

To our customers,

Old Company Name in Catalogs and Other Documents

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Renesas Electronics website: <http://www.renesas.com>

April 1st, 2010
Renesas Electronics Corporation

Issued by: Renesas Electronics Corporation (<http://www.renesas.com>)

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NX8304BE-CC, NX8304CE-CC

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

Phase-out/Discontinued

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.

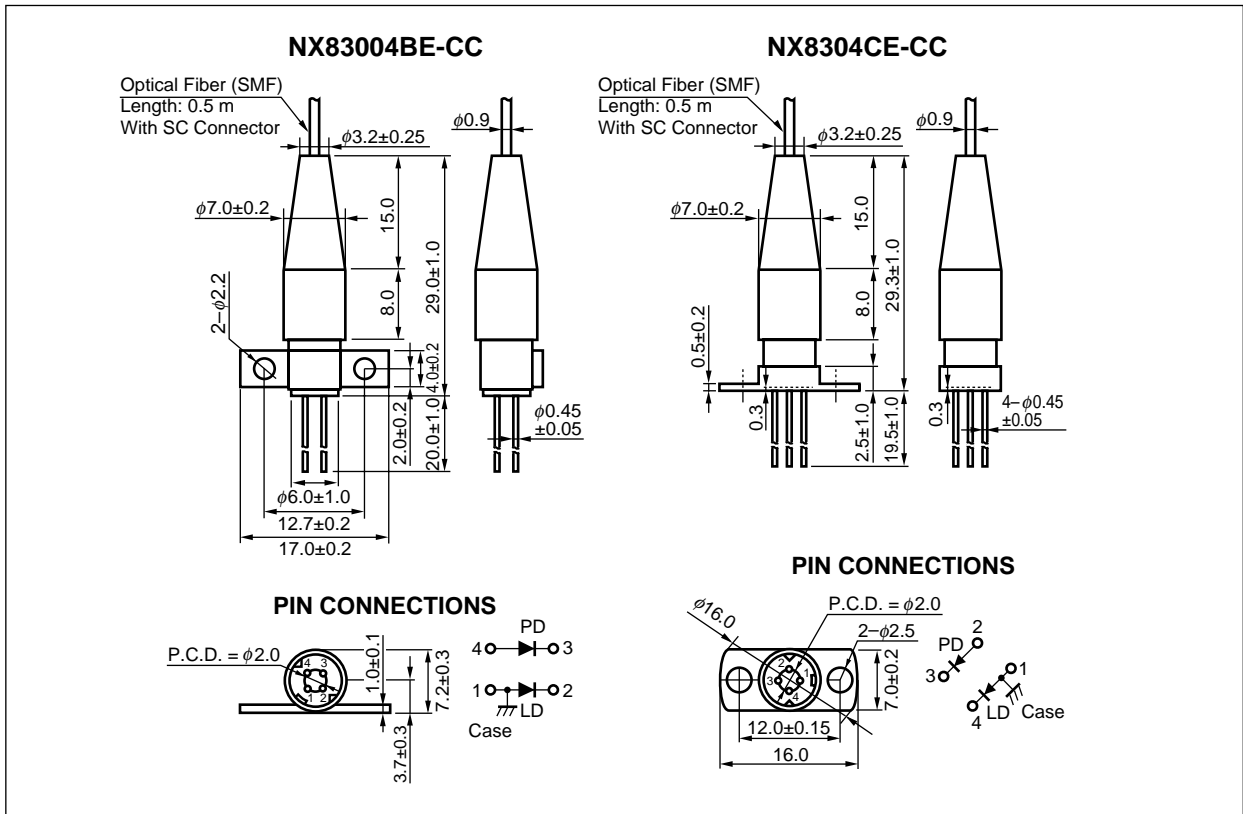
This module is as a light source for fiberoptic communications.

