

1 550 nm OPTICAL FIBER COMMUNICATIONS EA MODULATOR INTEGRATED MQW-DFB LASER DIODE MODULE FOR 2.5 Gb/s ULTRALONG-REACH APPLICATIONS

DESCRIPTION

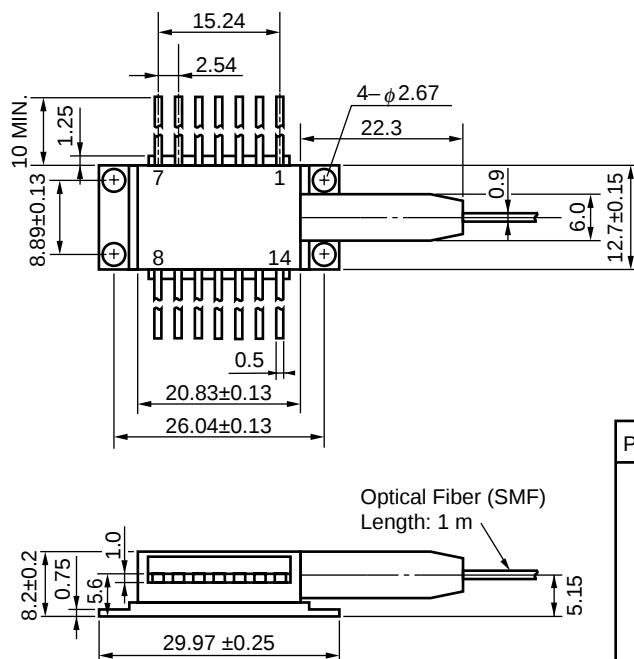
The NDL7910P is an EA modulator integrated 1 550 nm DFB-LD for 2.5 Gb/s. The newly developed bandgap energy controlled Selective MOVPE technology is utilized as fabrication method. It is designed for 2.5 Gb/s ultralong-reach applications.

FEATURES

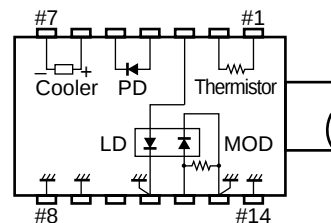
- Integrated electroabsorption modulator
- Low modulation voltage
- Wavelength selectable for ITU-T standards
- 14-pin butterfly package

PACKAGE DIMENSIONS

in millimeters



TOP VIEW



PIN CONNECTIONS

Pin No.	Function	Pin No.	Function
1	Thermistor	8	GND
2	Thermistor	9	GND
3	LD DC Bias	10	NC
4	PD Anode	11	GND
5	PD Cathode	12	Signal Input (MOD), 50 Ω RF Input
6	Cooler Anode	13	GND
7	Cooler Cathode	14	GND

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

ORDERING INFORMATION

Part Number	Available Connector
NDL7910P	Without Connector
NDL7910PC	With FC-PC Connector

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

Parameter	Symbol	Ratings	Unit
Optical Output Power from Fiber	P _f	10	mW
Forward Current of LD	I _{FLD}	150	mA
Reverse Voltage of LD	V _{RLD}	2.0	V
Forward Voltage of Modulator	V _{Fm}	1	V
Reverse Voltage of Modulator	V _{Rm}	5	V
Forward Current of PD	I _{FPD}	1	mA
Reverse Voltage of PD	V _{RPD}	10	V
Cooler Current	I _c	1.5	A
Cooler Voltage	V _c	2.5	V
Operating Case Temperature	T _c	−20 to +70	°C
Storage Temperature	T _{stg}	−40 to +85	°C
Lead Soldering Temperature (10 s)	T _{slid}	260	°C

