DATA SHEET

NEC

LASER DIODE

NX8304BE-CC,NX8304CE-CC

1 310 nm InGaAsP MQW-DFB LASER DIODE
COAXIAL MODULE FOR FIBEROPTIC COMMUNICATIONS

DESCRIPTION

The NX8304BE-CC and NX8304CE-CC are 1 310 nm Multiple Quantum Well (MQW) structured Distributed Feed-Back (DFB) laser diode coaxial modules with an internal optical isolator.

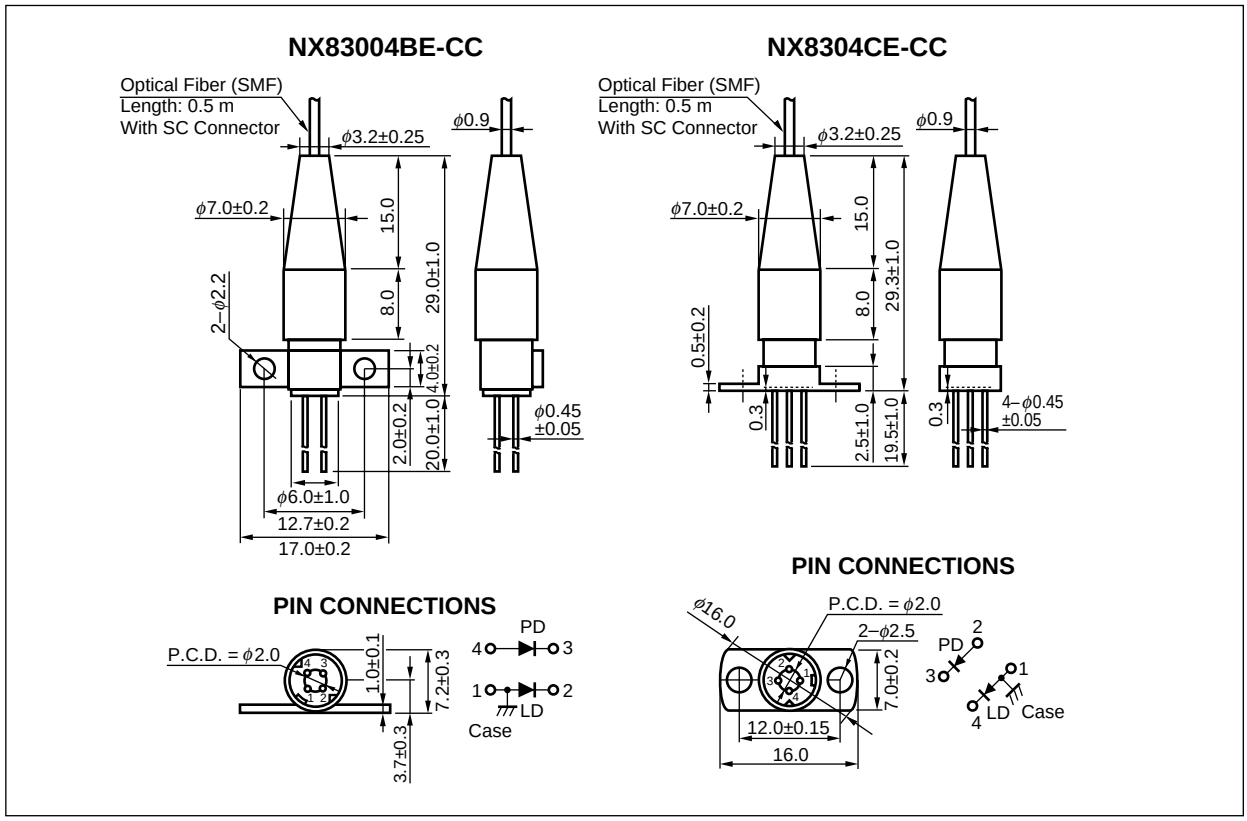
This module is as a light source for fiberoptic communications.

