

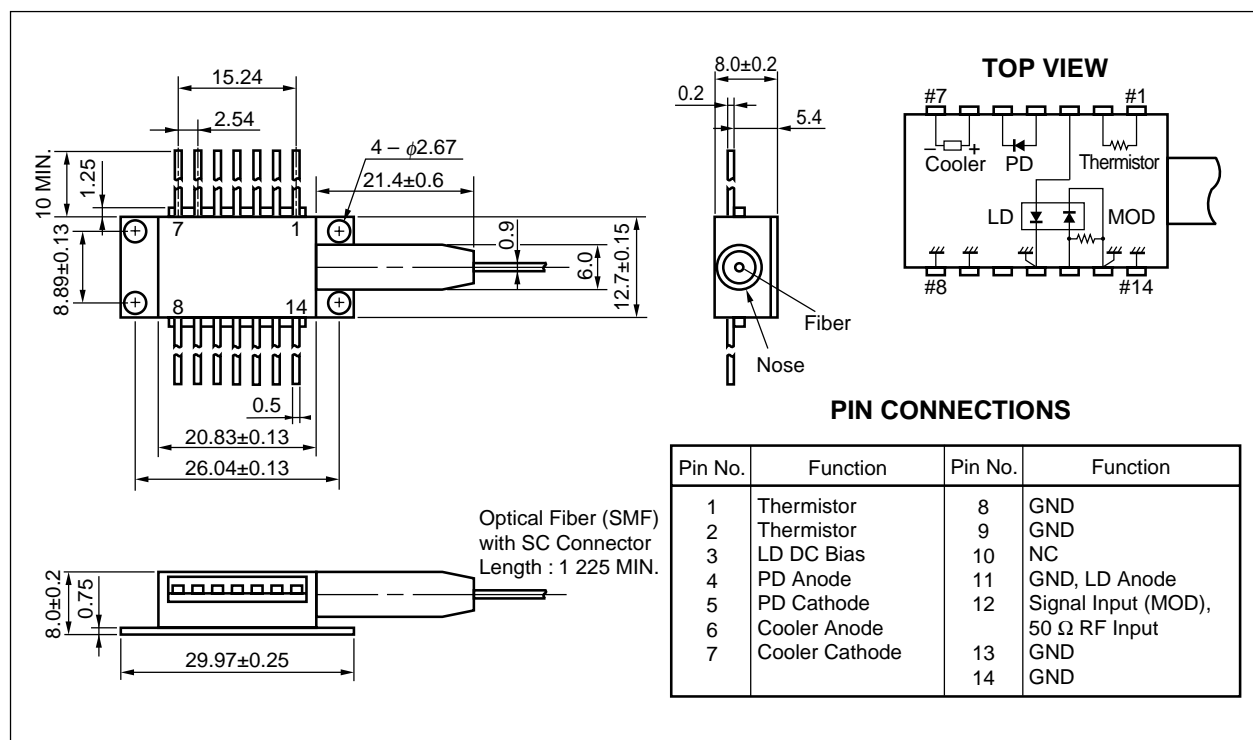
**EA MODULATOR INTEGRATED**  
**1 550 nm MQW-DFB LASER DIODE MODULE**  
**FOR 2.5 Gb/s DWDM LONG-REACH 240 km APPLICATIONS**

**DESCRIPTION**

The NX8566LE-CC is an Electro-Absorption (EA) modulator integrated, 1 550 nm Multiple Quantum Well (MQW) structured Distributed Feed-Back (DFB) laser diode. The module is capable of 2.5 Gb/s applications of over 240 km long-reach and available for Dense Wavelength Division Multiplexing (DWDM) wavelengths based on ITU-T recommendations, enabling a wide range of applications.

