PRELIMINARY DATA SHEET

NEC

LASER DIODE
NX8560LJ-CC

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

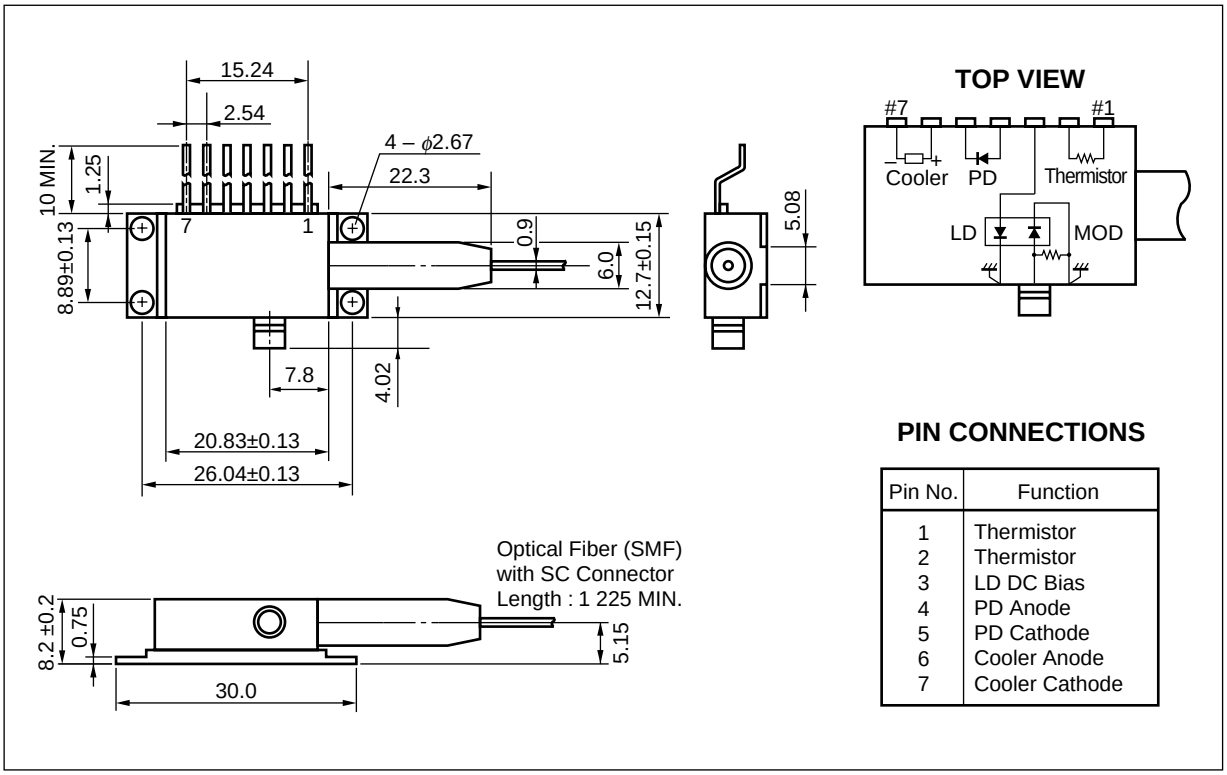
DESCRIPTION

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. The module offers wide range of wavelengths, Dense Wavelength Division Multiplexing (DWDM) based on ITU-T recommendations.

FEATURES

- Integrated electroabsorption modulator
- Up to 40 km transmission capability with standard single mode fiber
- Low modulation voltage
- With GPO connector
- ★ • Available for DWDM wavelength based on ITU-T recommendation
- ★ • Butterfly package with SC-UPC connector

PACAGE DIMENSIONS (UNIT: mm)



PIN CONNECTIONS

Pin No.	Function
1	Thermistor
2	Thermistor
3	LD DC Bias
4	PD Anode
5	PD Cathode
6	Cooler Anode
7	Cooler Cathode

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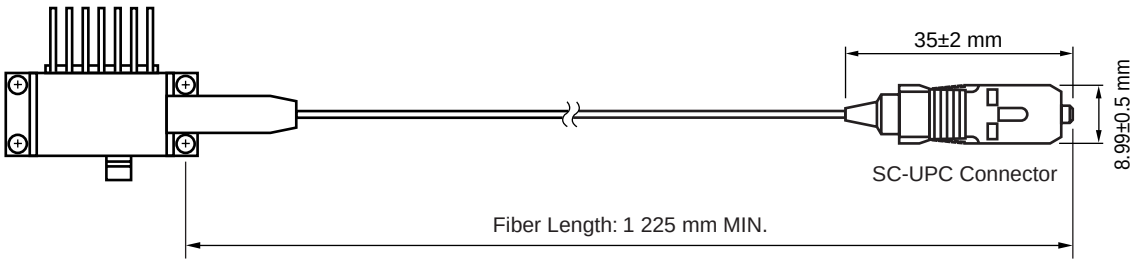
The mark ★ shows major revised points.

