# NEC

LASER DIODE

NX8571SCxxxQ-BA

1 550 nm CW LIGHT SOURCE
InGaAsP MQW-DFB LASER DIODE MODULE
WITH WAVELENGTH MONITOR

DESCRIPTION

The NX8571SCxxxQ-BA is a 1 550 nm Multiple Quantum Well (MQW) structured Distributed Feed-Back (DFB) laser diode module with wavelength monitor function. This device is temperature tunable over 8×50 GHz channels. Available at both C-band (1 530.334 to 1 565.087 nm) and L-band (1 565.496 to 1 608.760 nm) ITU-T grid wavelengths.

This device is designed as CW light source and ideal for transmission systems in which external modulators are used.
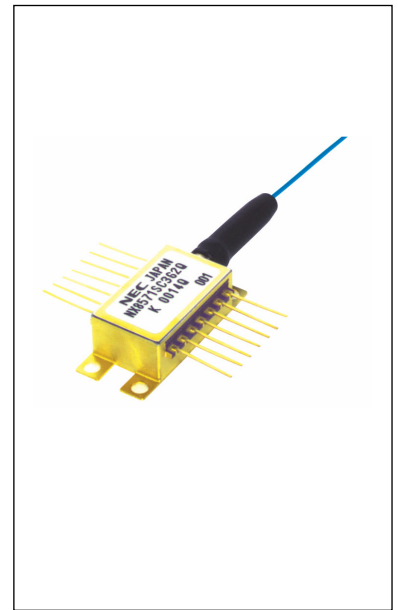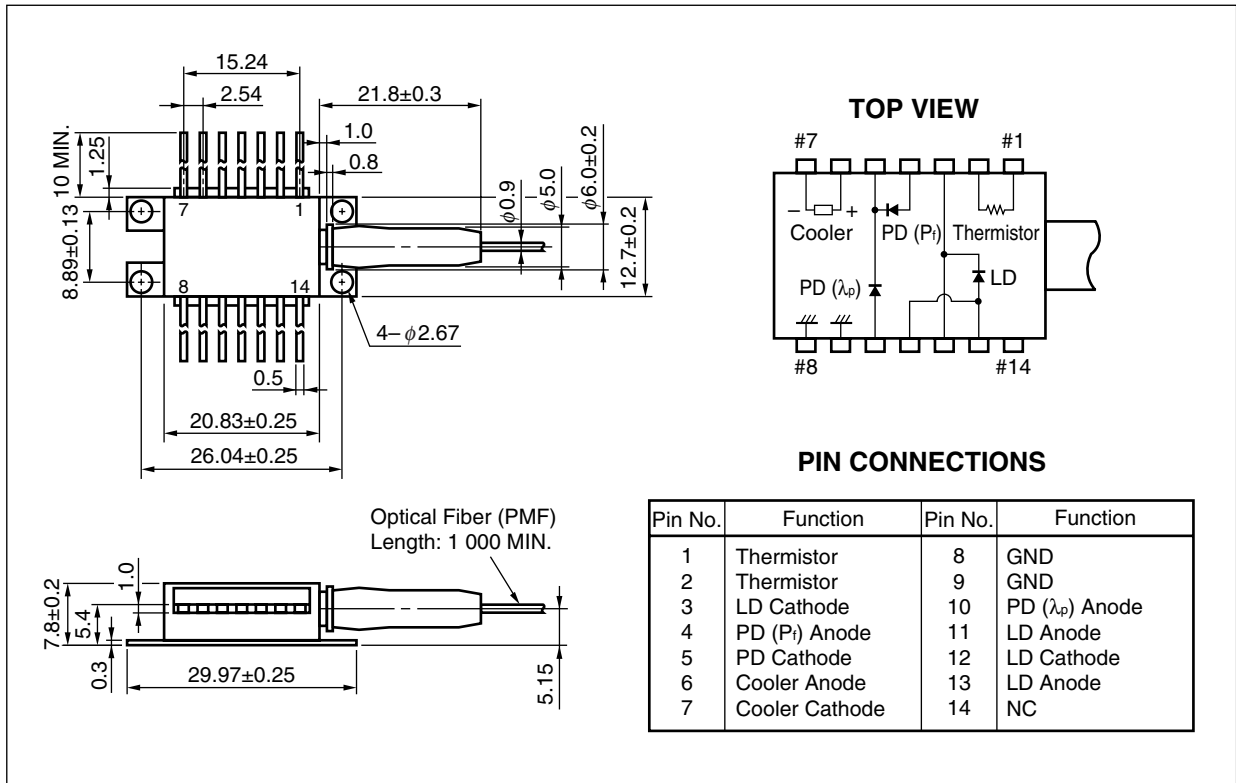