**FEATURES**

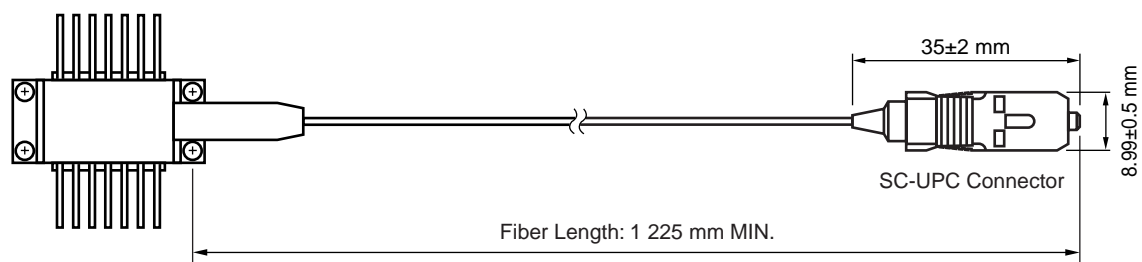
- Integrated electroabsorption modulator
- Very low dispersion penalty over 240 km
- Low modulation voltage
- Available for DWDM wavelengths based on ITU-T recommendations (100 GHz grid, refer to ORDERING INFORMATION)
- 14-pin butterfly package with SC-UPC connector

**PACKAGE DIMENSIONS (UNIT: mm, unless otherwise specified:  $\pm 0.2$  mm)**

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 Not all devices/types available in every country. Please check with local NEC Compound Semiconductor Devices 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
Fiber Length	1 225 MIN.	mm
Flammability	UL1581 VW-1	



**ORDERING INFORMATION: Wavelength is a certain point between 1 530 nm and 1 563 nm  
@  $T_{LD} = T_{set}$  (SC-UPC Connector)**

Part Number	Available Connector
NX8566LE-CC	With SC-UPC Connector

**ORDERING INFORMATION: Wavelength on ITU-T grid @  $T_{LD} = T_{set}$**

Part Number	ITU-T Wavelength <sup>*1</sup>	Frequency
With SC-UPC Connector	(nm)	(THz)
NX8566LE303-CC	1530.33	195.90
NX8566LE311-CC	1531.11	195.80
NX8566LE318-CC	1531.89	195.70
NX8566LE326-CC	1532.68	195.60
NX8566LE334-CC	1533.46	195.50
NX8566LE342-CC	1534.25	195.40
NX8566LE350-CC	1535.03	195.30
NX8566LE358-CC	1535.82	195.20
NX8566LE366-CC	1536.60	195.10
NX8566LE373-CC	1537.39	195.00
NX8566LE381-CC	1538.18	194.90
NX8566LE389-CC	1538.97	194.80
NX8566LE397-CC	1539.76	194.70
NX8566LE405-CC	1540.55	194.60
NX8566LE413-CC	1541.35	194.50
NX8566LE421-CC	1542.14	194.40
NX8566LE429-CC	1542.93	194.30
NX8566LE437-CC	1543.73	194.20
NX8566LE445-CC	1544.52	194.10
NX8566LE453-CC	1545.32	194.00
NX8566LE461-CC	1546.11	193.90
NX8566LE469-CC	1546.91	193.80
NX8566LE477-CC	1547.71	193.70
NX8566LE485-CC	1548.51	193.60
NX8566LE493-CC	1549.31	193.50
NX8566LE501-CC	1550.11	193.40
NX8566LE509-CC	1550.91	193.30
NX8566LE517-CC	1551.72	193.20
NX8566LE525-CC	1552.52	193.10

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

Part Number	ITU-T Wavelength <sup>*1</sup>	Frequency
With SC-UPC Connector	(nm)	(THz)
NX8566LE533-CC	1553.32	193.00
NX8566LE541-CC	1554.13	192.90
NX8566LE549-CC	1554.94	192.80
NX8566LE557-CC	1555.74	192.70
NX8566LE565-CC	1556.55	192.60
NX8566LE573-CC	1557.36	192.50
NX8566LE581-CC	1558.17	192.40
NX8566LE589-CC	1558.98	192.30
NX8566LE597-CC	1559.79	192.20
NX8566LE606-CC	1560.60	192.10
NX8566LE614-CC	1561.41	192.00
NX8566LE622-CC	1562.23	191.90
NX8566LE630-CC	1563.04	191.80
NX8566LE745-CC	1574.54	190.40
NX8566LE753-CC	1575.36	190.30
NX8566LE761-CC	1576.19	190.20
NX8566LE770-CC	1577.02	190.10
NX8566LE778-CC	1577.85	190.00
NX8566LE786-CC	1578.68	189.90
NX8566LE795-CC	1579.51	189.80
NX8566LE803-CC	1580.35	189.70
NX8566LE811-CC	1581.18	189.60
NX8566LE820-CC	1582.01	189.50
NX8566LE828-CC	1582.85	189.40
NX8566LE836-CC	1583.68	189.30
NX8566LE845-CC	1584.52	189.20
NX8566LE853-CC	1585.36	189.10
NX8566LE862-CC	1586.20	189.00
NX8566LE870-CC	1587.04	188.90
NX8566LE878-CC	1587.88	188.80
NX8566LE887-CC	1588.72	188.70
NX8566LE895-CC	1589.56	188.60
NX8566LE904-CC	1590.41	188.50
NX8566LE912-CC	1591.25	188.40
NX8566LE921-CC	1592.10	188.30
NX8566LE929-CC	1592.94	188.20