★ 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
Fiber Length	1 225 MIN.	mm
Flammability	UL1581 VW-1	



★ ORDERING INFORMATION

Part Number With SC-UPC Connector	ITU-T Wavelength*1 (nm)	Frequency (THz)
NX8560LJ311-CC	1531.11	195.80
NX8560LJ318-CC	1531.89	195.70
NX8560LJ326-CC	1532.68	195.60
NX8560LJ334-CC	1533.46	195.50
NX8560LJ342-CC	1534.25	195.40
NX8560LJ350-CC	1535.03	195.30
NX8560LJ358-CC	1535.82	195.20
NX8560LJ366-CC	1536.60	195.10
NX8560LJ373-CC	1537.39	195.00
NX8560LJ381-CC	1538.18	194.90
NX8560LJ389-CC	1538.97	194.80
NX8560LJ397-CC	1539.76	194.70
NX8560LJ405-CC	1540.55	194.60
NX8560LJ413-CC	1541.34	194.50
NX8560LJ421-CC	1542.14	194.40
NX8560LJ429-CC	1542.93	194.30
NX8560LJ437-CC	1543.73	194.20
NX8560LJ445-CC	1544.52	194.10
NX8560LJ453-CC	1545.32	194.00
NX8560LJ461-CC	1546.11	193.90
NX8560LJ469-CC	1546.91	193.80
NX8560LJ477-CC	1547.71	193.70
NX8560LJ485-CC	1548.51	193.60
NX8560LJ493-CC	1549.31	193.50
NX8560LJ501-CC	1550.11	193.40
NX8560LJ509-CC	1550.91	193.30
NX8560LJ517-CC	1551.72	193.20
NX8560LJ525-CC	1552.52	193.10
NX8560LJ533-CC	1553.32	193.00
NX8560LJ541-CC	1554.13	192.90
NX8560LJ549-CC	1554.94	192.80
NX8560LJ557-CC	1555.74	192.70
NX8560LJ565-CC	1556.55	192.60
NX8560LJ573-CC	1557.36	192.50
NX8560LJ581-CC	1558.17	192.40

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

Part Number With SC-UPC Connector	ITU-T Wavelength*1 (nm)	Frequency (THz)
NX8560LJ589-CC	1558.98	192.30
NX8560LJ597-CC	1559.79	192.20
NX8560LJ606-CC	1560.60	192.10
NX8560LJ614-CC	1561.41	192.00
NX8560LJ622-CC	1562.23	191.90
NX8560LJ630-CC	1563.04	191.80
NX8560LJ638-CC	1563.86	191.70
NX8560LJ646-CC	1564.67	191.60

***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_{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	–10 to +70	°C
	Storage Temperature	T_{stg}	–40 to +85	°C
	Lead Soldering Temperature	T_{sld}	260 (10 sec.)	°C

★ ELECTRO-OPTICAL CHARACTERISTICS

(T_{LD} = 25 °C, T_C = –10 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	ITU-T[*2]	1 565	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], $V_{Rmpp} \geq$ 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, f_C = DC to 5 GHz		–10		dB
		$I_{FLD} = I_{op}$, V_{Rm} = –1 V, f_C = 5 G to 10 GHz		–5		

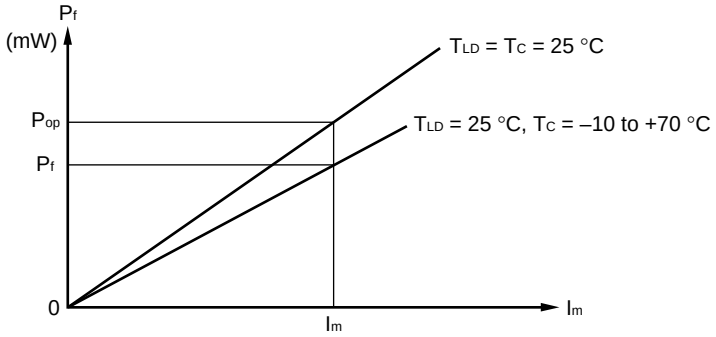
***1** 40 km SMF under modulation, 10 Gb/s, PRBS 2^{23-1}, $V_{Rm} = V_{Rmc} \pm 0.5V_{Rmpp}$, BER = 10^{-10}, NEC Test System

