



# NEC's 1310 nm InGaAsP MQW FP LASER DIODE IN COAXIAL PACKAGE FOR 622 Mb/s APPLICATIONS

**NX7302BA-CC**  
**NX7302CA-CC**

## FEATURES

- **CENTER WAVELENGTH:**  
 $\lambda_c = 1310 \text{ nm}$
- **OPTICAL OUTPUT POWER:**  
 $P_f = 0.2 \text{ mW}$
- **LOW THRESHOLD CURRENT:**  
 $I_{TH} = 9 \text{ mA}$
- **HIGH CUTOFF FREQUENCY:**  
 $f_c = 2.0 \text{ GHz}$
- **InGaAs MONITOR PIN-PD**
- **WITH SC-UPC CONNECTOR**
- **WIDE OPERATING TEMPERATURE RANGE:**  
-40 to +85°C
- **BASED ON TELCORDIA RELIABILITY**

## DESCRIPTION

NEC's NX7302BA-CC and NX7302CA-CC are 1310 nm Fabry-Perot (FP) laser diode coaxial modules with single mode fiber. They have a Multiple Quantum Well (MQW) structure and a built-in InGaAs monitor photo diode. These modules are ideal as light sources for Synchronous Digital Hierarchy (SDH) systems, STM-4 and short-haul S-4.1 ITU-T recommendations.

## ELECTRO-OPTICAL CHARACTERISTICS (T<sub>c</sub> = -40 to +85°C, unless otherwise specified)

PART NUMBER			NX7302BA-CC, NX7302CA-CC		
SYMBOLS	PARAMETERS AND CONDITIONS	UNITS	MIN	TYP	MAX
P <sub>f</sub>	Optical Output Power from Fiber	mW		0.2	
V <sub>OP</sub>	Operating Voltage, P <sub>f</sub> = 0.2 mW	V		1.2	1.5
I <sub>TH</sub>	Threshold Current	T <sub>c</sub> = +25°C	4	9	20
			2		50
P <sub>TH</sub>	Threshold Output Power, I <sub>F</sub> = I <sub>TH</sub>	μW			15
I <sub>MOD</sub>	Modulation Current	P <sub>f</sub> = 0.2 mW, T <sub>c</sub> = 25°C	7	15	20
		P <sub>f</sub> = 0.2 mW	5		40
η <sub>d</sub>	Differential Efficiency	P <sub>f</sub> = 0.2 mW, T <sub>c</sub> = 25°C	0.010	0.015	0.025
		P <sub>f</sub> = 0.2 mW	0.005		0.040
Δη <sub>d</sub>	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	-2	
Kink	Kink, P <sub>f</sub> = Up to 0.24 mW (Refer to Definitions)	%			±20
λ <sub>c</sub>	Center Wavelength, P <sub>f</sub> = 0.2 mW, RMS (-20 dB)	nm	1274	1310	1356
Δλ/ΔT	Temperature Dependence of Center Wavelength	nm/°C		0.4	0.5
σ	Spectral Width, P <sub>f</sub> = 0.2 mW, RMS (-20 dB)	nm		1.3	2.5
f <sub>c</sub>	Cut-off Frequency, -3 dB	GHz		2.0	
t <sub>r</sub>	Rise Time, 10 to 90%, P <sub>pk</sub> = 0.2 mW, I <sub>F</sub> = I <sub>TH</sub>	ns		0.2	0.5
t <sub>f</sub>	Fall Time, 90 to 10%, P <sub>pk</sub> = 0.2 mW, I <sub>F</sub> = I <sub>TH</sub>	ns		0.3	0.5
Applicable to Monitor PD: T <sub>c</sub> = -40 to +85 °C unless otherwise specified					
I <sub>m</sub>	Monitor Current, V <sub>R</sub> = 5 V, P <sub>f</sub> = 0.2 mW	μA	100	700	1200
I <sub>D</sub>	Dark Current	V <sub>R</sub> = 5 V, T <sub>c</sub> = 25 °C	nA	0.1	50
		V <sub>R</sub> = 5 V	nA	10	500
C <sub>t</sub>	Terminal Capacitance, V <sub>R</sub> = 5 V, f = 1 MHz	pF			20
LIN <sub>m</sub>	Linearity, V <sub>R</sub> = 5 V, P <sub>f</sub> = 0.02 to 0.2 mW (Refer to Definitions)	%			±10
γ	Tracking Error, I <sub>m</sub> = const. (Refer to Definitions)	dB		0.5	1.0

