

NEC 1550 nm OPTICAL FIBER COMM. EA MODULATOR INTEGRATED MQW-DFB LASER DIODE MODULE FOR 2.5 Gb/s D-WDM ULTRALONG-REACH APPLICATIONS (600 km)

NDL7912P SERIES

FEATURES

- INTEGRATED ELECTROABSORPTION MODULATOR
- VERY LOW DISPERSION PENALTY OVER 600 km
- LOW MODULATION VOLTAGE
- WAVELENGTH SELECTABLE FOR ITU-T STANDARDS
- 14-PIN BUTTERFLY PACKAGE

DESCRIPTION

The NDL7912P is an EA modulator integrated 1550 nm DFB-LD module for 2.5 Gb/s. The newly developed bandgap energy controlled selective MOVPE technology is utilized as the fabrication method. It is designed for 2.5 Gb/s D-WDM ultralong-reach applications.

ELECTRO-OPTICAL CHARACTERISTICS (T_{LD} = 25°C, T_c = -20 to +70°C, unless otherwise specified)

PART NUMBER PACKAGE OUTLINE			NDL7912P		
SYMBOLS	PARAMETERS AND CONDITIONS	UNITS	MIN	TYP	MAX
T _{SET}	Laser Set Temperature	°C	20		35
I _{OP}	Operating Current	mA	50		100
V _{Rmc}	Modulation Center Voltage	V	0.5		1.5
V _{Rmpp}	Modulation Voltage	V	2		3
V _{FLD}	Forward Voltage of LD, I _{FLD} = I _{OP}	V			1.8
I _{TH}	Threshold Current	mA		7	20
P _f	Optical Output Power from Fiber, V _{Rm} = 0 V, I _{FLD} = I _{OP}	mW	0.5		
λ _P	Peak Emission Wavelength, I _{FLD} = I _{OP} , V _{Rm} = 0 V, T _{LD} = T _{SET}	nm	Specified to ITU-T ¹		
Δν	Spectral Line Width, I _{FLD} = I _{OP} , -20 dB, Under modulation ²	GHz		4	
SMSR	Side Mode Suppression Ratio, I _{FLD} = I _{OP} , V _{Rm} = 0 V	dB	30		
ER	Extinction Ratio, I _{FLD} = I _{OP} , Under modulation ²	dB	10		
f _c	Cut-off Frequency, I _{FLD} = I _{OP} , V _{Rm} = 1/2 V _{Rmpp} , -3 dB, 50 Ω	GHz	3.2		
t _r	Rise Time, I _{FLD} = I _{OP} , 20-80%, Under modulation ²	ps			125
t _r	Rise Time, I _{FLD} = I _{OP} , 20-80%, Under modulation ²	ps			125
P _e	Transmission Penalty Due to Dispersion, I _{FLD} = I _{OP} , Under modulation ² , 600 km standard fiber ³	dB			2
ISOL	Isolation	dB	30		

Notes:

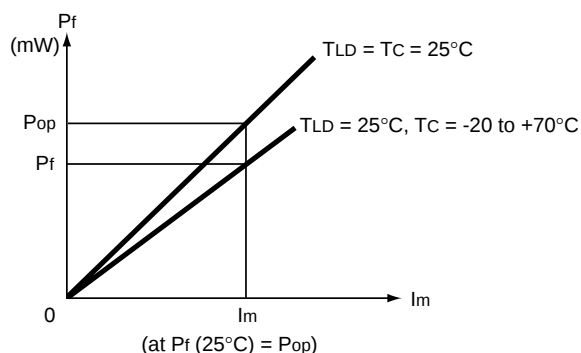
1. Please refer to Ordering Information.
2. 2.48832 Gb/s, PRBS 2²³-1, V_{Rm} = V_{Rmc} ± 1/2 V_{Rmpp}, NEC Test System.
3. 600 km standard fiber NEC Test System, Transmission penalty at BER = 10⁻⁹

ELECTRO-OPTICAL CHARACTERISTICS ($T_{LD} = 25^{\circ}\text{C}$, $T_C = -20$ to $+70^{\circ}\text{C}$, unless otherwise specified)