FEATURES

- Wavelength monitor function (Etalon Filter, Wavelength monitor PD)
- Optical output power $P_f = 10$ mW MIN.
- Available for DWDM wavelengths based on ITU-T recommendations (50 GHz grid, please refer to the **ORDERING INFORMATION**)
- 8 channel wavelength tunable capability for 50 GHz-spacing
- Internal thermo-electric cooler and isolator
- Hermetically sealed 14-pin butterfly package
- Polarization maintain fiber pigtail

The mark ★ shows major revised points.

★ **PACKAGE DIMENSIONS (UNIT : mm)**

TOP VIEW

PIN CONNECTIONS

Pin No.	Function	Pin No.	Function
1	Thermistor	8	GND
2	Thermistor	9	GND
3	LD Cathode	10	PD (λ_p) Anode
4	PD (P_f) Anode	11	LD Anode
5	PD Cathode	12	LD Cathode
6	Cooler Anode	13	LD Anode
7	Cooler Cathode	14	NC

OPTICAL FIBER CHARACTERISTICS

Parameter	Specification	Unit
Outer Diameter	0.9±0.1	mm
Minimum Fiber Bending Radius	25	mm
Fiber Length	1 000 MIN.	mm
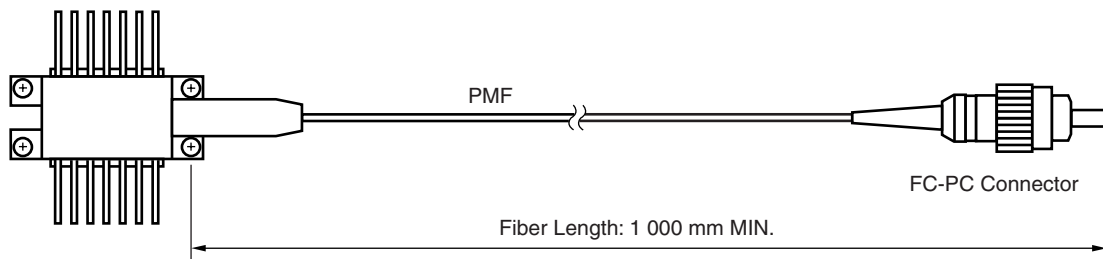
ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Ratings	Unit
Forward Current of LD	I_F	300	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 +70	°C
Storage Temperature	T_{stg}	−40 to +85	°C
Lead Soldering Temperature	T_{sld}	260 (10 sec.)	°C

ELECTRO-OPTICAL CHARACTERISTICS (T_{LD} = T_{set}, T_C = −5 to +70°C, unless otherwise specified)

