

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

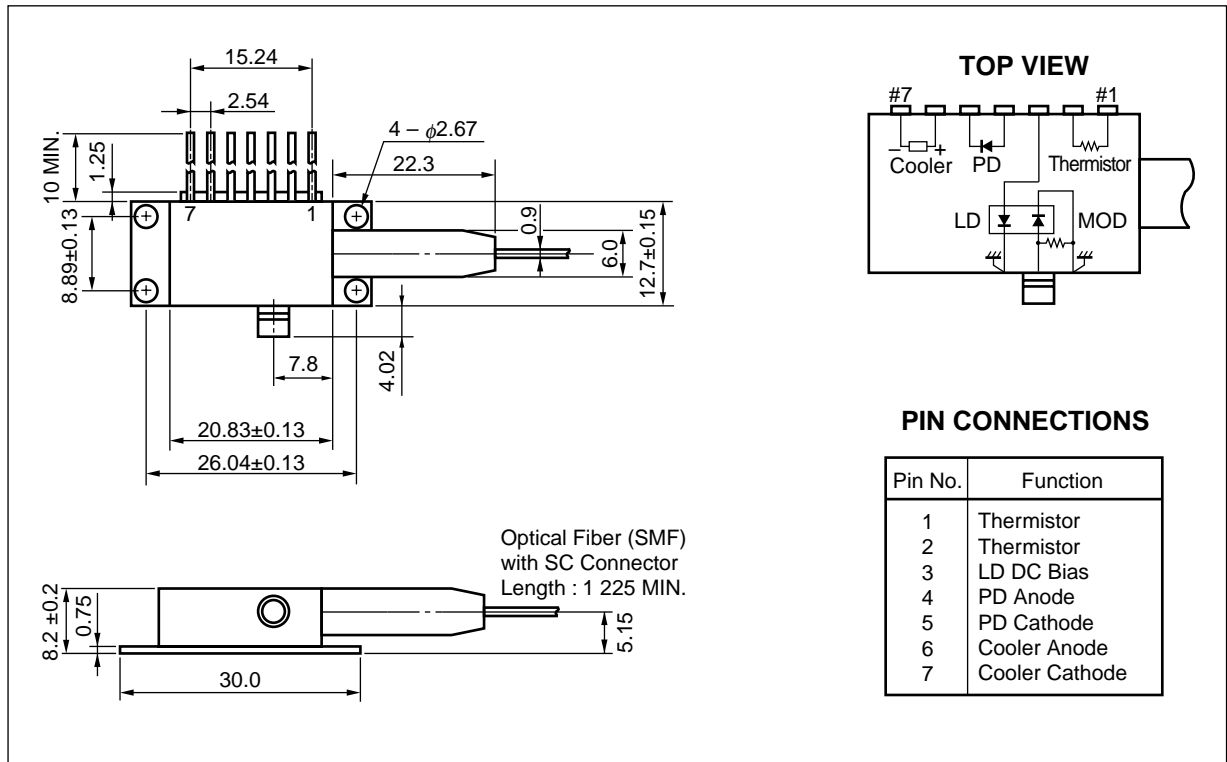
DESCRIPTION

The NX8560LJ-CC is an Electro-Absorption (EA) modulator integrated, 1 550 nm Multiple Quantum Well (MQW) structured Distributed Feed-Back (DFB) laser diode. It is capable of transmitting up to 40 km for 10 Gb/s applications by using standard fiber.

FEATURES

- Integrated electroabsorption modulator
- Up to 40 km transmission capability with standard single mode fiber
- Low modulation voltage
- With GPO™ connector
- ★ • 10 Gb/s application based on ITU-T recommendations
- Butterfly package with SC-UPC connector

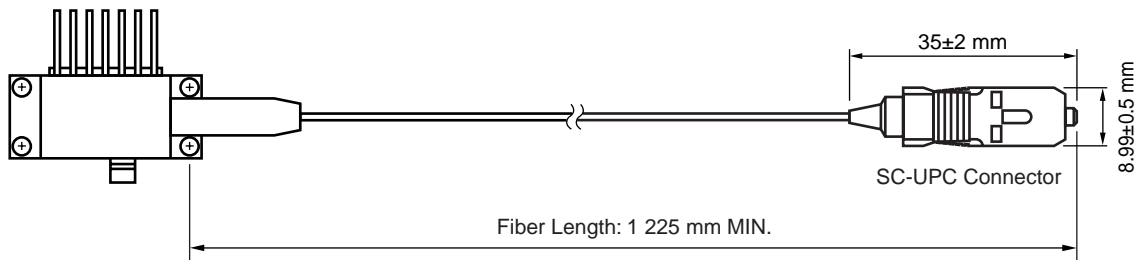
★ **PACKAGE DIMENSIONS (UNIT: mm)**



The information in this document is subject to change without notice. Before using this document, please confirm that this is the latest version.
Not all devices/types available in every country. Please check with local NEC representative for availability and additional information.

