DATA SHEET

NEC

LASER DIODE
NDL7670P

1 310 nm OPTICAL CATV/ANALOG APPLICATIONS
InGaAsP MQW-DFB LASER DIODE MODULE

DESCRIPTION

NDL7670P is a 1 310 nm DFB (Distributed Feed-Back) laser diode, that has a newly developed Multiple Quantum Well (MQW) structure, butterfly package module with optical isolator. It is especially designed for a 8 mW light source of CATV analog applications.

FEATURES

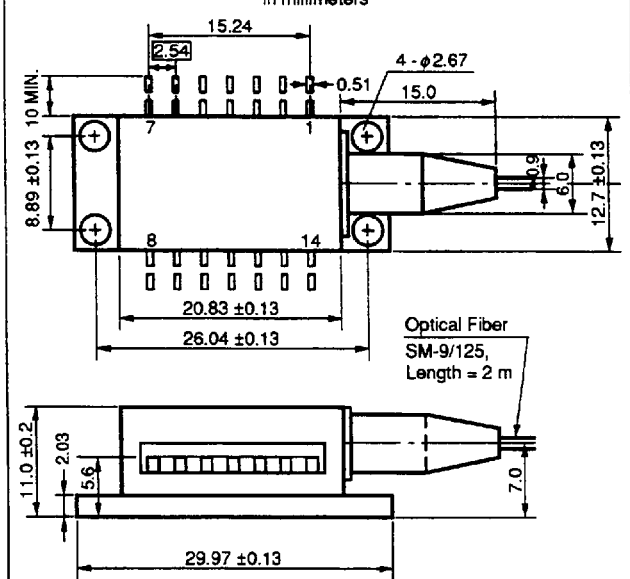
- Low noise RIN = –155 dB/Hz MAX.
- Low distortion CSO = –58 dBc
  CTB = –65 dBc
- High output power P_f = 8.0 mW MIN.
- Long wavelength λ_p = 1 310 nm
- High isolation 40 dB
- Internal InGaAs monitor PD
- Internal thermoelectric cooler
- Hermetically sealed 14 pin butterfly package
- Singlemode fiber pigtail
- Wide operating temperature range
- High reliability

ORDERING INFORMATION

Part Number	Available Connector
NDL7670P	Without Connector
NDL7670PC	With FC-UPC Connector
NDL7670PD	With SC-UPC Connector

PACKAGE DIMENSIONS

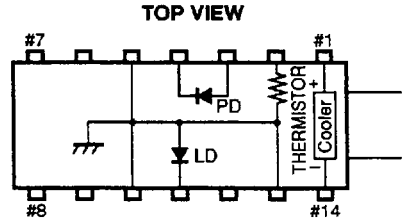
in millimeters



PIN CONNECTIONS

PIN No.	FUNCTION	PIN No.	FUNCTION
1	COOLER ANODE	8	NC
2	THERMISTOR	9	NC
3	PD ANODE	10	CASE GROUND
4	PD CATHODE	11	LD CATHODE
5	CASE GROUND	12	NC
6	NC	13	LD ANODE,
7	NC		CASE GROUND
		14	COOLER CATHODE

TOP VIEW



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Document No. P11636EJ3V0DS00 (3rd edition)
(Previous No. LC-2350)
Date Published June 1996 P
Printed in Japan

ABSOLUTE MAXIMUM RATINGS (T_C = 25 °C)

Parameter	Symbol	Ratings	Unit
Operating Case Temperature	T_C	–20 to +65	°C
Storage Temperature	T_{stg}	–40 to +70	°C
Lead Soldering Temperature (10 s)	T_{sld}	260	°C
Optical Output Power	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

ELECTRO-OPTICAL CHARACTERISTICS (T_{LD} = 25 °C, T_C = –20 °C 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		8.0			mW
Spontaneous Emission Power from Fiber	P_s	$I_b = I_{th}$			50	μW
Differential Efficiency from Fiber	η_d	$P_f \leq P_{op}$	0.16	0.22		mW/mA
Peak Emission Wavelength	λ_p	$P_f = P_{op}$	1 290	1 310	1 330	nm
Sub-mode Suppression Ratio	SMSR	$P_f = P_{op}$	30	35		dB
1 dB Bandwidth	f	$P_f = P_{op}$	900			MHz
Relative Intensity Noise	RIN*2	$P_f = P_{op}$		–155	–150	dB/Hz
Composite Second Order Distortion	CSO*3	$P_f = P_{op}$		–58	–55	dBc
Composite Triple Beat Distortion	CTB*3	$P_f = P_{op}$		–65	–60	dBc
Carrier to Noise Ratio	CNR*3	$P_f = P_{op}$	50			dBc
Isolation	I_s		35	40		dB

