

To our customers,

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## Old Company Name in Catalogs and Other Documents

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

April 1<sup>st</sup>, 2010  
Renesas Electronics Corporation

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

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# NX7303BA-CC, NX7303CA-CC

1 310 nm InGaAsP MQW-FP LASER DIODE  
COAXIAL MODULE FOR 156 Mb/s

**Phase-out/Discontinued**

## DESCRIPTION

★ The NX7303BA-CC and NX7303CA-CC are 1 310 nm Multiple Quantum Well (MQW) structured Fabry-Perot (FP) laser diode coaxial modules with single mode fiber.

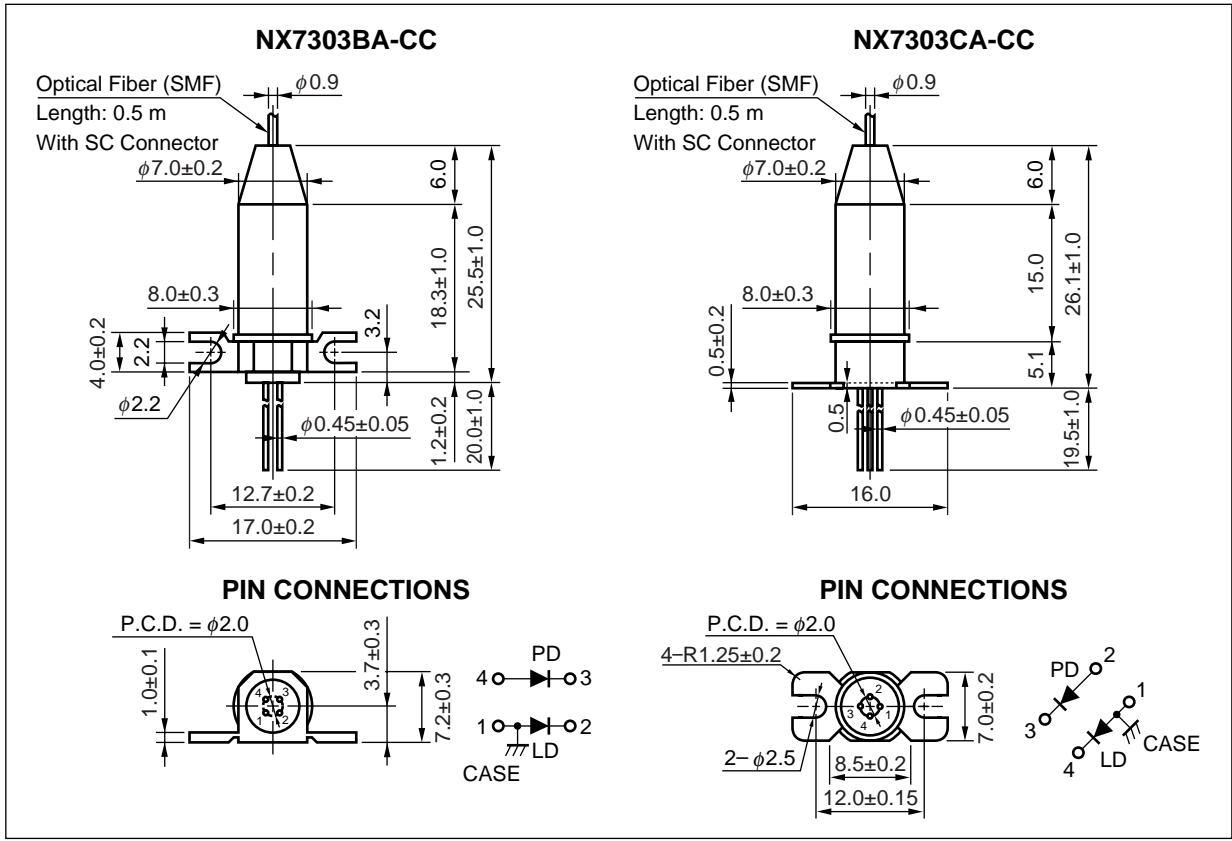
These modules are ideal as a light source for Synchronous Digital Hierarchy (SDH) system, STM-1 and long-haul L-1.1 ITU-T recommendations.

