DATA SHEET

NEC

LASER DIODE

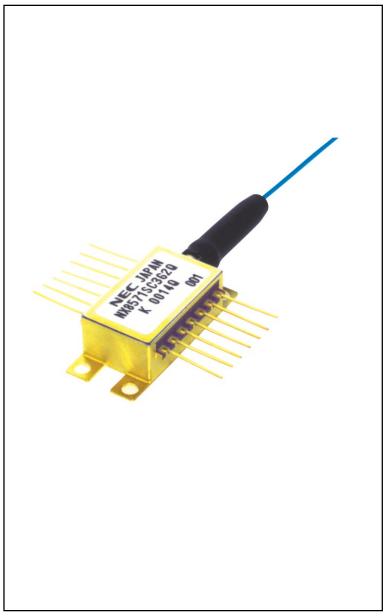
NX8571SCxxxQ-BA

1 550 nm CW LIGHT SOURCE
InGaAsP MQW-DFB LASER DIODE MODULE
WITH WAVELENGTH MONITOR

DESCRIPTION

The NX8571SCxxxQ-BA is a 1 550 nm Multiple Quantum Well (MQW) structured Distributed Feed-Back (DFB) laser diode module with wavelength monitor function. This device is temperature tunable over 8 × 50 GHz channels. Available at both C-band (1530.334 to 1565.087 nm) and L-band (1565.496 to 1608.760 nm) ITU-T grid wavelengths.

This device is designed as CW light source and ideal for transmission systems in which external modulators are used.



FEATURES

- Wavelength monitor function (Etalon Filter, Wavelength monitor PD)
- Optical output power P_f = 10 mW MIN.
- Available for DWDM wavelengths based on ITU-T recommendations (50 GHz grid)
- 8 channel wavelength tunable capability for 50 GHz-spacing
- Internal thermo-electric cooler and isolator
- Hermetically sealed 14-pin butterfly package
- Polarization maintain fiber pigtail

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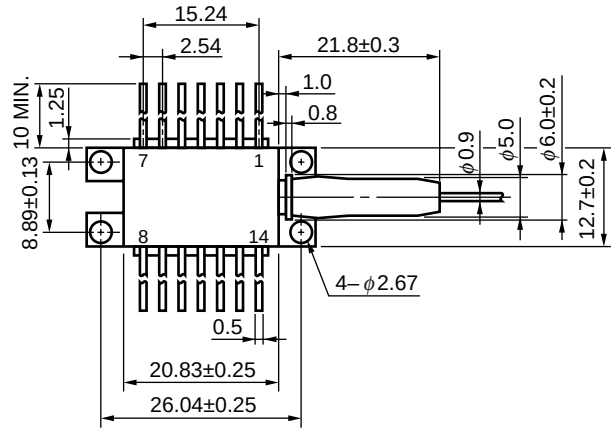
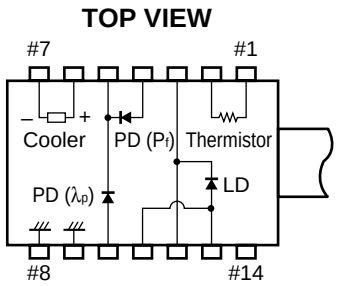
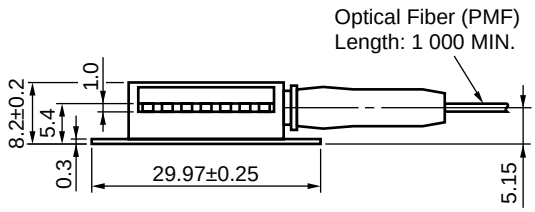
PACKAGE DIMENSIONS (UNIT : mm)





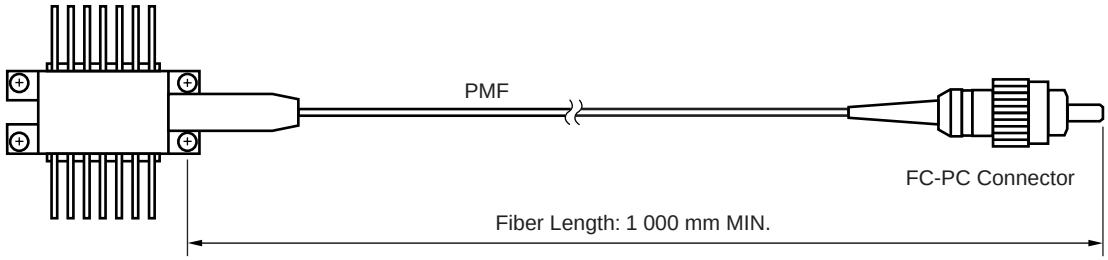


PIN CONNECTIONS

Pin No.	Function	Pin No.	Function
1	Thermistor	8	GND
2	Thermistor	9	GND
3	LD Cathode	10	PD (λ_p) Anode
4	PD (P_f) Anode	11	LD Anode
5	PD Cathode	12	LD Cathode
6	Cooler Anode	13	LD Anode
7	Cooler Cathode	14	NC