ELECTRO-OPTICAL CHARACTERISTICS

(T_{LD} = 25 °C, T_c = −20 to +70 °C, unless otherwise specified)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Operating Current	I _{op}		50		100	mA
Modulation Center Voltage	V _{Rmc}		0.5		1.5	V
Modulation Voltage	V _{Rmpp}		2		3	V
Forward Voltage of LD	V _{FLD}	I _{FLD} = I _{op}			1.8	V
Threshold Current	I _{th}			7	20	mA
Optical Output Power from Fiber	P _f	V _{Rm} = 0 V, I _{FLD} = I _{op}	0.5			mW
Peak Emission Wavelength	λ _p	I _{FLD} = I _{op} , V _{Rm} = 0 V	1 545		1 560	nm
Spectral Line Width	Δν	I _{FLD} = I _{op} , −20 dB, Under modulation ^{*1}		4		GHz
Side Mode Suppression Ratio	SMSR	I _{FLD} = I _{op} , V _{Rm} = 0 V	30			dB
Extinction Ratio	ER	I _{FLD} = I _{op} , Under modulation ^{*1}	10			dB
Cut-off Frequency	f _c	I _{FLD} = I _{op} , V _{Rm} = 1/2 V _{Rmpp} , −3 dB, 50 Ω	3.2			GHz
Rise Time	t _r	I _{FLD} = I _{op} , 20-80 %, Under modulation ^{*1}			125	ps
Fall Time	t _f	I _{FLD} = I _{op} , 80-20 %, Under modulation ^{*1}			125	ps
Isolation	I _s		30			dB

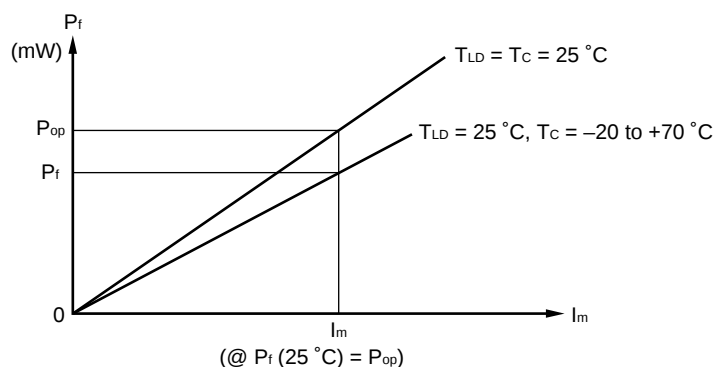
*1 2.48832 Gb/s, PRBS 2²³⁻¹, V_{Rm} = V_{Rmc} ± 1/2 V_{Rmpp}, NEC Test System

ELECTRO-OPTICAL CHARACTERISTICS

(Applicable to Monitor PD: $T_{LD} = 25\text{ }^{\circ}\text{C}$, $T_c = -20\text{ to }+70\text{ }^{\circ}\text{C}$)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Monitor Current	I_m	$I_{FLD} = I_{op}$, $V_{Rm} = 0\text{ V}$	20		1 000	μA
Dark Current	I_D	$V_{RPD} = 5\text{ V}$			10	nA
Tracking Error	γ^{*1}	$I_m = \text{const.}$			0.5	dB
Monitor Capacitance	C_t	$V_{RPD} = 5\text{ V}$, $f = 1\text{ MHz}$			15	pF

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



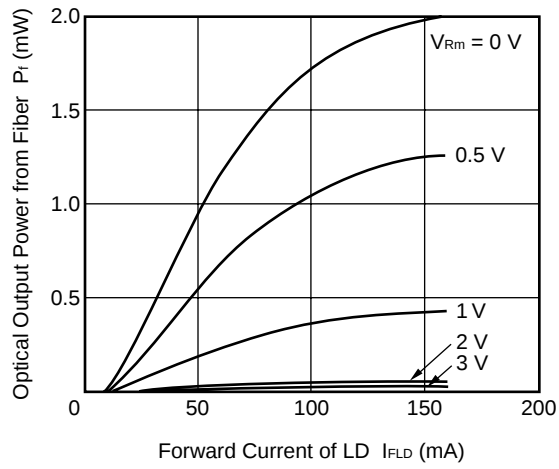
ELECTRO-OPTICAL CHARACTERISTICS

(Applicable to Thermistor and TEC: $T_{LD} = 25\text{ }^{\circ}\text{C}$, $T_c = -20\text{ to }+70\text{ }^{\circ}\text{C}$)