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

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

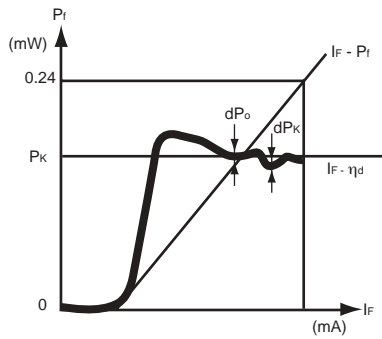
SYMBOLS	PARAMETERS	UNITS	RATINGS
P <sub>f</sub>	Optical Output Power from Fiber	mW	0.5
I <sub>F</sub>	Forward Current of LD	mA	150
V <sub>R</sub>	Reverse Voltage of LD	V	2.0
I <sub>F</sub>	Forward Current of PD	mA	10
V <sub>R</sub>	Reverse Voltage of PD	V	20
T <sub>c</sub>	Operating Case Temperature	°C	-40 to +85
T <sub>STG</sub>	Storage Temperature	°C	-40 to +85
T <sub>SLD</sub>	Lead Soldering Temperature (10 s)	°C	260
RH	Relative Humidity (noncondensing)	%	85

Note:

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

**PARAMETER DEFINITIONS**

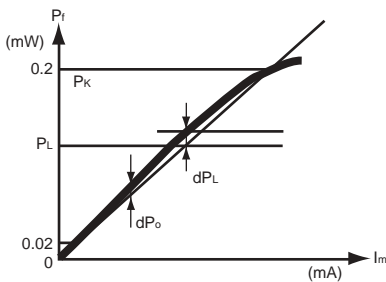
**Kink : kink**



$$\text{kink} = \frac{|dP_k|}{P_k} \times 100 \text{ [%]}$$

dP<sub>k</sub> = dP<sub>o</sub> MAX  
 P<sub>k</sub> ≤ 0.24 (mW)

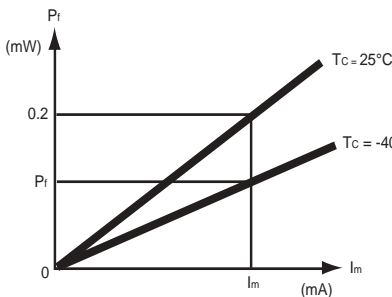
**Linearity : LINm**



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

dP<sub>L</sub> = dP<sub>o</sub> MAX  
 0.02 < P<sub>k</sub> < 0.2 (mW)

