

**1 550 nm InGaAsP MQW-DFB LASER DIODE
COAXIAL MODULE FOR 622 Gb/s****DESCRIPTION**

The NX8504BE-CC and NX8504CE-CC are 1 550 nm Multiple Quantum Well (MQW) structured Distributed Feed-Back (DFB) laser diode coaxial modules with an internal optical isolator.

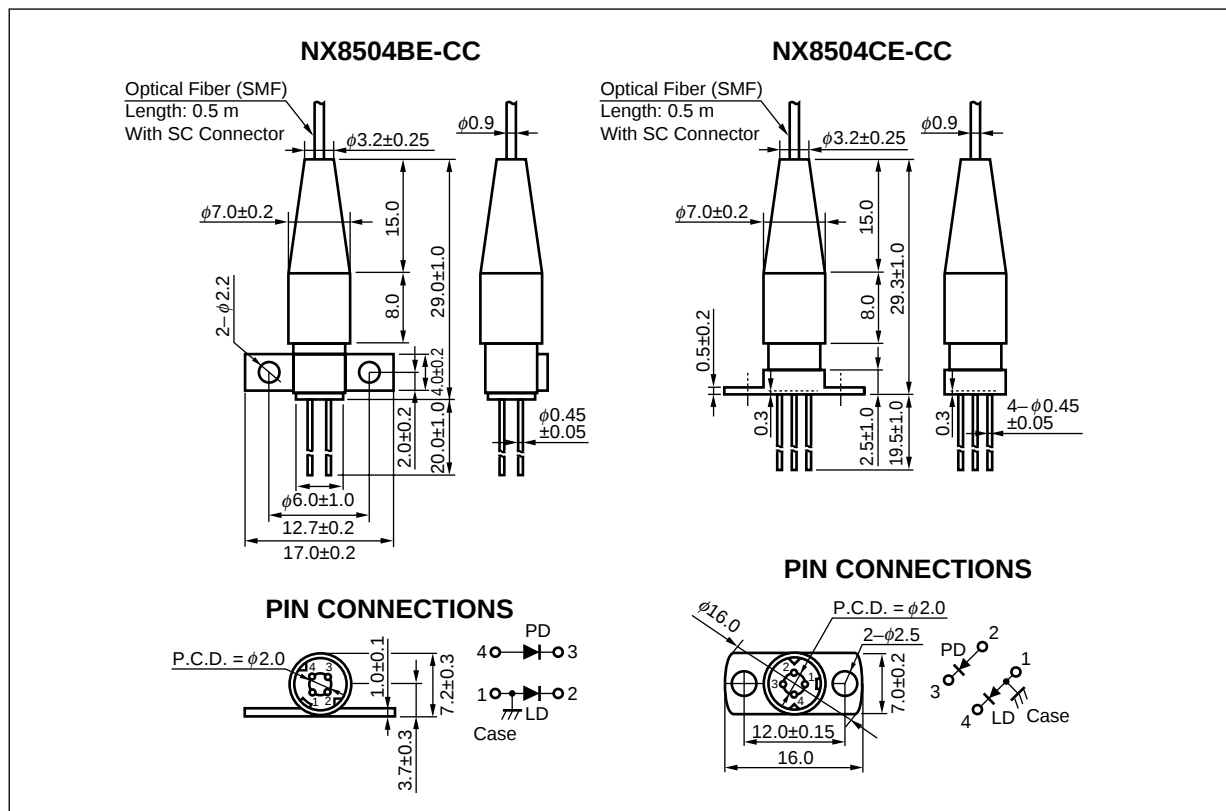
These modules are ideal as a light source for Synchronous Digital Hierarchy (SDH) system, STM-4, long-haul L-4.2, L-4.3 ITU-T recommendations.