OPTICAL FIBER CHARACTERISTICS

Parameter	Specification	Unit
Outer Diameter	0.9±0.1	mm
Minimum Fiber Bending Radius	25	mm
Fiber Length	1 000 MIN.	mm



ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Ratings	Unit
Forward Current of LD	I_F	300	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	−20 to +70	°C
Storage Temperature	T_{stg}	−40 to +85	°C
Lead Soldering Temperature	T_{sld}	260 (10 sec.)	°C

ELECTRO-OPTICAL CHARACTERISTICS ($T_{LD} = T_{set}$, T_C = −5 to +70°C, unless otherwise specified)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Laser Set Temperature	T_{set}	8 channel tunable	5		55	°C
Forward Voltage	V_F	P_f = 10 mW	0.9	1.2	2.5	V
Threshold Current	I_{th}			20	40	mA
Operation Current	I_{op}	P_f = 10 mW		70	125	mA
Optical Output Power from Fiber	P_f	I_F = 125 mA, $T_{LD} = T_{set}$	10			mW
Peak Emission Wavelength	λ_p	P_f = 10 mW, CW, $T_{LD} = T_{set}$	1 530	ITU-T[*1]	1 609	nm
Wevelength Stability	–	$T_{LD} = T_{set}$, applicable to wavelength monitor, E.O.L	−20		+20	pm
Spectral Line Width	$\Delta\nu$	P_f = 10 mW, CW, 3 dB down		1	2	MHz
Side Mode Suppression Ratio	SMSR	P_f = 10 mW, CW	35	45		dB
Relative Intensity Noise	RIN	P_f = 10 mW, 20 MHz to 3 GHz			−150	dB/Hz
Isolation	I_s		30			dB
Polarization Extinction Ratio[*2]	ext	P_f = 10 mW, CW	20			dB

***1** Available for DWDM wavelengths based on ITU-T recommendations (50 GHz grid).
Please refer to **Table A**.

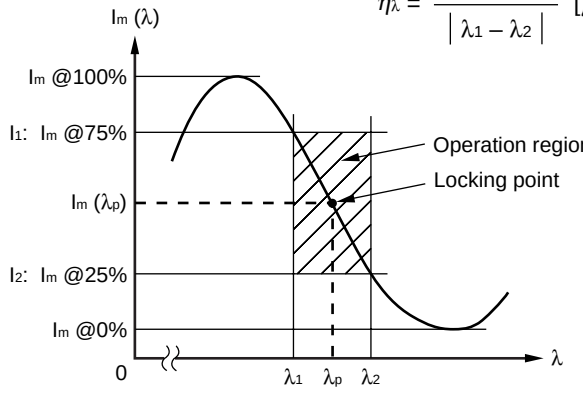
***2** Polarization state of LD is aligned parallel to the slow axis.

ELECTRO-OPTICAL CHARACTERISTICS (Applicable to Monitor PD: $T_{LD} = T_{set}$, T_C = –5 to +70°C)

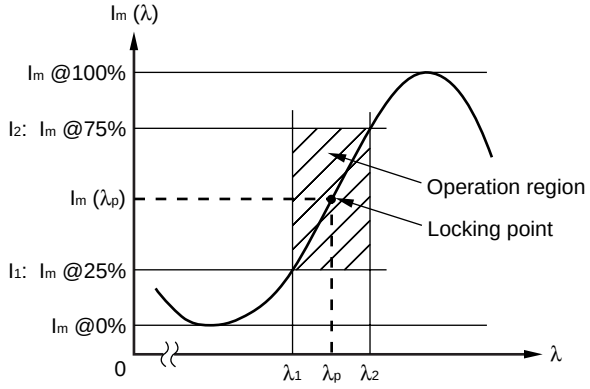
Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Monitor Current (P_f Monitor)	I_m (P_f)	P_f = 10 mW, V_R = 5 V	20		200	μA
Monitor Current (λ_p Monitor)	I_m (λ_p)	P_f = 10 mW, V_R = 5 V, Locking point	10		100	μA
Operation Region *1	I_m (λ)		25		75	%
	$\lvert\lambda_1-\lambda_2\rvert$		90			pm
Discrimination Slope *1	η_λ		0.05			μA/pm
Dark Current	I_D	V_R = 5 V		2	10	nA
Tracking Error	γ *2	I_m = const.			0.5	dB