## FEATURES

- Center wavelength  $\lambda_c = 1\ 310\ \text{nm}$
- Optical output power  $P_r = 1.0\ \text{mW}$
- Low threshold current  $I_{th} = 9\ \text{mA}$
- High cut-off frequency  $f_c = 2.0\ \text{GHz}$
- 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

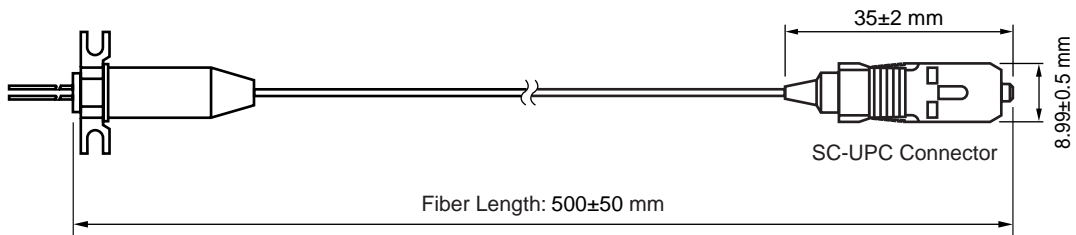
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Not all devices/types available in every country. Please check with local NEC Compound Semiconductor Devices representative for availability and additional information.

★ PACKAGE DIMENSIONS (UNIT: mm)



OPTICAL FIBER CHARACTERISTICS

Parameter	Specification	Unit
Mode Field Diameter	9.5 $\pm$ 1	$\mu$ m
Cladding Diameter	125 $\pm$ 2	$\mu$ 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
NX7303BA-CC	Flat Mount Flange	With SC-UPC Connector
NX7303CA-CC	Vertical Mount Flange	

★

**ABSOLUTE MAXIMUM RATINGS**

Parameter	Symbol	Ratings	Unit
Optical Output Power from Fiber	$P_f$	3.0	mW
Forward Current of LD	$I_F$	150	mA
Reverse Voltage of LD	$V_R$	2.0	V
Forward Current of PD	$I_F$	10	mA
Reverse Voltage of PD	$V_R$	20	V
Operating Case Temperature	$T_c$	-40 to +85	°C
Storage Temperature	$T_{stg}$	-40 to +85	°C
Lead Soldering Temperature	$T_{slid}$	350 (3 sec.)	°C
Relative Humidity (noncondensing)	RH	85	%

★

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

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Optical Output Power from Fiber	$P_f$			1.0		mW
Operating Voltage	$V_{op}$	$P_f = 1.0$ mW		1.2	1.5	V
Threshold Current	$I_{th}$	$T_c = 25^\circ\text{C}$	4	9	20	mA
			2		50	
Threshold Output Power	$P_{th}$	$I_F = I_{th}$			75	$\mu\text{W}$
Modulation Current	$I_{mod}$	$P_f = 1.0$ mW, $T_c = 25^\circ\text{C}$	8	15	35	mA
			5		60	
Differential Efficiency	$\eta_d$	$P_f = 1.0$ mW, $T_c = 25^\circ\text{C}$	0.030	0.070	0.100	W/A
			0.018		0.150	
Temperature Dependence of Differential Efficiency	$\Delta\eta_d$	$\Delta\eta_d = 10 \log \frac{\eta_d (@ T_c^\circ\text{C})}{\eta_d (@ 25^\circ\text{C})}$	-3	-2		dB
Kink (Refer to <b>DEFINITIONS</b> )	kink	$P_f = \text{Up to } 1.2$ mW			$\pm 20$	%
Center Wavelength	$\lambda_c$	$P_f = 1.0$ mW, RMS (-20 dB)	1 263	1 310	1 360	nm
Temperature Dependence of Center Wavelength	$\Delta\lambda/\Delta T$			0.4	0.5	nm/°C
Spectral Width	$\sigma$	$P_f = 1.0$ mW, RMS (-20 dB)		1.3	4.0	nm
Cut-off Frequency	$f_c$	-3 dB		2.0		GHz
Rise Time	$t_r$	10-90%, $P_{pk} = 1.0$ mW, $I_F = I_{th}$		0.2	0.5	ns
Fall Time	$t_f$	90-10%, $P_{pk} = 1.0$ mW, $I_F = I_{th}$		0.3	0.5	ns