FEATURES

- Internal optical isolator
- Peak emission wavelength $\lambda_p = 1\,550\text{ nm}$
- Optical output power $P_r = 2.0\text{ mW}$
- Wide operating temperature range $T_c = -10\text{ to }+85^\circ\text{C}$
- InGaAs monitor PIN-PD
- With SC-UPC connector
- Based on Telcordia reliability

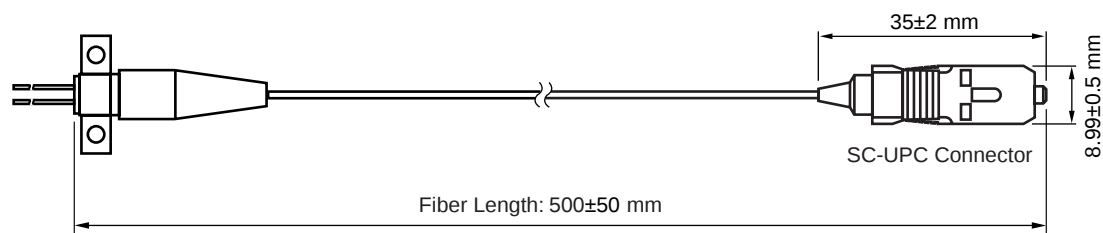
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PACKAGE DIMENSIONS (UNIT : mm)



OPTICAL FIBER CHARACTERISTICS

Parameter	Specification	Unit
Mode Field Diameter	9.5 $\pm$ 1	μ m
Cladding Diameter	125 $\pm$ 2	μ m
Maximum Cladding Noncircularity	2	%
Maximum Core/Cladding Concentricity	1.6	%
Outer Diameter	0.9 $\pm$ 0.1	mm
Cut-off Wavelength	1 100 to 1 270	nm
Minimum Fiber Bending Radius	30	mm
Fiber Length	500 $\pm$ 50	mm
Flammability	UL1581 VW-1	



ORDERING INFORMATION

Part Number	Flange Type	Available Connector
NX8504BE-CC	Flat Mount Flange	With SC-UPC Connector
NX8504CE-CC	Vertical Mount Flange	

ABSOLUTE MAXIMUM RATINGS

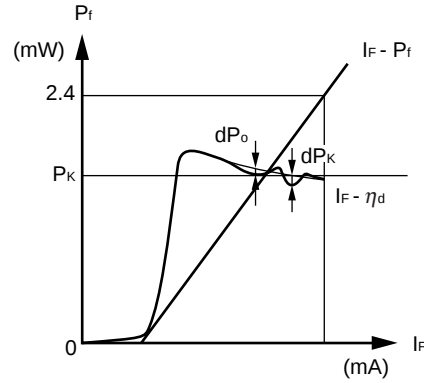
Parameter	Symbol	Ratings	Unit
Optical Output Power from Fiber	P_r	5	mW
Forward Current of LD	I_F	150	mA
Reverse Voltage of LD	V_R	2.0	V
Forward Current of PD	I_F	2.0	mA
Reverse Voltage of PD	V_R	15	V
Operating Case Temperature	T_c	-10 to +85	°C
Storage Temperature	T_{stg}	-40 to +85	°C
Lead Soldering Temperature	T_{sld}	260 (10 sec.)	°C
Relative Humidity (noncondensing)	RH	85	%

ELECTRO-OPTICAL CHARACTERISTICS (T_c = –10 to +85°C, unless otherwise specified)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Optical Output Power from Fiber	P _f	CW		2.0		mW
Operating Voltage	V _{op}	P _f = 2.0 mW		1.1	1.6	V
Threshold Current	I _{th}	T _c = 25°C		15	25	mA
			2		50	
Threshold Output Power	P _{th}	I _F = I _{th}			100	μW
Modulation Current	I _{mod}	P _f = 2.0 mW, T _c = 25°C	11	20	35	mA
		P _f = 2.0 mW	9		55	
Differential Efficiency	η _d	P _f = 2.0 mW, T _c = 25°C	0.060	0.100	0.150	W/A
		P _f = 2.0 mW	0.036		0.200	
Temperature Dependence of Differential Efficiency	Δη _d	$\Delta\eta_d = 10 \log \frac{\eta_d (@ T_c \text{ } ^\circ\text{C})}{\eta_d (@ 25^\circ\text{C})}$	–3	–1.6		dB
Kink (Refer to DEFINITIONS)	kink	P _f = Up to 2.4 mW			±20	%
Peak Emission Wavelength	λ _p	P _f = 2.0 mW	1 530	1 550	1 570	nm
Temperature Dependence of Peak Emission Wavelength	Δλ/ΔT			0.10	0.12	nm/°C
Spectral Width	Δλ	P _f = 2.0 mW, –20 dB down width		0.3	1.0	nm
Side Mode Suppression Ratio	SMSR	P _f = 2.0 mW	30	40		dB
Rise Time	t _r	10-90%, P _{pk} = 2.0 mW, I _F = I _{th}			0.5	ns
Fall Time	t _f	90-10%, P _{pk} = 2.0 mW, I _F = I _{th}			0.5	ns
Monitor Current	I _m	V _R = 5 V, P _f = 2.0 mW	200	1 000	2 000	μA
Monitor Dark Current	I _D	V _R = 5 V, T _c = 25°C		1.0	50	nA
		V _R = 5 V		10	500	
Monitor PD Terminal Capacitance	C _t	V _R = 5 V, f = 1 MHz		1.0	20	pF
Linearity (Refer to DEFINITIONS)	LIN _m	V _R = 5 V, P _f = 0.2 to 2.0 mW			10	%
Tracking Error (Refer to DEFINITIONS)	γ	I _m = const.		0.5	1.0	dB

