

**1 550 nm InGaAsP MQW-DFB LASER DIODE  
COAXIAL MODULE FOR 622 Gb/s****DESCRIPTION**

The NX8504BE-CC and NX8504CE-CC are 1 550 nm Distributed Feed-Back (DFB) laser diode coaxial modules with an internal optical isolator. Multiple Quantum Well (MQW) structure is adopted to achieve stable dynamic single longitudinal mode operation over a wide temperature range of  $-10$  to  $+85$  °C.

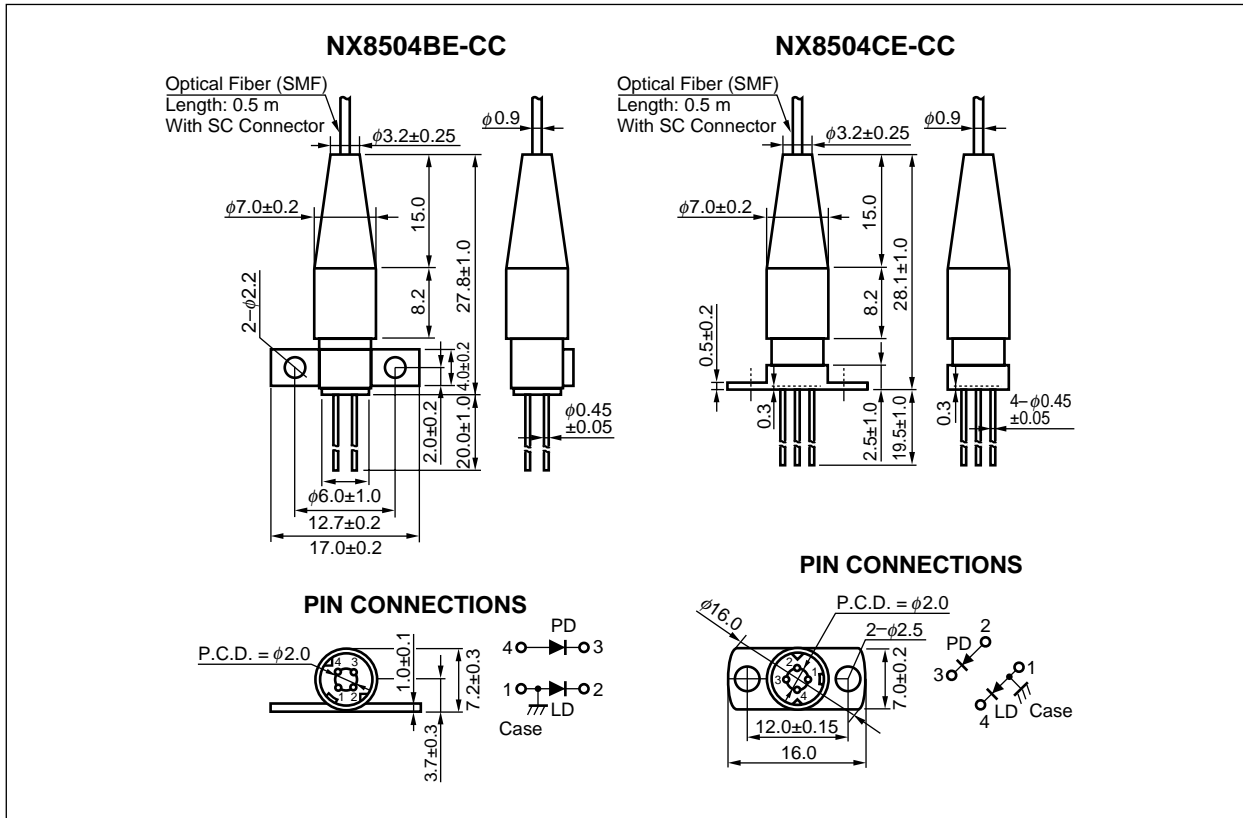
These modules are ideal as a light source for Synchronous Digital Hierarchy (SDH) system, STM-4, long-haul L-4.2, L-4.3 ITU-T recommendations.