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

*2. Conditions : $P_f = P_{op}$, CW
Measuring Bandwidth: 50 MHz to 600 MHz
Optical Reflection –40 dB

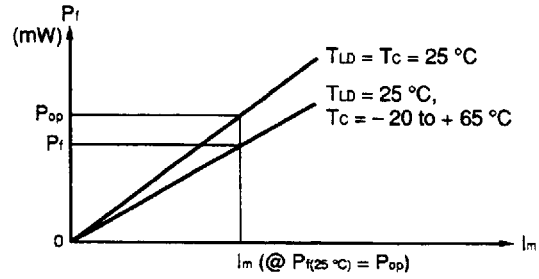
*3. Conditions : $P_f = P_{op}$, Optical Modulation Index = 3.5 %/channel
79 channel unmodulated carriers (55.25 MHz to 547.25 MHz)
Optical Reflection –40 dB, Optical Loss = 7.0 dB

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

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Monitor Current	I_m	V_R = 5 V, P_f = P_{op}	50	200		μA
Dark Current	I_D	V_R = 5 V		2	10	nA
Tracking Error	γ *4	I_m = const.			0.5	dB

*4. Tracking Error : γ

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



ELECTRO-OPTICAL CHARACTERISTICS
(Applicable to Thermistor and TE Cooler: T_{LD} = 25 °C, T_C = –20 °C to +65 °C)

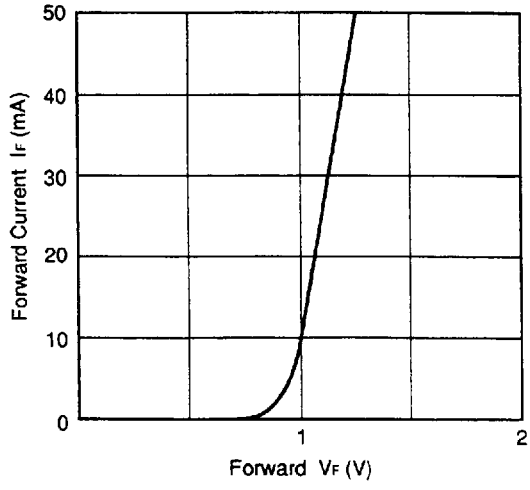
Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Thermistor Resistance	R*5	T_{LD} = 25 °C	9.5	10	10.5	kΩ
Cooler Current	I_C	ΔT = 40 K		0.6	0.8	A
Cooler Voltage	V_C	ΔT = 40 K		1.1	1.5	V
Cooling Capacity	ΔT*6	I_C = 0.8 A, P_f = P_{op}	40			K

*5. B Constant = 3 400 ±100 K

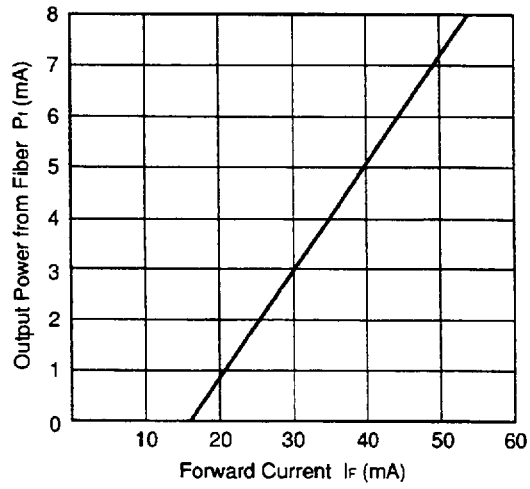
*6. $\Delta T = |T_C - T_{LD}|$

TYPICAL CHARACTERISTICS (T_C = 25 °C)