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	1 225 MIN.	mm
Flammability	UL1581 VW-1	



★ **ORDERING INFORMATION**

Part Number	Available Connector
NX8560LJ-CC	With SC-UPC Connector

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_{Fm}	1	V
Reverse Voltage of Modulator	V_{Rm}	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_{slid}	260 (10 sec.)	°C

ELECTRO-OPTICAL CHARACTERISTICS

★ (T_{LD} = 25 °C, T_c = -20 to +70 °C, unless otherwise specified)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Laser Set Temperature	T _{set}	I _{FLD} = I _{op} , V _{Rm} = 0 V	20		35	°C
Operating Current	I _{op}	T _{LD} = T _{set}	50		100	mA
Modulation Center Voltage	V _{Rmc}	Under modulation ^{*1}	-2.0		-0.5	V
Modulation Voltage	V _{Rmpp}	Under modulation ^{*1}	2.0		3.0	V
Forward Voltage of LD	V _{FLD}	I _{FLD} = I _{op}			2.0	V
Threshold Current	I _{th}	T _{LD} = T _{set}		6	20	mA
Optical Output Power from Fiber	P _f	I _{FLD} = I _{op} , T _{LD} = T _{set} , Under modulation ^{*1}	-2.0			dBm
★ Peak Emission Wavelength	λ _p	I _{FLD} = I _{op} , V _{Rm} = 0 V, T _{LD} = T _{set}	1 530	1 550	1 563	nm
Side Mode Suppression Ratio	SMSR	I _{FLD} = I _{op} , V _{Rm} = 0 V	30	37		dB
Extinction Ratio	ER	I _{FLD} = I _{op} , Under modulation ^{*1} , V _{Rmpp} ≥ 2.4 V	10	11		dB
Rise Time	t _r	I _{FLD} = I _{op} , 20-80%, Under modulation ^{*1}			40	ps
Fall Time	t _f	I _{FLD} = I _{op} , 80-20%, Under modulation ^{*1}			40	ps
Dispersion Penalty	DP	I _{FLD} = I _{op} , 40 km SMF under modulation ^{*1}		1.5	3.0	dB
Isolation	I _s		23			dB
★ Input Return Loss	S ₁₁	I _{FLD} = I _{op} , V _{Rm} = -1 V, 50 Ω, f = 130 MHz to 5 GHz		-10		dB
		I _{FLD} = I _{op} , V _{Rm} = -1 V, 50 Ω, f = 5 GHz to 10 GHz		-5		

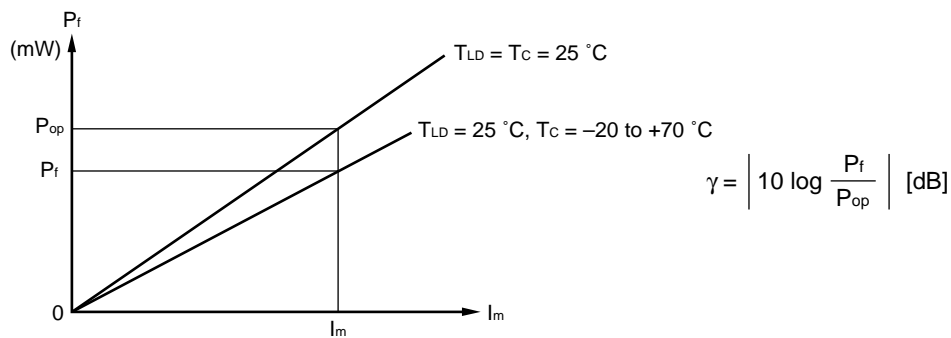
★ *1 40 km SMF under modulation, 9.95328 Gb/s, PRBS 2³¹-1, V_{Rm} = V_{Rmc} ± 0.5V_{Rmpp}, BER = 10⁻¹⁰, NEC Test System

ELECTRO-OPTICAL CHARACTERISTICS

★ (Applicable to Monitor PD: $T_{LD} = 25\text{ °C}$, $T_c = -20\text{ to }+70\text{ °C}$)