FEATURES

- Internal optical isolator
- Peak emission wavelength $\lambda_p = 1\ 310\ \text{nm}$
- Optical output power $P_r = 2.0\ \text{mW}$
- Wide operating temperature range $T_c = -40\ \text{to}\ +85^\circ\text{C}$
- InGaAs monitor PIN-PD
- With SC-UPC connector
- Based on Telcordia reliability

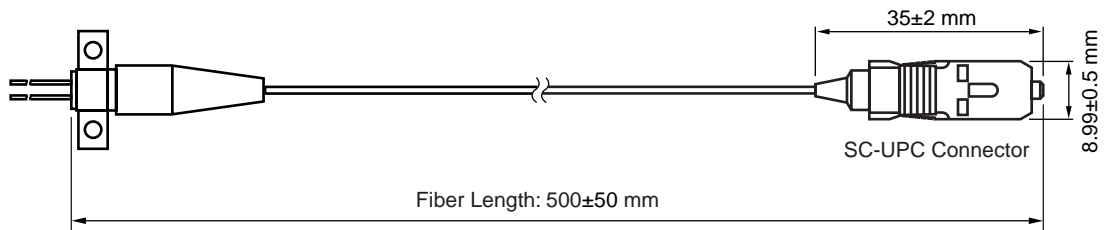
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PACKAGE DIMENSIONS (UNIT: mm)



OPTICAL FIBER CHARACTERISTICS

Parameter	Specification	Unit
Mode Field Diameter	9.5 \pm 1	μ m
Cladding Diameter	125 \pm 2	μ m
Maximum Cladding Noncircularity	2	%
Maximum Core/Cladding Concentricity	1.6	%
Outer Diameter	0.9 \pm 0.1	mm
Cut-off Wavelength	1 100 to 1 270	nm
Minimum Fiber Bending Radius	30	mm
Fiber Length	500 \pm 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

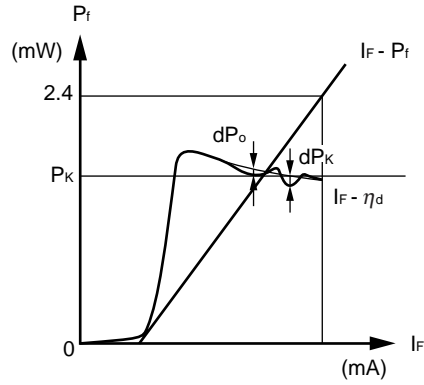
Parameter	Symbol	Ratings	Unit
Optical Output Power from Fiber	P_i	5	mW
Forward Current of LD	I_F	150	mA
Reverse Voltage of LD	V_R	2.0	V
Forward Current of PD	I_F	2.0	mA
Reverse Voltage of PD	V_R	15	V
Operating Case Temperature	T_c	-40 to +85	°C
Storage Temperature	T_{stg}	-40 to +85	°C
Lead Soldering 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	Δη _d	$\Delta\eta_d = 10 \log \frac{\eta_d (@ T_c^\circ\text{C})}{\eta_d (@ 25^\circ\text{C})}$	-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	Δλ/ΔT			0.09	0.1	nm/°C
Spectral Width	Δλ	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