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

Part Number	ITU-T Wavelength <sup>*1</sup>	Frequency
With SC-UPC Connector	(nm)	(THz)
NX8566LE937-CC	1593.79	188.10
NX8566LE946-CC	1594.64	188.00
NX8566LE954-CC	1595.48	187.90
NX8566LE963-CC	1596.33	187.80
NX8566LE971-CC	1597.18	187.70
NX8566LE980-CC	1598.04	187.60
NX8566LE988-CC	1598.89	187.50
NX8566LE997-CC	1599.74	187.40
NX8566LE6006-CC	1600.60	187.30
NX8566LE6014-CC	1601.45	187.20
NX8566LE6023-CC	1602.31	187.10
NX8566LE6031-CC	1603.16	187.00
NX8566LE6040-CC	1604.02	186.90
NX8566LE6048-CC	1604.88	186.80
NX8566LE6057-CC	1605.74	186.70
NX8566LE6066-CC	1606.60	186.60
NX8566LE6074-CC	1607.46	186.50
NX8566LE6083-CC	1608.32	186.40

\*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 <sub>f</sub>	10	mW
Forward Current of LD	I <sub>FLD</sub>	150	mA
Reverse Voltage of LD	V <sub>RLD</sub>	2.0	V
Forward Voltage of Modulator	V <sub>FEA</sub>	1	V
Reverse Voltage of Modulator	V <sub>REA</sub>	4	V
Forward Current of PD	I <sub>FPD</sub>	1	mA
Reverse Voltage of PD	V <sub>RPD</sub>	10	V
Cooler Current	I <sub>C</sub>	1.5	A
Cooler Voltage	V <sub>C</sub>	2.5	V
Operating Case Temperature	T <sub>C</sub>	-20 to +70	°C
Storage Temperature	T <sub>stg</sub>	-40 to +85	°C
Lead Soldering Temperature	T <sub>slid</sub>	260 (10 sec.)	°C

# ELECTRO-OPTICAL CHARACTERISTICS

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

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Laser Set Temperature	$T_{set}$	*1	20		35	$^{\circ}\text{C}$
Operating Current	$I_{op}$	$T_{LD} = T_{set}$	50	60	80	mA
Modulation Center Voltage	$V_{center}$	Under modulation <sup>*2</sup>	-1.5	-1.2	-0.5	V
Modulation Voltage	$V_{mod}$	Under modulation <sup>*2</sup>	2		3	V
Forward Voltage of LD	$V_{FLD}$	$I_{FLD} = I_{op}$		1.6	2.0	V
Threshold Current	$I_{th}$	$T_{LD} = T_{set}$		7	20	mA
Optical Output Power from Fiber	$P_f$	$I_{FLD} = I_{op}$ , $T_{LD} = T_{set}$ , Under modulation <sup>*2</sup>	0			dBm
Peak Emission Wavelength	$\lambda_p$	$I_{FLD} = I_{op}$ , $V_{EA} = 0\text{ V}$ , $T_{LD} = T_{set}$	1 530 1 574	ITU-T <sup>*3</sup>	1 563 1 609	nm
Side Mode Suppression Ratio	SMSR	$I_{FLD} = I_{op}$ , $V_{EA} = 0\text{ V}$	30	37		dB
Extinction Ratio	ER	$I_{FLD} = I_{op}$ , Under modulation <sup>*2</sup>	10	11		dB
Rise Time	$t_r$	$I_{FLD} = I_{op}$ , 20-80%, Under modulation <sup>*2</sup>		70	125	ps
Fall Time	$t_f$	$I_{FLD} = I_{op}$ , 80-20%, Under modulation <sup>*2</sup>		70	125	ps
Dispersion Penalty	DP	$I_{FLD} = I_{op}$ , 240 km SMF under modulation <sup>*2, 4</sup>		1.5	2.0	dB
Optical Isolation	$I_s$		23			dB
Relative Intensity Noise	RIN	10 MHz to 10 GHz, $V_{EA} = 0\text{ V}$ , $I_{FLD} = I_{op}$		-135	-130	dB
Input Return Loss	$S_{11}$	$I_{FLD} = I_{op}$ , $V_{EA} = -1\text{ V}$ , 50 $\Omega$ , $f = 130\text{ MHz}$ to 2 GHz			-10	dB
		$I_{FLD} = I_{op}$ , $V_{EA} = -1\text{ V}$ , 50 $\Omega$ , $f = 2\text{ GHz}$ to 2.5 GHz			-5	
		$I_{FLD} = I_{op}$ , $V_{EA} = -1\text{ V}$ , 50 $\Omega$ , $f = 2.5\text{ GHz}$ to 3.5 GHz			-3	