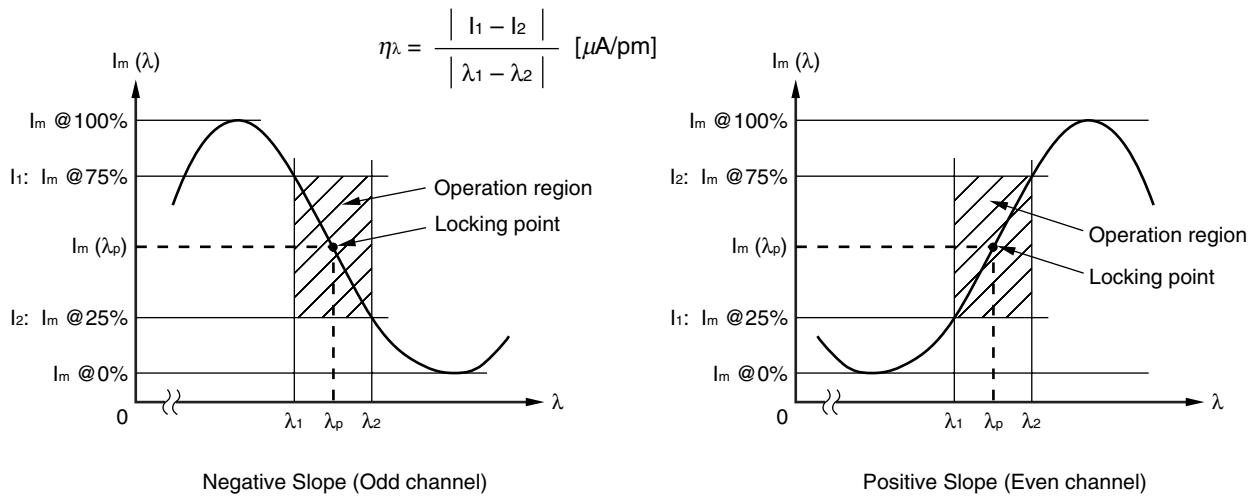| Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Laser Set Temperature	T_{set}	8 channel tunable	5		55	°C
Forward Voltage	V_F	P_f = 10 mW	0.9	1.2	2.5	V
Threshold Current	I_{th}			20	40	mA
Operation Current	I_{op}	P_f = 10 mW		70	125	mA
Optical Output Power from Fiber	P_f	I_F = 125 mA, T_{LD} = T_{set}	10			mW
Peak Emission Wavelength	λ_p	P_f = 10 mW, CW, T_{LD} = T_{set}	1 530	ITU-T [1]	1 609	nm
Wevelength Stability	−	T_{LD} = T_{set}, applicable to wavelength monitor, E.O.L	−20		+20	pm
Spectral Line Width	Δv	P_f = 10 mW, CW, 3 dB down		1	2	MHz
Side Mode Suppression Ratio	SMSR	P_f = 10 mW, CW	35	45		dB
Relative Intensity Noise	RIN	P_f = 10 mW, 20 MHz to 3 GHz			−150	dB/Hz
Isolation	I_s		30			dB
Polarization Extinction Ratio [2]	ext	P_f = 10 mW, CW	20			dB

[1] Available for DWDM wavelengths based on ITU-T recommendations
(50 GHz grid, please refer to the **ORDERING INFORMATION**)

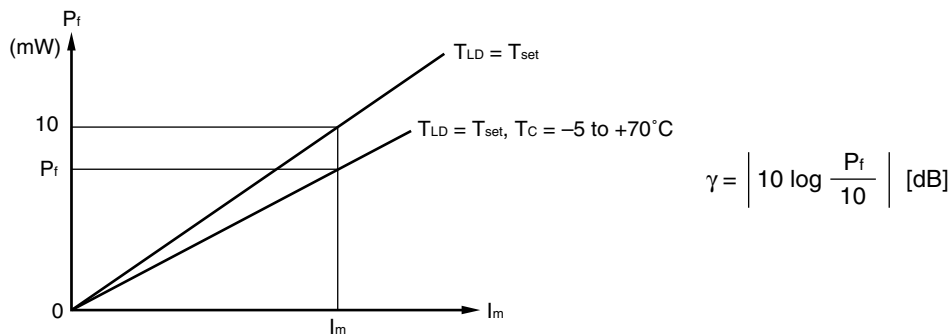**[2]** Polarization state of LD is aligned parallel to the slow axis.

ELECTRO-OPTICAL CHARACTERISTICS (Applicable to Monitor PD: $T_{LD} = T_{set}$, $T_C = -5$ to $+70°C$)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Monitor Current (P_f Monitor)	$I_m (P_f)$	$P_f = 10$ mW, $V_R = 5$ V	20		200	μA
Monitor Current (λ_p Monitor)	$I_m (\lambda_p)$	$P_f = 10$ mW, $V_R = 5$ V, Locking point	10		100	μA
Operation Region [*1]	$I_m (\lambda)$		25		75	%
	$\left|\lambda_1 - \lambda_2\right|$		90			pm
Discrimination Slope [*1]	η_λ		0.05			μA/pm
Dark Current	I_D	$V_R = 5$ V		2	10	nA
Tracking Error	γ [*2]	$I_m = $ const.			0.5	dB