***1** Operation region, Discrimination slope, Slope assignment

$$\eta_\lambda = \frac{\lvert I_1 - I_2 \rvert}{\lvert \lambda_1 - \lambda_2 \rvert} \ [\mu A/pm]$$

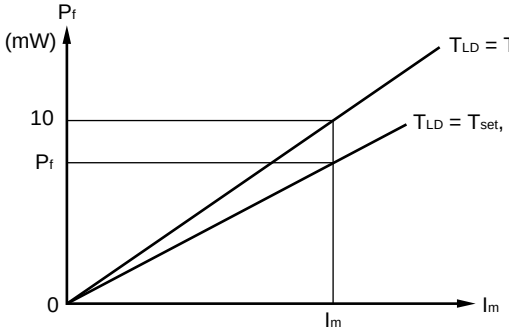


Negative Slope (Odd channel)



Positive Slope (Even channel)

***2** Tracking Error: γ



$$\gamma = \left| 10 \log \frac{P_f}{10} \right| \ [dB]$$

ELECTRO-OPTICAL CHARACTERISTICS (Applicable to Thermistor and TEC: $T_{LD} = T_{set}$, T_C = –5 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	T_{LD} = 25°C	3 350	3 450	3 550	K
Cooler Current	I_C	$\Delta T = 70 - T_{set}$, P_f = 10 mW			1.5	A
Cooler Voltage	V_C	$\Delta T = 70 - T_{set}$, P_f = 10 mW			3.0	V

ORDERING INFORMATION

NX8571SC □□□ Q-BA

- With FC-PC connector
- 8 channel tunable
- Wavelength code : Refer to **Table A**
- Anode froating

Table A: DWDM wavelength base on ITU-T recommendations (@ T_{LD} = T_{set}) (1/7)

Wavelength Code 8 channel tunable	ITU-T Wavelength *1 (nm)	Frequency (THz)	Monitor Slope
330Q	1530.33	195.90	Negative
	1530.72	195.85	Positive
	1531.11	195.80	Negative
	1531.50	195.75	Positive
	1531.89	195.70	Negative
	1532.29	195.65	Positive
	1532.68	195.60	Negative
	1533.07	195.55	Positive
362Q	1533.46	195.50	Negative
	1533.85	195.45	Positive
	1534.25	195.40	Negative
	1534.64	195.35	Positive
	1535.03	195.30	Negative
	1535.42	195.25	Positive
	1535.82	195.20	Negative
	1536.21	195.15	Positive
393Q	1536.60	195.10	Negative
	1537.00	195.05	Positive
	1537.39	195.00	Negative
	1537.79	194.95	Positive
	1538.18	194.90	Negative
	1538.58	194.85	Positive
	1538.97	194.80	Negative
	1539.37	194.75	Positive

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

Table A: DWDM wavelength base on ITU-T recommendations (@ $T_{LD} = T_{set}$) (2/7)

Wavelength Code 8 channel tunable	ITU-T Wavelength *1 (nm)	Frequency (THz)	Monitor Slope
425Q	1539.76	194.70	Negative
	1540.16	194.65	Positive
	1540.55	194.60	Negative
	1540.95	194.55	Positive
	1541.34	194.50	Negative
	1541.74	194.45	Positive
	1542.14	194.40	Negative
	1542.53	194.35	Positive
457Q	1542.93	194.30	Negative
	1543.33	194.25	Positive
	1543.73	194.20	Negative
	1544.12	194.15	Positive
	1544.52	194.10	Negative
	1544.92	194.05	Positive
	1545.32	194.00	Negative
	1545.72	193.95	Positive
489Q	1546.11	193.90	Negative
	1546.51	193.85	Positive
	1546.91	193.80	Negative
	1547.31	193.75	Positive
	1547.71	193.70	Negative
	1548.11	193.65	Positive
	1548.51	193.60	Negative
	1548.91	193.55	Positive
521Q	1549.31	193.50	Negative
	1549.71	193.45	Positive
	1550.11	193.40	Negative
	1550.51	193.35	Positive
	1550.91	193.30	Negative
	1551.31	193.25	Positive
	1551.72	193.20	Negative
	1552.12	193.15	Positive

