

## NEC's 1550 nm InGaAsP MQW DFB LASER DIODE IN COAXIAL PACKAGE FOR 155 Mb/s AND 622 Mb/s APPLICATIONS

**NX8503BG-CC**  
**NX8503CG-CC**

### FEATURES

- **PEAK EMISSION WAVELENGTH:**  
 $\lambda_P = 1550 \text{ nm}$
- **OPTICAL OUTPUT POWER:**  
 $P_f = 2.0 \text{ mW}$
- **LOW THRESHOLD CURRENT:**  
 $I_{TH} = 15 \text{ mA @ } T_c = 25^\circ\text{C}$
- **InGaAs MONITOR PIN-PD**
- **WIDE OPERATING TEMPERATURE RANGE:**  
 $T_c = -10 \text{ to } +85^\circ\text{C}$
- **WITH SC-UPC CONNECTOR**
- **BASED ON TELCORDIA RELIABILITY**

### DESCRIPTION

NEC's NX8503BG-CC and NX8503CG-CC are 1550 nm Coaxial Module DFB (Distributed Feed-Back) laser diode with single mode fiber. 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.

The module is ideal as a light source for Synchronous Digital Hierarchy (SDH) system, STM-1, log-haul L-1.2, L-1.3 and STM-4, log-haul L-4.2, L-4.3 ITU-T recommendations.

### ELECTRO-OPTICAL CHARACTERISTICS ( $T_c = -10 \text{ to } +85^\circ\text{C}$ , unless otherwise specified)

PART NUMBER			NX8300BG-CC, NX8300CG-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		1.1	1.6
$I_{TH}$	Threshold Current	$T_c = +25^\circ\text{C}$		15	25
			2		50
$P_{TH}$	Threshold Output Power, $I_F = I_{TH}$	$\mu\text{W}$			100
$I_{MOD}$	Modulation Current	$P_f = 2.0 \text{ mW}, T_c = 25^\circ\text{C}$	15	25	40
		$P_f = 2.0 \text{ mW}$	13		60
$\eta_d$	Differential Efficiency	$P_f = 2.0 \text{ mW}, T_c = 25^\circ\text{C}$	0.050	0.080	0.130
		$P_f = 2.0 \text{ mW}$	0.030		0.150
$\Delta\eta_d$	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	-1.6	
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	1530	1550	1570
$\Delta\lambda/\Delta T$	Temperature Dependence of Peak Emission Wavelength	nm/°C		0.1	0.12
$\Delta\lambda$	Spectral Width, $P_f = 2.0 \text{ mW}$ , -20 dB down width	nm		0.3	1.0
SMSR	Side Mode Suppression Ratio, $P_f = 2.0 \text{ mW}$	dB	30	40	
$f_c$	Cut-off Frequency, -3 dB, $V_R = 5 \text{ V}$ , $P_f = 2.0 \text{ mW}$	GHz		2.0	
$t_r$	Rise Time, 10 to 90%, $P_{pk} = 2.0 \text{ mW}$ , $I_F = I_{TH}$	ns			0.5
$t_f$	Fall Time, 90 to 10%, $P_{pk} = 2.0 \text{ mW}$ , $I_F = I_{TH}$	ns			0.5
$I_m$	Monitor Current, $V_R = 5 \text{ V}$ , $P_f = 2.0 \text{ mW}$	$\mu\text{A}$	200	1000	2000
$I_D$	Monitor Dark Current	$V_R = 5 \text{ V}, T_c = 25^\circ\text{C}$	nA	1.0	50
		$V_R = 5 \text{ V}$	nA	10	500

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

PART NUMBER		NX8503BG-CC, NX8503CG-CC			
SYMBOLS	PARAMETERS AND CONDITIONS	UNITS	MIN	TYP	MAX
C <sub>t</sub>	Monitor PD Terminal Capacitance, V <sub>R</sub> = 5 V, f = 1 MHz	pF		1.0	20
LIN <sub>m</sub>	Linearity, V <sub>R</sub> = 5 V, P <sub>f</sub> = 0.2 to 2.0 mW (Refer to definitions)	%			10
γ	Tracking Error, I <sub>m</sub> = const. (Refer to definitions)	dB		0.5	1.0
RIN	Relative Intensity Noise, Ref = -14dB	dB/Hz		-135	