*1 Operation region, Discrimination slope, Slope assignment

$$\eta_\lambda = \frac{\left| I_1 - I_2 \right|}{\left| \lambda_1 - \lambda_2 \right|} \quad [\mu A/pm]$$

Negative Slope (Odd channel)

Positive Slope (Even channel)

*2 Tracking Error: γ

$$\gamma = \left| 10 \log \frac{P_f}{10} \right| \quad [dB]$$

ELECTRO-OPTICAL CHARACTERISTICS
(Applicable to Thermistor and TEC: $T_{LD} = T_{set}$, $T_C = -5$ to $+70°C$)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Thermistor Resistance	R	$T_{LD} = 25°C$	9.5	10.0	10.5	kΩ
B Constant	B	$T_{LD} = 25°C$	3 350	3 450	3 550	K
Cooler Current	I_C	$\Delta T = 70 - T_{set}$, $P_f = 10$ mW			1.5	A
Cooler Voltage	V_C	$\Delta T = 70 - T_{set}$, $P_f = 10$ mW			3.0	V

ORDERING INFORMATION

NX8571SC □□□ Q-BA
- With FC-PC connector
- 8 channel tunable
- Wavelength code : Refer to **Table A**
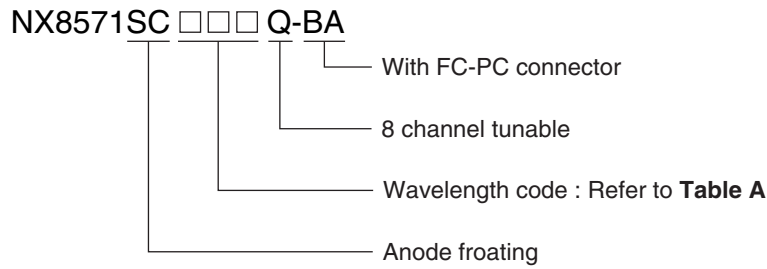- Anode froating

Table A: DWDM wavelength base on ITU-T recommendations (@ $T_{LD} = T_{set}$) (1/7)

Wavelength Code	ITU-T Wavelength [1]	Frequency	Monitor Slope
8 channel tunable	(nm)	(THz)	
330Q	1 530.33	195.90	Negative
	1 530.72	195.85	Positive
	1 531.11	195.80	Negative
	1 531.50	195.75	Positive
	1 531.89	195.70	Negative
	1 532.29	195.65	Positive
	1 532.68	195.60	Negative
	1 533.07	195.55	Positive
362Q	1 533.46	195.50	Negative
	1 533.85	195.45	Positive
	1 534.25	195.40	Negative
	1 534.64	195.35	Positive
	1 535.03	195.30	Negative
	1 535.42	195.25	Positive
	1 535.82	195.20	Negative
	1 536.21	195.15	Positive
393Q	1 536.60	195.10	Negative
	1 537.00	195.05	Positive
	1 537.39	195.00	Negative
	1 537.79	194.95	Positive
	1 538.18	194.90	Negative
	1 538.58	194.85	Positive
	1 538.97	194.80	Negative
	1 539.37	194.75	Positive

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

Table A: DWDM wavelength base on ITU-T recommendations (@ $T_{LD} = T_{set}$) (2/7)

Wavelength Code 8 channel tunable	ITU-T Wavelength [1] (nm)	Frequency (THz)	Monitor Slope
425Q	1 539.76	194.70	Negative
	1 540.16	194.65	Positive
	1 540.55	194.60	Negative
	1 540.95	194.55	Positive
	1 541.34	194.50	Negative
	1 541.74	194.45	Positive
	1 542.14	194.40	Negative
	1 542.53	194.35	Positive
457Q	1 542.93	194.30	Negative
	1 543.33	194.25	Positive
	1 543.73	194.20	Negative
	1 544.12	194.15	Positive
	1 544.52	194.10	Negative
	1 544.92	194.05	Positive
	1 545.32	194.00	Negative
	1 545.72	193.95	Positive
489Q	1 546.11	193.90	Negative
	1 546.51	193.85	Positive
	1 546.91	193.80	Negative
	1 547.31	193.75	Positive
	1 547.71	193.70	Negative
	1 548.11	193.65	Positive
	1 548.51	193.60	Negative
	1 548.91	193.55	Positive
521Q	1 549.31	193.50	Negative
	1 549.71	193.45	Positive
	1 550.11	193.40	Negative
	1 550.51	193.35	Positive
	1 550.91	193.30	Negative
	1 551.31	193.25	Positive
	1 551.72	193.20	Negative
	1 552.12	193.15	Positive