FEATURES

- Internal optical isolator
- Peak emission wavelength λ_p = 1 310 nm
- Optical output power P_f = 2.0 mW
- Wide operating temperature range T_C = –40 to +85°C
- InGaAs monitor PIN-PD
- With SC-UPC connector
- Based on Telcordia reliability

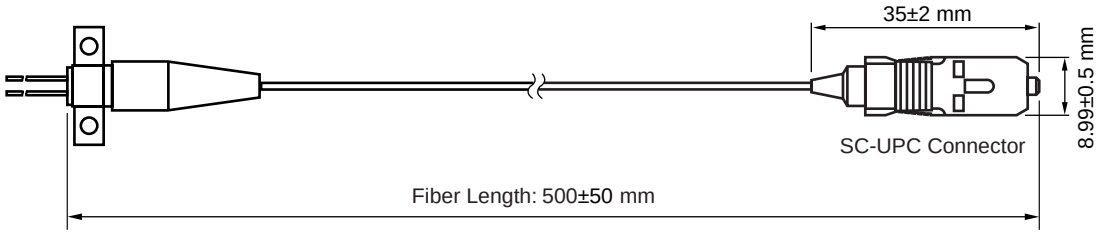
Document No. PL10173EJ01V0DS (1st edition)
Date Published July 2002 CP(K)
Printed in Japan

PACKAGE DIMENSIONS (UNIT: mm)



OPTICAL FIBER CHARACTERISTICS

Parameter	Specification	Unit
Mode Field Diameter	9.5±1	μm
Cladding Diameter	125±2	μm
Maximum Cladding Noncircularity	2	%
Maximum Core/Cladding Concentricity	1.6	%
Outer Diameter	0.9±0.1	mm
Cut-off Wavelength	1 100 to 1 270	nm
Minimum Fiber Bending Radius	30	mm
Fiber Length	500±50	mm
Flammability	UL1581 VW-1	



ORDERING INFORMATION

Part Number	Flange Type	Available Connector
NX8304BE-CC	Flat Mount Flange	With SC-UPC Connector
NX8304CE-CC	Vertical Mount Flange	

ABSOLUTE MAXIMUM RATINGS

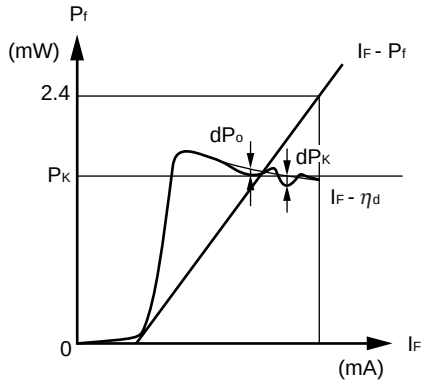
Parameter	Symbol	Ratings	Unit
Optical Output Power from Fiber	P_f	5	mW
Forward Current of LD	I_F	150	mA
Reverse Voltage of LD	V_R	2.0	V
Forward Current of PD	I_F	2.0	mA
Reverse Voltage of PD	V_R	15	V
Operating Case Temperature	T_C	–40 to +85	°C
Storage Temperature	T_{stg}	–40 to +85	°C
Lead Soldering Temperature	T_{sld}	350 (3 sec.)	°C
Relative Humidity (noncondensing)	RH	85	%

