

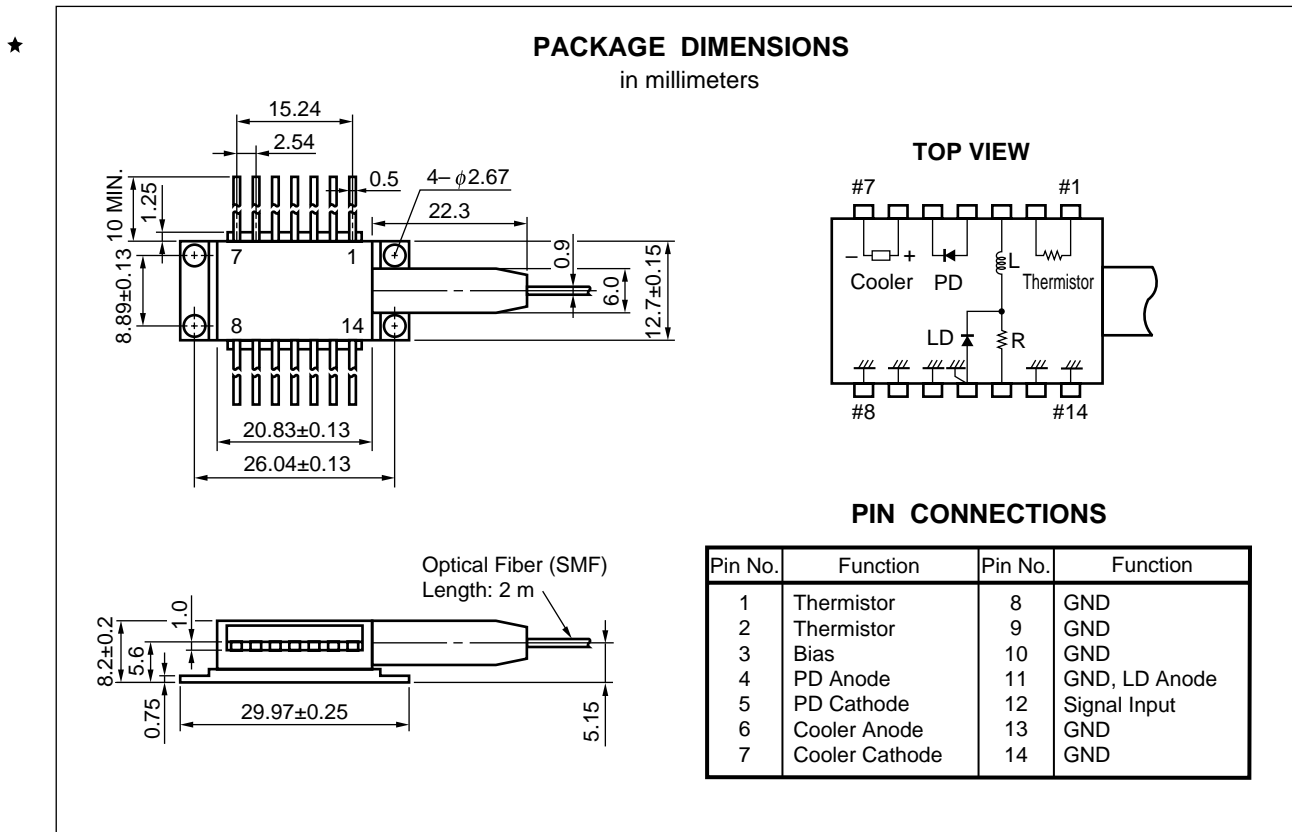
1 310 nm OPTICAL CATV NARROW CAST APPLICATION
InGaAsP STRAINED MQW DFB PC LASER DIODE MODULE

DESCRIPTION

The NDL7680P is a 1 310 nm DFB (Distributed Feed-Back) laser diode that has a newly developed Partially Corrugated (PC) waveguide structure, butterfly package module with optical isolator. It is especially designed for optical CATV narrow cast application.

FEATURES

- Low noise RIN = -150 dB/Hz MAX.
- Low distortion CSO = -50 dBc MAX.
CTB = -55 dBc MAX.
- Output power $P_r = 3.0$ mW to 6.0 mW
- Wide operating temperature range $T_c = -20$ to $+65$ °C
- High reliability
- Internal thermoelectric cooler
- Hermetically sealed 14-pin butterfly package
- Internal InGaAs monitor PD
- 25 Ω impedance matching



The information in this document is subject to change without notice.