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

Table A: DWDM wavelength base on ITU-T recommendations (@ T$_{LD}$ = T$_{set}$) (3/7)

Wavelength Code 8 channel tunable	ITU-T Wavelength [1] (nm)	Frequency (THz)	Monitor Slope
553Q	1 552.52	193.10	Negative
	1 552.92	193.05	Positive
	1 553.32	193.00	Negative
	1 553.73	192.95	Positive
	1 554.13	192.90	Negative
	1 554.53	192.85	Positive
	1 554.94	192.80	Negative
	1 555.34	192.75	Positive
585Q	1 555.74	192.70	Negative
	1 556.15	192.65	Positive
	1 556.55	192.60	Negative
	1 556.95	192.55	Positive
	1 557.36	192.50	Negative
	1 557.76	192.45	Positive
	1 558.17	192.40	Negative
	1 558.57	192.35	Positive
618Q	1 558.98	192.30	Negative
	1 559.38	192.25	Positive
	1 559.79	192.20	Negative
	1 560.20	192.15	Positive
	1 560.60	192.10	Negative
	1 561.01	192.05	Positive
	1 561.41	192.00	Negative
	1 561.82	191.95	Positive
650Q	1 562.23	191.90	Negative
	1 562.64	191.85	Positive
	1 563.04	191.80	Negative
	1 563.45	191.75	Positive
	1 563.86	191.70	Negative
	1 564.27	191.65	Positive
	1 564.67	191.60	Negative
	1 565.08	191.55	Positive

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

Table A: DWDM wavelength base on ITU-T recommendations (@ T$_{LD}$ = T$_{set}$) (4/7)

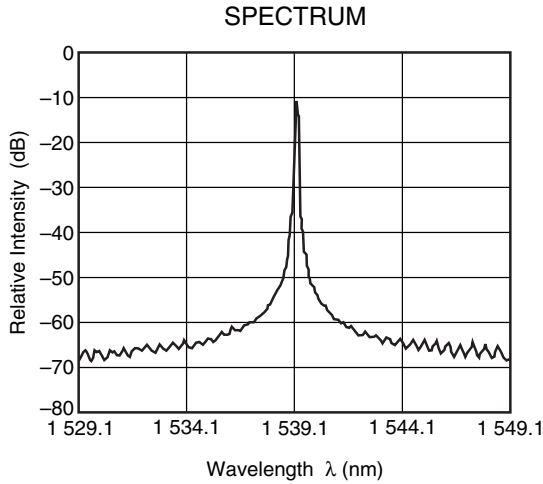| Wavelength Code 8 channel tunable	ITU-T Wavelength [*1] (nm)	Frequency (THz)	Monitor Slope
683Q	1 565.49	191.50	Negative
	1 565.90	191.45	Positive
	1 566.31	191.40	Negative
	1 566.72	191.35	Positive
	1 567.13	191.30	Negative
	1 567.54	191.25	Positive
	1 567.95	191.20	Negative
	1 568.36	191.15	Positive
716Q	1 568.77	191.10	Negative
	1 569.18	191.05	Positive
	1 569.59	191.00	Negative
	1 570.00	190.95	Positive
	1 570.41	190.90	Negative
	1 570.82	190.85	Positive
	1 571.23	190.80	Negative
	1 571.65	190.75	Positive
749Q	1 572.06	190.70	Negative
	1 572.47	190.65	Positive
	1 572.88	190.60	Negative
	1 573.30	190.55	Positive
	1 573.71	190.50	Negative
	1 574.12	190.45	Positive
	1 574.54	190.40	Negative
	1 574.95	190.35	Positive
782Q	1 575.36	190.30	Negative
	1 575.78	190.25	Positive
	1 576.19	190.20	Negative
	1 576.61	190.15	Positive
	1 577.02	190.10	Negative
	1 577.44	190.05	Positive
	1 577.85	190.00	Negative
	1 578.27	189.95	Positive

