

NEC EA MODULATOR INTEGRATED 1550 nm MQW-DFB LASER DIODE MODULE FOR 2.5 Gb/s DWDM ULTRALONG-REACH 600 km APPLICATIONS

NX8565LE-CC

FEATURES

- INTEGRATED ELECTROABSORPTION MODULATOR
- VERY LOW DISPERSION PENALTY OVER 600 km
- LOW MODULATION VOLTAGE
- 14-PIN BUTTERFLY PACKAGE WITH SC-UPC CONNECTOR
- AVAILABLE FOR DWDM WAVELENGTH BASED ON ITU-T RECOMMENDATION

DESCRIPTION

The NX8565LE-CC is an Electro-Absorption (EA) modulator integrated, 1550 nm Multiple Quantum Well (MQW) structured Distributed Feed-Back (DFB) laser diode. The module is capable of 2.5 Gb/s applications of over 600 km ultralong-reach and available for Dense Wavelength Division Multiplexing (DWDM) wavelengths based on ITU-T recommendations, enabling a wide range of applications.

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

PART NUMBER			NX8565LE-CC		
SYMBOLS	PARAMETERS AND CONDITIONS	UNITS	MIN	TYP	MAX
T _{SET}	Laser Set Temperature	°C	20		35
I _{OP}	Operating Current, T _{LD} = T _{Set}	mA	50	60	100
V _{Rmc}	Modulation Center Voltage ¹	V	-1.5	-1.2	-0.5
V _{Rmpp}	Modulation Voltage ¹	V	2		3
V _{FLD}	Forward Voltage of LD, I _{FLD} = I _{OP}	V		1.6	2.0
I _{TH}	Threshold Current, T _{LD} = T _{Set}	mA		7	20
P _f	Optical Output Power from Fiber, V _{Rm} = 0 V, I _{FLD} = I _{OP} , Under modulation ¹	mW	0.3	0.6	
λ _P	Peak Emission Wavelength, I _{FLD} = I _{OP} , V _{Rm} = 0 V, T _{LD} = T _{SET}	nm	1530 1574	Specified to ITU-T ²	1563 1609
SMSR	Side Mode Suppression Ratio, I _{FLD} = I _{OP} , V _{Rm} = 0 V	dB	30	37	
ER	Extinction Ratio, I _{FLD} = I _{OP} , Under modulation ¹	dB	10	11	
t _r	Rise Time, I _{FLD} = I _{OP} , 20-80%, Under modulation ¹	ps		70	125
t _r	Rise Time, I _{FLD} = I _{OP} , 80-20%, Under modulation ¹	ps		70	125
DP	Dispersion Penalty, I _{FLD} = I _{OP} , 600 km SMF Under modulation ¹	dB		1.5	2
I _s	Isolation	dB	23		
RIN	Relative Intensity Noise 10 MHz to 10 GHz, V _{RM} = 0 V, T _{LD} , I _{OP}	dB		-135	-130
S ₁₁	Input Return Loss	I _{FLD} = I _{OP} , V _{RM} = 1/2V _{Rmpp} , 50 Ω 130 MHz to 2 GHz			-10
		I _{FLD} = I _{OP} , V _{RM} = 1/2V _{Rmpp} , 50 Ω 2 GHz to 2.5 GHz			-5
		I _{FLD} = I _{OP} , V _{RM} = 1/2V _{Rmpp} , 50 Ω 2.5 GHz to 3.5 GHz			-3

Notes:

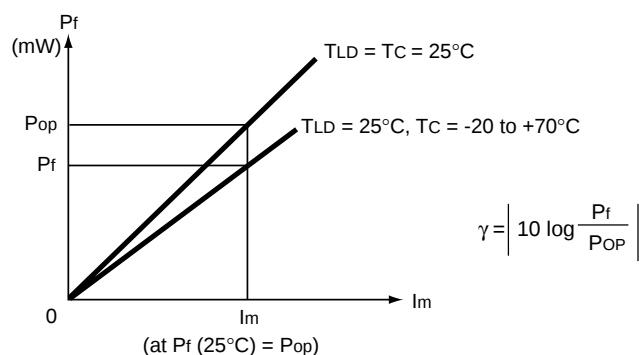
1. 600 km (at C-band) SMF under Modulation, 2.48832 Gb/s PRBS 2²³-1, V_{RM} = V_{Rmc} ± 1/2 V_{Rmpp}, BER = 10⁻⁹, NEC Test System.
480 km (at L-band) SMF under Modulation, 2.48832 Gb/s PRBS 2²³-1, V_{RM} = V_{Rmc} ± 1/2 V_{Rmpp}, BER = 10⁻⁹, NEC Test System.
2. Available for DWDM wavelength based on ITU-T recommendation (100 GHz grid). Please refer to ORDERING INFORMATION.

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

PART NUMBER			NX8565LE-CC		
SYMBOLS	PARAMETERS AND CONDITIONS	UNITS	MIN	TYP	MAX
Applicable to Monitor PD					
I_m	Monitor Current, $I_{FLD} = I_{OP}$, $V_{Rm} = 0$ V	μA	20	100	1000
I_D	Dark Current, $V_{RPD} = 5$ V	nA			10
γ^1	Tracking Error, $I_m = \text{const.}$	dB			0.5
C_t	Terminal Capacitance, $V_{RPD} = 5$ V, $f = 1$ MHz	pF			15
Applicable to Thermistor and TEC					
R	Thermistor Resistance	k Ω	9.5	10.0	10.5
B	B Constant	K	3350	3450	3550
I_C	Cooler Current, $\Delta T = 50^{\circ}\text{C}$, $I_{OP} = 150$ mA	A			1.2
V_C	Cooler Voltage, $\Delta T = 50^{\circ}\text{C}$, $I_{OP} = 150$ mA	V			2.4

Note:

- Tracking Error: γ

**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	4
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

Note:

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

ORDERING INFORMATION

PART NUMBER With SC-PC Connector	ITU-T Wavelength ¹ (nm)	Frequency (THz)
NX8565LE311-CC	1531.11	195.80
NX8565LE318-CC	1531.89	195.70
NX8565LE326-CC	1532.68	195.60
NX8565LE334-CC	1533.46	195.50
NX8565LE342-CC	1534.25	195.40
NX8565LE350-CC	1535.03	195.30
NX8565LE358-CC	1536.82	195.20
NX8565LE366-CC	1536.60	195.10
NX8565LE373-CC	1537.39	195.00
NX8565LE381-CC	1538.97	194.90
NX8565LE389-CC	1538.97	194.80
NX8565LE397-CC	1539.76	194.70
NX8565LE405-CC	1540.55	194.60
NX8565LE413-CC	1541.34	194.50
NX8565LE421-CC	1542.93	194.40
NX8565LE429-CC	1542.93	194.30
NX8565LE437-CC	1543.73	194.20
NX8565LE445-CC	1544.52	194.10
NX8565LE453-CC	1545.32	194.00
NX8565LE461-CC	1546.11	193.90
NX8565LE469-CC	1546.91	193.80
NX8565LE477-CC	1547.71	193.70
NX8565LE485-CC	1548.51	193.60
NX8565LE493-CC	1549.31	193.50
NX8565LE501-CC	1555.11	193.40
NX8565LE509-CC	1550.91	193.30
NX8565LE517-CC	1551.72	193.20
NX8565LE525-CC	1552.52	193.10
NX8565LE533-CC	1553.32	193.00
NX8565LE541-CC	1554.13	192.90
NX8565LE549-CC	1554.94	192.80
NX8565LE557-CC	1555.74	192.70
NX8565LE565-CC	1556.55	192.60
NX8565LE573-CC	1557.36	192.50
NX8565LE581-CC	1558.17	192.40
NX8565LE589-CC	1558.98	192.30
NX8565LE597-CC	1559.79	192.20
NX8565LE606-CC	156.60	192.10
NX8565LE614-CC	1561.41	192.00
NX8565LE622-CC	1562.23	191.90
NX8565LE704-CC	1570.41	190.90