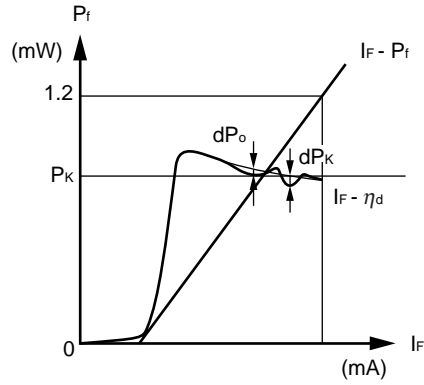
**ELECTRO-OPTICAL CHARACTERISTICS**

(Applicable to Monitor PD:  $T_c = -40$  to  $+85^\circ\text{C}$ , unless otherwise specified)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Monitor Current	$I_m$	$V_R = 5\text{ V}$ , $P_f = 1.0\text{ mW}$	100	700	1 200	$\mu\text{A}$
Dark Current	$I_D$	$V_R = 5\text{ V}$ , $T_c = 25^\circ\text{C}$		0.1	50	nA
		$V_R = 5\text{ V}$		10	500	
Terminal Capacitance	$C_t$	$V_R = 5\text{ V}$ , $f = 1\text{ MHz}$			20	pF
Linearity (Refer to <b>DEFINITIONS</b> )	$LIN_m$	$V_R = 5\text{ V}$ , $P_f = 0.1$ to $1.0\text{ mW}$			$\pm 10$	%
Tracking Error (Refer to <b>DEFINITIONS</b> )	$\gamma$	$I_m = \text{const.}$		0.5	1.0	dB

PARAMETER DEFINITIONS

**Kink : kink**

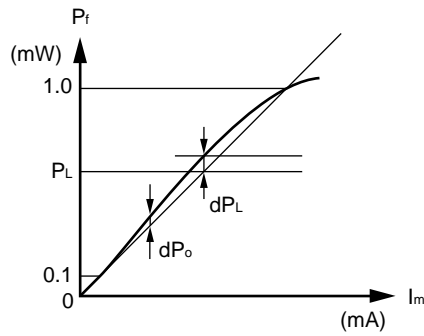


$$\text{kink} = \frac{|dP_K|}{P_K} \times 100 [\%]$$

$dP_K = dP_o \text{ MAX.}$

$P_K \leq 1.2 \text{ (mW)}$

**Linearity : LIN<sub>m</sub>**

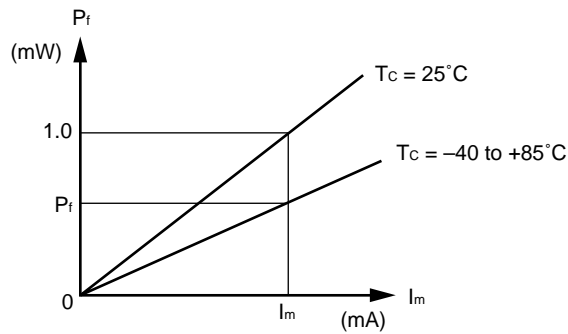


$$\text{LIN}_m = \frac{|dP_L|}{P_L} \times 100 [\%]$$

$dP_L = dP_o \text{ MAX.}$

$0.1 < P_L < 1.0 \text{ (mW)}$

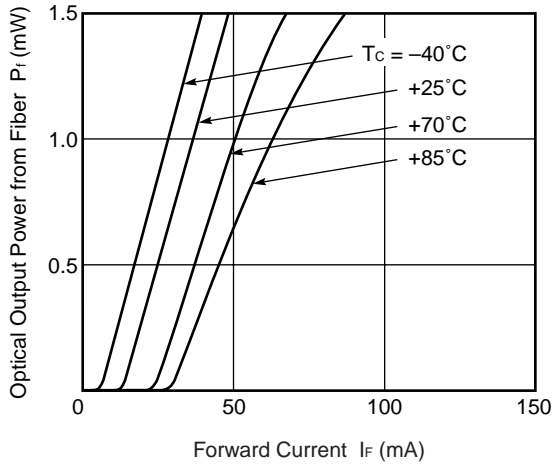
**Tracking Error :  $\gamma$**



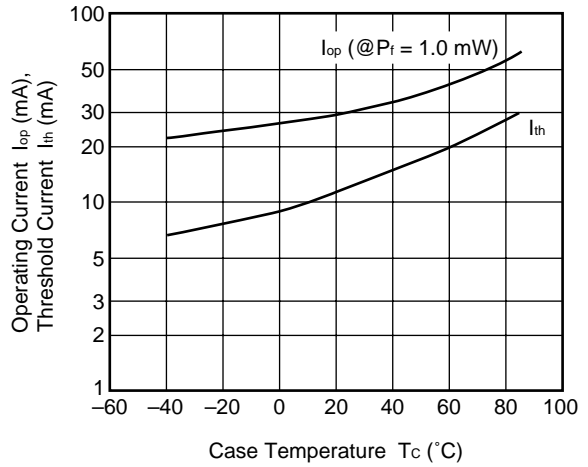
$$\gamma = \left| 10 \log \frac{P_f}{1.0} \right| [\text{dB}]$$