PART NUMBER PACKAGE OUTLINE			NDL7912P		
SYMBOLS	PARAMETERS AND CONDITIONS	UNITS	MIN	TYP	MAX
Applicable to Monitor PD					
I_m	Monitor Current, $I_{FLD} = I_{OP}$, $V_{Rm} = 0\text{ V}$	μA	20		1000
I_D	Dark Current, $V_{RPD} = 5\text{ V}$	nA			10
γ^1	Tracking Error, $I_m = \text{const.}$	dB			0.5
C_t	Monitor Capacitance, $V_{RPD} = 5\text{ V}$, $f = 1\text{ MHz}$	pF			15
Applicable to Thermistor and TEC					
R	Thermistor Resistance	$\text{k}\Omega$	9.5	10.0	10.5
B	B Constant	K	3300	3400	3500
I_C	Cooler Current, $\Delta T = 70 - T_{\text{set}}$	A			1.5
V_C	Cooler Voltage, $\Delta T = 70 - T_{\text{set}}$	V			2.5

Note:

$$1. \gamma = \left| 10 \log \frac{P_f}{P_{OP}} \right|$$

**ABSOLUTE MAXIMUM RATINGS¹**($T_C = 25^{\circ}\text{C}$, unless otherwise specified)

SYMBOLS	PARAMETERS	UNITS	RATINGS
P_f	Optical Output Power from Fiber	mW	10
I_{FLD}	Forward Current of LD	mA	150
V_{RLD}	Reverse Voltage of LD	V	2.0
V_{Fm}	Forward Voltage of Modulator	V	1
V_{Rm}	Reverse Voltage of Modulator	V	5
I_{FPD}	Forward Current of PD	mA	1
V_{RPD}	Reverse Voltage of PD	V	10
I_C	Cooler Current	A	1.5
V_C	Cooler Voltage	V	2.5
T_C	Operating Case Temperature	$^{\circ}\text{C}$	-20 to +70
T_{STG}	Storage Temperature	$^{\circ}\text{C}$	-40 to +85
T_{SLD}	Lead Soldering Temp. (10 s)	$^{\circ}\text{C}$	260