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

Table A: DWDM wavelength base on ITU-T recommendations (@ $T_{LD} = T_{set}$) (3/7)

Wavelength Code 8 channel tunable	ITU-T Wavelength *1 (nm)	Frequency (THz)	Monitor Slope
553Q	1552.52	193.10	Negative
	1552.92	193.05	Positive
	1553.32	193.00	Negative
	1553.73	192.95	Positive
	1554.13	192.90	Negative
	1554.53	192.85	Positive
	1554.94	192.80	Negative
	1555.34	192.75	Positive
585Q	1555.74	192.70	Negative
	1556.15	192.65	Positive
	1556.55	192.60	Negative
	1556.95	192.55	Positive
	1557.36	192.50	Negative
	1557.76	192.45	Positive
	1558.17	192.40	Negative
	1558.57	192.35	Positive
618Q	1558.98	192.30	Negative
	1559.38	192.25	Positive
	1559.79	192.20	Negative
	1560.20	192.15	Positive
	1560.60	192.10	Negative
	1561.01	192.05	Positive
	1561.41	192.00	Negative
	1561.82	191.95	Positive
650Q	1562.23	191.90	Negative
	1562.64	191.85	Positive
	1563.04	191.80	Negative
	1563.45	191.75	Positive
	1563.86	191.70	Negative
	1564.27	191.65	Positive
	1564.67	191.60	Negative
	1565.08	191.55	Positive

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

Table A: DWDM wavelength base on ITU-T recommendations (@ $T_{LD} = T_{set}$) (4/7)

Wavelength Code 8 channel tunable	ITU-T Wavelength *1 (nm)	Frequency (THz)	Monitor Slope
683Q	1565.49	191.50	Negative
	1565.90	191.45	Positive
	1566.31	191.40	Negative
	1566.72	191.35	Positive
	1567.13	191.30	Negative
	1567.54	191.25	Positive
	1567.95	191.20	Negative
	1568.36	191.15	Positive
716Q	1568.77	191.10	Negative
	1569.18	191.05	Positive
	1569.59	191.00	Negative
	1570.00	190.95	Positive
	1570.41	190.90	Negative
	1570.82	190.85	Positive
	1571.23	190.80	Negative
	1571.65	190.75	Positive
749Q	1572.06	190.70	Negative
	1572.47	190.65	Positive
	1572.88	190.60	Negative
	1573.30	190.55	Positive
	1573.71	190.50	Negative
	1574.12	190.45	Positive
	1574.54	190.40	Negative
	1574.95	190.35	Positive
782Q	1575.36	190.30	Negative
	1575.78	190.25	Positive
	1576.19	190.20	Negative
	1576.61	190.15	Positive
	1577.02	190.10	Negative
	1577.44	190.05	Positive
	1577.85	190.00	Negative
	1578.27	189.95	Positive

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

Table A: DWDM wavelength base on ITU-T recommendations (@ $T_{LD} = T_{set}$) (5/7)

Wavelength Code 8 channel tunable	ITU-T Wavelength *1 (nm)	Frequency (THz)	Monitor Slope
816Q	1578.68	189.90	Negative
	1579.10	189.85	Positive
	1579.51	189.80	Negative
	1579.93	189.75	Positive
	1580.35	189.70	Negative
	1580.76	189.65	Positive
	1581.18	189.60	Negative
	1581.60	189.55	Positive
849Q	1582.01	189.50	Negative
	1582.43	189.45	Positive
	1582.85	189.40	Negative
	1583.27	189.35	Positive
	1583.69	189.30	Negative
	1584.10	189.25	Positive
	1584.52	189.20	Negative
	1584.94	189.15	Positive
883Q	1585.36	189.10	Negative
	1585.78	189.05	Positive
	1586.20	189.00	Negative
	1586.62	188.95	Positive
	1587.04	188.90	Negative
	1587.46	188.85	Positive
	1587.88	188.80	Negative
	1588.30	188.75	Positive
916Q	1588.72	188.70	Negative
	1589.14	188.65	Positive
	1589.56	188.60	Negative
	1589.98	188.55	Positive
	1590.41	188.50	Negative
	1590.83	188.45	Positive
	1591.25	188.40	Negative
	1591.67	188.35	Positive

