



# NEC's 1310 nm InGaAsP MQW-DFB LASER DIODE IN COAXIAL PACKAGE FOR FIBER OPTIC COMMUNICATIONS

**NX8304BE-CC**  
**NX8304CE-CC**

## FEATURES

- **INTERNAL OPTICAL ISOLATOR**
- **PEAK EMISSION WAVELENGTH:**  
 $\lambda_p = 1310 \text{ nm}$
- **OPTICAL OUTPUT POWER:**  
 $P_f = 2.0 \text{ mW}$
- **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**

## DESCRIPTION

NEC's NX8304BE-CC and NX8304CE-CC are 1310 nm Distributed Feed-Back (DFB) laser diode coaxial modules with an internal optical isolator. These modules are light source for fiber optic communications.

## ELECTRO-OPTICAL CHARACTERISTICS ( $T_c = -40 \text{ to } +85^\circ\text{C}$ , unless otherwise specified)

PART NUMBER			NX8304BE-CC, NX8304CE-CC		
SYMBOLS	PARAMETERS AND CONDITIONS	UNITS	MIN	TYP	MAX
$P_f$	Optical Output Power from Fiber, CW	mW		2.0	
$V_{OP}$	Operating Voltage, $P_f = 2.0 \text{ mW}$	V		1.2	1.6
$I_{TH}$	Threshold Current	$T_c = +25^\circ\text{C}$		15	25
					55
$P_{TH}$	Threshold Output Power, $I_f = I_{TH}$	$\mu\text{W}$			100
$I_{MOD}$	Modulation Current	$P_f = 2.0 \text{ mW}$ , $T_c = 25^\circ\text{C}$	8	20	30
		$P_f = 2.0 \text{ mW}$	6		50
$\eta_d$	Differential Efficiency	$P_f = 2.0 \text{ mW}$ , $T_c = 25^\circ\text{C}$	0.07	0.100	0.2
		$P_f = 2.0 \text{ mW}$	0.040		0.300
$\Delta\eta_d$	Temperature Dependence of Differential Efficiency, $\Delta\eta_d = 10 \log \frac{\eta_d (@ T_c \text{ }^\circ\text{C})}{\eta_d (@ 25 \text{ }^\circ\text{C})}$	dB	-3.5	-2.2	
Kink	Kink, $P_f = \text{Up to } 2.4 \text{ mW}$ (Refer to defenitions)	%			$\pm 20$
$\lambda_p$	Peak Emission Wavelength, $P_f = 2.0 \text{ mW}$	nm	1280	1310	1335
$\Delta\lambda/\Delta T$	Temperature Dependence of Peak Emission Wavelength	$\text{nm}/^\circ\text{C}$		0.09	0.1
$\Delta\lambda$	Spectral Width, $P_f = 2.0 \text{ mW}$ , -20 dB down width	nm		0.1	1.0
SMSR	Side Mode Suppression Ratio, $P_f = 2.0 \text{ mW}$	dB	30	40	
$f_c$	Cut-Off Frequency, $P_f = 2.0\text{mW}$	GHz		2.0	
$t_r$	Rise Time, 10 to 90%, $P_{pk} = 2.0 \text{ mW}$ , $I_f = I_{TH}$	ns		0.15	0.5
$t_f$	Fall Time, 90 to 10%, $P_{pk} = 2.0 \text{ mW}$ , $I_f = I_{TH}$	ns		0.15	0.5
$I_m$	Monitor Current, $V_R = 5 \text{ V}$ , $P_f = 2.0 \text{ mW}$	$\mu\text{A}$	200	700	1500
$I_D$	Monitor Dark Current	$V_R = 5 \text{ V}$ , $T_c = 25^\circ\text{C}$		0.1	50
		$V_R = 5 \text{ V}$		10	500
$C_t$	Monitor PD Terminal Capacitance, $V_R = 5 \text{ V}$ , $f = 1 \text{ MHz}$	pF		1.0	20
$LIN_m$	Linearity, $V_R = 5 \text{ V}$ , $P_f = 0.2 \text{ to } 2.0 \text{ mW}$ (Refer to defenitions)	%			15
$\gamma^1$	Tracking Error, $I_m = \text{const.}$ (Refer to defenitions)	dB		0.5	1.0
RIN	Relative Intensity Noise	dB/Hz		-135	
ORL	Optical Return Loss, SMF	dB	35	52	