\*1 NX8566LE-CC :  $T_{set}$  is a certain point between  $20^{\circ}\text{C}$  and  $35^{\circ}\text{C}$

NX8566LExxx-CC:  $T_{set}$  is set at a certain point between  $20^{\circ}\text{C}$  and  $35^{\circ}\text{C}$  for ITU-T grid wavelength

\*2 240 km SMF under modulation, 2.48832 Gb/s, PRBS  $2^{23}-1$ ,  $V_{EA} = V_{center} \pm 1/2V_{mod}$ ,  $I_{FLD} = I_{op}$ ,  $T_{LD} = T_{set}$ , NEC Test System

$V_{center}$  : a certain point between -0.5 V and -1.5 V

$V_{mod}$  : a certain point between 2 V and 3 V

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

192 km (@ L-band) SMF under modulation, 2.48832 Gb/s, PRBS  $2^{23}-1$ ,  $V_{EA} = V_{center} \pm 1/2V_{mod}$ ,  $I_{FLD} = I_{op}$ ,  $T_{LD} = T_{set}$ , NEC Test System

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

Please refer to ORDERING INFORMATION.

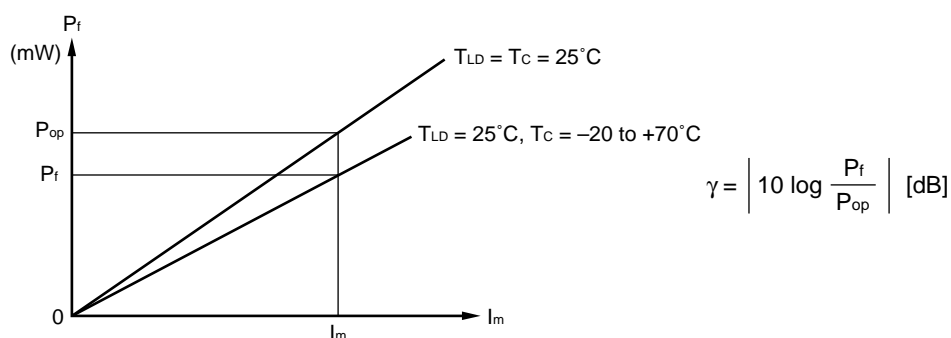
\*4  $\text{BER} = 10^{-10}$

# ELECTRO-OPTICAL CHARACTERISTICS

(Applicable to Monitor PD:  $T_{LD} = 25^{\circ}\text{C}$ ,  $T_C = -20$  to  $+70^{\circ}\text{C}$ )

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Monitor Current	$I_m$	$V_{RPD} = 5\text{ V}$ , $I_{FLD} = I_{op}$ , $V_{EA} = 0\text{ V}$	20	100	1 000	$\mu\text{A}$
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	$\gamma^*$	$I_m = \text{const.}$			0.5	dB

\*1 Tracking error:  $\gamma$



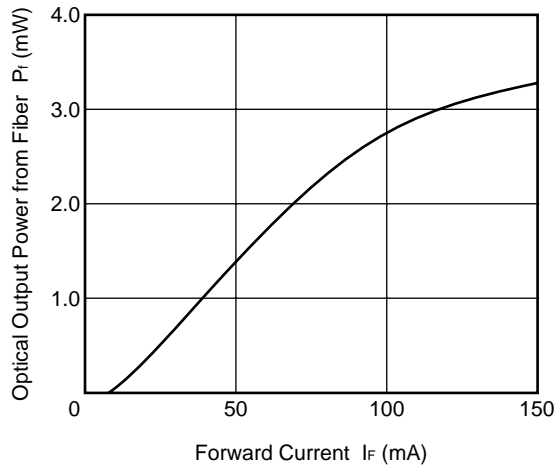
# ELECTRO-OPTICAL CHARACTERISTICS

(Applicable to Thermistor and TEC:  $T_{LD} = 25^{\circ}\text{C}$ ,  $T_C = -20$  to  $+70^{\circ}\text{C}$ )