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

(T<sub>c</sub> = -20 to +85°C, unless otherwise specified)

SYMBOLS	PARAMETERS	UNITS	RATINGS
I <sub>F</sub>	Forward Current of LD	mA	150
P <sub>f</sub>	Optical Output Power from Fiber	mW	5.0
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	-10 to +85
T <sub>STG</sub>	Storage Temperature	°C	-40 to +85
T <sub>SLD</sub>	Lead Soldering Temperature (10 s)	°C	260
RH	Relative Humidity (non-condensing)	%	85

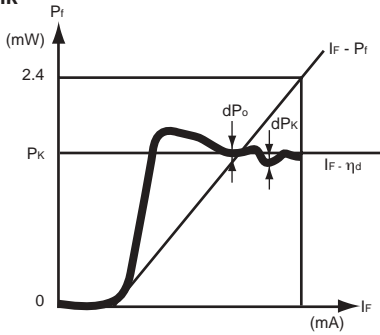
Note:

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



PARAMETER DEFINITIONS

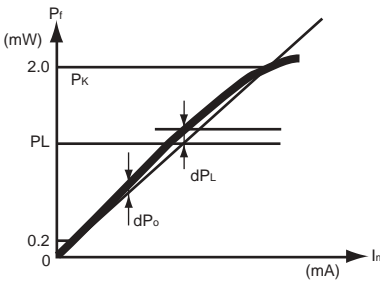
Kink : kink



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

$dPk = dPo \text{ MAX}$   
 $Pk \leq 2.4 \text{ (mW)}$

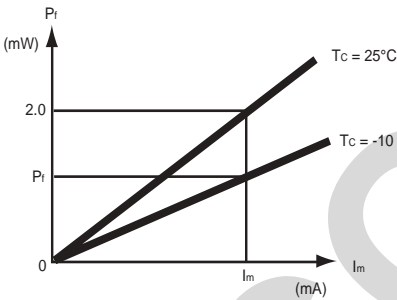
Linearity : LINm



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

$dPL = dPo \text{ MAX}$   
 $0.2 < PL < 2.0 \text{ (mW)}$

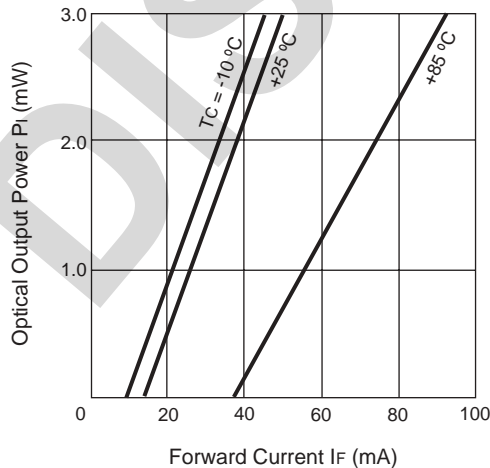
Tracking Error : γ



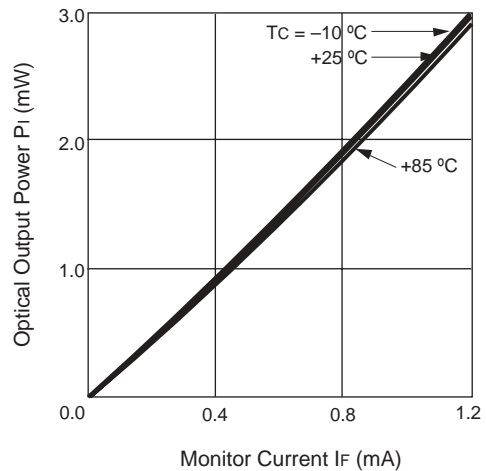
$$\gamma = \left| 10 \log \frac{P_f}{2.0} \right| \text{ [dB]}$$

TYPICAL CHARACTERISTICS (TC = 25 °C, Unless otherwise specified)