ORDERING INFORMATION

PART NUMBER With SC-PC Connector	ITU-T Wavelength¹ (nm)	Frequency (THz)
NX8565LE712-CC	1571.23	190.80
NX8565LE720-CC	1572.06	190.70
NX8565LE728-CC	1572.88	190.60
NX8565LE737-CC	1573.71	190.50
NX8565LE745-CC	1574.54	190.40
NX8565LE753-CC	1575.36	190.30
NX8565LE761-CC	1576.19	190.20
NX8565LE770-CC	1577.02	190.10
NX8565LE778-CC	1577.85	190.00
NX8565LE786-CC	1578.68	189.90
NX8565LE795-CC	1579.51	189.80
NX8565LE803-CC	1580.35	189.70
NX8565LE811-CC	1581.18	189.60
NX8565LE820-CC	1582.01	189.50
NX8565LE828-CC	1582.85	189.40
NX8565LE836-CC	1583.69	189.30
NX8565LE845-CC	1584.52	189.20
NX8565LE853-CC	1585.36	189.10
NX8565LE862-CC	1586.20	189.00
NX8565LE870-CC	1587.04	188.90
NX8565LE878-CC	1587.88	188.80
NX8565LE887-CC	1588.72	188.70
NX8565LE895-CC	1589.56	188.60
NX8565LE904-CC	1590.41	188.50
NX8565LE912-CC	1591.25	188.40
NX8565LE921-CC	1592.10	188.30
NX8565LE929-CC	1592.94	188.20
NX8565LE937-CC	1593.79	188.10
NX8565LE946-CC	1594.64	188.00
NX8565LE954-CC	1595.48	187.90
NX8565LE963-CC	1596.33	187.80
NX8565LE971-CC	1597.18	187.70
NX8565LE980-CC	1598.04	187.60
NX8565LE988-CC	1598.89	187.50
NX8565LE997-CC	1599.74	187.40
NX8565LE6006-CC	1600.60	187.30
NX8565LE6014-CC	1601.46	187.20
NX8565LE6023-CC	1602.31	187.10
NX8565LE6031-CC	1603.16	187.00
NX8565LE6040-CC	1604.88	186.90
NX8565LE6048-CC	1604.88	186.80