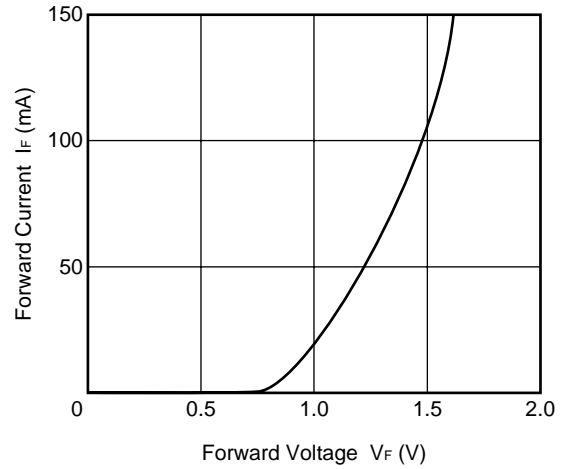
Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Thermistor Resistance	$R$	$T_{LD} = 25^{\circ}\text{C}$	9.5	10.0	10.5	$\text{k}\Omega$
B Constant	$B$		3 350	3 450	3 550	K
Cooler Current	$I_c$	$\Delta T = 50^{\circ}\text{C}$			1.2	A
Cooler Voltage	$V_c$	$\Delta T = 50^{\circ}\text{C}$			2.4	V

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

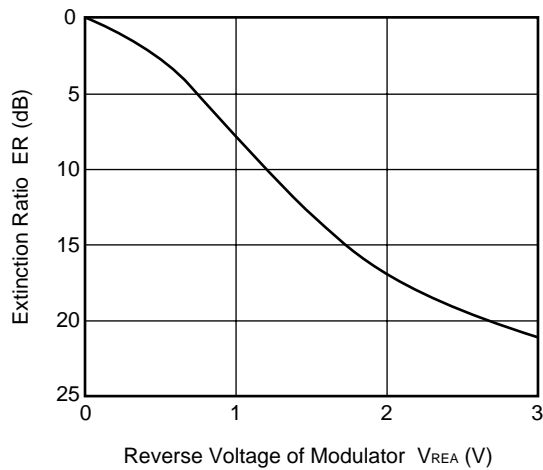
OPTICAL OUTPUT POWER FROM FIBER (CW) vs. FORWARD CURRENT