ORDERING INFORMATION

Part Number	Available Connector
NDL7680P	Without Connector
NDL7680PC	With FC-UPC Connector
NDL7680PD	With SC-UPC Connector

ABSOLUTE MAXIMUM RATINGS (T_c = 25 °C, unless otherwise specified)

Parameter	Symbol	Ratings	Unit
Optical Output Power from Fiber	P _f	15	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
Cooler Current	I _c	1.0	A
Cooler Voltage	V _c	2.0	V
Operating Case Temperature	T _c	-20 to +65	°C
Storage Temperature	T _{stg}	-40 to +70	°C
Lead Soldering Temperature (10 s)	T _{slid}	260	°C

ELECTRO-OPTICAL CHARACTERISTICS (T_{LD} = 25 °C, T_C = -20 to +65 °C)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Threshold Current	I _{th}			20	35	mA
Forward Voltage	V _F	I _F = 30 mA	0.9	1.2	1.4	V
Optical Output Power from Fiber (Recommended Operating Point)	P _{op} ^{*1}		3.0		6.0	mW
Spontaneous Emission Power from Fiber	P _s	I _b = I _{th}			50	μW
Differential Efficiency from Fiber	η _d	P _f ≤ P _{op}	0.16			W/A
Peak Emission Wavelength	λ _p	P _f = P _{op}	1 290	1 310	1 330	nm
Side Mode Suppression Ratio	SMSR	P _f = P _{op}	30	35		dB
1 dB Bandwidth	f	P _f = P _{op}	1.0			GHz
Relative Intensity Noise	RIN	P _f = P _{op} , CW, Optical Reflection = -40 dB, Measuring Bandwidth = 50 to 600 MHz		-155	-150	dB/Hz
Composite Second Order Distortion	CSO	P _f = P _{op} (5 mW TYP.), OMI = 3.5 %/ch, Optical Reflection = -40 dB,		-55	-50	dBc
Composite Triple Beat Distortion	CTB	Optical Loss = 7 dB, 79 channel unmodulated carriers		-60	-55	dBc
Carrier to Noise Ratio	CNR	(55.25 to 547.25 MHz)	51			dB
Isolation	I _s		25	35		dB

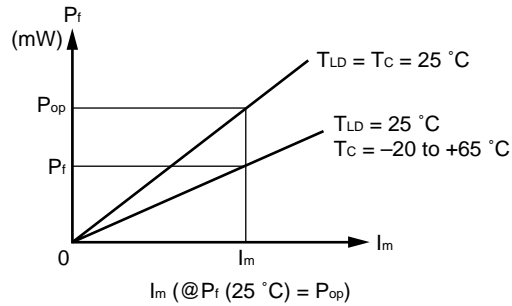
*1 Recommended P_{op} value is supplied with each device.

ELECTRO-OPTICAL CHARACTERISTICS

(Applicable to Monitor PD: $T_{LD} = 25\text{ °C}$, $T_c = -20\text{ to }+65\text{ °C}$)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Monitor Current	I_m	$P_f = P_{op}$, $V_R = 5\text{ V}$	50			μA
Dark Current	I_D	$V_R = 5\text{ V}$		2.0	10	nA
★ Tracking Error	γ^{-1}	$I_m = \text{const.}$			0.5	dB

$$*1 \gamma = \left| 10 \log \frac{P_f}{P_{op}} \right|$$



ELECTRO-OPTICAL CHARACTERISTICS

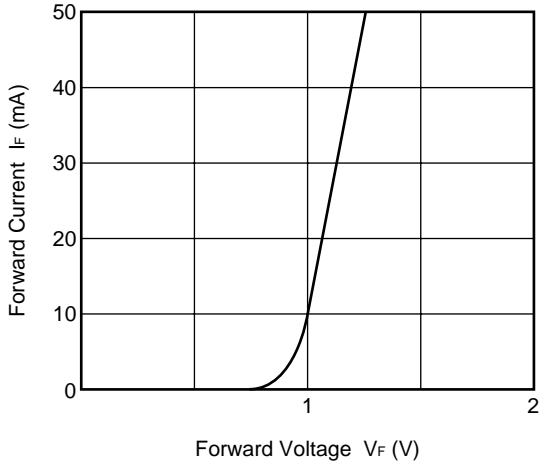
(Applicable to Thermistor and TEC: $T_{LD} = 25\text{ °C}$, $T_c = -20\text{ to }+65\text{ °C}$)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Thermistor Resistance	R	$T_{LD} = 25\text{ °C}$	9.5	10.0	10.5	$\text{k}\Omega$
B Constant	B		3 300	3 400	3 500	K
Cooler Current	I_c	$\Delta T = 40\text{ K}$		0.6	0.8	A
Cooler Voltage	V_c	$\Delta T = 40\text{ K}$		1.1	1.5	V
Cooling Capacity	ΔT^{-1}	$I_c = 0.8\text{ A}$, $P_f = P_{op}$	40			K