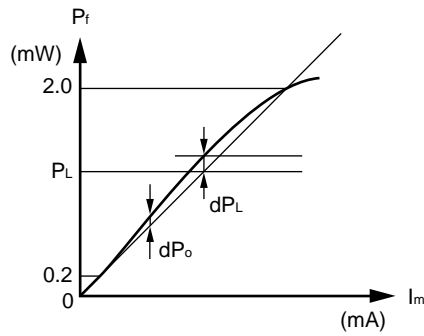


$$\text{kink} = \frac{|dP_K|}{P_K} \times 100 [\%]$$

$dP_K = dP_o \text{ MAX.}$

$P_K \leq 2.4 \text{ (mW)}$

Linearity : LIN_m

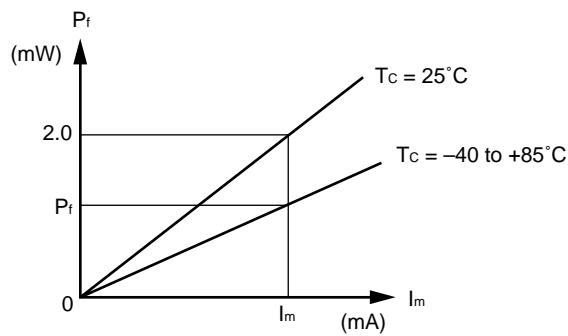


$$\text{LIN}_m = \frac{|dP_L|}{P_L} \times 100 [\%]$$

$dP_L = dP_o \text{ MAX.}$

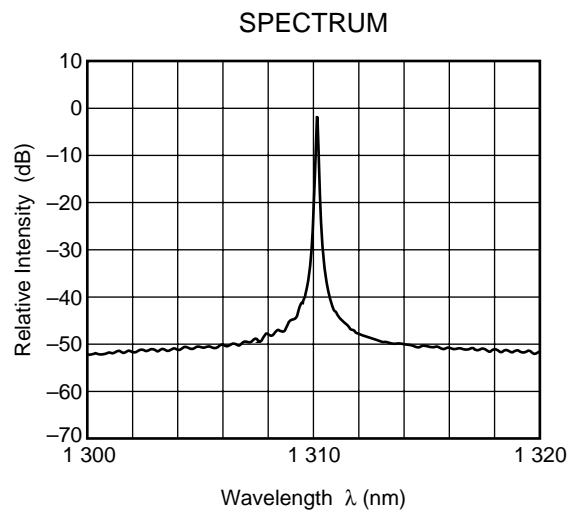
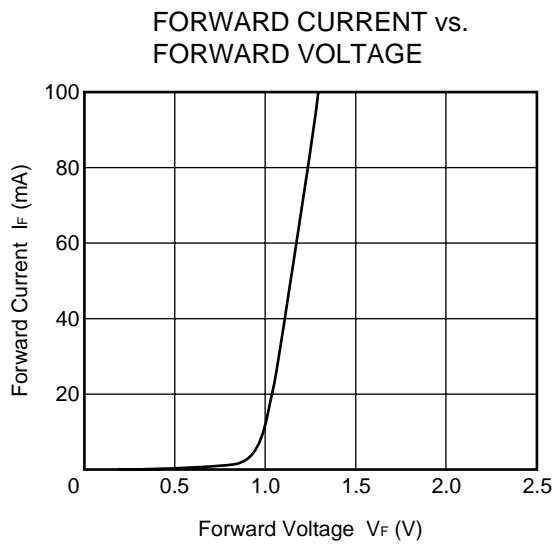
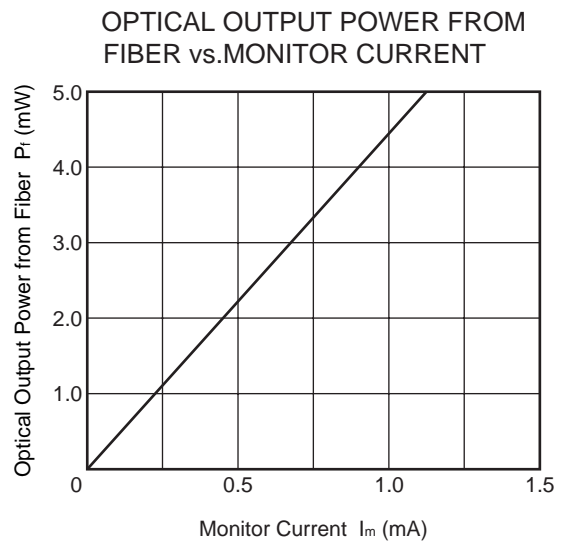
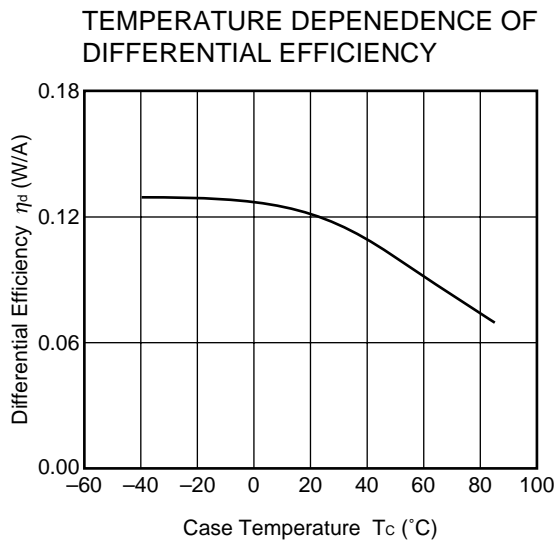
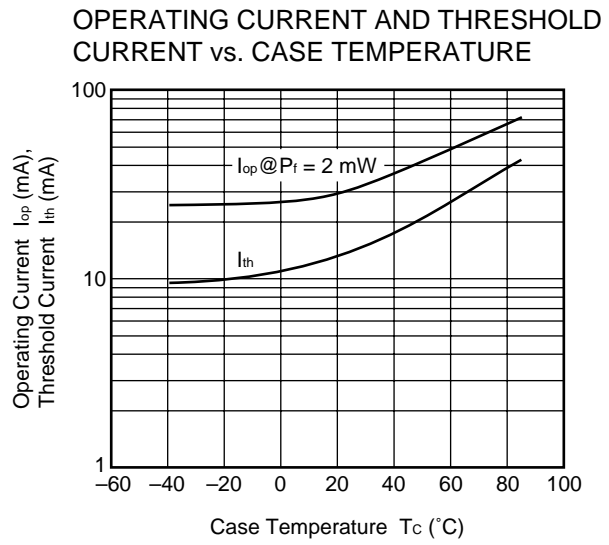
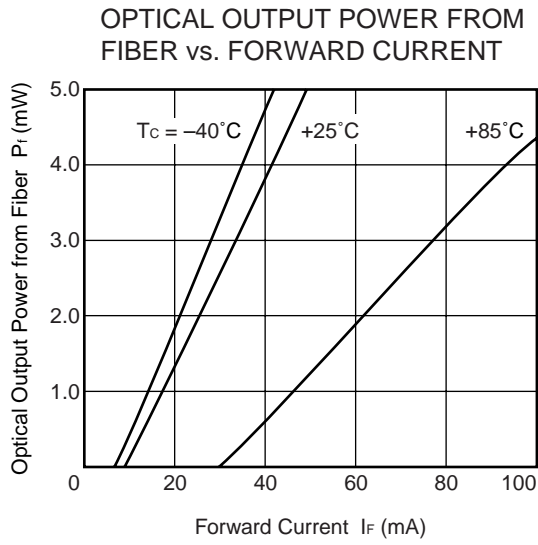
$0.2 < P_L < 2.0 \text{ (mW)}$