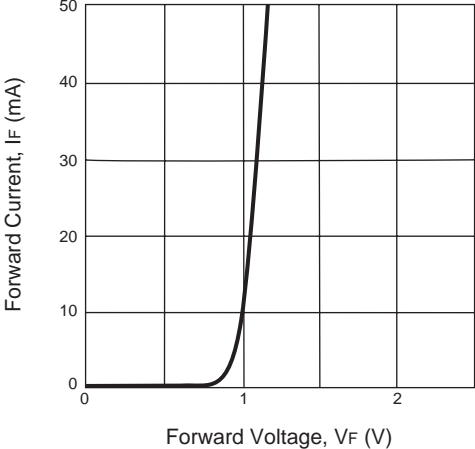
**Tracking Error : γ**



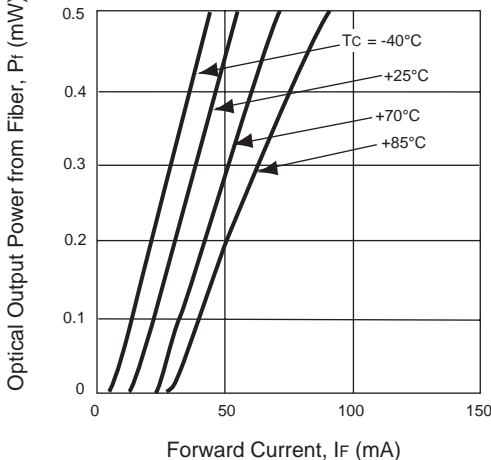
$$\gamma = \left| 10 \log \frac{P_f}{0.2} \right| \text{ [dB]}$$

TYPICAL PERFORMANCE CURVES (Tc = -40 to +85°C)