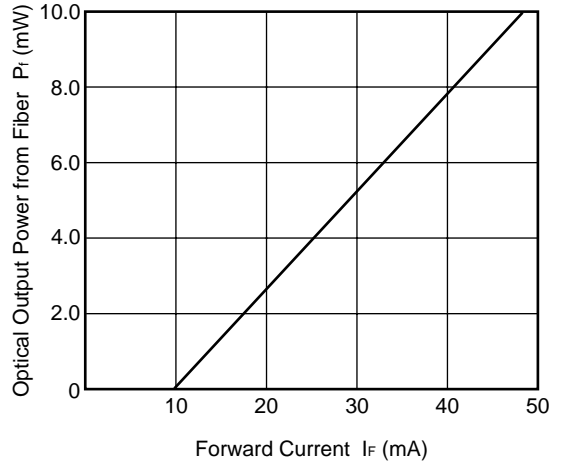
$$*1 \Delta T = |T_c - T_{LD}|$$

★ TYPICAL CHARACTERISTICS (T_c = 25 °C, unless otherwise specified)

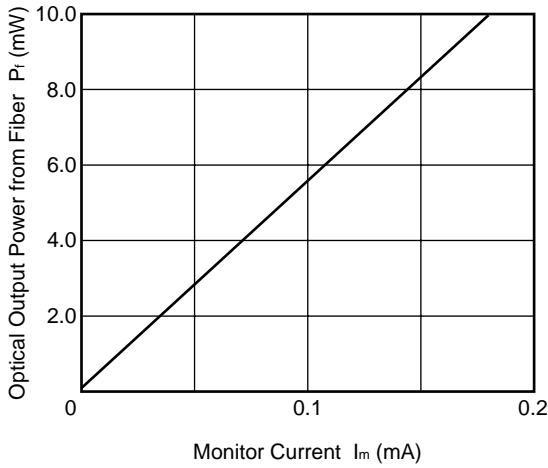
FORWARD CURRENT vs. FORWARD VOLTAGE



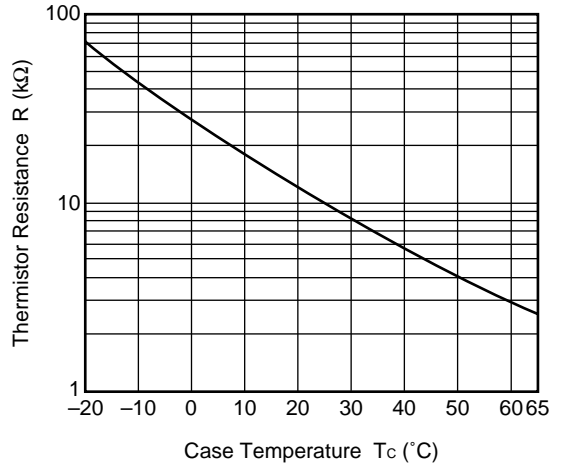
OPTICAL OUTPUT POWER FROM FIBER vs. FORWARD CURRENT



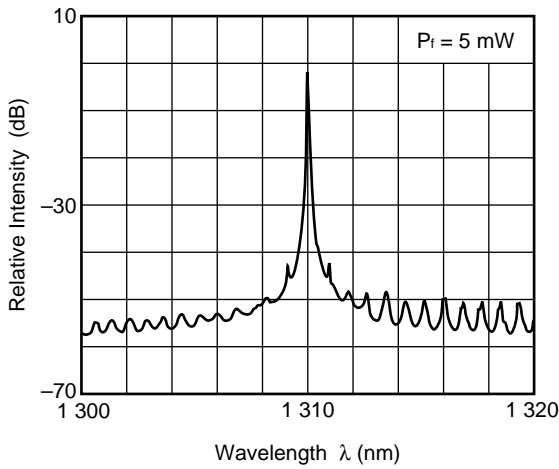
OPTICAL OUTPUT POWER FROM FIBER vs. MONITOR CURRENT



