

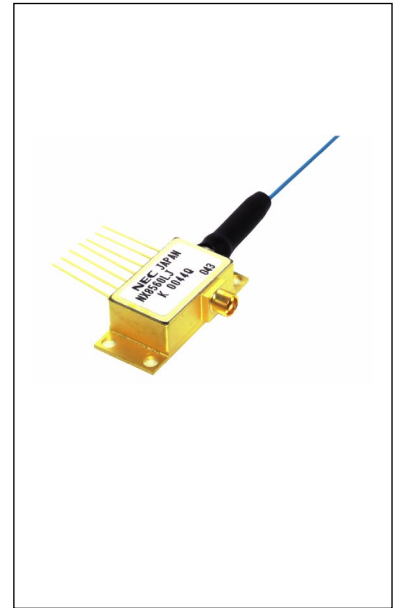
EA MODULATOR INTEGRATED
1 550 nm MQW-DFB LASER DIODE MODULE
FOR 10 Gb/s DWDM APPLICATIONS

DESCRIPTION

The NX8560LJ Series is an Electro-Absorption (EA) modulator integrated, 1 550 nm Multiple Quantum Well (MQW) structured Distributed Feed-Back (DFB) laser diode module. It is capable of transmitting up to 40 km standard single mode fiber (dispersion: 800 ps/nm) for 10 Gb/s applications with built in wavelength monitor.

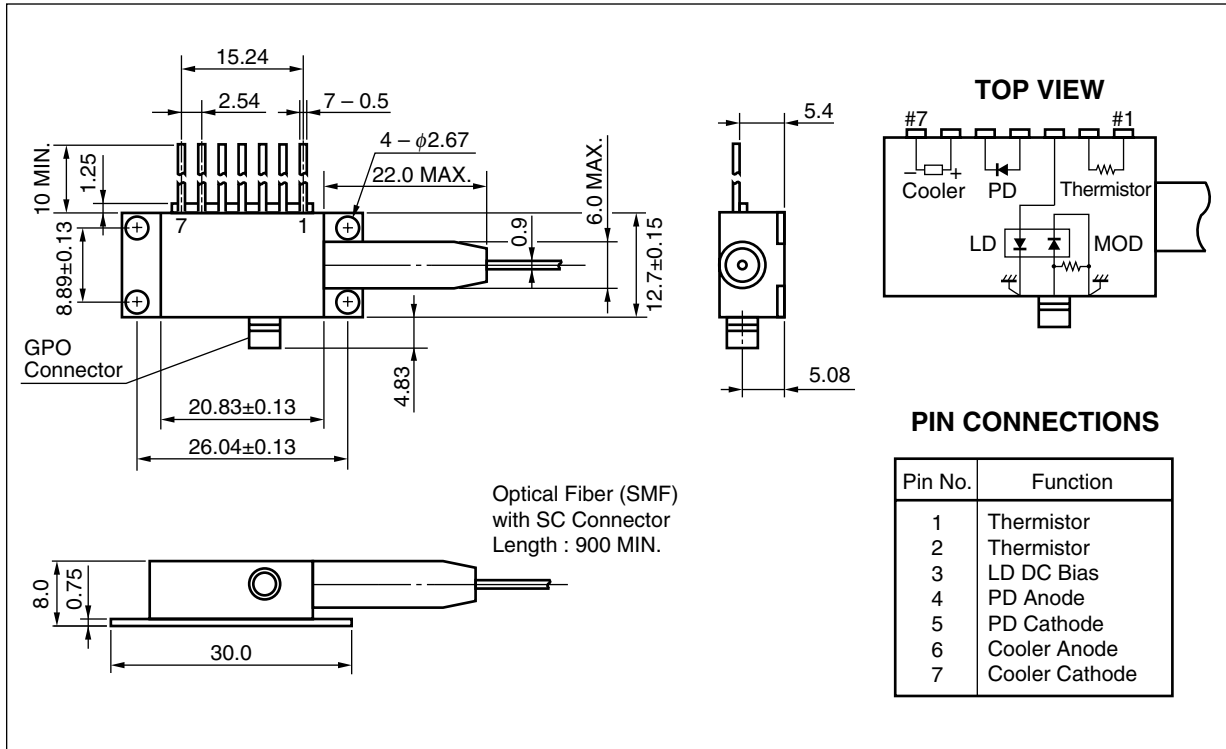
FEATURES

- Integrated electroabsorption modulator
- 10 Gb/s transmission up to 40 km SSMF (dispersion: 800 ps/nm)
- Low modulation voltage
- 7-pin butterfly package with GPO™ connector
- Available for DWDM wavelengths based on ITU-T recommendations