★ PARAMETER DEFINITIONS

Kink : kink

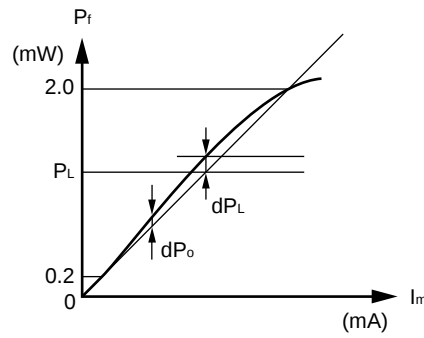


$$\text{kink} = \frac{|dP_K|}{P_K} \times 100 [\%]$$

$$dP_K = dP_o \text{ MAX.}$$

$$P_K \leq 2.4 \text{ (mW)}$$

Linearity : LIN_m

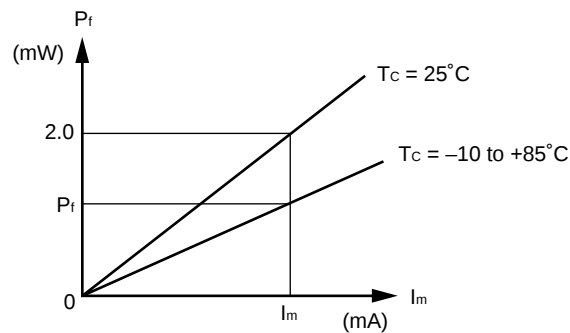


$$\text{LIN}_m = \frac{|dP_L|}{P_L} \times 100 [\%]$$

$$dP_L = dP_o \text{ MAX.}$$

$$0.2 < P_L < 2.0 \text{ (mW)}$$

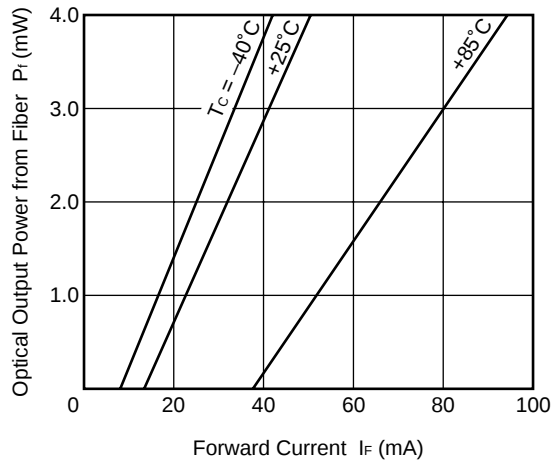
Tracking Error : γ



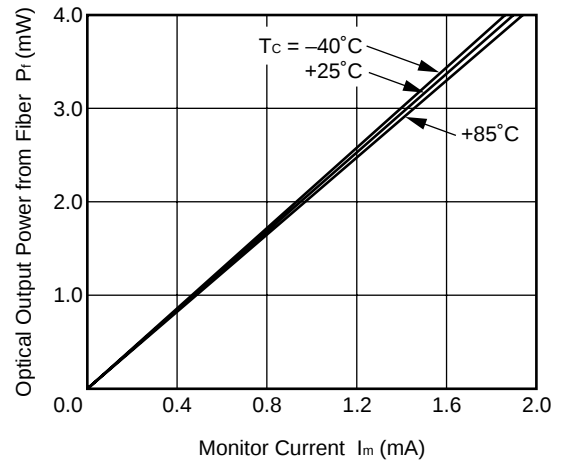
$$\gamma = \left| 10 \log \frac{P_f}{2.0} \right| [\text{dB}]$$