ELECTRO-OPTICAL CHARACTERISTICS (T_C = –40 to +85°C, unless otherwise specified)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Optical Output Power from Fiber	P_f	CW		2.0		mW
Operating Voltage	V_{op}	P_f = 2.0 mW		1.2	1.6	V
Threshold Current	I_{th}	T_C = 25°C		15	25	mA
					55	
Threshold Output Power	P_{th}	$I_F = I_{th}$			100	μW
Modulation Current	I_{mod}	P_f = 2.0 mW, T_C = 25°C	8	20	30	mA
		P_f = 2.0 mW	6		50	
Differential Efficiency	η_d	P_f = 2.0 mW, T_C = 25°C	0.07	0.1	0.2	W/A
		P_f = 2.0 mW	0.04		0.3	
Temperature Dependence of Differential Efficiency	$\Delta\eta_d$	$\Delta\eta_d = 10 \log \frac{\eta_d\ (@\ T_C°C)}{\eta_d\ (@\ 25°C)}$	–3.5	–2.2		dB
Kink (Refer to **DEFINITIONS**)	kink	P_f = Up to 2.4 mW			±20	%
Peak Emission Wavelength	λ_p	P_f = 2.0 mW	1 280	1 310	1 335	nm
Temperature Dependence of Peak Emission Wavelength	$\Delta\lambda/\Delta T$			0.09	0.1	nm/°C
Spectral Width	$\Delta\lambda$	P_f = 2.0 mW, –20 dB down width		0.1	1.0	nm
Side Mode Suppression Ratio	SMSR	P_f = 2.0 mW	30	40		dB
Cut-off Frequency	f_C	P_f = 2.0 mW, –3 dBm		2.0		GHz
Rise Time	t_r	10-90%, P_{pk} = 2.0 mW, $I_F = I_{th}$		0.15	0.5	ns
Fall Time	t_f	90-10%, P_{pk} = 2.0 mW, $I_F = I_{th}$		0.15	0.5	ns
Monitor Current	I_m	V_R = 5 V, P_f = 2.0 mW, T_C = 25°C	200	700	1 500	μA
Monitor Dark Current	I_D	V_R = 5 V, P_f = 2.0 mW		10	500	nA
		V_R = 5 V, T_C = 25°C		0.1	50	
Monitor PD Terminal Capacitance	C_t	V_R = 5 V, f = 1 MHz		1.0	20	pF
Linearity (Refer to **DEFINITIONS**)	LIN_m	V_R = 5 V, P_f = 0.2 to 2.0 mW			15	%
Tracking Error (Refer to **DEFINITIONS**)	γ	I_m = const.		0.5	1.0	dB
Relative Intensity Noise	RIN	Ref = –14 dB		–135		dB/Hz
Optical Return Ross	ORL	SMF	35	52		dB

PARAMETER DEFINITIONS

Kink : kink

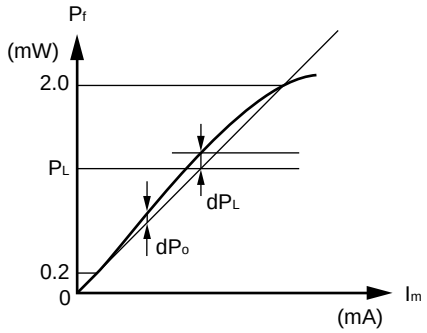


$$kink = \frac{|dP_K|}{P_K} \times 100\ [\%]$$

$dP_K = dP_o$ MAX.

$P_K \leq 2.4$ (mW)

Linearity : LIN_m

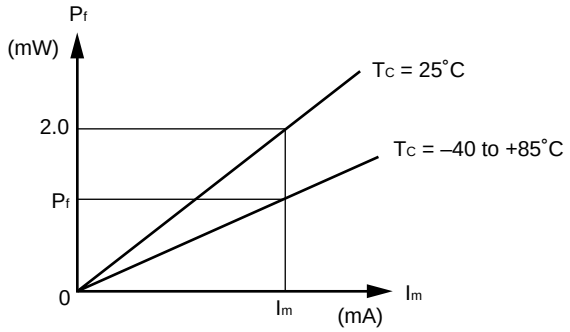


$$LIN_m = \frac{|dP_L|}{P_L} \times 100\ [\%]$$

$dP_L = dP_o$ MAX.

$0.2 < P_L < 2.0$ (mW)