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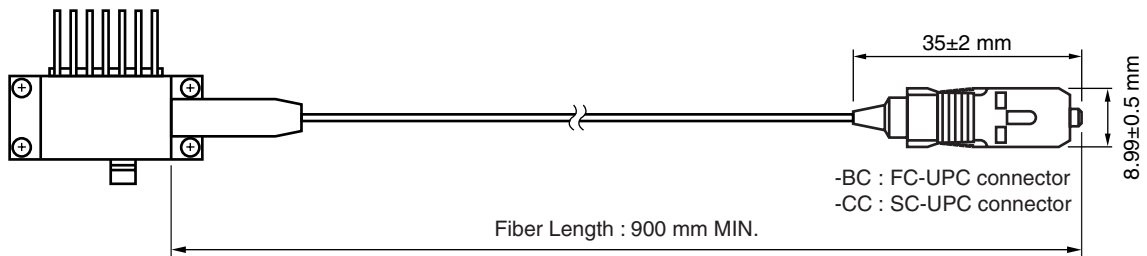
★ PACKAGE DIMENSIONS (UNIT: mm, unless otherwise specified ±0.2 mm)



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

NX8560LJ □□□-□□

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

Without wavelength code : Wavelength is a certain point between
 1 528 to 1 565 nm

With wavelength code : Refer to **Table A**

Table A: DWDM wavelength base on ITU-T recommendations (@ T_{LD} = T_{set})

Wavelength Code	ITU-T Wavelength *1 (nm)	Frequency (THz)	Wavelength Code	ITU-T Wavelength *1 (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			

*1 The value which omitted and computed the 3rd place below the decimal point

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 (T_{LD} = T_{set}, T_c = 25°C, BOL, 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 ² , Single channel	-3	-2		dBm
		Under modulation ² , DWDM wavelength based on ITU-T recommendations	-1			
Peak Emission Wavelength	λ _p	I _{FLD} = I _{op} , V _{EA} = 0 V, T _{LD} = T _{set}	1 528	ITU-T ³	1 565	nm
Side Mode Suppression Ratio	SMSR	I _{FLD} = I _{op} , V _{EA} = 0 V	30	> 37		dB
Extinction Ratio	ER	Under modulation ²	10	> 11		dB
Rise Time	t _r	20-80%, Under modulation ²			40	ps
Fall Time	t _f	80-20%, Under modulation ²			40	ps
Dispersion Penalty	DP	40 km SMF under modulation ^{2,4}			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 2²³-1, V_{EA} = V_{center} ± 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).

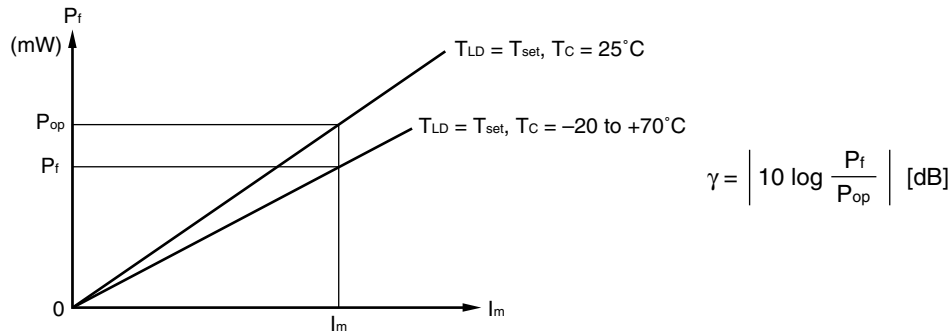
Please refer to **ORDERING INFORMATION**.