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

Table A: DWDM wavelength base on ITU-T recommendations (@ $T_{LD} = T_{set}$) (6/7)

Wavelength Code 8 channel tunable	ITU-T Wavelength *1 (nm)	Frequency (THz)	Monitor Slope
950Q	1592.10	188.30	Negative
	1592.52	188.25	Positive
	1592.94	188.20	Negative
	1593.36	188.15	Positive
	1593.79	188.10	Negative
	1594.21	188.05	Positive
	1594.64	188.00	Negative
	1595.06	187.95	Positive
984Q	1595.48	187.90	Negative
	1595.91	187.85	Positive
	1596.33	187.80	Negative
	1596.76	187.75	Positive
	1597.18	187.70	Negative
	1597.61	187.65	Positive
	1598.04	187.60	Negative
	1598.46	187.55	Positive
6018Q	1598.89	187.50	Negative
	1599.32	187.45	Positive
	1599.74	187.40	Negative
	1600.17	187.35	Positive
	1600.60	187.30	Negative
	1601.02	187.25	Positive
	1601.45	187.20	Negative
	1601.88	187.15	Positive
6053Q	1602.31	187.10	Negative
	1602.74	187.05	Positive
	1603.16	187.00	Negative
	1603.59	186.95	Positive
	1604.02	186.90	Negative
	1604.45	186.85	Positive
	1604.88	186.80	Negative
	1605.31	186.75	Positive

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

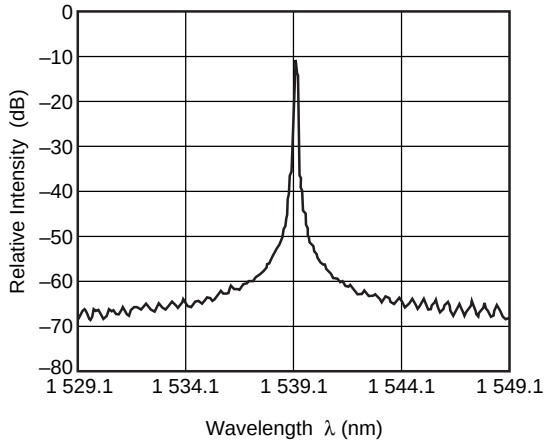
Table A: DWDM wavelength base on ITU-T recommendations (@ T_{LD} = T_{set}) (7/7)

Wavelength Code 8 channel tunable	ITU-T Wavelength *1 (nm)	Frequency (THz)	Monitor Slope
6087Q	1605.74	186.70	Negative
	1606.17	186.65	Positive
	1606.60	186.60	Negative
	1607.03	186.55	Positive
	1607.46	186.50	Negative
	1607.89	186.45	Positive
	1608.32	186.40	Negative
	1608.76	186.35	Positive

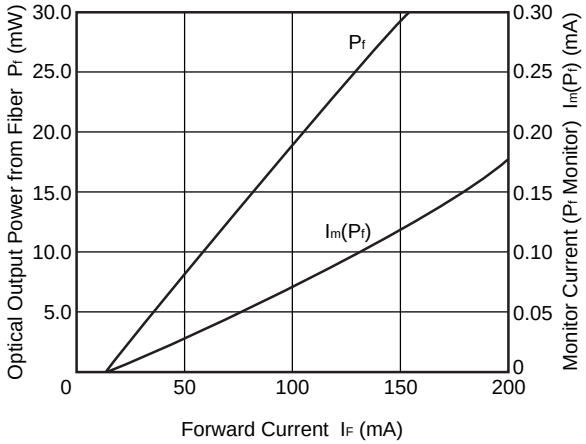
***1** The value which omitted and computed the 3rd place below the decimal point

TYPICAL CHARACTERISTICS (T_{LD} = T_{set}, unless otherwise specified)

