

1 550 nm OPTICAL FIBER COMMUNICATIONS
InGaAsP PHASE-SHIFTED MQW-DFB LASER DIODE MODULE for 2.5 Gb/s

DESCRIPTION

NDL7710PA is a 1 550 nm laser diode butterfly package module with a singlemode fiber for 2.5 Gb/s optical fiber communication systems. This has a newly developed Multiple Quantum Well (MQW) structure phase-shifted DFB (Distributed Feed-Back) so that it can achieve stable dynamic single longitudinal mode operation under high speed modulation. It incorporates an InGaAs monitor photo diode, thermistor, thermo-electric cooler, optical isolator and impedance matching circuit. YAG laser welding technique is utilized to achieve stable optical coupling over wide operating temperature range. This module is also available with FC-PC connector as NDL7710PAC.

FEATURES

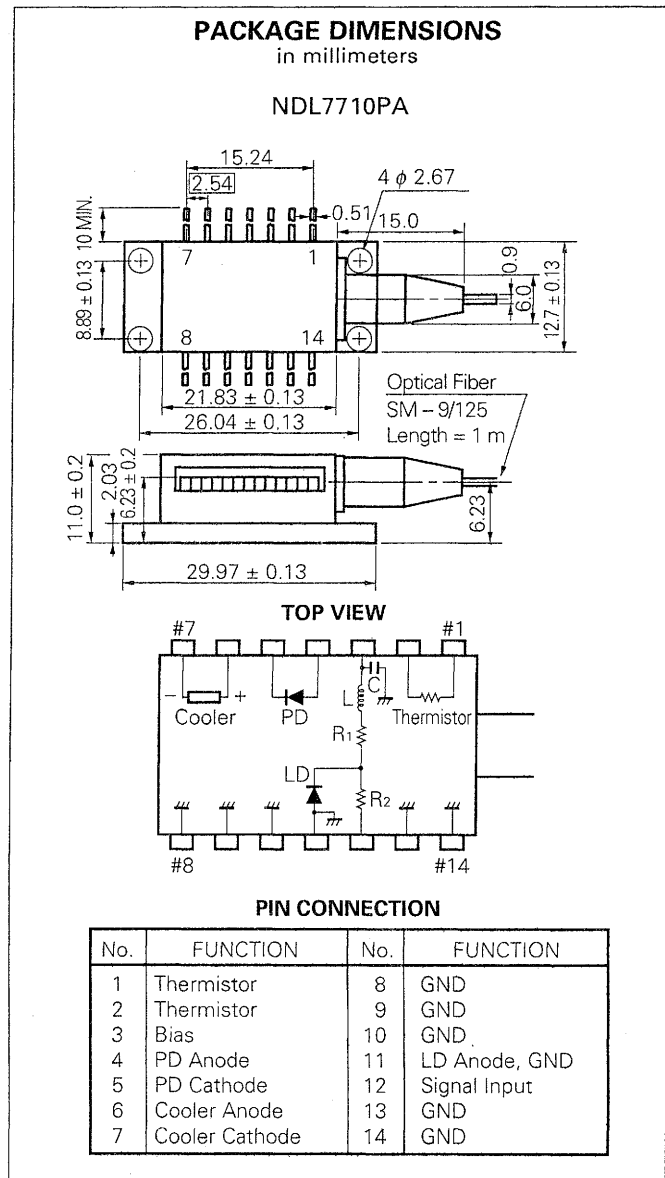
- High speed f_c (-3 dB) = 4 GHz
- Input return loss $t_r = 100$ ps, $t_f = 170$ ps
- Output power $S_{11} = -10$ dB @ 3 GHz
- Low noise $P_f = 1.0$ mW MIN.
- Peak wavelength $RIN = -150$ dB/Hz
- Low threshold current $\lambda_p = 1$ 550 nm
- Input impedance $I_{th} = 25$ mA
- Internal isolator 25Ω
- High reliability

ORDERING INFORMATION

PART NUMBER	AVAILABLE CONNECTOR	QUALITY GRADE
NDL7710PA	Without Connector	Standard
NDL7710PAC	With FC-PC Connector	

Please refer to "Quality grade on NEC Semiconductor Devices" (Document number IEI-1209) published by NEC Corporation to know the specification of quality grade on the devices and its recommended applications.