*4 BER = 10⁻¹⁰

ELECTRO-OPTICAL CHARACTERISTICS (Applicable to Monitor PD: $T_{LD} = T_{set}$, $T_C = -20$ to $+70^\circ\text{C}$)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Monitor Current	I_m	$V_{RPD} = 5\text{ V}$, $I_{FLD} = I_{op}$, $V_{EA} = 0\text{ V}$	30		1 100	μA
Dark Current	I_D	$V_{RPD} = 5\text{ V}$, $V_{EA} = 0\text{ V}$			10	nA
Terminal Capacitance	C_t	$V_{RPD} = 5\text{ V}$, $f = 1\text{ MHz}$			15	pF
Tracking Error	γ^*	$I_m = \text{const.}$			0.5	dB

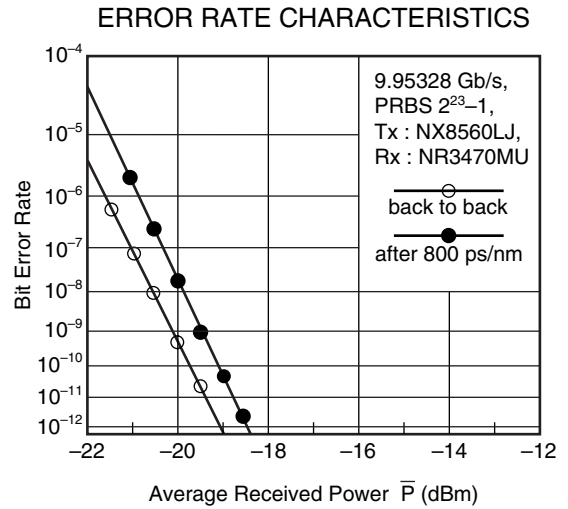
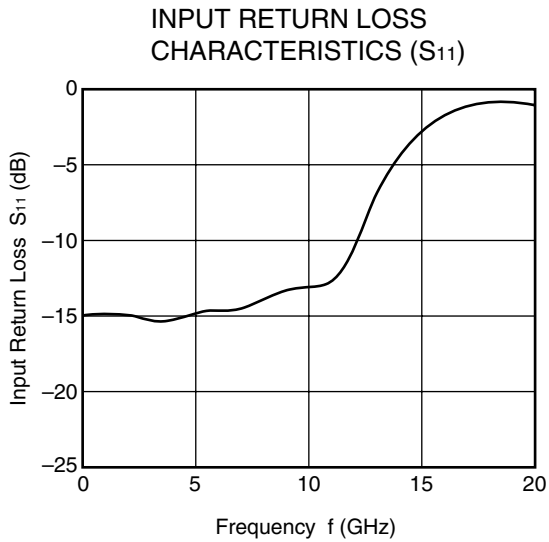
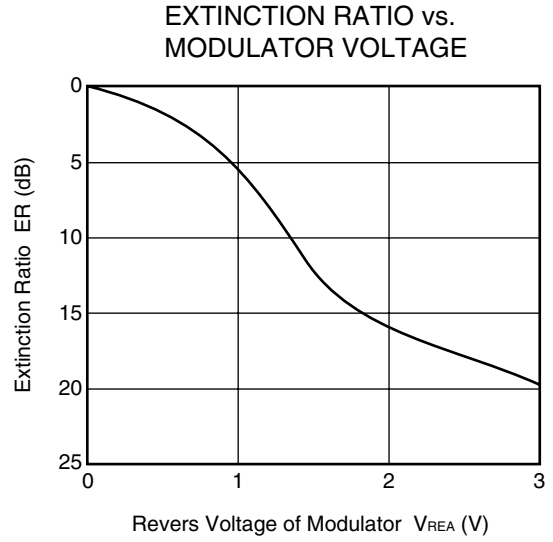
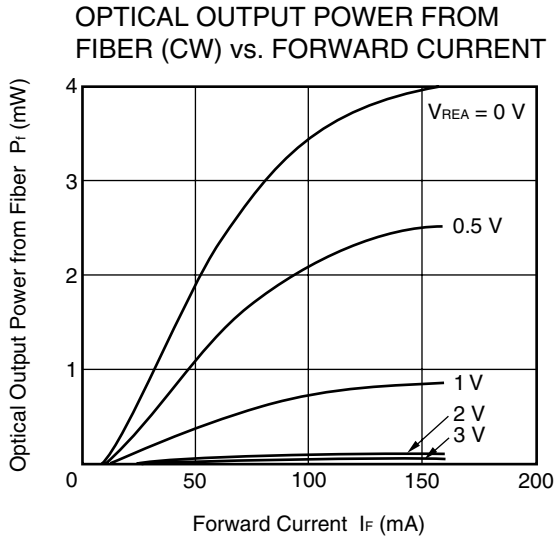
*1 Tracking Error: γ