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

Table A: DWDM wavelength base on ITU-T recommendations (@ $T_{LD} = T_{set}$) (5/7)
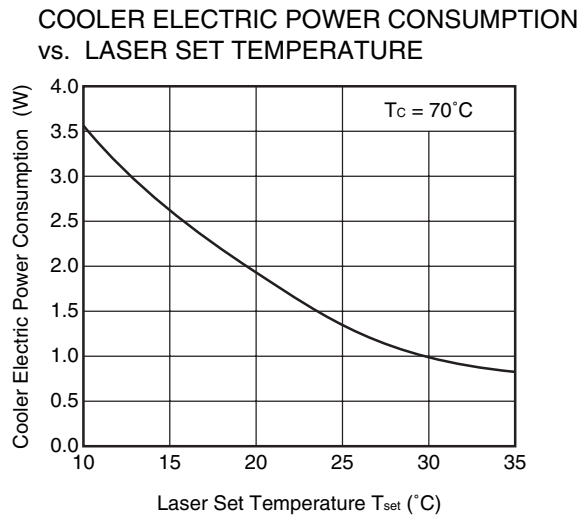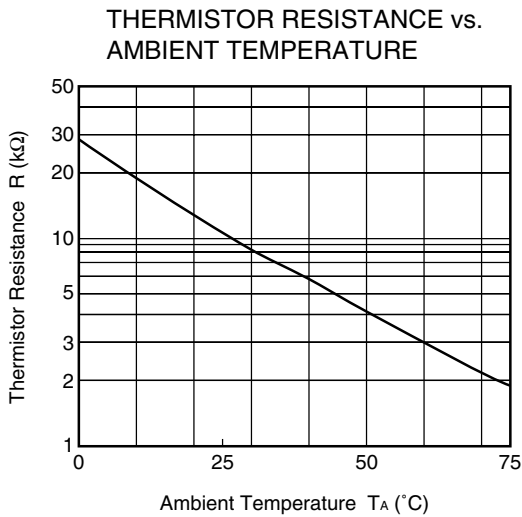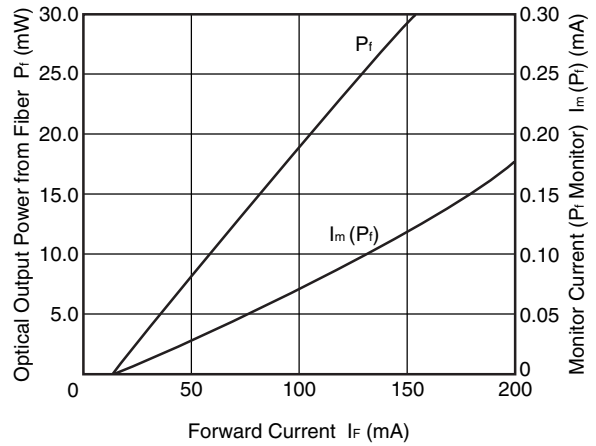
Wavelength Code 8 channel tunable	ITU-T Wavelength [*1] (nm)	Frequency (THz)	Monitor Slope
816Q	1 578.68	189.90	Negative
	1 579.10	189.85	Positive
	1 579.51	189.80	Negative
	1 579.93	189.75	Positive
	1 580.35	189.70	Negative
	1 580.76	189.65	Positive
	1 581.18	189.60	Negative
	1 581.60	189.55	Positive
849Q	1 582.01	189.50	Negative
	1 582.43	189.45	Positive
	1 582.85	189.40	Negative
	1 583.27	189.35	Positive
	1 583.69	189.30	Negative
	1 584.10	189.25	Positive
	1 584.52	189.20	Negative
	1 584.94	189.15	Positive
883Q	1 585.36	189.10	Negative
	1 585.78	189.05	Positive
	1 586.20	189.00	Negative
	1 586.62	188.95	Positive
	1 587.04	188.90	Negative
	1 587.46	188.85	Positive
	1 587.88	188.80	Negative
	1 588.30	188.75	Positive
916Q	1 588.72	188.70	Negative
	1 589.14	188.65	Positive
	1 589.56	188.60	Negative
	1 589.98	188.55	Positive
	1 590.41	188.50	Negative
	1 590.83	188.45	Positive
	1 591.25	188.40	Negative
	1 591.67	188.35	Positive