TYPICAL CHARACTERISTICS ($T_c = 25^\circ\text{C}$, unless otherwise specified)

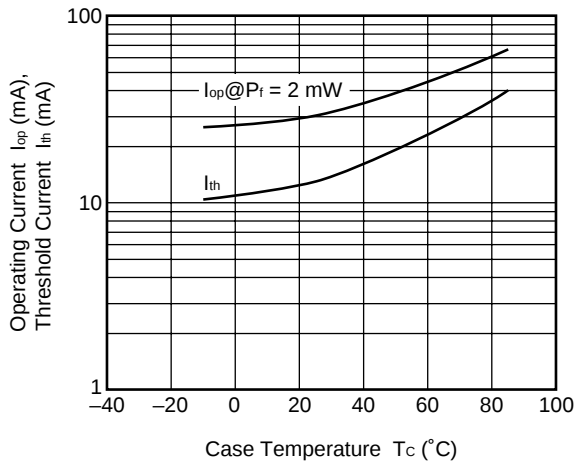
OPTICAL OUTPUT POWER FROM FIBER
vs. FORWARD CURRENT



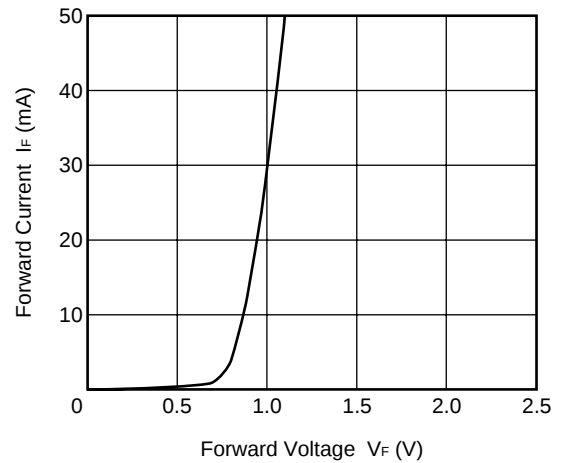
OPTICAL OUTPUT POWER FROM FIBER
vs. MONITOR CURRENT