ELECTRO-OPTICAL CHARACTERISTICS (Applicable to Thermistor and TEC: $T_C = -20$ to $+70^\circ\text{C}$)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Thermistor Resistance	R	$T_{LD} = 25^\circ\text{C}$	9.5	10.0	10.5	$\text{k}\Omega$
B Constant	B		3 350	3 450	3 550	K
TEC Current	I_C	$T_{LD} = T_{set}$			1.2	A
TEC Voltage	V_C	$T_{LD} = T_{set}$			2.4	V

TYPICAL CHARACTERISTICS ($T_{LD} = T_{set}$, $T_c = 25^\circ\text{C}$, unless otherwise specified)



Remark The graphs indicate nominal characteristics.

EA MODULATOR INTEGRATED DFB-LD FAMILY

Part Number	Absolute Maximum Ratings		Electro-Optical Characteristics		Application	Package
	T _c (°C)	T _{stg} (°C)	P _{r1} [*] (mW)	λ _p (nm)		
			MIN.	TYP.		
NX8560LJ Series	-20 to +70	-40 to +85	-3 dBm	1 550 ^{*2}	10 Gb/s: STM-64	BFY with GPO
			-1 dBm	1 550		
NX8560MC Series	0 to +75	-40 to +85	-1 dBm	1 550	10 Gb/s: STM-64	19-pin mini BFY
NX8560MCS Series	0 to +75	-40 to +85	-5 dBm	1 550	10 Gb/s: STM-64	19-pin mini BFY
NX8560SJ Series	-5 to +70	-40 to +85	-3 dBm	1 550 ^{*2}	10 Gb/s: STM-64 with λ monitoring PD	BFY with GPO
NX8564LE Series	-20 to +70	-40 to +85	-5 dBm	1 550 ^{*2}	2.5 Gb/s: STM-16, 360 km	BFY
NX8565LE Series	-20 to +70	-40 to +85	-5 dBm	1 550 ^{*2}	2.5 Gb/s: STM-16, 600 km	BFY
NX8566LE Series	-20 to +70	-40 to +85	0 dBm	1 550 ^{*2}	2.5 Gb/s: STM-16, 240 km	BFY
NX8567SA Series	-5 to +70	-40 to +85	-5 dBm	1 550 ^{*2}	2.5 Gb/s: STM-16, 600 km with λ monitoring PD	BFY
NX8567SAM Series	-5 to +70	-40 to +85	-5 dBm	1 550 ^{*2}	2.5 Gb/s: STM-16, 360 km with λ monitoring PD	BFY
NX8567SAS Series	-5 to +70	-40 to +85	0 dBm	1 550 ^{*2}	2.5 Gb/s: STM-16, 240 km with λ monitoring PD	BFY

*1 Under modulation

*2 Available for DWDM Wavelengths based on ITU-T recommendations

REFERENCE

Document Name	Document No.
OPTICAL SEMICONDUCTOR DEVICES FOR FIBEROPTIC COMMUNICATIONS SELECTION GUIDE	PL10161E
Opto-Electronics Devices Pamphlet	PX10160E

- **PATENT**
 USP 4,826,295
 CA 1,286,848
 EP 143 000

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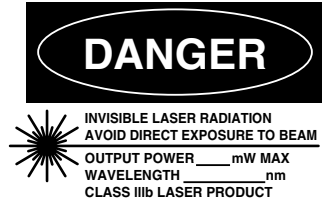
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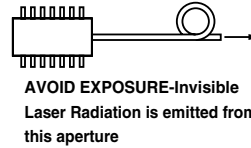
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M8E 00.4-0110

SAFETY INFORMATION ON THIS PRODUCT



SEMICONDUCTOR LASER



<p>Warning Laser Beam</p>	<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.
<p>Caution GaAs Products</p>	<p>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.</p> <ul style="list-style-type: none"> 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. <ol style="list-style-type: none"> 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. 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.
<p>Caution Optical Fiber</p>	<p>A glass-fiber is attached on the product. Handle with care.</p> <ul style="list-style-type: none"> When the fiber is broken or damaged, handle carefully to avoid injury from the damaged part or fragments.

► For further information, please contact

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