**FEATURES**

- Internal optical isolator
- Peak emission wavelength  $\lambda_p = 1\,550$  nm
- Optical output power  $P_f = 2.0$  mW
- Wide operating temperature range  $T_c = -10$  to  $+85$  °C
- InGaAs monitor PIN-PD
- With SC-UPC connector
- Based on Telcordia reliability

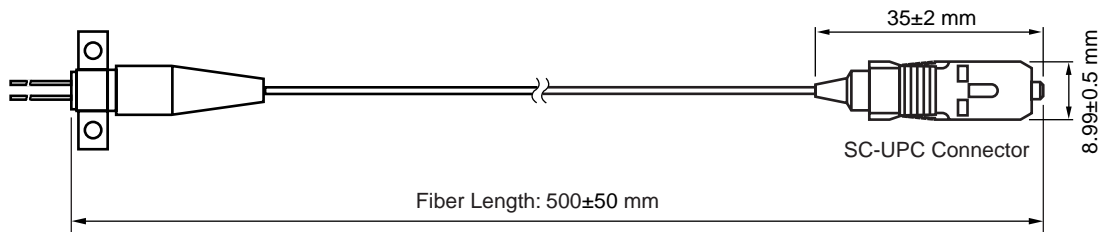
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Not all devices/types available in every country. Please check with local NEC representative for availability and additional information.

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	Available Connector	Flange Type
NX8504BE-CC	With SC-UPC Connector	Flat Mount Flange
NX8504CE-CC		Vertical Mount Flange

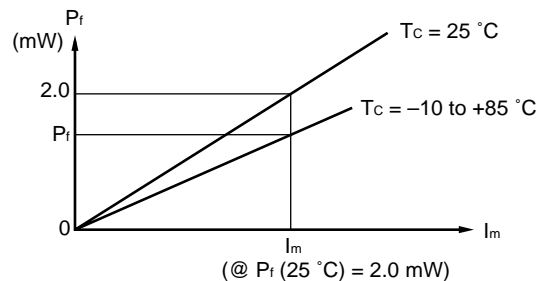
**ABSOLUTE MAXIMUM RATINGS**

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	$T_c$	-10 to +85	°C
Storage Temperature	$T_{stg}$	-40 to +85	°C
Lead Soldering Temperature	$T_{sld}$	260 (10 sec.)	°C
Relative Humidity (noncondensing)	RH	85	%

**ELECTRO-OPTICAL CHARACTERISTICS (T<sub>c</sub> = -10 to +85 °C, unless otherwise specified)**

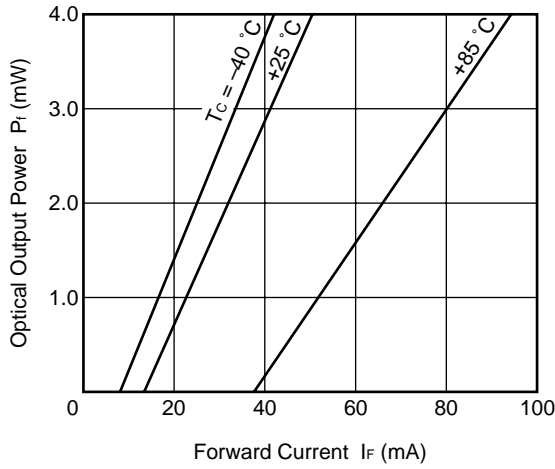
Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Optical Output Power from Fiber	P <sub>f</sub>	CW		2.0		mW
Operating Voltage	V <sub>op</sub>	P <sub>f</sub> = 2.0 mW		1.1	1.6	V
Threshold Current	I <sub>th</sub>	T <sub>c</sub> = 25 °C		15	25	mA
			2		50	
Threshold Output Power	P <sub>th</sub>	I <sub>f</sub> = I <sub>th</sub>			100	μW
Modulation Current	I <sub>mod</sub>	P <sub>f</sub> = 2.0 mW, T <sub>c</sub> = 25 °C	11	20	35	mA
		P <sub>f</sub> = 2.0 mW	9		55	
Differential Efficiency	η <sub>d</sub>	P <sub>f</sub> = 2.0 mW, T <sub>c</sub> = 25 °C	0.060	0.100	0.150	W/A
		P <sub>f</sub> = 2.0 mW	0.036		0.200	
Temperature Dependence of Differential Efficiency	Δη <sub>d</sub>	$\Delta\eta_d = 10 \log \frac{\eta_d (@ T_c \text{ °C})}{\eta_d (@ 25 \text{ °C})}$	-3	-1.6		dB
Kink	kink	P <sub>f</sub> = Up to 2.4 mW			±20	%
Peak Emission Wavelength	λ <sub>p</sub>	P <sub>f</sub> = 2.0 mW	1 530	1 550	1 570	nm
Temperature Dependence of Peak Emission Wavelength	Δλ/ΔT			0.10	0.12	nm/°C
Spectral Width	Δλ	P <sub>f</sub> = 2.0 mW, -20 dB down width		0.3	1.0	nm
Side Mode Suppression Ratio	SMSR	P <sub>f</sub> = 2.0 mW	30	40		dB
Rise Time	t <sub>r</sub>	10-90 %, P <sub>pk</sub> = 2.0 mW, I <sub>f</sub> = I <sub>th</sub>			0.5	ns
Fall Time	t <sub>f</sub>	90-10 %, P <sub>pk</sub> = 2.0 mW, I <sub>f</sub> = I <sub>th</sub>			0.5	ns
Monitor Current	I <sub>m</sub>	V <sub>R</sub> = 5 V, P <sub>f</sub> = 2.0 mW	200	1 000	2 000	μA
Monitor Dark Current	I <sub>D</sub>	V <sub>R</sub> = 5 V, T <sub>c</sub> = 25 °C		1.0	50	nA
		V <sub>R</sub> = 5 V		10	500	
Monitor PD Terminal Capacitance	C <sub>t</sub>	V <sub>R</sub> = 5 V, f = 1 MHz		1.0	20	pF
Linearity	LIN <sub>m</sub>	V <sub>R</sub> = 5 V, P <sub>f</sub> = 0.2 to 2.0 mW			10	%
Tracking Error	γ <sup>-1</sup>	I <sub>m</sub> = const.		0.5	1.0	dB