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

*1 Tracking Error: γ

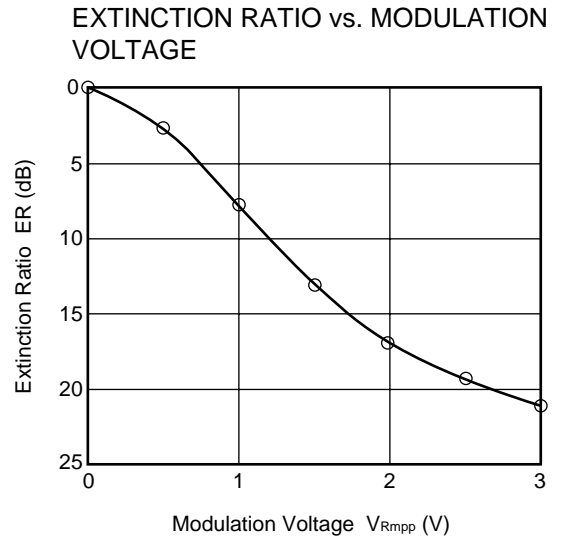
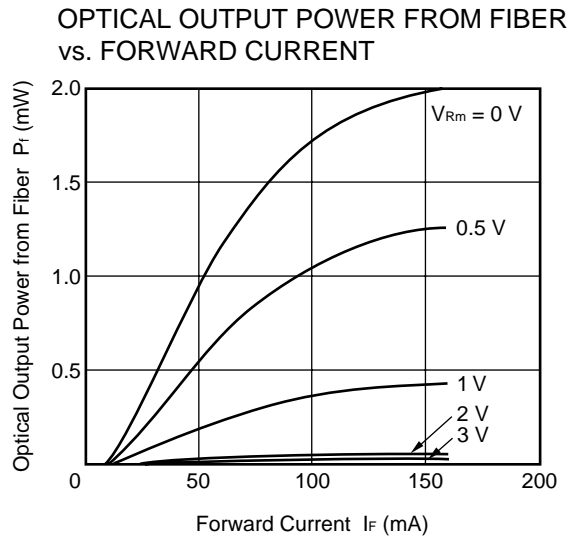


ELECTRO-OPTICAL CHARACTERISTICS

★ (Applicable to Thermistor and TEC: $T_{LD} = 25\text{ °C}$, $T_c = -20\text{ to }+70\text{ °C}$)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Thermistor Resistance	R	$T_{LD} = 25\text{ °C}$	9.5	10.0	10.5	$\text{k}\Omega$
B Constant	B		3 350	3 450	3 550	K
Cooler Current	I_c	$\Delta T = 50\text{ °C}$			1.2	A
Cooler Voltage	V_c	$\Delta T = 50\text{ °C}$			2.4	V

TYPICAL CHARACTERISTICS (T_{LD} = 25 °C, unless otherwise specified)



Remark The graphs indicate nominal characteristics.

★ DFB-LD FAMILY

Part Number	Absolute Maximum Ratings		Electro-Optical Characteristics (T _c = 25 °C)			Application	Package
	T _c (°C)	T _{stg} (°C)	I _{th} (mA)	P _f (mW)	λ _p (nm)		
			TYP.	MIN.	TYP.		
NX8300BE-CC NX8300CE-CC	0 to +75	-40 to +85	15	2 ^{*1}	1 310	2.5 Gb/s: STM-16 (S-16.1, L-16.1)	Coaxial
NX8303BG-CC NX8303CG-CC	-10 to +85	-40 to +85	15	2 ^{*1}	1 310	622 Mb/s: STM-4 (L-4.1)	Coaxial
NX8503BG-CC NX8503CG-CC	-10 to +85	-40 to +85	15	2 ^{*1}	1 550	156 Mb/s: STM-1 (L-1.2, L-1.3)	Coaxial
						622 Mb/s: STM-4 (L-4.2, L-4.3)	
NX8504BE-CC NX8504CE-CC	-10 to +85	-40 to +85	15	2 ^{*1}	1 550	622 Mb/s: STM-4 (L-4.2, L-4.3)	Coaxial
NX8560LJ-CC	-20 to +70	-40 to +85	6	-2 dBm	1 550	≤ 10 Gb/s: STM-64	BFY with GPO
NX8562LB	-20 to +65	-40 to +85	20	20	1 550 ^{*2}	CW Light Source for external modulator	BFY
NX8563LB	-20 to +65	-40 to +85	20	10	1 550 ^{*2}	CW Light Source for external modulator	BFY
NX8564LE-CC	-20 to +70	-40 to +85	7	0.6 ^{*1}	1 550 ^{*2}	2.5 Gb/s: STM-16 EA modulator integrated	BFY
NX8565LE-CC	-20 to +70	-40 to +85	7	0.6 ^{*1}	1 550 ^{*2}	2.5 Gb/s: STM-16 EA modulator integrated	BFY
NX8570SA	-20 to +70	-40 to +85	20	20	1 550 ^{*2}	CW Light Source with λ monitoring PD	BFY
NX8571SA	-20 to +70	-40 to +85	20	10	1 550 ^{*2}	CW Light Source with λ monitoring PD	BFY

*1 TYP.