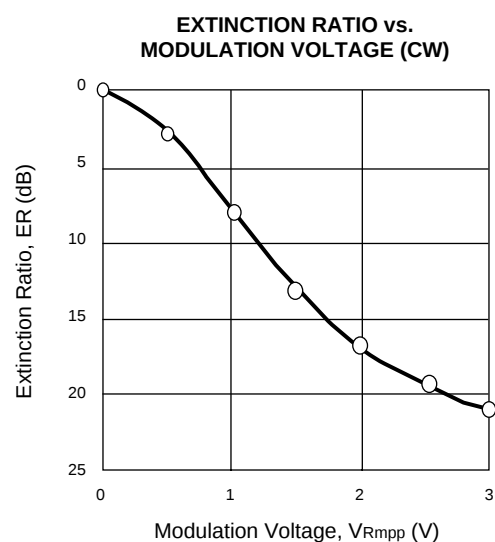
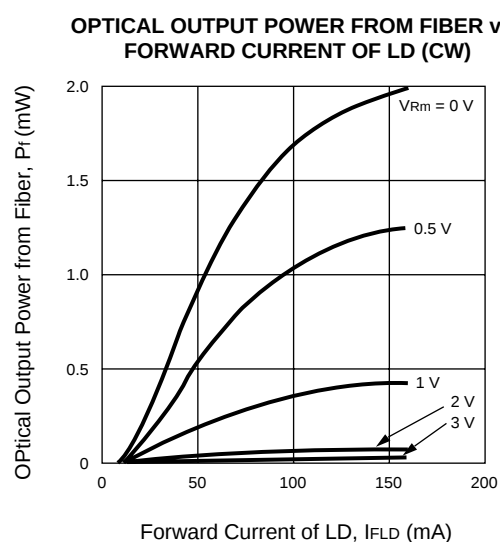
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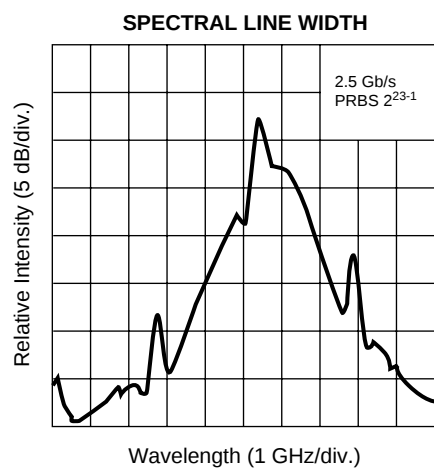
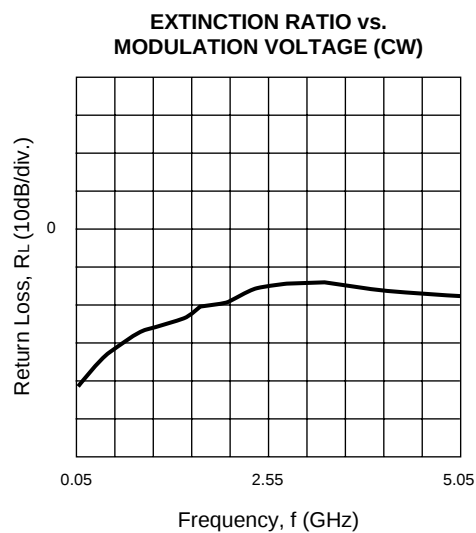
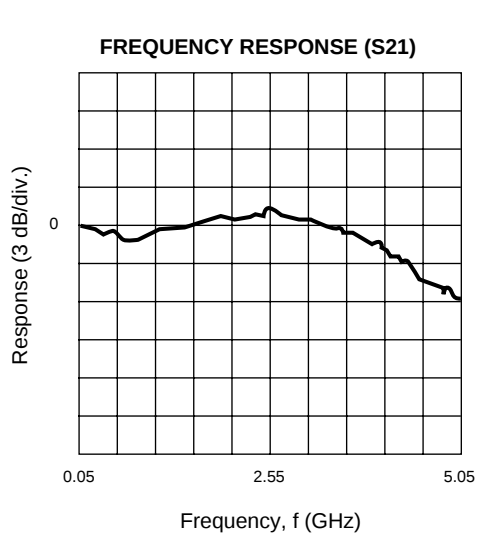
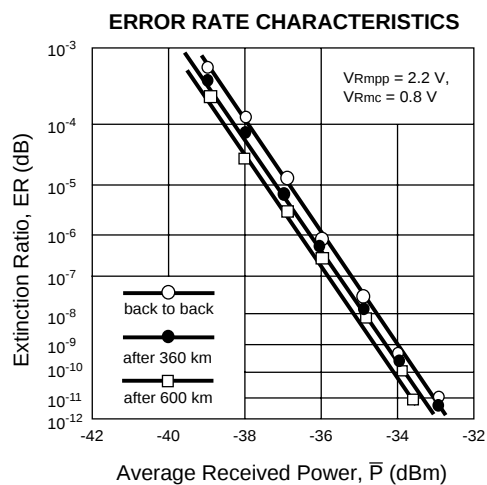
- Operation in excess of any one of these parameters may result in permanent damage.