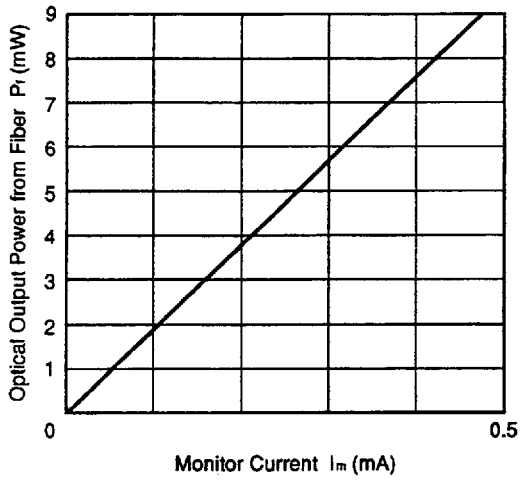
FORWARD CURRENT vs.
FORWARD VOLTAGE



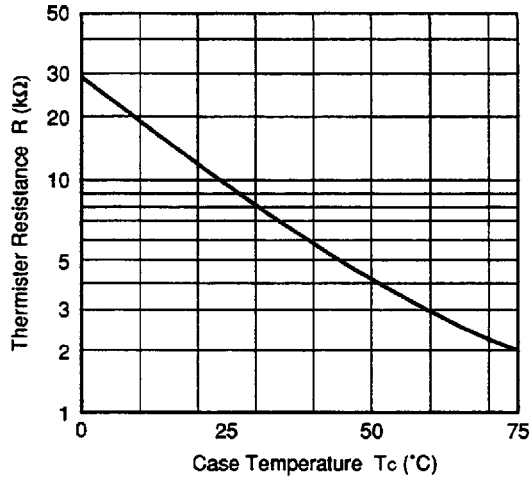
OUTPUT POWER FROM FIBER vs.
LD FORWARD CURRENT



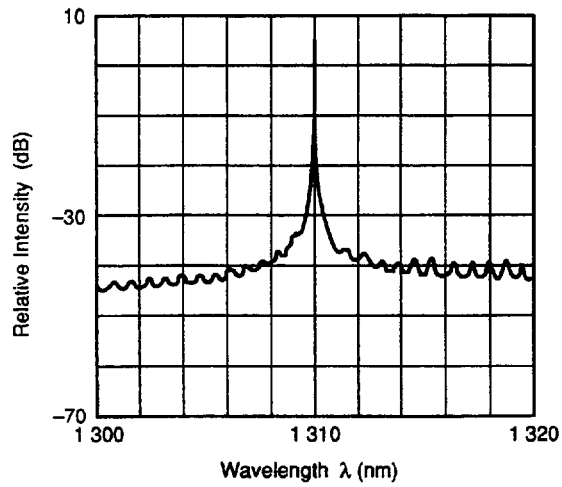
OUTPUT POWER FROM FIBER vs.
LD MONITOR CURRENT



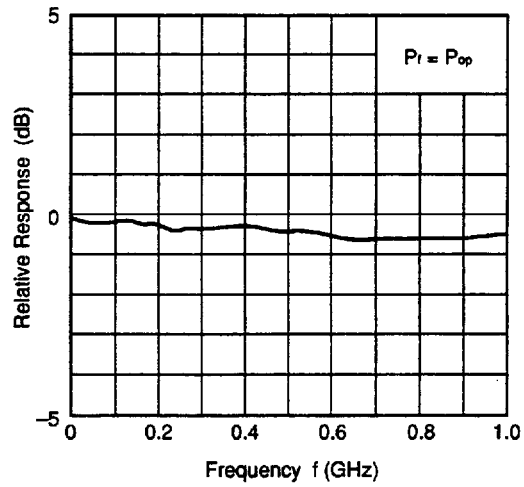
TYPICAL THERMISTOR RESISTANCE vs.
CASE TEMPERATURE



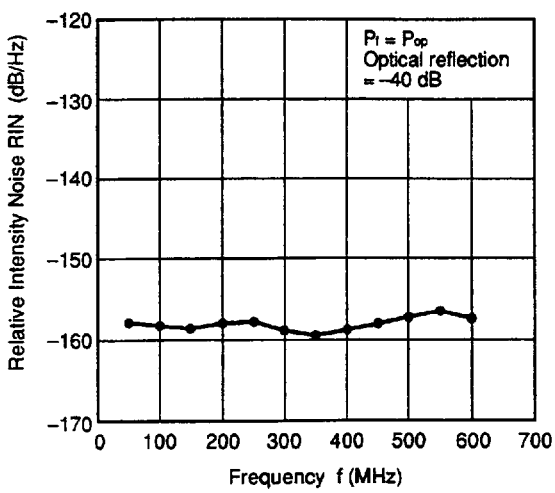
LONGITUDINAL MODE



FREQUENCY RESPONSE



RIN vs. FREQUENCY



DFB LASER DIODE FAMILY FOR CATV/ANALOG APPLICATIONS

Features / Packages	P_{op}: Operating point power (min. value)						Remarks
	3 mW min.	4 mW min.	6 mW min.	8 mW min.	12 mW min.	15 mW min.	
14 pin BFY module with SMF	NDL7680P	NDL7650P	NDL7660P	NDL7670P	NDL7672P	NDL7673P	BFY module with monitor PD, TEC, thermistor, isolator

REFERENCE

Document Name	Document No.
NEC semiconductor device reliability/quality control system	LEI-1201
Quality grade on NEC semiconductor devices	IEI-1209
Semiconductor device mounting technology manual	C10535E
Guide to quality assurance for semiconductor devices	MEI-1202
Semiconductor selection guide	X10679E