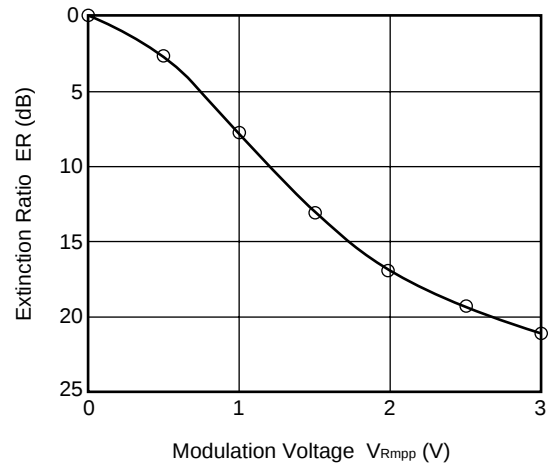
Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Thermistor Resistance	R	$T_{LD} = 25\text{ }^{\circ}\text{C}$	9.5	10.0	10.5	$\text{k}\Omega$
B Constant	B		3 300	3 400	3 500	K
Cooler Current	I_c	$\Delta T = 70 - T_{set}$			1.5	A
Cooler Voltage	V_c	$\Delta T = 70 - T_{set}$			2.5	V

TYPICAL CHARACTERISTICS ($T_{LD} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified)

OPTICAL OUTPUT POWER FROM FIBER vs.
FORWARD CURRENT OF LD (CW)



EXTINCTION RATIO vs. MODULATION
VOLTAGE (CW)



Remark The graphs indicate nominal characteristics.

★ DFB-LD FAMILY FOR TELECOM

Part Number	Absolute Maximum Ratings		Typical Characteristics			SDH Application	Package
	T _c (°C)	T _{stg} (°C)	I _{th} (mA)	P _r (mW)	λ _c (nm)		
			TYP.	MIN.	TYP.		
NDL7603P Series	−40 to +85	−40 to +85	15	2	1 310	≤ STM-4 : 622 Mb/s	Coaxial
NDL7620P Series	0 to +70	−40 to +85	45 (MAX.)	2	1 310	≤ STM-16: 2.5 Gb/s	Coaxial
NDL7701P Series	−20 to +85	−40 to +85	15	2	1 550	≤ STM-4 : 622 Mb/s	Coaxial
NDL7705P Series	−40 to +85	−40 to +85	15	2	1 550	≤ STM-4 : 622 Mb/s	Coaxial
NX8562LB	−20 to +65	−40 to +85	20	20	1 550 ^{*1}	CW Light Source for external modulator	BFY
NX8563LB Series	−20 to +65	−40 to +85	20	10	ITU-T ^{*2}	CW Light Source for external modulator	BFY
NDL7910P	−20 to +70	−40 to +85	7	0.5	1 550 ^{*1}	≤ STM-16: 2.5 Gb/s EA modulator integrated DFB-LD	BFY

*1 Wavelength selectable for ITU-T standards upon request.

*2 Wavelength selectable for ITU-T standards.

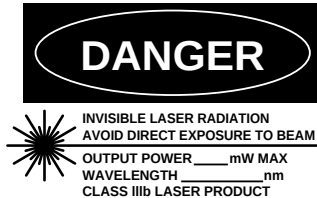
REFERENCE

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

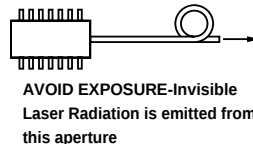
[MEMO]

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



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.