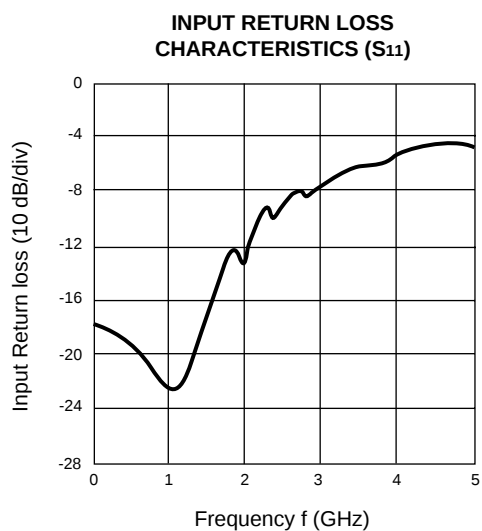
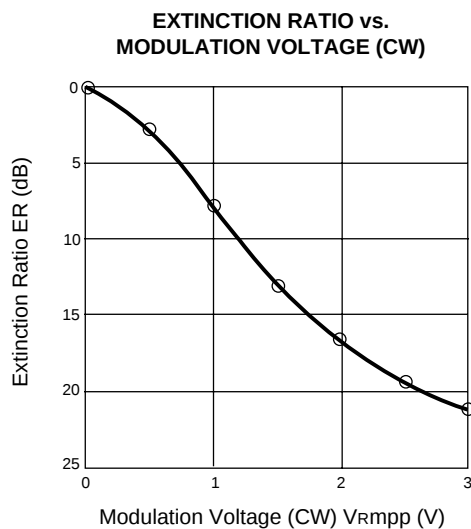
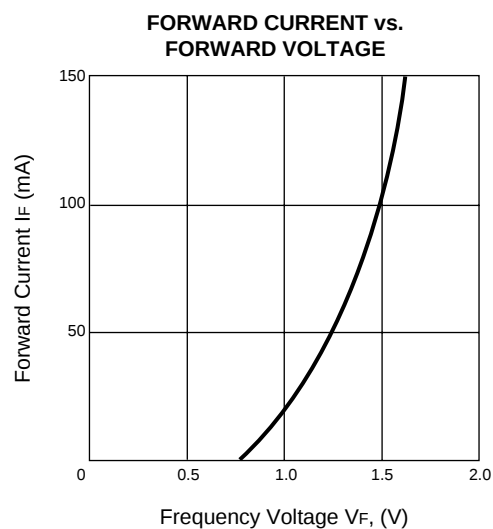
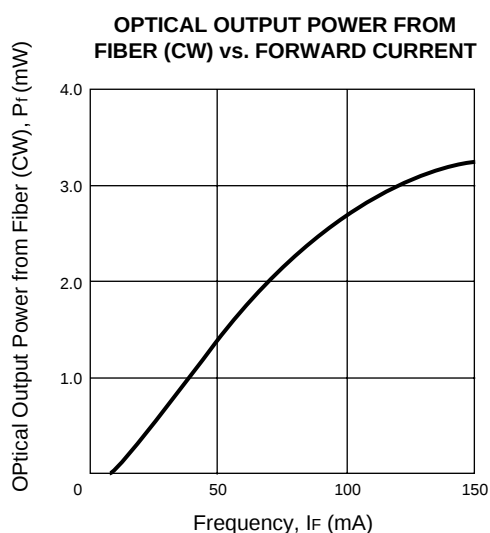
ORDERING INFORMATION

PART NUMBER With SC-PC Connector	ITU-T Wavelength ¹ (nm)	Frequency (THz)
NX8565LE6057-CC	1605.74	186.70
NX8565LE6066-CC	1606.60	186.60
NX8565LE6074-CC	1607.46	186.50
NX8565LE6083-CC	1608.32	186.40

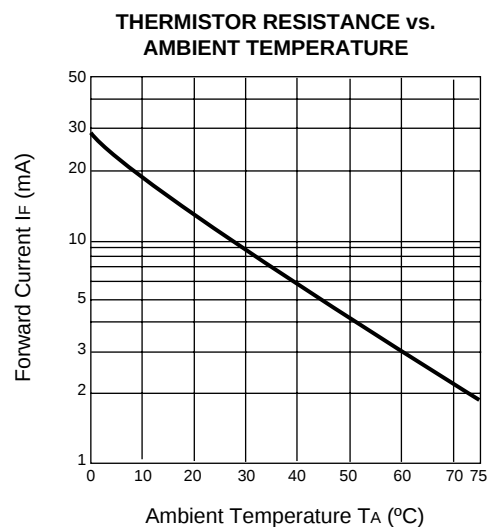
Note:

1. The value which omitted and computed the 3rd place below the decimal point.

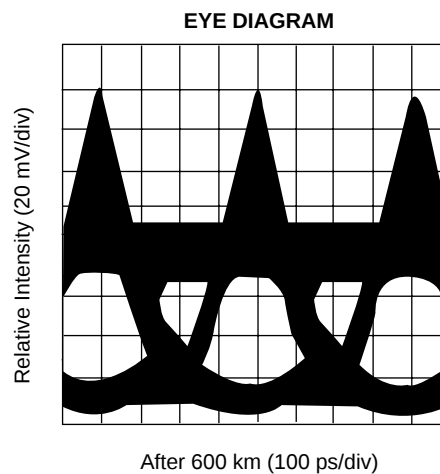
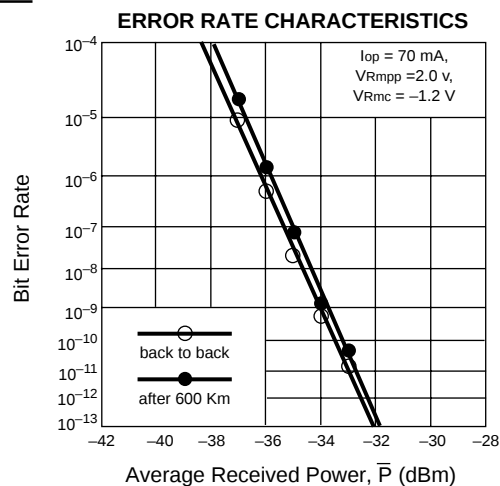
TYPICAL PERFORMANCE CURVES (T_{LD} = +25°C, Unless otherwise specified)



Remark: The graphs indicate nominal characteristics.



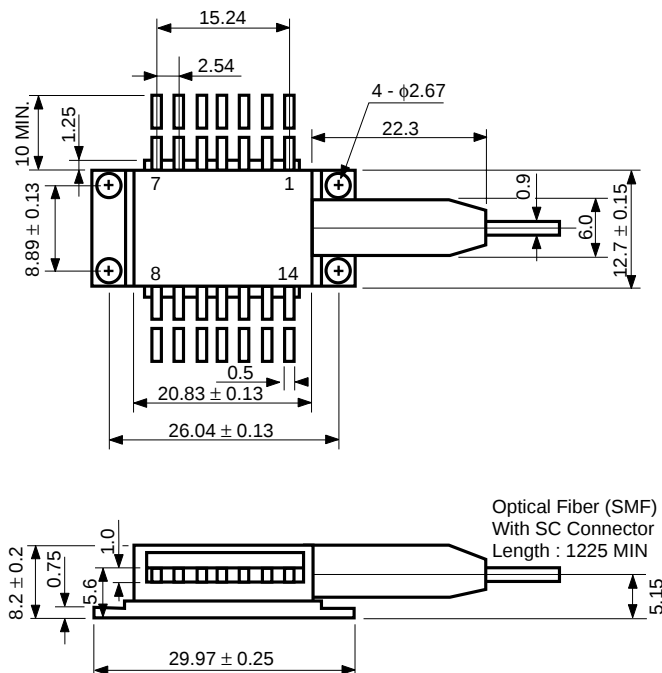
600 km STANDARD FIBER TRANSMISSION EXAMPLE



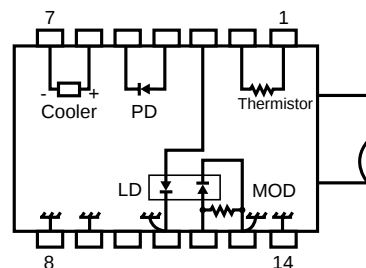
Remark: The graphs indicate nominal characteristics.

OUTLINE DIMENSIONS (Units in mm)

NX8565LE-CC



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

OPTICAL FIBER CHARACTERISTICS

PARAMETER	UNITS	SPECIFICATION
Mode Field Diameter	μm	9.3 ± 0.5
Cladding Diameter	μm	125 ± 1
Tight Buffer Diameter	μm	900 ± 100
Cut-off Wavelength	nm	< 1270
Attenuation 1525 to 1575 nm	dB/km	< 0.3
Minimum Fiber Bending Radius	mm	30
Fiber Length	mm	1225 MIN
Flammability	UL1581 VW-1	