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

Table A: DWDM wavelength base on ITU-T recommendations (@ T$_{LD}$ = T$_{set}$) (6/7)

Wavelength Code 8 channel tunable	ITU-T Wavelength [*1] (nm)	Frequency (THz)	Monitor Slope
950Q	1 592.10	188.30	Negative
	1 592.52	188.25	Positive
	1 592.94	188.20	Negative
	1 593.36	188.15	Positive
	1 593.79	188.10	Negative
	1 594.21	188.05	Positive
	1 594.64	188.00	Negative
	1 595.06	187.95	Positive
984Q	1 595.48	187.90	Negative
	1 595.91	187.85	Positive
	1 596.33	187.80	Negative
	1 596.76	187.75	Positive
	1 597.18	187.70	Negative
	1 597.61	187.65	Positive
	1 598.04	187.60	Negative
	1 598.46	187.55	Positive
6018Q	1 598.89	187.50	Negative
	1 599.32	187.45	Positive
	1 599.74	187.40	Negative
	1 600.17	187.35	Positive
	1 600.60	187.30	Negative
	1 601.02	187.25	Positive
	1 601.45	187.20	Negative
	1 601.88	187.15	Positive
6053Q	1 602.31	187.10	Negative
	1 602.74	187.05	Positive
	1 603.16	187.00	Negative
	1 603.59	186.95	Positive
	1 604.02	186.90	Negative
	1 604.45	186.85	Positive
	1 604.88	186.80	Negative
	1 605.31	186.75	Positive

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

Table A: DWDM wavelength base on ITU-T recommendations (@ $T_{LD} = T_{set}$) (7/7)

Wavelength Code	ITU-T Wavelength [*1]	Frequency	Monitor Slope
8 channel tunable	(nm)	(THz)	
6087Q	1 605.74	186.70	Negative
	1 606.17	186.65	Positive
	1 606.60	186.60	Negative
	1 607.03	186.55	Positive
	1 607.46	186.50	Negative
	1 607.89	186.45	Positive
	1 608.32	186.40	Negative
	1 608.76	186.35	Positive

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

TYPICAL CHARACTERISTICS (T_{LD} = T_{set}, unless otherwise specified)

SPECTRUM

OPTICAL OUTPUT POWER FROM FIBER, MONITOR CURRENT (P_f MONITOR) vs. FORWARD CURRENT

THERMISTOR RESISTANCE vs. AMBIENT TEMPERATURE

COOLER ELECTRIC POWER CONSUMPTION vs. LASER SET TEMPERATURE

Remark The graphs indicate nominal characteristics.

REFERENCE

Document Name	Document No.
OPTICAL SEMICONDUCTOR DEVICES FOR FIBEROPTIC COMMUNICATIONS SELECTION GUIDE	PL10161E
Opto-Electronics Devices Pamphlet	PX10160E

When the product(s) listed in this document is subject to any applicable import or export control laws and regulation of the authority having competent jurisdiction, such product(s) shall not be imported or exported without obtaining the import or export license.

SAFETY INFORMATION ON THIS PRODUCT

DANGER

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

Warning Laser Beam	A laser beam is emitted from this diode during operation. The laser beam, visible or invisible, directly or indirectly, may cause injury to the eye or loss of eyesight. • Do not look directly into the laser beam. • Avoid exposure to the laser beam, any reflected or collimated beam.

Caution GaAs Products	This product uses gallium arsenide (GaAs).
	GaAs vapor and powder are hazardous to human health if inhaled or ingested, so please observe the following points.
	• Follow related laws and ordinances when disposing of the product. If there are no applicable laws and/or ordinances, dispose of the product as recommended below.
	  1. Commission a disposal company able to (with a license to) collect, transport and dispose of materials that contain arsenic and other such industrial waste materials.
	  2. Exclude the product from general industrial waste and household garbage, and ensure that the product is controlled (as industrial waste subject to special control) up until final disposal.
	• Do not burn, destroy, cut, crush, or chemically dissolve the product.
	• Do not lick the product or in any way allow it to enter the mouth.

Caution Optical Fiber	A glass-fiber is attached on the product. Handle with care. • When the fiber is broken or damaged, handle carefully to avoid injury from the damaged part or fragments.

▶**For further information, please contact**

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