*2 Available for DWDM Wavelength based on ITU-T recommendation

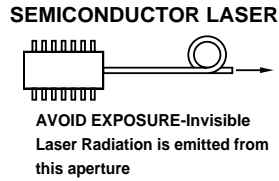
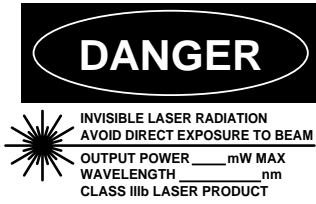
REFERENCE

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	C11159E
Quality grades on NEC semiconductor devices	C11531E
SEMICONDUCTOR SELECTION GUIDE –Products and Packages–	X13769E

[MEMO]

[MEMO]

SAFETY INFORMATION ON THIS PRODUCT



NEC Corporation
 NEC Building, 7-1, Shiba 5-chome,
 Minato-ku, Tokyo 108-01, Japan
 Type number: _____
 Manufactured: _____
 Serial Number: _____
 This product conforms to FDA
 regulations as applicable
 to standards 21 CFR Chapter 1.
 Subchapter J.

<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>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>
<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.

GPO is a trademark of Gilbert Engineering Co., Inc.

The export of this product from Japan is prohibited without governmental license. To export or re-export this product from a country other than Japan may also be prohibited without a license from that country. Please call an NEC sales representative.

- **The information in this document is current as of May, 2001. The information is subject to change without notice. For actual design-in, refer to the latest publications of NEC's data sheets or data books, etc., for the most up-to-date specifications of NEC semiconductor products. Not all products and/or types are available in every country. Please check with an NEC sales representative for availability and additional information.**
 - No part of this document may be copied or reproduced in any form or by any means without prior written consent of NEC. NEC assumes no responsibility for any errors that may appear in this document.
 - NEC does not assume any liability for infringement of patents, copyrights or other intellectual property rights of third parties by or arising from the use of NEC semiconductor products listed in this document or any other liability arising from the use of such products. No license, express, implied or otherwise, is granted under any patents, copyrights or other intellectual property rights of NEC or others.
 - Descriptions of circuits, software and other related information in this document are provided for illustrative purposes in semiconductor product operation and application examples. The incorporation of these circuits, software and information in the design of customer's equipment shall be done under the full responsibility of customer. NEC assumes no responsibility for any losses incurred by customers or third parties arising from the use of these circuits, software and information.
 - While NEC endeavours to enhance the quality, reliability and safety of NEC semiconductor products, customers agree and acknowledge that the possibility of defects thereof cannot be eliminated entirely. To minimize risks of damage to property or injury (including death) to persons arising from defects in NEC semiconductor products, customers must incorporate sufficient safety measures in their design, such as redundancy, fire-containment, and anti-failure features.
 - NEC semiconductor products are classified into the following three quality grades:
 "Standard", "Special" and "Specific". The "Specific" quality grade applies only to semiconductor products developed based on a customer-designated "quality assurance program" for a specific application. The recommended applications of a semiconductor product depend on its quality grade, as indicated below. Customers must check the quality grade of each semiconductor product before using it in a particular application.
 "Standard": Computers, office equipment, communications equipment, test and measurement equipment, audio and visual equipment, home electronic appliances, machine tools, personal electronic equipment and industrial robots
 "Special": Transportation equipment (automobiles, trains, ships, etc.), traffic control systems, anti-disaster systems, anti-crime systems, safety equipment and medical equipment (not specifically designed for life support)
 "Specific": Aircraft, aerospace equipment, submersible repeaters, nuclear reactor control systems, life support systems and medical equipment for life support, etc.
- The quality grade of NEC semiconductor products is "Standard" unless otherwise expressly specified in NEC's data sheets or data books, etc. If customers wish to use NEC semiconductor products in applications not intended by NEC, they must contact an NEC sales representative in advance to determine NEC's willingness to support a given application.
- (Note)
- (1) "NEC" as used in this statement means NEC Corporation and also includes its majority-owned subsidiaries.
 - (2) "NEC semiconductor products" means any semiconductor product developed or manufactured by or for NEC (as defined above).