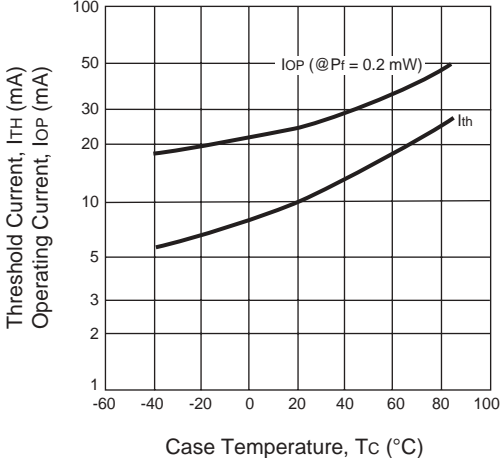
FORWARD CURRENT vs. FORWARD VOLTAGE



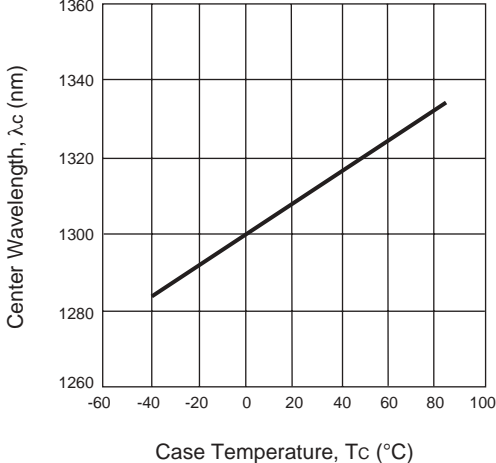
OPTICAL OUTPUT POWER FROM FIBER vs. FORWARD CURRENT



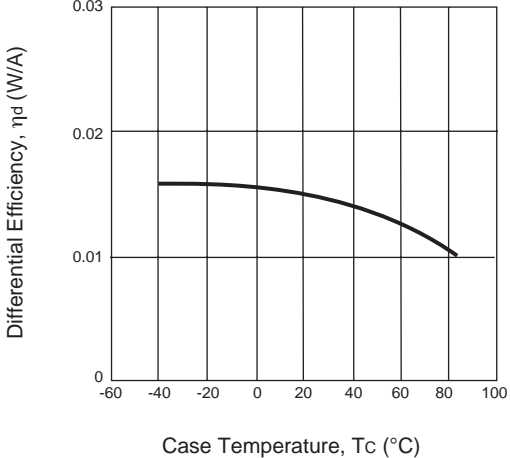
OPERATING CURRENT AND THRESHOLD CURRENT vs. CASE TEMPERATURE



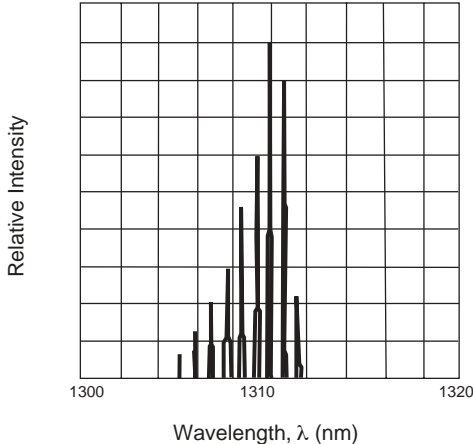
TEMPERATURE DEPENDENCE OF CENTER WAVELENGTH



TEMPERATURE DEPENDENCE OF DIFFERENTIAL EFFICIENCY



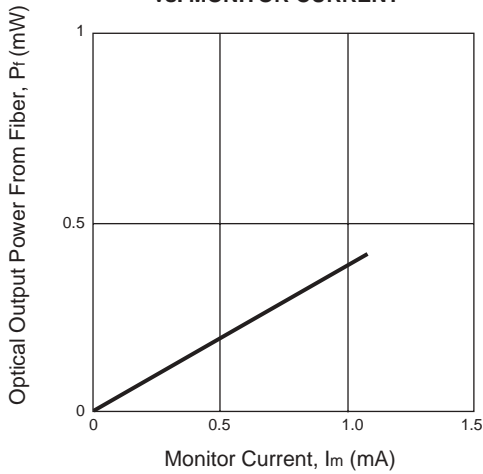
LONGITUDINAL MODE



**TYPICAL PERFORMANCE CURVES**

(Tc = -40 to +85°C)

**OPTICAL OUTPUT POWER FROM FIBER vs. MONITOR CURRENT**

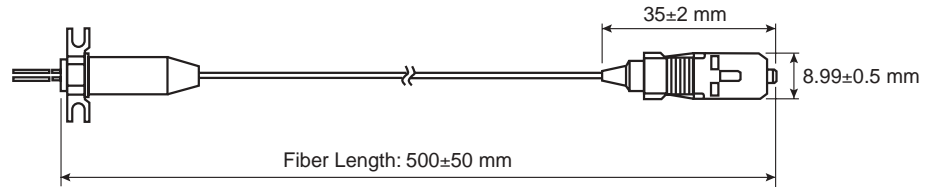


**ORDERING INFORMATION**

PART NUMBER	AVAILABLE CONNECTOR	FLANGE TYPE
NX7302BA-CC	With SC-UPC Connector	Flat Mount Flange
NX7302CA-CC	With SC-UPC Connector	Vertical Mount Flange

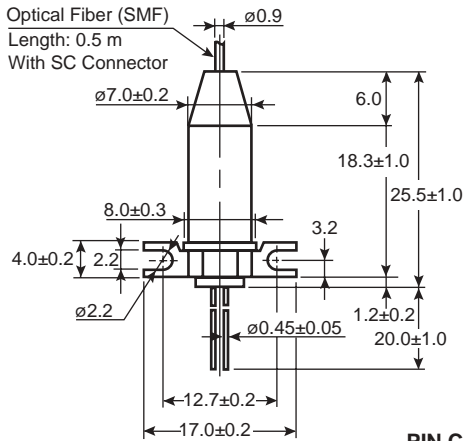
**OPTICAL FIBER CHARACTERISTICS**

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

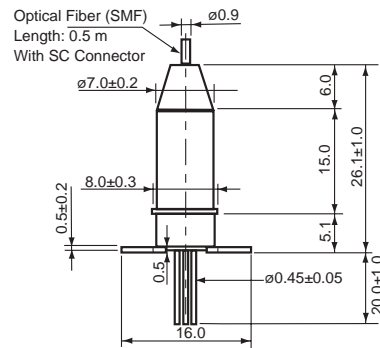


**OUTLINE DIMENSIONS (Units in mm)**

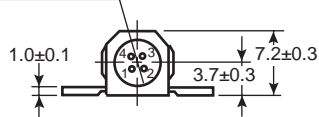
**NX7302BA-CC**



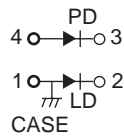
**NX7302CA-CC**



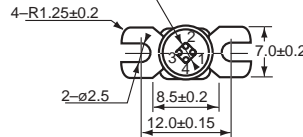
P.C.D. = ø2.0



**PIN CONNECTIONS**



P.C.D. = ø2.0



**PIN CONNECTIONS**