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



ABSOLUTE MAXIMUM RATINGS (T_c = 25 °C)

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	-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)

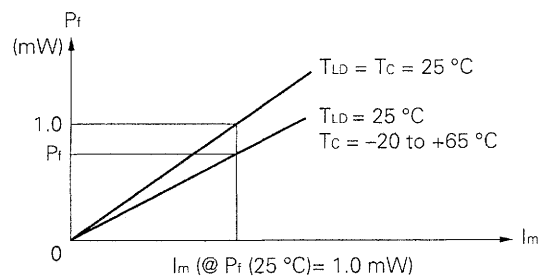
PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Threshold Current	I _{th}		25	50	mA	
Forward Voltage between Pin 11 and Pin 3	V ₁₁₋₃	1.5	1.9	2.4	V	I _F = 30 mA
Forward Voltage between Pin 11 and Pin 12	V ₁₁₋₁₂	1.2	1.6	1.9	V	I _F = 30 mA
Optical Output Power from Fiber	P _f	1.0	2.0		mW	I _F = I _{th} + 30 mA
Differential Quantum Efficiency from Fiber	DQE	0.033	0.066		mW/mA	I _{th} ≤ I _F ≤ I _{th} + 30 mA
Peak Emission Wavelength	λ _p	1 530	1 550	1 570	nm	P _f = 1.0 mW
Spectral Width	Δλ		0.5		nm	2.488 Gb/s, NRZ, I _F = I _{th} -20 dB Full Width
Sub-mode Suppression Ratio	SMSR	30	35		dB	P _f = 1.0 mW
Rise Time	t _r		100	150	ps	10 – 90 %
Fall Time	t _f		170	200	ps	90 – 10 %
Cut off Frequency	f _c	3	4		GHz	-3 dB
Relative Intensity Noise	RIN		-150	-135	dB/Hz	P _f = 1.0 mW, Ref. = 8 %

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

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Monitor Current	I _m	100	350	1 000	μA	V _R = 5 V, P _f = 1.0 mW
Dark Current	I _d		2	10	nA	V _R = 5 V
Tracking Error	γ*1			0.5	dB	I _m = const.

*1 Tracking Error : γ

$$\gamma = \left| 10 \log \frac{P_f}{1.0 \text{ mW}} \right|$$



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

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Thermistor Resistance	R*2	9.5	10	10.5	kΩ	T _{LD} = 25 °C
Cooler Current	I _c		0.8	1.0	A	ΔT = 40 K
Cooler Voltage	V _c		1.6	2.2	V	ΔT = 40 K
Cooling Capacitor	ΔT*3	40			K	I _c = 1.0 A, P _f = 1.0 mW

*2 B Constant (= 3 400 ± 100 K)

*3 ΔT = |T_C - T_{LD}|

2.5 Gb/s PHASE-SHIFTED DFB-DC-PBH LASER DIODE FAMILY

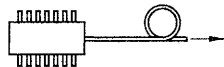
FEATURES & STRUCTURE PACKAGES		WAVELENGTH & LD CHIP STRUCTURE		REMARK	
		1.3 μm	1.55 μm		
14 PIN BFY MODULE WITH SMF		NDL7610PA	NDL7710PA	WITH MONITOR PD, TEC, THERMISTOR, ISOLATOR, IMPEDANCE MATCHING CIRCUIT: 25 Ω , $f_c = 4$ GHz	
MAIN CHARACTERISTICS				UNIT	CONDITIONS
Optical Output Power	P_f	2.0	2.0	mW	$I_f = I_{th} + 30$ mA
Threshold Current	I_{th}	20	25	mA	
Sub-Mode Suppression Ratio	SMSR	35	35	dB	
Rise Time	t_r	100	100	ps	$I_b = I_{th}$
Fall Time	t_f	170	170	ps	$I_b = I_{th}$

[MEMO]



INVISIBLE LASER RADIATION
 AVOID DIRECT EXPOSURE TO BEAM
 OUTPUT POWER _____mw MAX
 WAVELENGTH _____nm
 CLASS IIIb LASER PRODUCT

SEMICONDUCTOR LASER



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

NEC Corporation
 NEC Building, 7-1, Shiba Gochome,
 Minato-ku, Tokyo 108-01, Japan

Type number: _____
 Manufactured: _____
 Serial number: _____

This product conforms to DHHS
 regulations as applicable
 to standards 21 CFR Chapter I,
 Subchapter J.

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Application examples recommended by NEC Corporation.

Standard: Computer, Office equipment, Communication equipment, Test and Measurement equipment, Machine tools, Industrial robots, Audio and Visual equipment, Other consumer products, etc.

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