Tracking Error : γ

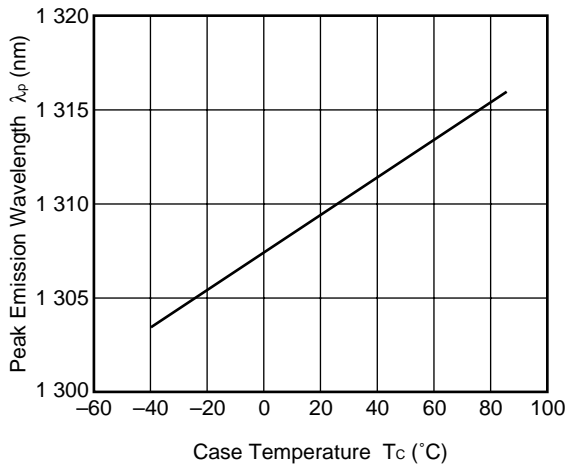


$$\gamma = \left| 10 \log \frac{P_f}{2.0} \right| [\text{dB}]$$

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



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) 622 Mb/s: STM-4 (L-4.2, L-4.3)	Coaxial
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 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 ^{*1}	C11159E
Quality grades on NEC semiconductor devices ^{*1}	C11531E
SEMICONDUCTOR SELECTION GUIDE –Products and Packages– ^{*1}	X13769E

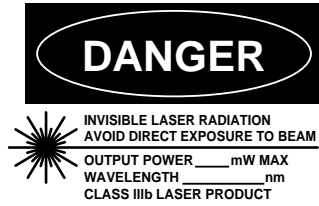
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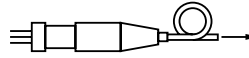
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M8E 00.4-0110

SAFETY INFORMATION ON THIS PRODUCT



SEMICONDUCTOR LASER



AVOID EXPOSURE-Invisible Laser Radiation is emitted from this aperture

<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.

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