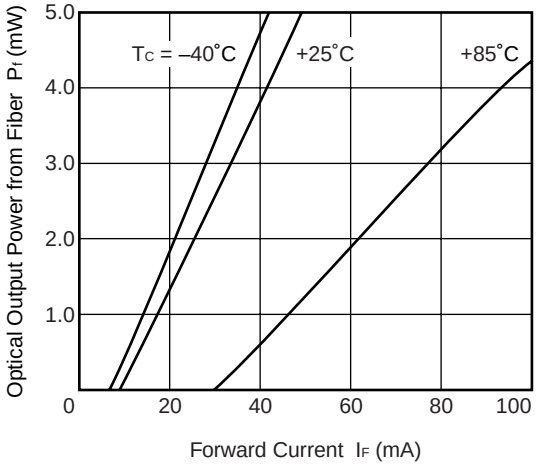
Tracking Error : γ



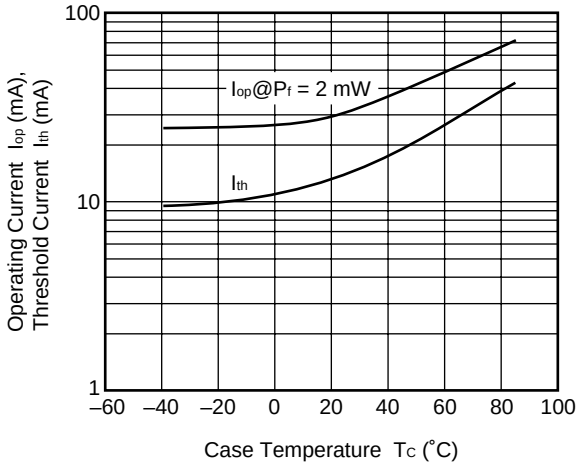
$$\gamma = \left| 10 \log \frac{P_f}{2.0} \right| [dB]$$

TYPICAL CHARACTERISTICS (T_C = 25°C, unless otherwise specified)

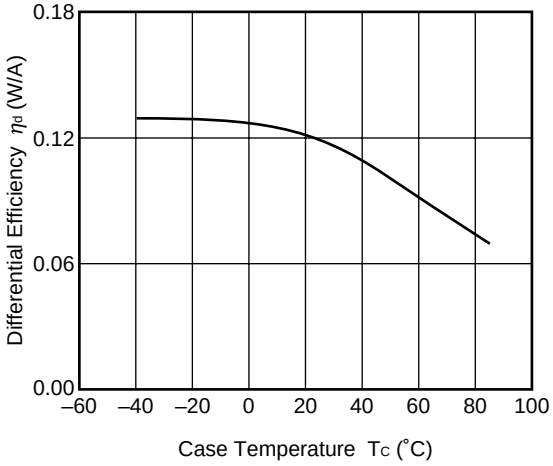
OPTICAL OUTPUT POWER FROM FIBER vs. FORWARD CURRENT



