



NEC's EA MODULATOR AND WAVELENGTH MONITOR INTEGRATED 1550 nm MQW-DFB LASER DIODE MODULE FOR 10 Gb/s APPLICATIONS

**NX8560SJ
Series**

FEATURES

- **INTEGRATED ELECTRO-ABSORPTION MODULATOR**
- **WAVELENGTH MONITOR FUNCTION**
- **10 Gb/s TRANSMISSION UP TO 40 KM SSMF**
- **7-PIN BUTTERFLY PACKAGE WITH GPO™ CONNECTOR**
- **AVAILABLE FOR DWDM WAVELENGTH BASED ON ITU-T RECOMMENDATION**

DESCRIPTION

NEC's NX8560SJ Series is an Electro-Absorption (EA) Modulator and wavelength monitor intergraded, 1550 nm Multiple Quantum Well (MQW) structured Distributed Feed-Back (DFB) laser diode module. It is capable of transmitting up to 40 km standard single mode fiber (dispersion: 800 ps/nm) for 10 Gb/s applications with built in wavelength monitor.

ELECTRO-OPTICAL CHARACTERISTICS (TLD = TSET, TC = -5 + 70°C, BOL unless otherwise specified)

PART NUMBER			NX8560SJ Series		
SYMBOLS	PARAMETERS AND CONDITIONS	UNITS	MIN	TYP	MAX
TSET	Laser Set Temperature ¹	°C	20		35
Iop	Operating Current	mA	50	60	80
VCENTER	Modulation Center Voltage	V	-2.0		-0.5
VMOD	Modulation Voltage	V		2	3
VFLD	Forward Voltage of LD, IFLD = Iop	V			2.0
ITH	Threshold Current	mA		7	20
Pr	Optical Output from Fiber, Under modulation ²	dBm	-3	-2	
λp	Peak Emission Wavelength, IFLD = Iop, VEA = 0 V, TLD = TSET	nm	1528	ITU-T ³	1564
SMSR	Side Mode Suppression Ratio, IFLD = Iop, VEA = 0 V	dB	30	> 37	
ER	Extinction Ratio, Under modulation ²	dB	10	11	
tr	Rise Time, 20-80%, Under modulation ²	ps			40
tf	Fall Time, 80-20%, Under modulation ²	ps			40
DP	Dispersion Penalty, 800 ps/nm under modulation ^{2, 4}	dB			2.0
Is	Optical Isolation	dB	23		
S11	RF Return Loss, IFLD = IOP, VEA = 1 V, 50 Ω, f = 130 MHz to 5 GHz	dB		-10	-8
		dB		-8	-5

Note:

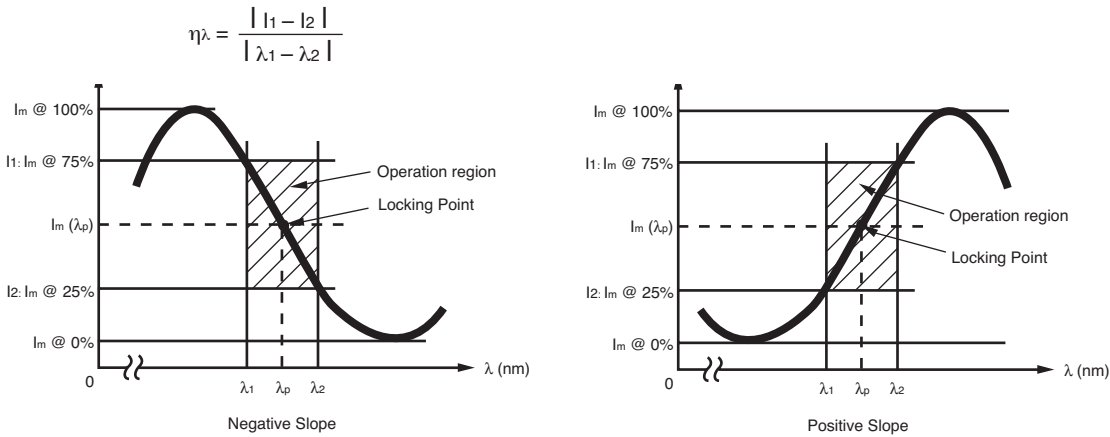
1. TSET is a certain point between 20°C and 35°C for ITU-T grid wavelength.
2. 40 km SMF under modulation, 9.95328 GB/S, PRBS 2²³⁻¹, VEA = VCENTER ± 1/2VMOD, IFLD = Iop, NEC Test System
Vcenter: a certain point between -2.0 V and -0.5 V.
Vmod: a certain point 3 V or below.
Iop: a certain point between 50 mA and 80 mA.
3. Available for DWDM wavelength based on ITU-T recommendations (50 GHz grid). Please refer to ordering information.
4. BER = 10⁻¹⁰.