### ABSOLUTE MAXIMUM RATINGS<sup>1</sup>

(T<sub>c</sub> = 25°C, unless otherwise specified)

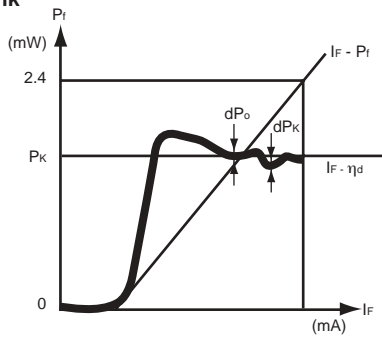
SYMBOLS	PARAMETERS	UNITS	RATINGS
P <sub>f</sub>	Optical Output Power from Fiber	mW	5
I <sub>F</sub>	Forward Current of LD	mA	150
V <sub>R</sub>	Reverse Voltage of LD	V	2.0
I <sub>F</sub>	Forward Current of PD	mA	2.0
V <sub>R</sub>	Reverse Voltage of PD	V	15
T <sub>C</sub>	Operating Case Temperature	°C	-40 to +85
T <sub>STG</sub>	Storage Temperature	°C	-40 to +85
T <sub>SLD</sub>	Lead Soldering Temperature (3 s)	°C	350
RH	Relative Humidity (noncondensing)	%	85

Note:

1. Operation in excess of any one of these parameters may result in permanent damage.

### PARAMETER DEFINITIONS

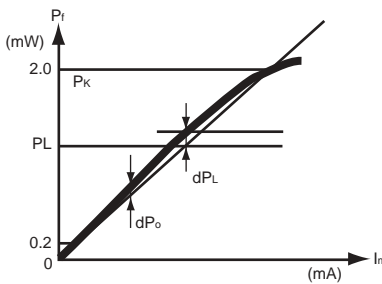
#### Kink : kink



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

dPk = dPo MAX  
 P<sub>K</sub> ≤ 2.4 (mW)