ORDERING INFORMATION

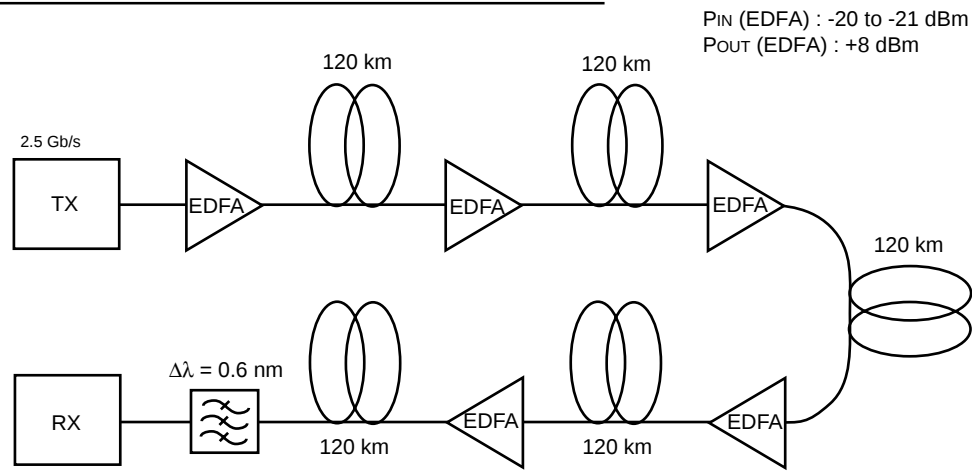
PART NUMBER With SC-PC Connector	PART NUMBER With FC-PC Connector	ITU-T Wavelength (nm)	Frequency (THz)
NDL7912PD477	NDL7912PC477	1547.72	193.7
NDL7912PD485	NDL7912PC485	1548.51	193.6
NDL7912PD493	NDL7912PC493	1549.32	193.5
NDL7912PD501	NDL7912PC501	1550.12	193.4
NDL7912PD509	NDL7912PC509	1550.92	193.3
NDL7912PD517	NDL7912PC517	1551.72	193.2
NDL7912PD525	NDL7912PC525	1552.52	193.1
NDL7912PD533	NDL7912PC533	1553.33	193.0
NDL7912PD541	NDL7912PC541	1554.13	192.9
NDL7912PD549	NDL7912PC549	1554.94	192.8
NDL7912PD557	NDL7912PC557	1555.75	192.7
NDL7912PD565	NDL7912PC565	1556.55	192.6
NDL7912PD573	NDL7912PC573	1557.36	192.5
NDL7912PD581	NDL7912PC581	1558.17	192.4
NDL7912PD589	NDL7912PC589	1558.98	192.3
NDL7912PD597	NDL7912PC597	1559.79	192.2
NDL7912PD606	NDL7912PC606	1560.61	192.1

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



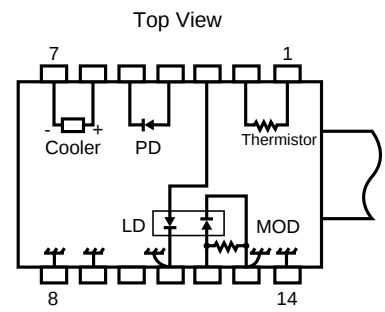
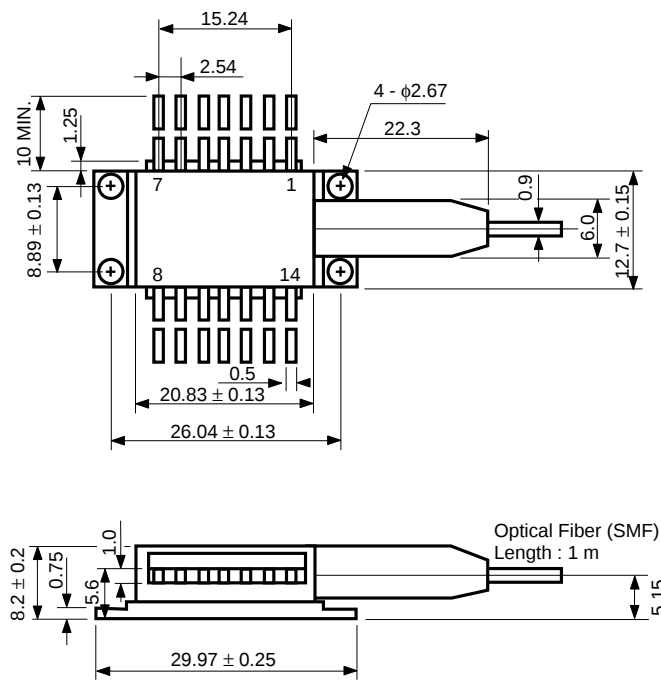
TYPICAL PERFORMANCE CURVES ($T_{LD} = +25^{\circ}\text{C}$)**ERROR RATE CHARACTERISTICS**

600 km STANDARD FIBER TRANSMISSION EXAMPLE



OUTLINE DIMENSIONS (Units in mm)

NDL7912P



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)
6.	Cooler Anode		50 Ω RF Input
7.	Cooler Cathode	13.	GND
		14.	GND