**TYPICAL CHARACTERISTICS ( $T_c = -40$  to  $+85^\circ\text{C}$ )**

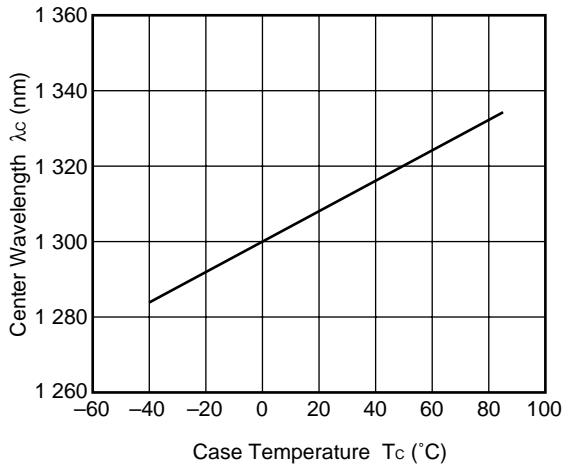
OPTICAL OUTPUT POWER FROM FIBER vs. FORWARD CURRENT



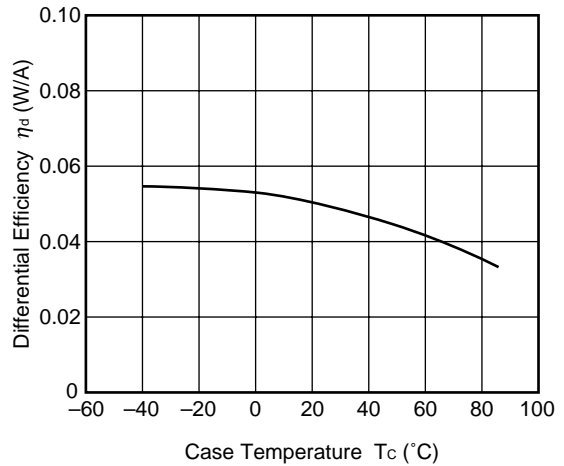
OPERATING CURRENT AND THRESHOLD CURRENT vs. CASE TEMPERATURE



TEMPERATURE DEPENDENCE OF CENTER WAVELENGTH



TEMPERATURE DEPENDENCE OF DIFFERENTIAL EFFICIENCY

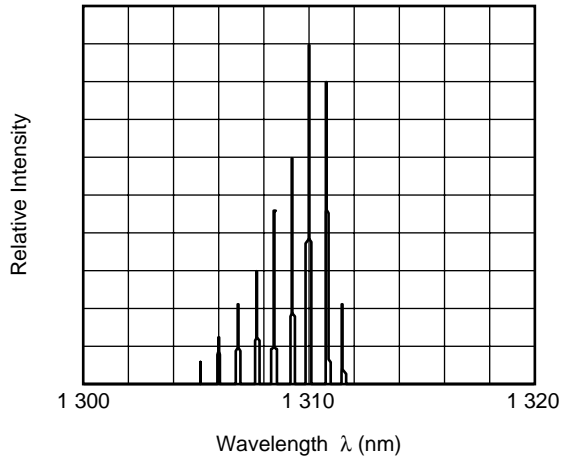


**Remark** The graphs indicate nominal characteristics.

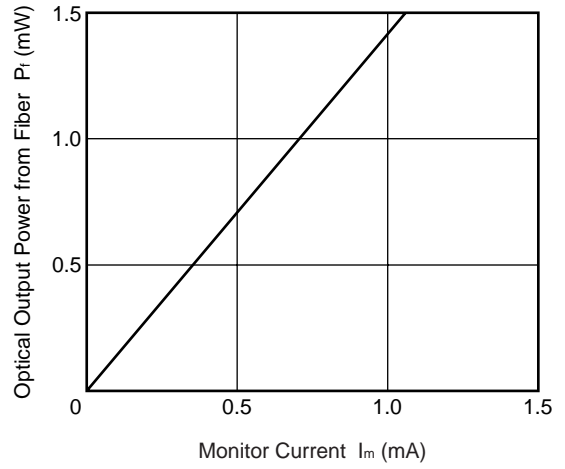


TYPICAL CHARACTERISTICS (T<sub>c</sub> = 25°C)