ELECTRO-OPTICAL CHARACTERISTICS (Applicable to Monitor PD: TLD = TSET, Tc = -5 to +70°C, BOL)

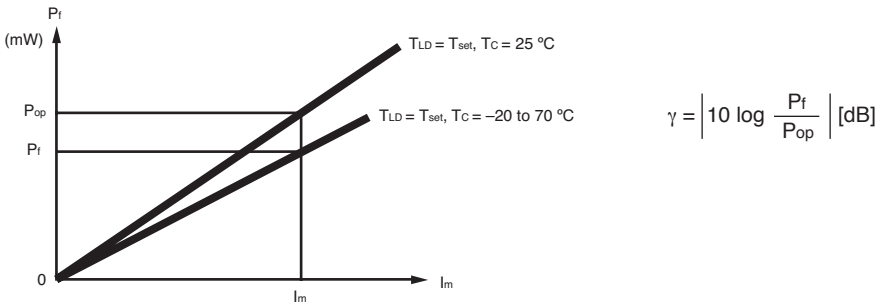
PART NUMBER			NX8560SJ-CC		
SYMBOLS	PARAMETERS AND CONDITIONS	UNITS	MIN	TYP	MAX
$I_m (P_t)$	Monitor Current, $V_{RPD} = 5V$, $I_{FLD} = I_{OP}$	μA	10		200
$I_m (\lambda_p)$	Monitor Current, $V_{RPD} = 5V$, $I_{FLD} = I_{OP}$, Locking point	μA	5		100
$I_m (\lambda)$	Operation Region ¹	%	25		75
$ \lambda_1 - \lambda_2 $		pm	90		
η_{λ}^1	Discrimination Slope, $V_{RPD} = 5V$, $I_{FLD} = I_{OP}$, Locking point	$\mu A/pm$	0.24		
I_D	Dark Current, $V_{RPD} = 5V$, $V_{EA} = 0V$	nA			10
C_t	Terminal Capacitance, $V_{RPD} = 5V$, $f = 1Mhz$	pF			15
γ^2	Tracking Error, $I_m = const.$	dB			0.5

Note:

1. Operation region, Discrimination slope, Slope assignment.



2. Tracking Error: γ



ELECTRO-OPTICAL CHARACTERISTICS (Applicable to Thermistor and TEC: Tc = -5 to +70°C)

PART NUMBER			NX8560SJ Series		
SYMBOLS	PARAMETERS AND CONDITIONS	UNITS	MIN	TYP	MAX
R	Thermistor Resistance, $T_{LD} = 25^{\circ}C$	k Ω	9.5	10.0	10.5
B	B Constant	K	3350	3450	3550
Ic	Cooler Current, $T_{LD} = T_{set}$	A			1.2
Vc	Cooler Voltage, $T_{LD} = T_{set}$	V			2.4

ABSOLUTE MAXIMUM RATINGS¹(T_C = 25°C, unless otherwise specified)

SYMBOLS	PARAMETERS	UNITS	RATINGS
P _f	Optical Output 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	°C	-5 to +70
T _{STG}	Storage Temperature	°C	-40 to +85
T _{SLD}	Lead Soldering Temperature (3 s)	°C	350

Note:

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

ORDERING INFORMATION

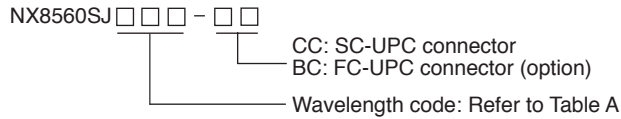


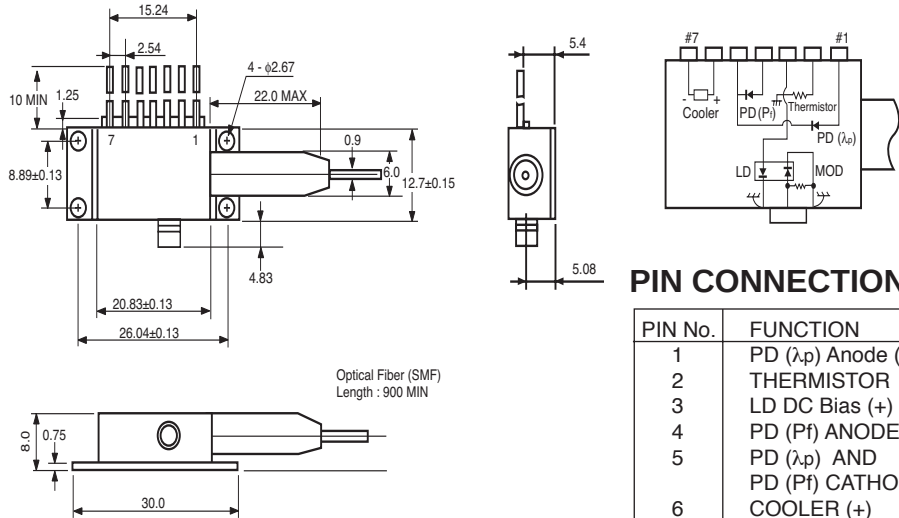
TABLE A: DWDM wavelengths based on ITU-T recommendations (@ TLD = Tset)