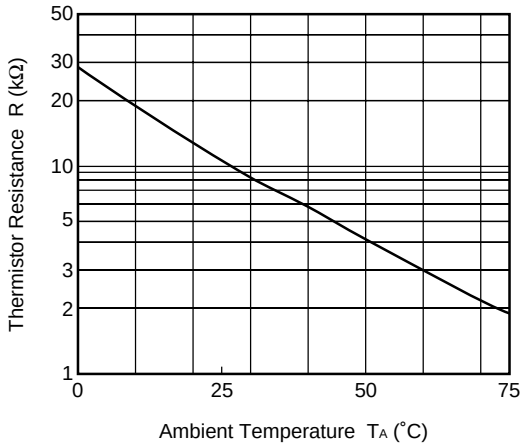
SPECTRUM



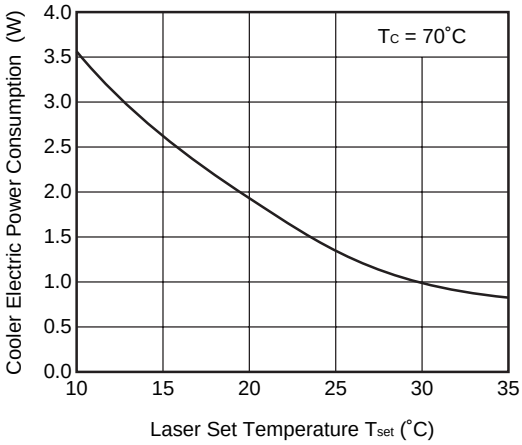
OPTICAL OUTPUT POWER FROM FIBER, MONITOR CURRENT (P_f MONITOR) vs. FORWARD CURRENT



THERMISTOR RESISTANCE vs. AMBIENT TEMPERATURE



COOLER ELECTRIC POWER CONSUMPTION vs. LASER SET TEMPERATURE



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
NX8304BE-CC NX8304CE-CC	−40 to +85	−40 to +85	15	2*1	1 310	For fiberoptic communications	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
NX8562 Series	−20 to +70	−40 to +85	20	20	1 550*2	CW Light Source for external modulator	BFY
NX8563 Series	−20 to +70	−40 to +85	20	10	1 550*2	CW Light Source for external modulator	BFY
NX8570SA/SCxxx-BA	−20 to +70	−40 to +85	20	20	1 550*2	CW Light Source with λ monitoring PD single channel wavelength, 50 GHz-spacing	BFY
NX8570SA/SCxxxD-BA	−20 to +70	−40 to +85	20	20	1 550*2	CW Light Source with λ monitoring PD 4 channel wavelength tunable capability for 50 GHz-spacing	BFY
NX8570SCxxxQ-BA	−20 to +70	−40 to +85	20	20	1 550*2	CW Light Source with λ monitoring PD 8 channel wavelength tunable capability for 50 GHz-spacing	BFY
NX8571SA/SCxxx-BA	−20 to +70	−40 to +85	20	10	1 550*2	CW Light Source with λ monitoring PD single channel wavelength, 50 GHz-spacing	BFY
NX8571SA/SCxxxD-BA	−20 to +70	−40 to +85	20	10	1 550*2	CW Light Source with λ monitoring PD 4 channel wavelength tunable capability for 50 GHz-spacing	BFY
NX8571SCxxxQ-BA	−20 to +70	−40 to +85	20	10	1 550*2	CW Light Source with λ monitoring PD 8 channel wavelength tunable capability for 50 GHz-spacing	BFY

***1** TYP.

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

REFERENCE

Document Name	Document No.
OPTICAL SEMICONDUCTOR DEVICES FOR FIBEROPTIC COMMUNICATIONS SELECTION GUIDE	PX10161E
Opto-Electronics Devices Pamphlet	PX10160E

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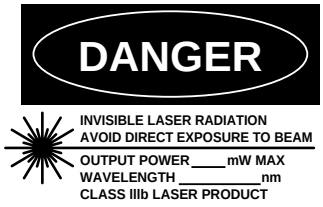
  (Note)

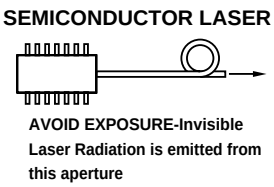
  (1) "NEC" as used in this statement means NEC Corporation, NEC Compound Semiconductor Devices, Ltd. and also includes its majority-owned subsidiaries.

  (2) "NEC semiconductor products" means any semiconductor product developed or manufactured by or for NEC (as defined above).

M8E 00.4-0110

SAFETY INFORMATION ON THIS PRODUCT





Warning Laser Beam	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. • Do not look directly into the laser beam. • Avoid exposure to the laser beam, any reflected or collimated beam.
Caution GaAs Products	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. • 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. 1. 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. 2. 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.
Caution Optical Fiber	A glass-fiber is attached on the product. Handle with care. • 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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