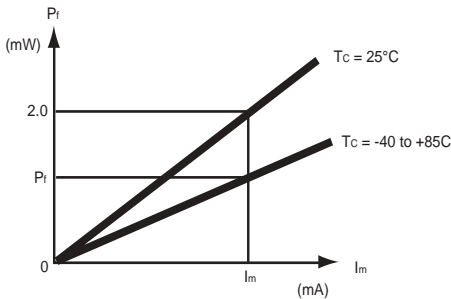
#### Linearity : LINm



$$\text{LINm} = \frac{|dPL|}{P_L} \times 100 \text{ [%]}$$

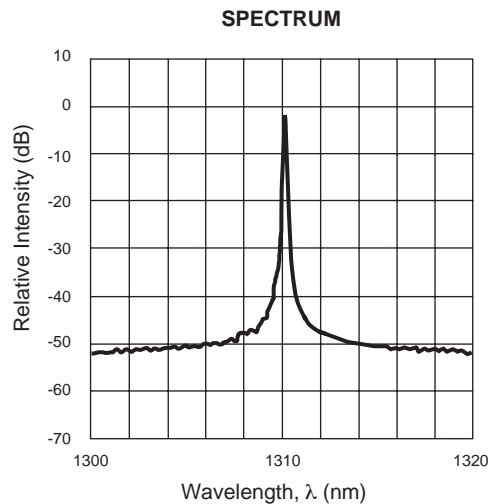
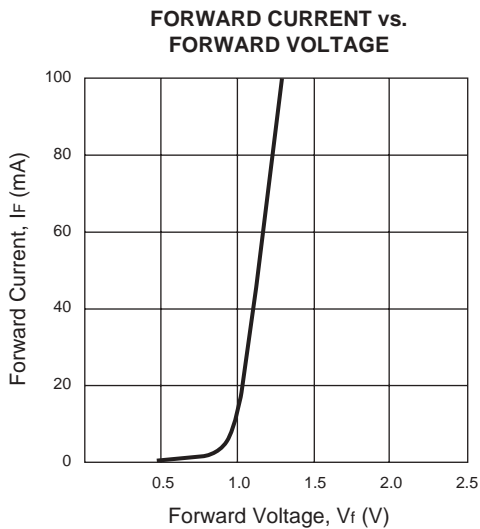
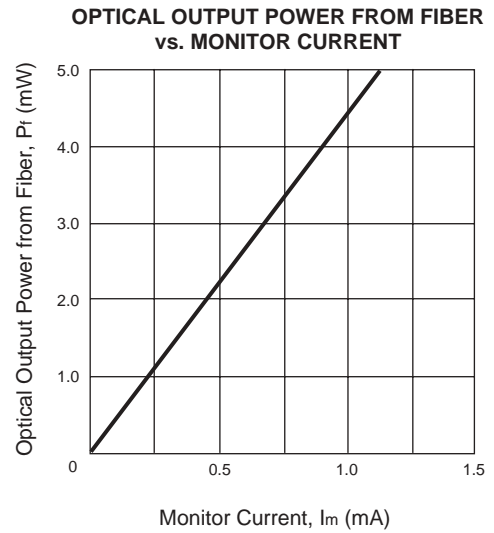
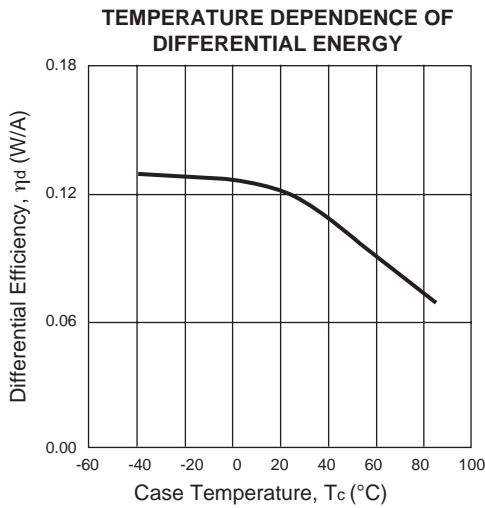
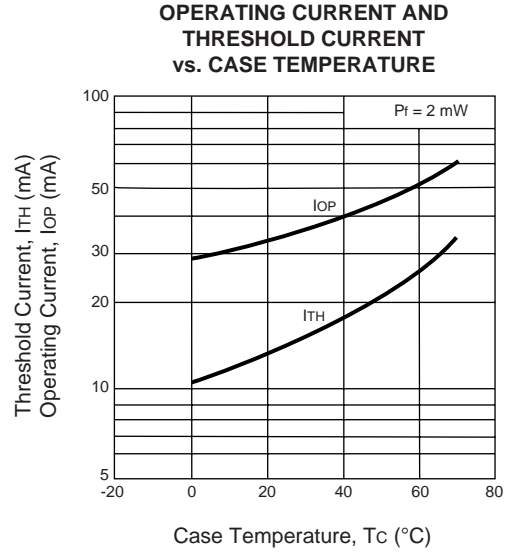
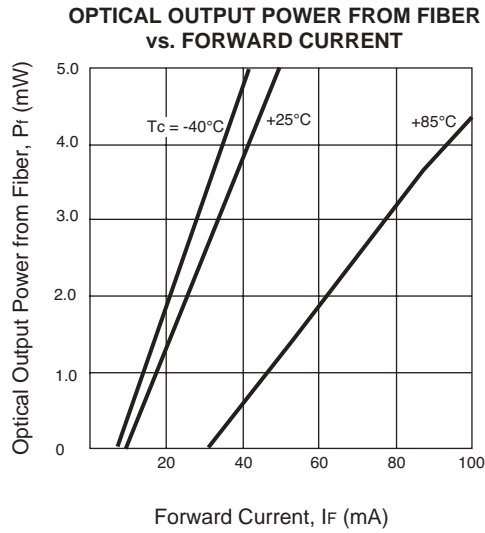
dPL = dPo MAX  
 0.2 < P<sub>L</sub> < 2.0 (mW)