Wavelength Code	ITU-T Wavelength ^{*1} (nm)	Frequency (THz)	Wavelength Code	ITU-T Wavelength ^{*1} (nm)	Frequency (THz)
287	1528.773	196.10	457	1545.720	193.95
291	1529.163	196.05	461	1546.119	193.90
295	1529.553	196.00	465	1546.518	193.85
299	1529.553	195.95	469	1546.917	193.80
303	1530.334	195.90	473	1547.316	193.70
307	1530.725	195.85	477	1547.715	193.70
311	1531.116	195.80	485	1548.515	193.60
315	1531.507	195.75	489	1548.915	193.55
318	1531.898	195.70	493	1549.315	193.50
322	1532.290	195.65	497	1549.715	193.45
326	1532.681	195.60	501	1550.116	193.40
330	1533.073	195.55	505	1550.517	193.35
334	1533.465	195.50	509	1550.918	193.30
338	1533.073	195.45	513	1551.319	193.25
342	1534.250	195.40	517	1551.721	193.20
346	1534.643	195.35	521	1552.122	193.15
350	1535.036	195.30	525	1552.524	193.10
354	1535.429	195.25	529	1552.926	193.05
358	1535.822	195.20	533	1553.329	193.00
362	1536.216	195.15	537	1553.731	192.95
366	1536.643	195.10	541	1554.134	192.90
370	1537.003	195.05	545	1554.537	192.85
373	1537.397	195.00	549	1554.940	192.80
377	1537.792	194.95	553	1555.343	192.75
381	1538.186	194.90	557	1555.747	192.70
385	1538.581	194.85	561	1556.151	192.65
389	1538.976	194.80	565	1556.555	192.60
393	1539.371	194.75	569	1556.959	192.55
397	1539.766	194.70	573	1557.363	192.50
401	1540.162	194.65	577	1557.768	192.45
405	1540.557	194.60	581	1558.173	192.40
409	1540.953	194.55	585	1558.578	192.30
413	1541.349	194.50	589	1558.983	192.30
417	1541.746	194.45	593	1559.389	192.25
421	1542.142	194.40	597	1559.794	192.20
425	1542.539	194.35	602	1560.200	192.15
429	1542.936	194.30	606	1560.606	192.10
433	1543.333	194.25	610	1561.013	192.05
437	1543.730	194.20	614	1561.419	192.00
441	1544.128	194.15	618	1561.826	191.95
445	1544.526	194.10	622	1562.233	191.90
449	1544.924	194.05	626	1562.640	191.85
453	1545.322	194.00	630	1563.047	191.80

Note:

- λ monitor slope: Channel frequency for 191.80 THz + 2n × 0.05 THz is assigned on negative slope.
Channel frequency for 191.80 THz + (2n + 1) × 0.05 THz is assigned on positive slope.
n is a positive integer including zero.

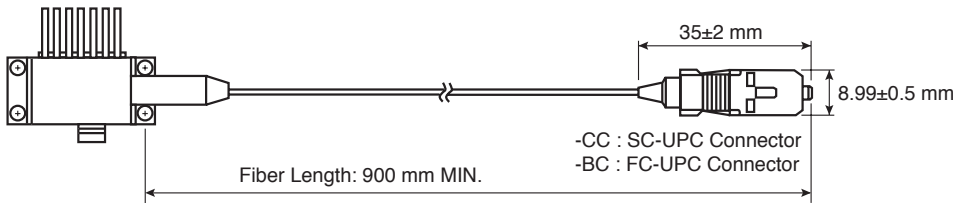
OUTLINE DIMENSIONS (Units in mm)



PIN CONNECTIONS	
PIN No.	FUNCTION
1	PD (λp) Anode (-)
2	THERMISTOR
3	LD DC Bias (+)
4	PD (Pf) ANODE (-)
5	PD (λp) AND PD (Pf) CATHODE (+)
6	COOLER (+)
7	COOLER (-)

OPTICAL FIBER CHARACTERISTICS

PARAMETER	UNITS	SPECIFICATIONS
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	dB/km	<0.3
Minimum Fiber Bending Radius	mm	30
Fiber Length	mm	900 MIN
Flammability	UL1581 VW-1	



Life Support Applications

These NEC products are not intended for use in life support devices, appliances, or systems where the malfunction of these products can reasonably be expected to result in personal injury. The customers of CEL using or selling these products for use in such applications do so at their own risk and agree to fully indemnify CEL for all damages resulting from such improper use or sale.

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4590 Patrick Henry Drive • Santa Clara, CA 95054-1817 • (408) 988-3500 • FAX (408) 988-0279 • www.cel.com

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