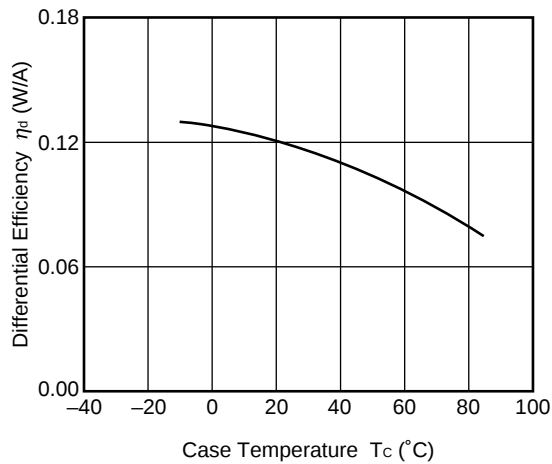
OPERATING CURRENT AND THRESHOLD
CURRENT vs. CASE TEMPERATURE



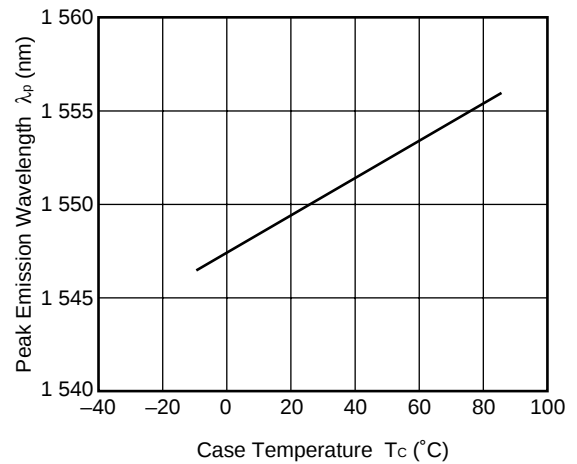
FORWARD CURRENT vs.
FORWARD VOLTAGE

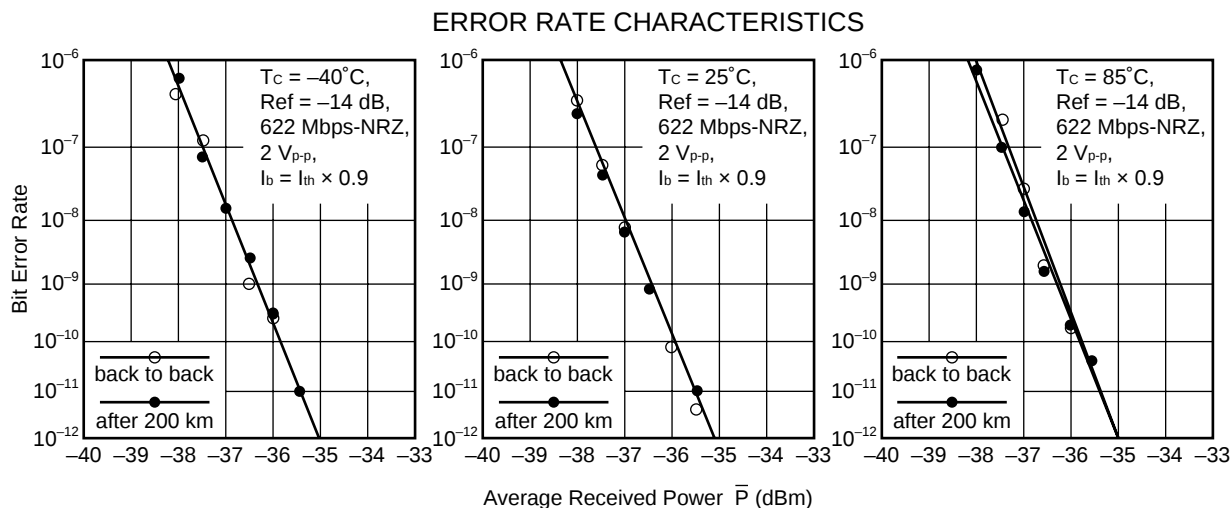
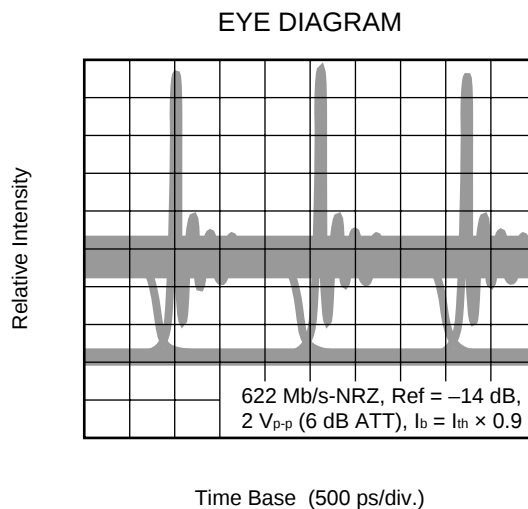
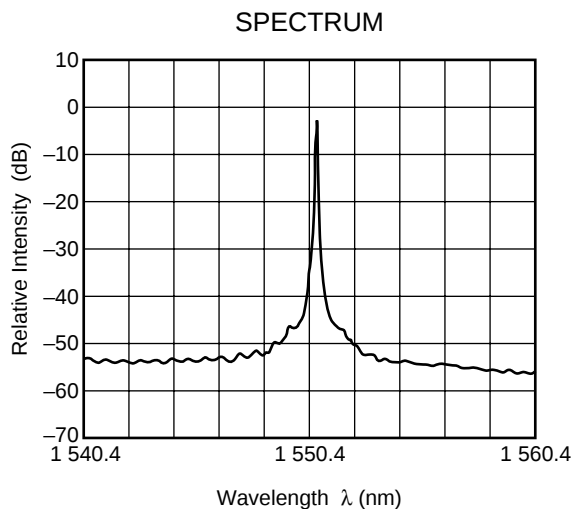


TEMPERATURE DEPENDENCE OF
DIFFERENTIAL EFFICIENCY



TEMPERATURE DEPENDENCE OF
PEAK EMISSION WAVELENGTH





Remark The graphs indicate nominal characteristics.