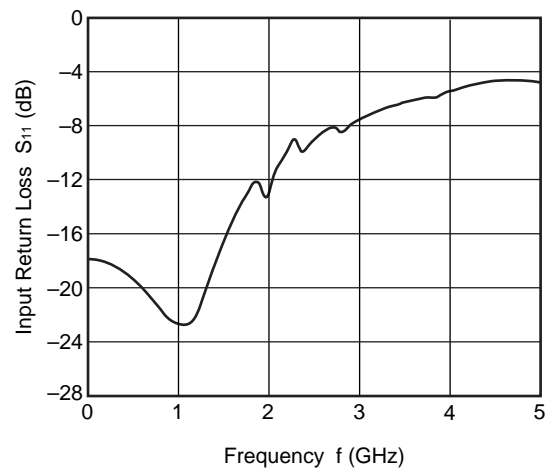
FORWARD CURRENT vs. FORWARD VOLTAGE



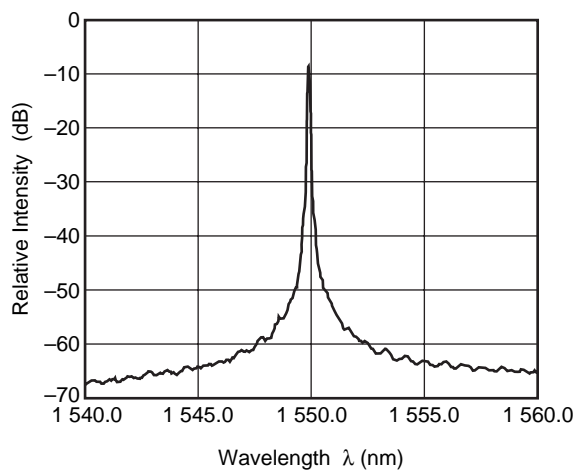
EXTINCTION RATIO vs. MODULATOR VOLTAGE



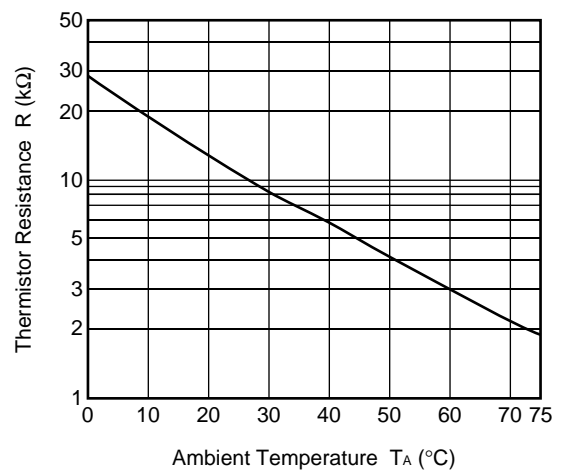
INPUT RETURN LOSS CHARACTERISTICS ( $S_{11}$ )



SPECTRUM



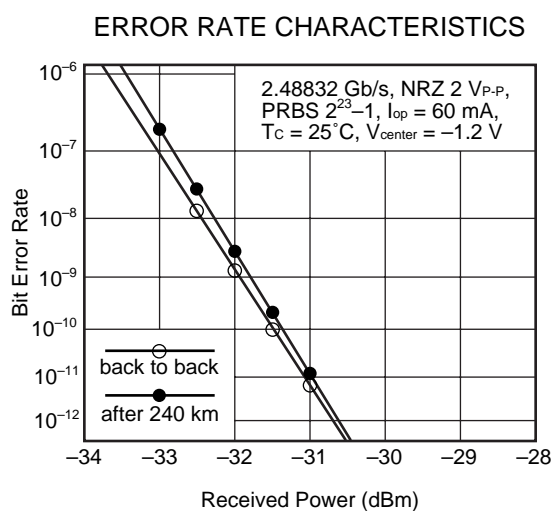
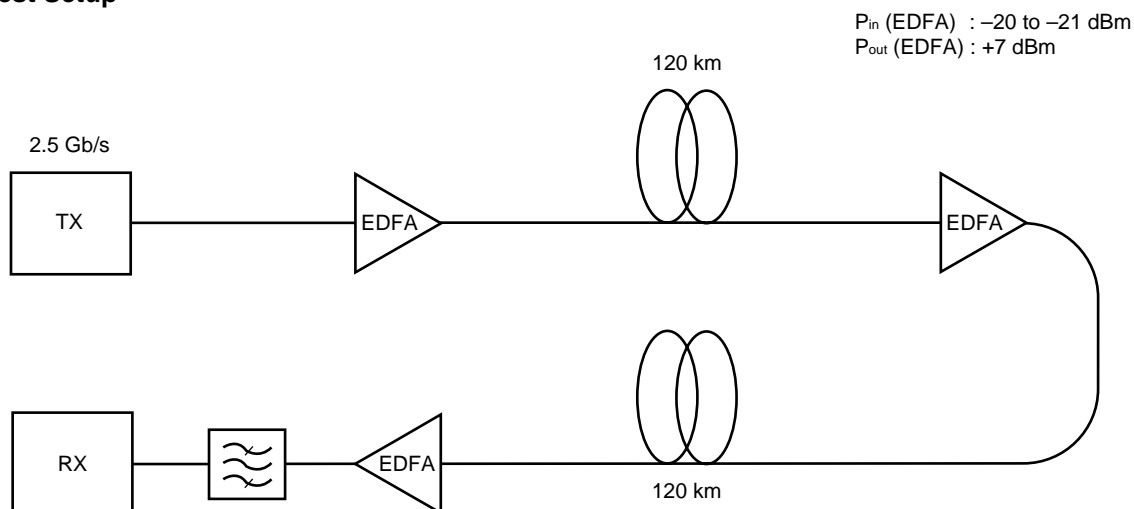
THERMISTOR RESISTANCE vs. AMBIENT TEMPERATURE