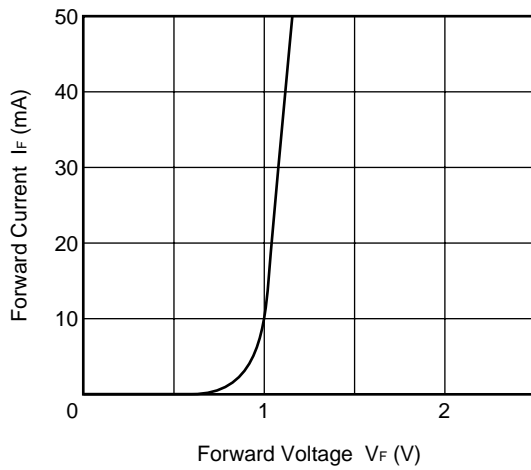
SPECTRUM



OPTICAL OUTPUT POWER FROM FIBER vs. MONITOR CURRENT



FORWARD CURRENT vs. FORWARD VOLTAGE



**Remark** The graphs indicate nominal characteristics.

FP-LD FAMILY

Part Number	Absolute Maximum Ratings		Electro-Optical Characteristics (T <sub>c</sub> = -40 to +85°C)				Applications	Package
	T <sub>c</sub> (°C)	T <sub>stg</sub> (°C)	P <sub>i</sub> (mW)	λ <sub>c</sub> (nm)		σ (nm)		
			TYP.	MIN.	MAX.	MAX.		
★ NX7301BA-CC NX7301CA-CC	-40 to +85	-40 to +85	0.2	1 261	1 360	4.0	156 Mb/s: STM-1 (I-1, S-1.1) 622 Mb/s: STM-4 (I-4)	Coaxial
★ NX7302BA-CC NX7302CA-CC	-40 to +85	-40 to +85	0.2	1 274	1 356	2.5	622 Mb/s: STM-4 (S-4.1)	Coaxial
★ NX7303BA-CC NX7303CA-CC	-40 to +85	-40 to +85	1.0	1 263	1 360	4.0	156 Mb/s: STM-1 (L-1.1)	Coaxial
NX7304BG-CC	-40 to +85	-40 to +85	2.0 <sup>*1</sup>	1 260	1 360	4.0	For fiberoptic communications	Coaxial

\*1 MIN.

REFERENCE

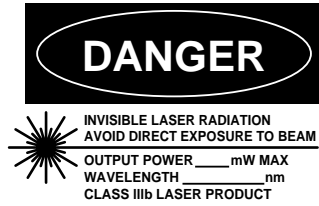
Document Name	Document No.
Optical semiconductor devices for fiberoptic communications Selection Guide	P12480E
Opto-Electronics Devices Pamphlet	P13623E
Opto-Electronics Devices (CD-ROM)	P12944X
NEC semiconductor device reliability/quality control system <sup>*1</sup>	C11159E
Quality grades on NEC semiconductor devices <sup>*1</sup>	C11531E
SEMICONDUCTOR SELECTION GUIDE –Products and Packages– <sup>*1</sup>	X13769E

\*1 Published by NEC Corporation

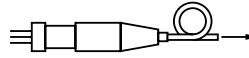
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M8E 00.4-0110

**SAFETY INFORMATION ON THIS PRODUCT**



**SEMICONDUCTOR LASER**



**AVOID EXPOSURE**-Invisible  
 Laser Radiation is emitted from  
 this aperture

<p><b>Warning</b> 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"> <li>• Do not look directly into the laser beam.</li> <li>• Avoid exposure to the laser beam, any reflected or collimated beam.</li> </ul>
<p><b>Caution</b> 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"> <li>• Do not destroy or burn the product.</li> <li>• Do not cut or cleave off any part of the product.</li> <li>• Do not crush or chemically dissolve the product.</li> <li>• Do not put the product in the mouth.</li> </ul> <p>Follow related laws and ordinances for disposal. The product should be excluded from general industrial waste or household garbage.</p>
<p><b>Caution</b> Optical Fiber</p>	<p>A glass-fiber is attached on the product. Handle with care.</p> <ul style="list-style-type: none"> <li>• When the fiber is broken or damaged, handle carefully to avoid injury from the damaged part or fragments.</li> </ul>

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