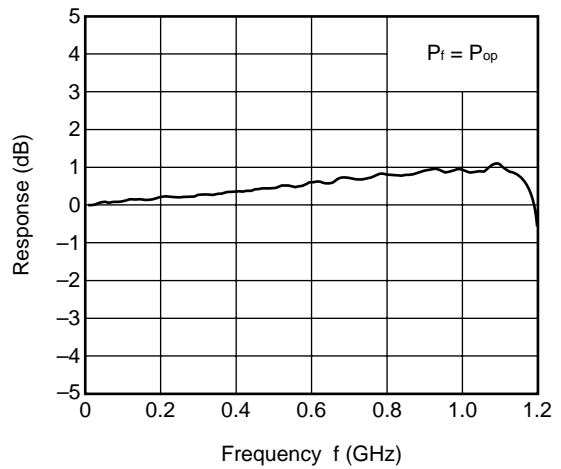
THERMISTOR RESISTANCE vs. CASE TEMPERATURE



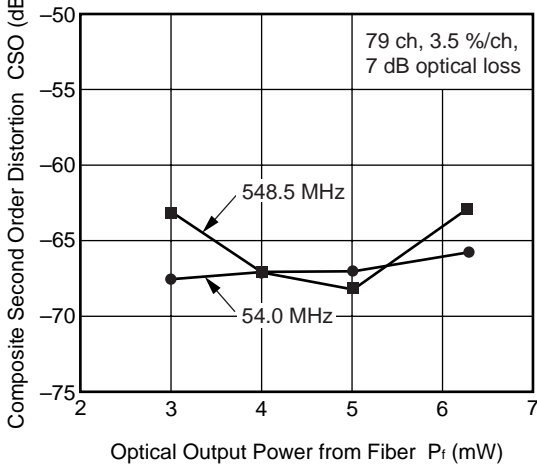
LONGITUDINAL MODE FROM FIBER



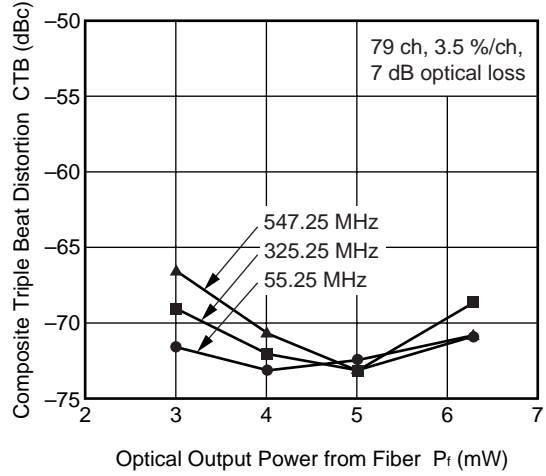
FREQUENCY RESPONSE



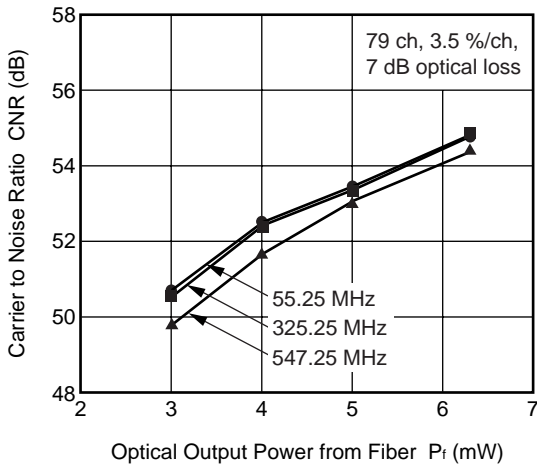
COMPOSITE SECOND ORDER DISTORTION vs. OPTICAL OUTPUT POWER FROM FIBER



COMPOSITE TRIPLE BEAT DISTORTION vs. OPTICAL OUTPUT POWER FROM FIBER



CARRIER TO NOISE RATIO vs. OPTICAL OUTPUT POWER FROM FIBER



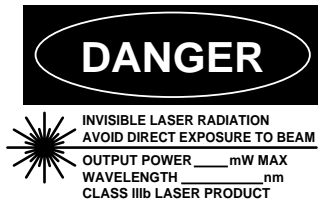
Remark The graphs indicate nominal characteristics.

REFERENCE

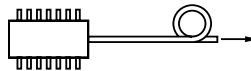
Document Name	Document No.
NEC semiconductor device reliability/quality control system	C11159E
Quality grades on NEC semiconductor devices	C11531E
Semiconductor device mounting technology manual	C10535E
Semiconductor selection guide	X10679E

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.



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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Special: Transportation equipment (automobiles, trains, ships, etc.), traffic control systems, anti-disaster systems, anti-crime systems, safety equipment and medical equipment (not specifically designed for life support)

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Anti-radioactive design is not implemented in this product.