OPTICAL OUTPUT POWER vs. FORWARD CURRENT

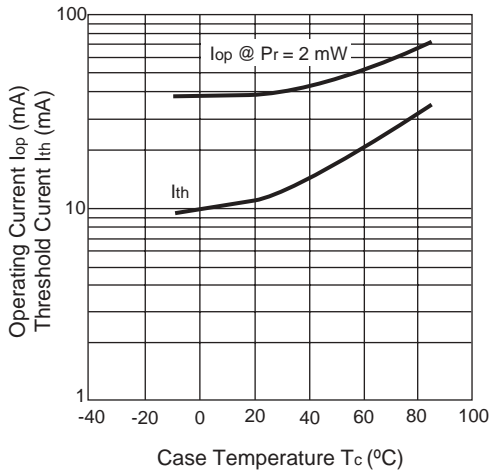


OPTICAL OUTPUT POWER vs. MONITOR CURRENT

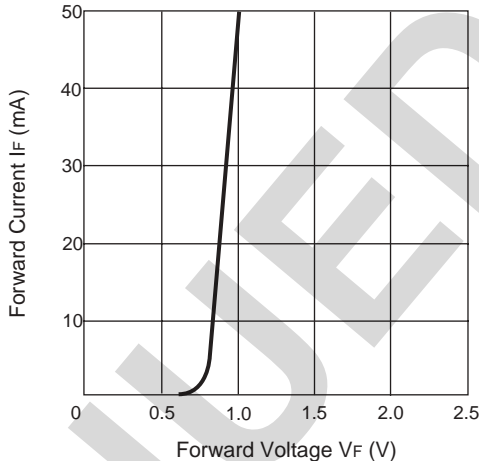


**TYPICAL CHARACTERISTICS** (TC = 25 °C, Unless otherwise specified)

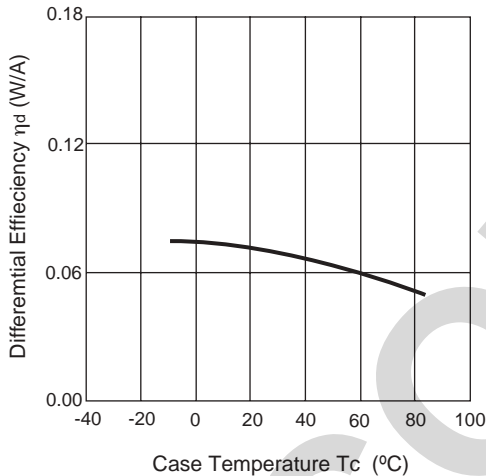
**OPERATING CURRENT AND THRESHOLD CURRENT vs. CASE TEMPERATURE**



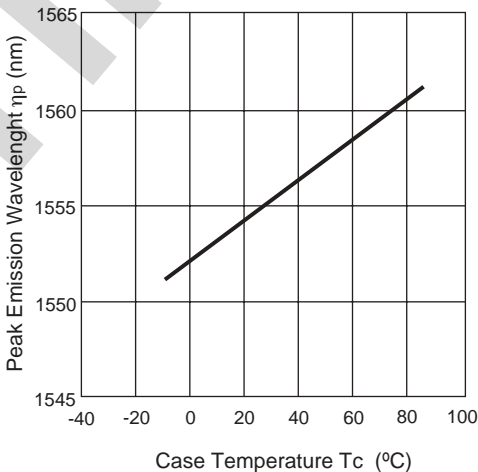
**FORWARD CURRENT vs. FORWARD VOLTAGE**



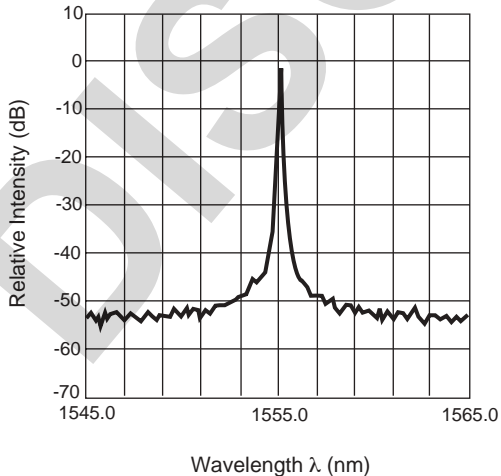
**TEMPERATURE DEPENDENCE OF DIFFERENTIAL EFFICIENCY**



**TEMPERATURE DEPENDENCE OF PEAK EMISSION WAVELENGTH**

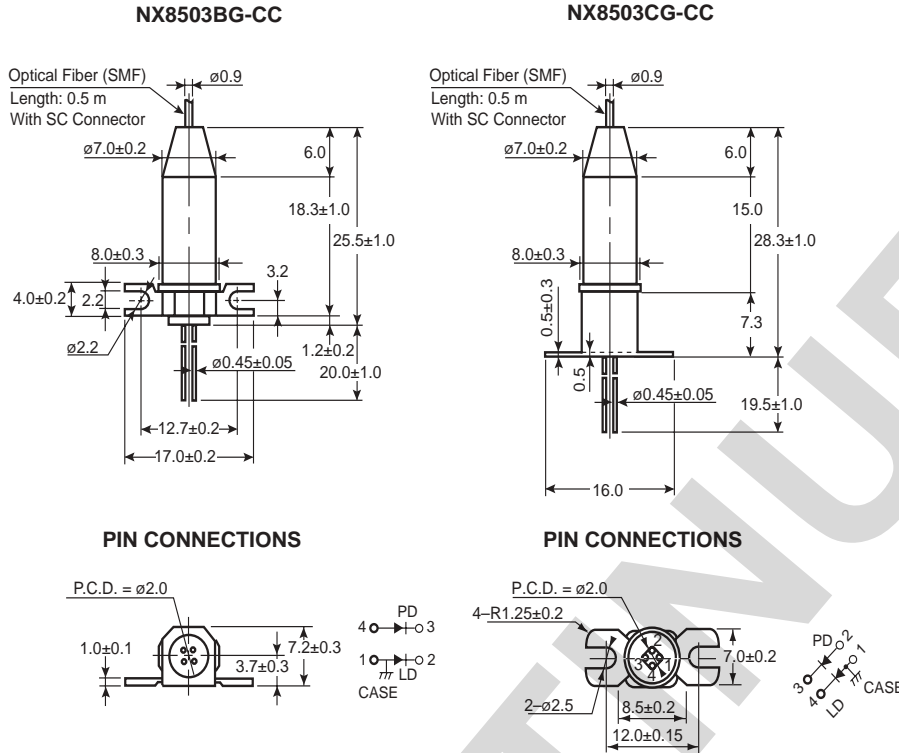


**SPECTRUM**



**REMARK** The graphs indicate nominal characteristics.

**OUTLINE DIMENSIONS** (Units in mm)

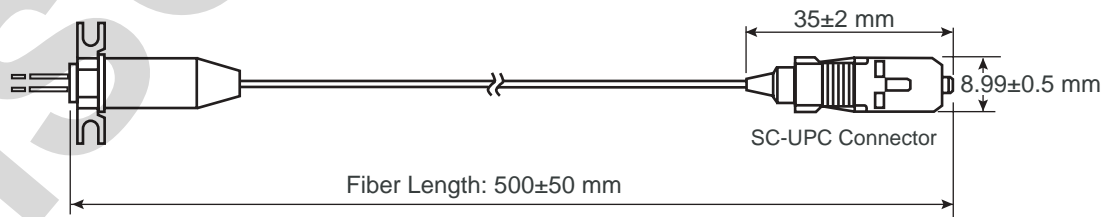


**OPTICAL FIBER CHARACTERISTICS**

PARAMETER	SPEC	UNIT
Mode Field Diameter	9.5 $\pm 1$	$\mu\text{m}$
Cladding Diameter	125 $\pm 2$	$\mu\text{m}$
Maximum Cladding Noncircularity	2	%
Maximum Core/Cladding Concentricity	1.6	%
Outer Diameter	0.9 $\pm 0.1$	mm
Cut-off Wavelength	1100 to 1270	nm
Minimum Fiber Bending Radius	30	mm
Fiber Length	500 $\pm 50$ MIN	mm
Flammability	UL1581 VW-1	

**ORDERING INFORMATION**

PART NUMBER	AVAILABLE CONNECTOR	FLANGE TYPE
NX8503BG-CC	With SC-UPC Connector	Flat Mount Flange
NX8503CG-CC		Vertical Mount Flange



**Life Support Applications**

These NEC products are not intended for use in life support devices, appliances, or systems where the malfunction of these products can reasonably be expected to result in personal injury. The customers of CEL using or selling these products for use in such applications do so at their own risk and agree to fully indemnify CEL for all damages resulting from such improper use or sale.