**Remark** The graphs indicate nominal characteristics.



## Test Setup



**Remark** The graph indicates nominal characteristics.

DFB-LD FAMILY

Part Number	Absolute Maximum Ratings		Electro-Optical Characteristics (T <sub>c</sub> = 25°C)			Application	Package
	T <sub>c</sub> (°C)	T <sub>stg</sub> (°C)	I <sub>th</sub> (mA)	P <sub>f</sub> (mW)	λ <sub>p</sub> (nm)		
			TYP.	MIN.	TYP.		
NX8300BE-CC NX8300CE-CC	0 to +75	−40 to +85	15	2 <sup>*1</sup>	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 <sup>*1</sup>	1 310	622 Mb/s: STM-4 (L-4.1)	Coaxial
NX8503BG-CC NX8503CG-CC	−10 to +85	−40 to +85	15	2 <sup>*1</sup>	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 <sup>*1</sup>	1 550	622 Mb/s: STM-4 (L-4.2, L-4.3)	Coaxial
NX8560LJ-CC	−20 to +70	−40 to +85	6	−1 dBm	1 550 <sup>*2</sup>	≤ 10 Gb/s: STM-64	BFY with GPO™
NX8562LB	−20 to +65	−40 to +85	20	20	1 550 <sup>*2</sup>	CW Light Source for external modulator	BFY
NX8563LB	−20 to +65	−40 to +85	20	10	1 550 <sup>*2</sup>	CW Light Source for external modulator	BFY
NX8564LE-CC	−20 to +70	−40 to +85	7	−2 dBm <sup>*1</sup>	1 550 <sup>*2</sup>	2.5 Gb/s: STM-16, 360 km EA modulator integrated	BFY
NX8565LE-CC	−20 to +70	−40 to +85	7	−2 dBm <sup>*1</sup>	1 550 <sup>*2</sup>	2.5 Gb/s: STM-16, 600 km EA modulator integrated	BFY
NX8566LE-CC	−20 to +70	−40 to +85	7	0 dBm	1 550 <sup>*2</sup>	2.5 Gb/s: STM-16, 240 km EA modulator integrated	BFY
NX8570 Series	−20 to +70	−40 to +85	20	20	1 550 <sup>*2</sup>	CW Light Source with λ monitoring PD	BFY
NX8571 Series	−20 to +70	−40 to +85	20	10	1 550 <sup>*2</sup>	CW Light Source with λ monitoring PD	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	P12480E
Opto-Electronics Devices Pamphlet	P13623E
Opto-Electronics Devices (CD-ROM)	P12944X
NEC semiconductor device reliability/quality control system <sup>*1</sup>	C11159E
Quality grades on NEC semiconductor devices <sup>*1</sup>	C11531E
SEMICONDUCTOR SELECTION GUIDE –Products and Packages– <sup>*1</sup>	X13769E

<sup>\*1</sup> Published by NEC Corporation

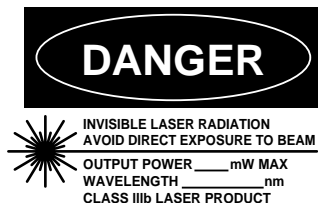
- **PATENT**  
 USP 4,826,295  
 CA 1,286,848  
 EP 143 000

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

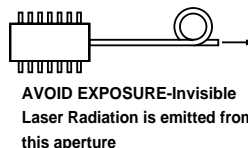
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M8E 00.4-0110

SAFETY INFORMATION ON THIS PRODUCT



SEMICONDUCTOR LASER



<b>Warning</b> Laser Beam	<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"> <li>• Do not look directly into the laser beam.</li> <li>• Avoid exposure to the laser beam, any reflected or collimated beam.</li> </ul>
<b>Caution</b> GaAs Products	<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"> <li>• Do not destroy or burn the product.</li> <li>• Do not cut or cleave off any part of the product.</li> <li>• Do not crush or chemically dissolve the product.</li> <li>• Do not put the product in the mouth.</li> </ul> <p>Follow related laws and ordinances for disposal. The product should be excluded from general industrial waste or household garbage.</p>
<b>Caution</b> Optical Fiber	<p>A glass-fiber is attached on the product. Handle with care.</p> <ul style="list-style-type: none"> <li>• When the fiber is broken or damaged, handle carefully to avoid injury from the damaged part or fragments.</li> </ul>

► Business issue

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► Technical issue

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