$$*1 \gamma = \left| 10 \log \frac{P_f}{2.0 \text{ mW}} \right|$$

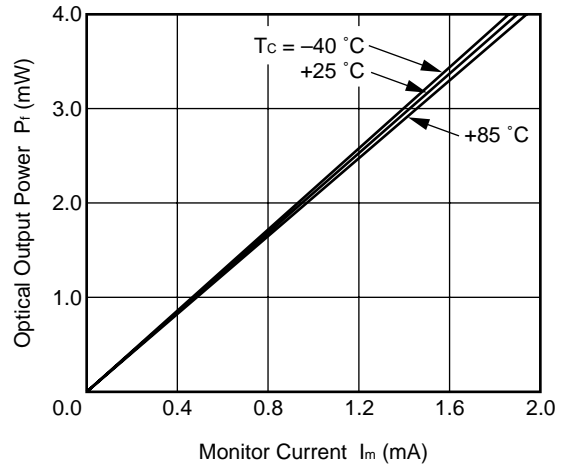


TYPICAL CHARACTERISTICS ( $T_c = 25\text{ }^\circ\text{C}$ , unless otherwise specified)

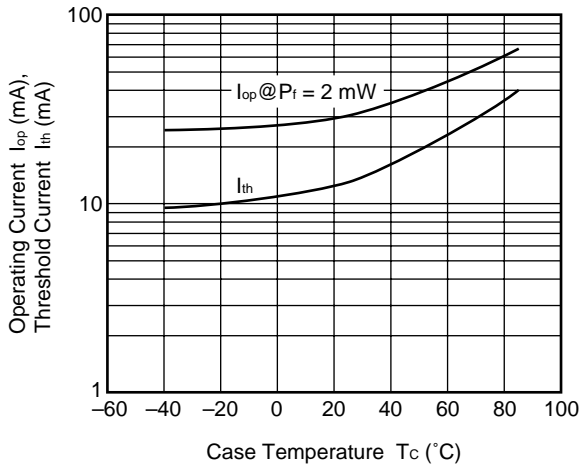
OPTICAL OUTPUT POWER vs. FORWARD CURRENT



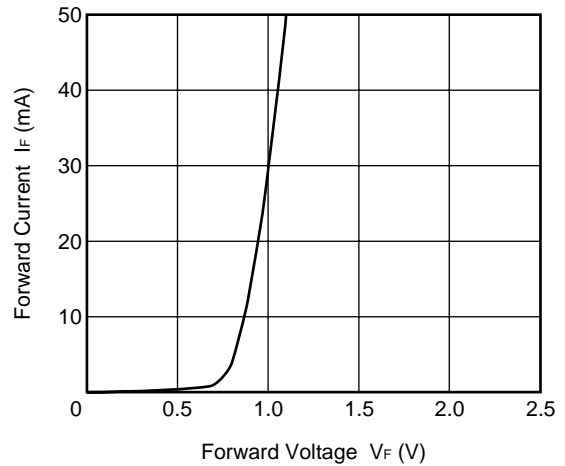
OPTICAL OUTPUT POWER vs. MONITOR CURRENT