DFB-LD FAMILY

Part Number	Absolute Maximum Ratings		Electro-Optical Characteristics (T _c = 25°C)			Application	Package
	T _c (°C)	T _{stg} (°C)	I _{th} (mA)	P _r (mW)	λ _p (nm)		
			TYP.	MIN.	TYP.		
NX8300BE-CC NX8300CE-CC	0 to +75	−40 to +85	15	2 ^{*1}	1 310	2.5 Gb/s: STM-16 (S-16.1, L-16.1)	Coaxial
NX8303BG-CC NX8303CG-CC	−10 to +85	−40 to +85	15	2 ^{*1}	1 310	622 Mb/s: STM-4 (L-4.1)	Coaxial
★ NX8304BE-CC NX8304CE-CC	−40 to +85	−40 to +85	15	2 ^{*1}	1 310	For fiberoptic communications	Coaxial
NX8503BG-CC NX8503CG-CC	−10 to +85	−40 to +85	15	2 ^{*1}	1 550	156 Mb/s: STM-1 (L-1.2, L-1.3)	Coaxial
						622 Mb/s: STM-4 (L-4.2, L-4.3)	
NX8504BE-CC NX8504CE-CC	−10 to +85	−40 to +85	15	2 ^{*1}	1 550	622 Mb/s: STM-4 (L-4.2, L-4.3)	Coaxial
★ NX8560LJ-CC	−20 to +70	−40 to +85	6	−1 dBm	1 550 ^{*2}	≤ 10 Gb/s: STM-64	BFY with GPO™
NX8562LB	−20 to +65	−40 to +85	20	20	1 550 ^{*2}	CW Light Source for external modulator	BFY
NX8563LB	−20 to +65	−40 to +85	20	10	1 550 ^{*2}	CW Light Source for external modulator	BFY
★ NX8564LE-CC	−20 to +70	−40 to +85	7	−2 dBm ^{*1}	1 550 ^{*2}	2.5 Gb/s: STM-16, 360 km EA modulator integrated	BFY
★ NX8565LE-CC	−20 to +70	−40 to +85	7	−2 dBm ^{*1}	1 550 ^{*2}	2.5 Gb/s: STM-16, 600 km EA modulator integrated	BFY
★ NX8566LE-CC	−20 to +70	−40 to +85	7	0 dBm	1 550 ^{*2}	2.5 Gb/s: STM-16, 240 km EA modulator integrated	BFY
NX8570 Series	−20 to +70	−40 to +85	20	20	1 550 ^{*2}	CW Light Source with λ monitoring PD	BFY
NX8571 Series	−20 to +70	−40 to +85	20	10	1 550 ^{*2}	CW Light Source with λ monitoring PD	BFY

*1 TYP.

*2 Available for DWDM Wavelengths based on ITU-T recommendations

REFERENCE

Document Name	Document No.
Optical semiconductor devices for fiberoptic communications Selection Guide	P12480E
Opto-Electronics Devices Pamphlet	P13623E
Opto-Electronics Devices (CD-ROM)	P12944X
NEC semiconductor device reliability/quality control system ^{*1}	C11159E
Quality grades on NEC semiconductor devices ^{*1}	C11531E
SEMICONDUCTOR SELECTION GUIDE –Products and Packages– ^{*1}	X13769E

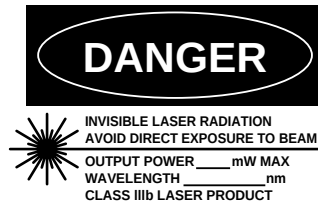
^{*1} Published by NEC Corporation

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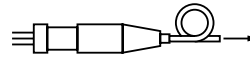
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M8E 00.4-0110

SAFETY INFORMATION ON THIS 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	The product contains gallium arsenide, GaAs. GaAs vapor and powder are hazardous to human health if inhaled or ingested. • Do not destroy or burn the product. • Do not cut or cleave off any part of the product. • Do not crush or chemically dissolve the product. • Do not put the product in the mouth. Follow related laws and ordinances for disposal. The product should be excluded from general industrial waste or household garbage.
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.

► Business issue

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► Technical issue

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