***2** Available for DWDM wavelength based on ITU-T recommendation (100 GHz grid).
Please refer to ORDERING INFORMATION.

ELECTRO-OPTICAL CHARACTERISTICS
(Applicable to Monitor PD: T_{LD} = 25 °C, T_C = –10 to +70 °C)

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

***1** $\gamma = \left| 10 \log \frac{P_f}{P_{op}} \right|$



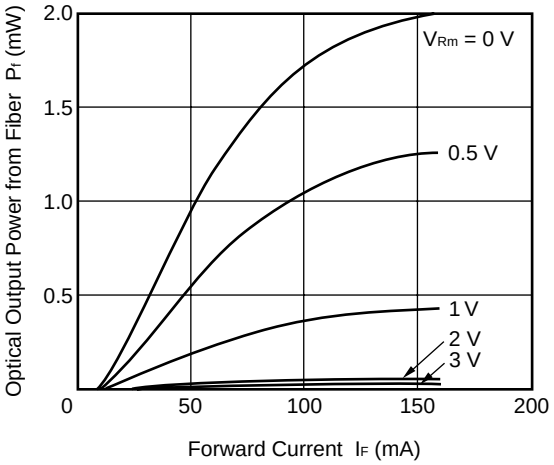
(@ P_f (25 °C) = P_{op})

★ ELECTRO-OPTICAL CHARACTERISTICS
(Applicable to Thermistor and TEC: T_{LD} = 25 °C, T_C = –10 to +70 °C)

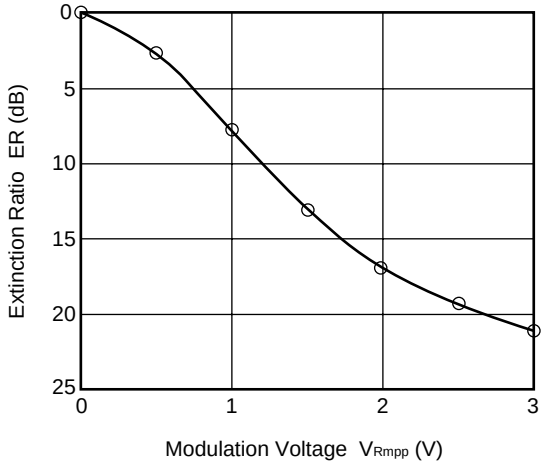
Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Thermistor Resistance	R	T_{LD} = 25 °C	9.5	10.0	10.5	kΩ
B Constant	B		3 350	3 450	3 550	K
Cooler Current	I_C	ΔT = 50 °C			1.2	A
Cooler Voltage	V_C	ΔT = 50 °C			2.4	V

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

OPTICAL OUTPUT POWER FROM FIBER vs. FORWARD CURRENT



EXTINCTION RATIO vs. MODULATION VOLTAGE



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	−10 to +85	−40 to +85	15	2[*1]	1 310	622 Mb/s: STM-4 (L-4.1)	Coaxial
NX8503BG-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	−10 to +70	−40 to +85	6	−2 dBm	1 550[*2]	≤ 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

***1** TYP.

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

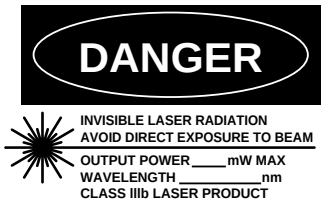
REFERENCE

Document Name	Document No.
NEC semiconductor device reliability/quality control system	C11159E
Quality grades on NEC semiconductor devices	C11531E
Semiconductor device mounting technology manual	C10535E
SEMICONDUCTOR SELECTION GUIDE Products & Packages (CD-ROM)	X13769X

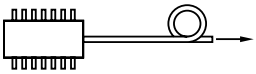
[MEMO]

CAUTION

Within this device there exists GaAs (Gallium Arsenide) material which is a harmful substance if ingested. Please do not under any circumstances break the hermetic seal.



SEMICONDUCTOR LASER



AVOID EXPOSURE-Invisible Laser Radiation is emitted from this aperture

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.

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