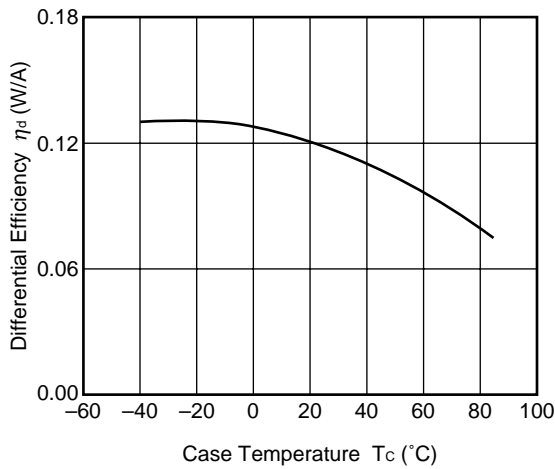
OPERATING CURRENT AND THRESHOLD CURRENT vs. CASE TEMPERATURE



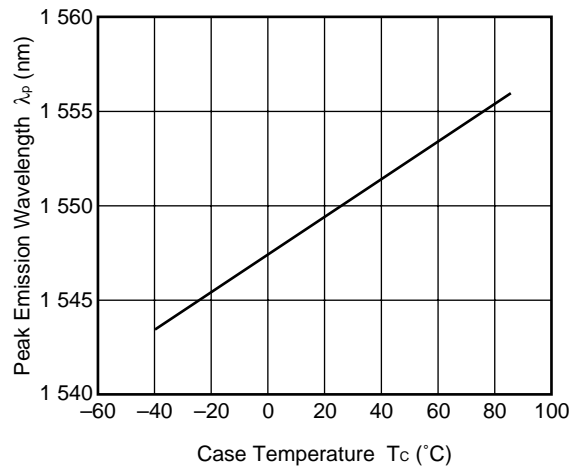
FORWARD CURRENT vs. FORWARD VOLTAGE



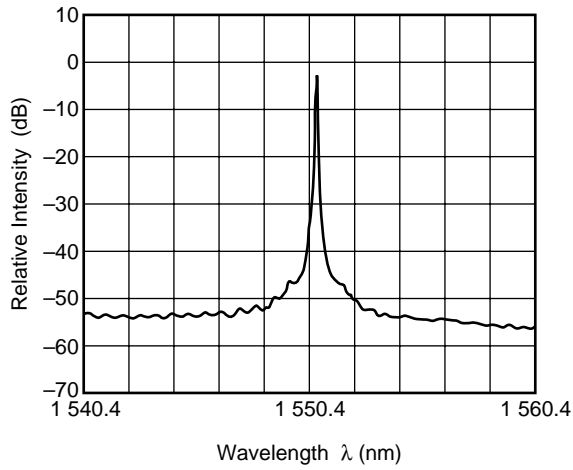
TEMPERATURE DEPENDENCE OF DIFFERENTIAL EFFICIENCY



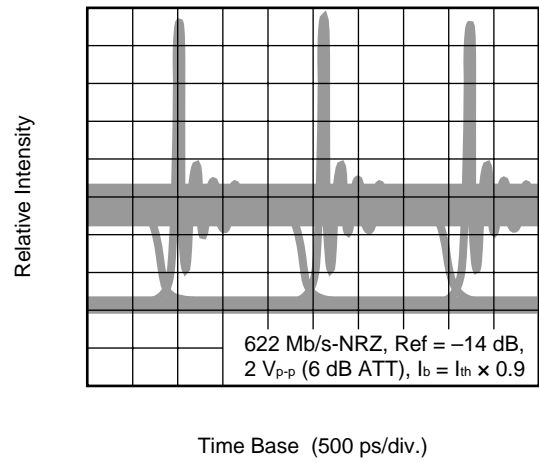
TEMPERATURE DEPENDENCE OF PEAK EMISSION WAVELENGTH



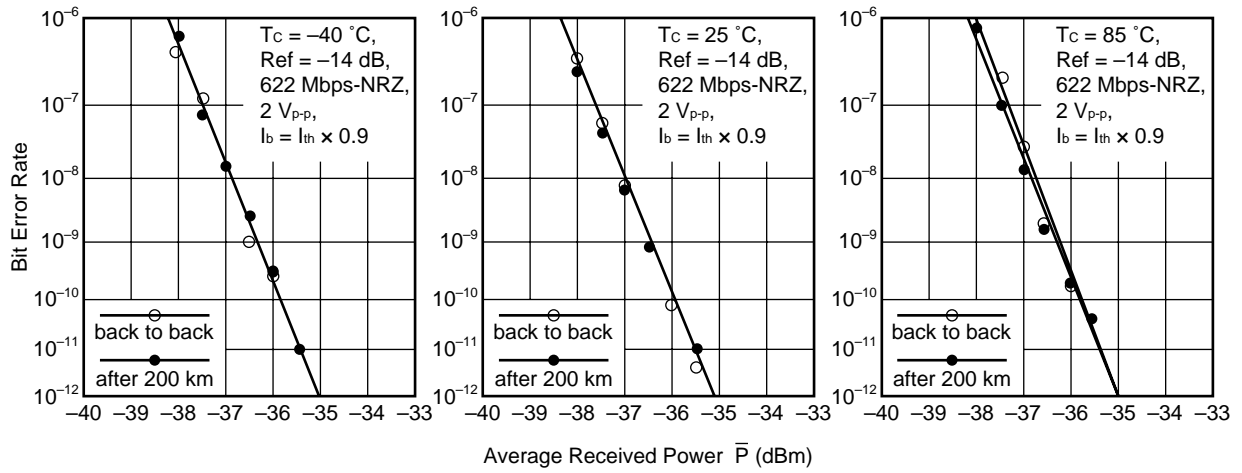
LONGITUDINAL MODE



EYE DIAGRAM



ERROR RATE CHARACTERISTICS



**Remark** The graphs indicate 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	1 310	2.5 Gb/s: STM-16 (S-16.1, L-16.1)	Coaxial
NX8303BG-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	-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	1 550	622 Mb/s: STM-4 (L-4.2, L-4.3)	Coaxial
NX8560LJ-CC	-10 to +70	-40 to +85	6	-2 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	0.5	1 550 <sup>*2</sup>	2.5 Gb/s: STM-16 EA modulator integrated	BFY
NX8565LE-CC	-20 to +70	-40 to +85	7	0.5	1 550 <sup>*2</sup>	2.5 Gb/s: STM-16 EA modulator integrated	BFY
NX8570SA	-20 to +70	-40 to +85	20	20	1 550 <sup>*2</sup>	CW Light Source with λ monitoring PD	BFY

\*1 TYP.