#### Tracking Error : γ

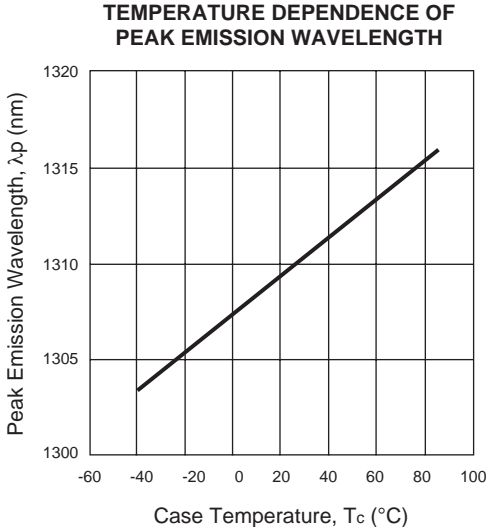


$$\gamma = \left| 10 \log \frac{P_f}{2.0} \right| \text{ [dB]}$$

**TYPICAL PERFORMANCE CURVES** ( $T_c = 25^\circ\text{C}$  unless otherwise specified)

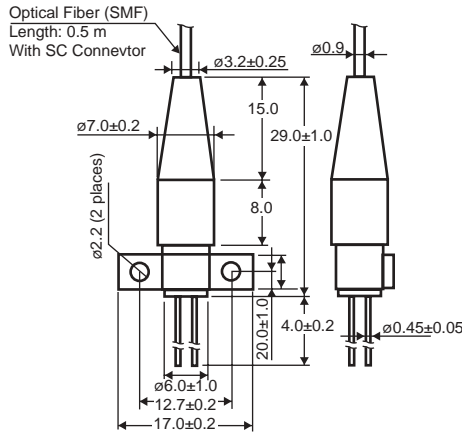


TYPICAL PERFORMANCE CURVES (T<sub>c</sub> = 25°C unless otherwise specified)

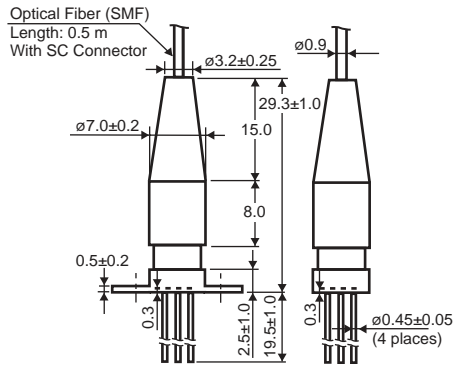


**OUTLINE DIMENSIONS** (Units in mm)

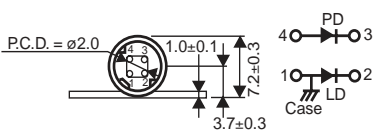
**NX8304BE-CC**



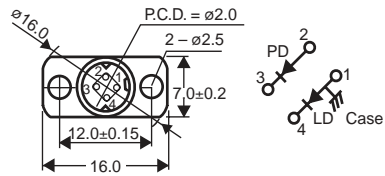
**NX8304CE-CC**



**PIN CONNECTIONS**



**PIN CONNECTIONS**

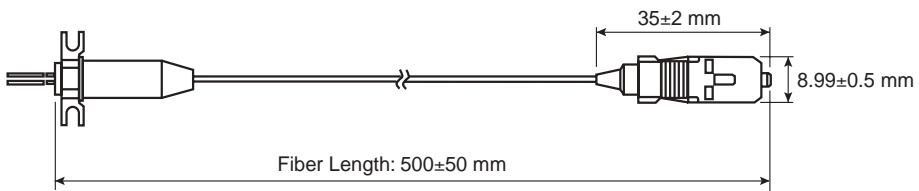


**OPTICAL FIBER CHARACTERISTICS**

PARAMETER	UNITS	SPECIFICATION
Mode Field Diameter	μm	9.5±1
Cladding Diameter	μm	125±2
Maximum Cladding Noncircularity	%	2
Maximum Core/Cladding Concentricity	%	1.6
Outer Diameter	mm	0.9±0.1
Cut-off Wavelength	nm	1100 to 1270
Minimum Fiber Bending Radius	mm	30
Fiber Length	mm	500±50
Flammability		UL 1581 VW-1

**ORDERING INFORMATION**

PART NUMBER	AVAILABLE CONNECTOR	FLANGE TYPE
NX8304BE-CC	With SC-UPC Connector	Flat Mount Flange
NX8304CE-CC		Vertical Mount Flange



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