

ELECTRO-OPTICAL CHARACTERISTICS (Applicable to Monitor PD: T<sub>LD</sub> = T<sub>set</sub>, T<sub>C</sub> = -20 to +70°C)

PARAMETER	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNIT
Monitor Current	I <sub>m</sub>	V <sub>RPD</sub> = 5 V, I <sub>FLD</sub> = I <sub>op</sub> , V <sub>EA</sub> = 0 V	30		1 100	μA
Dark Current	I <sub>D</sub>	V <sub>RPD</sub> = 5 V, V <sub>EA</sub> = 0 V			10	nA
Terminal Capacitance	C <sub>t</sub>	V <sub>RPD</sub> = 5 V, f = 1 MHz			15	pF
Tracking Error	γ <sup>*1</sup>	I <sub>m</sub> = const.			0.5	dB

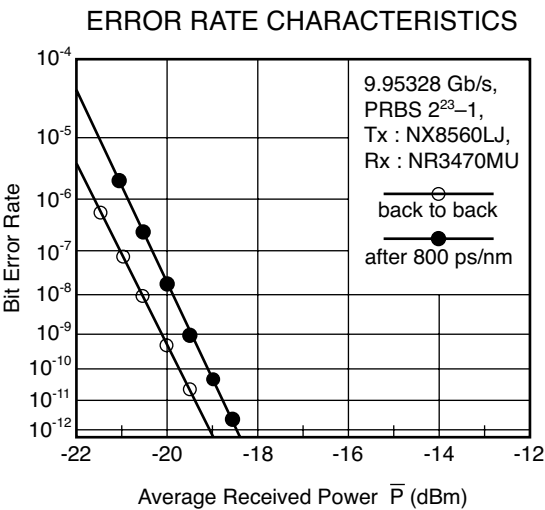
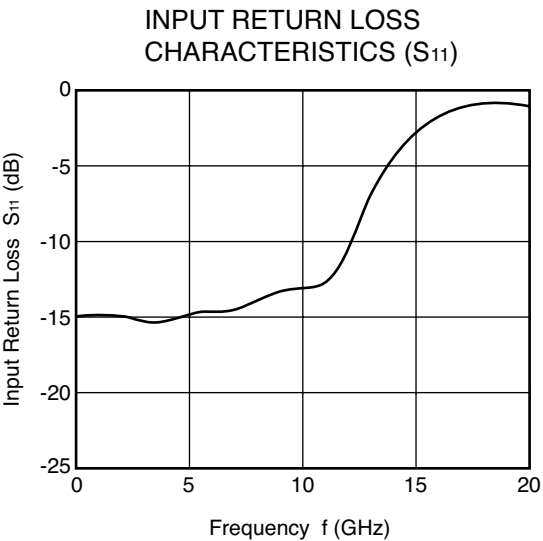
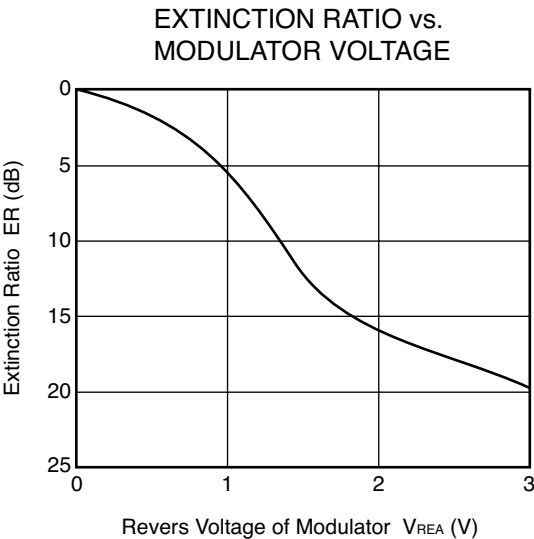
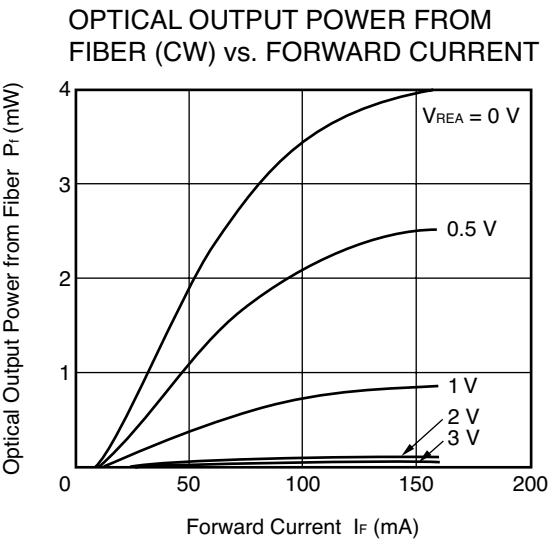
\*1 Tracking Error: γ



ELECTRO-OPTICAL CHARACTERISTICS (Applicable to Thermistor and TEC: T<sub>C</sub> = -20 to +70°C)

PARAMETER	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNIT
Thermistor Resistance	R	T <sub>LD</sub> = 25°C	9.5	10.0	10.5	kΩ
B Constant	B		3 350	3 450	3 550	K
TEC Current	I <sub>C</sub>	T <sub>LD</sub> = T <sub>set</sub>			1.2	A
TEC Voltage	V <sub>C</sub>	T <sub>LD</sub> = T <sub>set</sub>			2.4	V

TYPICAL CHARACTERISTICS (T<sub>C</sub> = 25°C, unless otherwise specified)



**Remark** The graphs indicate nominal characteristics.

Life Support Applications  
These NEC products are not intended for use in life support devices, appliances, or systems where the malfunction of these products can reasonably be expected to result in personal injury. The customers of CEL using or selling these products for use in such applications do so at their own risk and agree to fully indemnify CEL for all damages resulting from such improper use or sale.

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DATA SUBJECT TO CHANGE WITHOUT NOTICE

08/09/2004

Subject: Compliance with EU Directives

CEL certifies, to its knowledge, that semiconductor and laser products detailed below are compliant with the requirements of European Union (EU) Directive 2002/95/EC Restriction on Use of Hazardous Substances in electrical and electronic equipment (RoHS) and the requirements of EU Directive 2003/11/EC Restriction on Penta and Octa BDE.

CEL Pb-free products have the same base part number with a suffix added. The suffix –A indicates that the device is Pb-free. The –AZ suffix is used to designate devices containing Pb which are exempted from the requirement of RoHS directive (\*). In all cases the devices have Pb-free terminals. All devices with these suffixes meet the requirements of the RoHS directive.

This status is based on CEL's understanding of the EU Directives and knowledge of the materials that go into its products as of the date of disclosure of this information.

Restricted Substance per RoHS	Concentration Limit per RoHS (values are not yet fixed)	Concentration contained in CEL devices	
		-A	-AZ
Lead (Pb)	< 1000 PPM	Not Detected	(*)
Mercury	< 1000 PPM	Not Detected	
Cadmium	< 100 PPM	Not Detected	
Hexavalent Chromium	< 1000 PPM	Not Detected	
PBB	< 1000 PPM	Not Detected	
PBDE	< 1000 PPM	Not Detected	

If you should have any additional questions regarding our devices and compliance to environmental standards, please do not hesitate to contact your local representative.

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