\*2 Available for DWDM Wavelength based on ITU-T recommendation



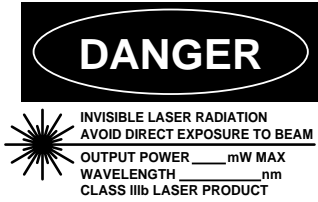
**REFERENCE**

Document Name	Document No.
NEC semiconductor device reliability/quality control system	C11159E
Quality grades on NEC semiconductor devices	C11531E
Semiconductor device mounting technology manual	C10535E
SEMICONDUCTOR SELECTION GUIDE Products & Packages (CD-ROM)	X13769X

[MEMO]

CAUTION

Within this device there exists GaAs (Gallium Arsenide) material which is a harmful substance if ingested. Please do not under any circumstances break the hermetic seal.

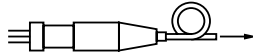


**DANGER**

INVISIBLE LASER RADIATION  
AVOID DIRECT EXPOSURE TO BEAM

OUTPUT POWER \_\_\_\_\_mW MAX  
WAVELENGTH \_\_\_\_\_nm  
CLASS IIIb LASER PRODUCT

SEMICONDUCTOR LASER



AVOID EXPOSURE-Invisible  
Laser Radiation is emitted from  
this aperture

NEC Corporation

NEC Building, 7-1, Shiba 5-chome,  
Minato-ku, Tokyo 108-01, Japan

Type number: \_\_\_\_\_

Manufactured: \_\_\_\_\_

Serial Number: \_\_\_\_\_

This product conforms to FDA  
regulations as applicable  
to standards 21 CFR Chapter 1.  
Subchapter J.

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