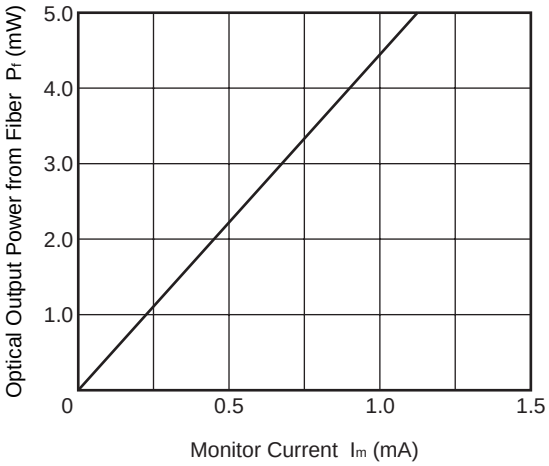
OPERATING CURRENT AND THRESHOLD CURRENT vs. CASE TEMPERATURE



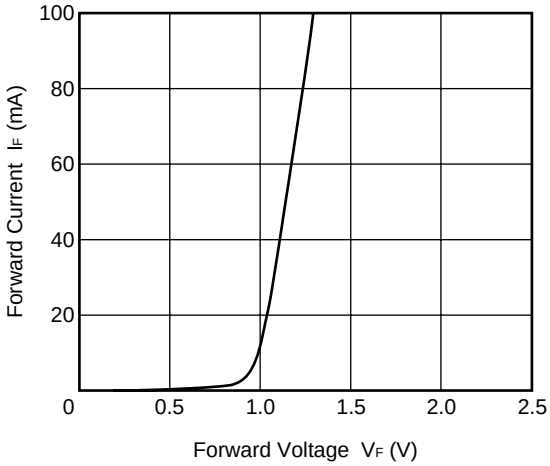
TEMPERATURE DEPENEDENCE OF DIFFERENTIAL EFFICIENCY



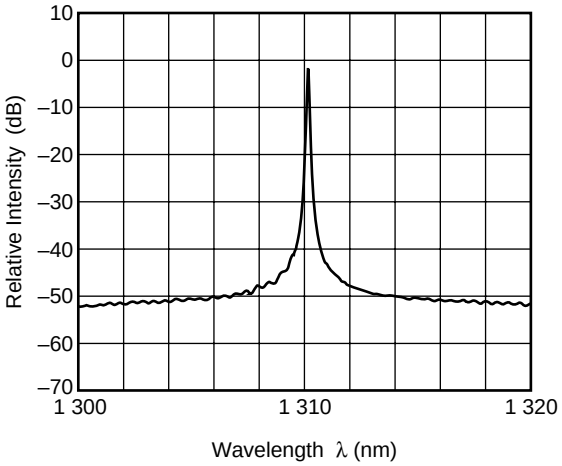
OPTICAL OUTPUT POWER FROM FIBER vs.MONITOR CURRENT



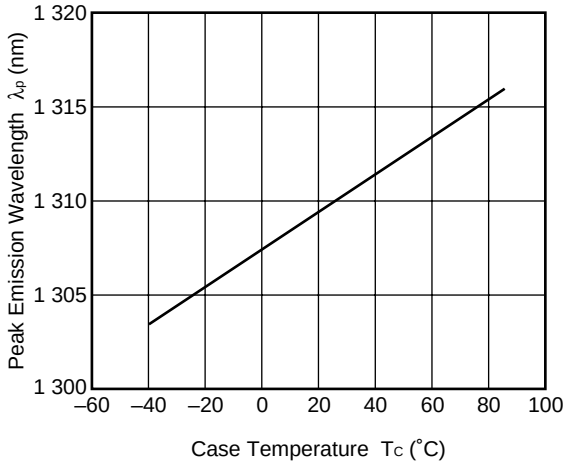
FORWARD CURRENT vs. FORWARD VOLTAGE



SPECTRUM



TEMPERATURE DEPENDENCE OF
PEAK EMISSION WAVELENGTH



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
NX8560LJ-CC	−20 to +70	−40 to +85	6	−1 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	−2 dBm*1	1 550*2	2.5 Gb/s: STM-16, 360 km EA modulator integrated	BFY
NX8565LE-CC	−20 to +70	−40 to +85	7	−2 dBm*1	1 550*2	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*2	2.5 Gb/s: STM-16, 240 km EA modulator integrated	BFY
NX8570 Series	−20 to +70	−40 to +85	20	20	1 550*2	CW Light Source with λ monitoring PD	BFY
NX8571 Series	−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 Wavelengths based on ITU-T recommendations

REFERENCE

Document Name	Document No.
Optical semiconducrtor 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[*1]	C11159E
Quality grades on NEC semiconductor devices[*1]	C11531E
SEMICONDUCTOR SELECTION GUIDE –Products and Packages–[*1]	X13769E

***1** Published by NEC Corporation

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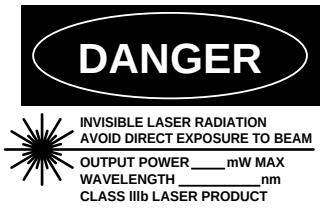

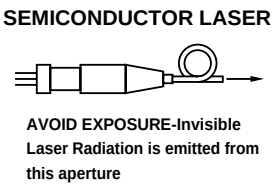

Warning Laser Beam	A laser beam is emitted from this diode during operation. The laser beam, visible or invisible, directly or indirectly, may cause injury to the eye or loss of eyesight. • Do not look directly into the laser beam. • Avoid exposure to the laser beam, any reflected or collimated beam.
Caution GaAs Products	The product contains gallium arsenide, GaAs. GaAs vapor and powder are hazardous to human health if inhaled or ingested. • 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. Follow related laws and ordinances for disposal. The product should be excluded from general industrial waste or household garbage.
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.

▶Business issue

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▶Technical issue

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