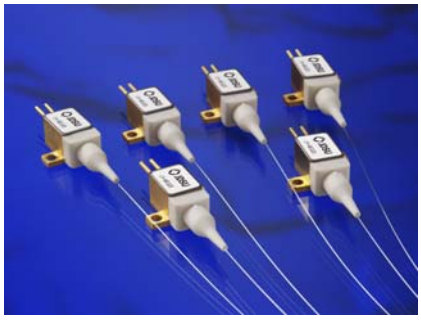
High-Power 10 W 9xx nm Fiber-Coupled Diode Laser

6398-L4*ti* Series



Key Features

- **976±3 nm wavelength**
- **Full fiber laser feedback protection**
- **10 W output power**
- **High reliability**
- **105 µm aperture**
- **0.22 or 0.15 NA**
- **Isolated electrical contacts**

Application

- Fiber laser pumping

The JDSU L4*ti* Series expands the L4 and L4*i* platforms by offering a tighter wavelength range specification at 976 nm combined with a fiber laser feedback protection.

By controlling accurately the wavelength of the epitaxial structure during the growth, the L4*ti* is specified at ±3 nm around 976 nm for pumping fiber lasers in this narrow pump absorption bandwidth.

A specific design without changing the L4*t* footprint, the L4*ti* offers a high degree of feedback protection from any fiber laser wavelength. This feature allows end users to operate the fiber laser in a feedback riskfree environment for the diode laser, and at a less costly solution than a traditional isolation system.

The 6398-L4*ti* series diode lasers offer 10W of power from a 105 µm fiber. In addition, L4*ti* multimode pump modules take advantage of the existing global JDSU manufacturing infrastructure to offer both high brightness and small footprint with consistent high reliability in a cost-effective solution.

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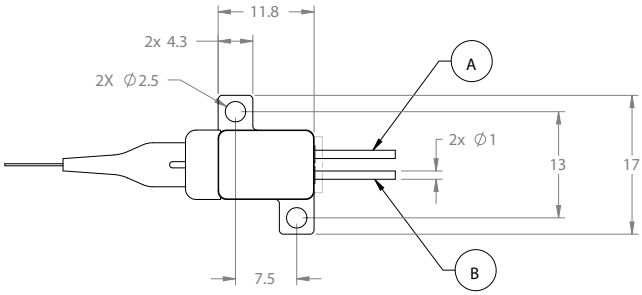
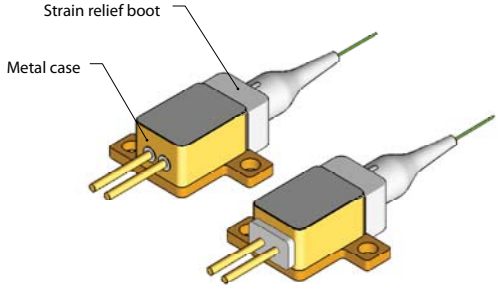
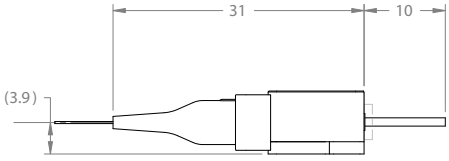
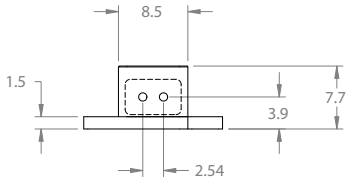
Dimensions Diagram

(Specifications in mm unless otherwise noted.)
Standard Tolerances
mm: x.x = ±0.5
x.xx = ±0.25









Pinout

Pin	Description
A	Laser cathode (-)
B	Laser anode (+)

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Specifications for 0.22NA[1]

Parameter	Symbol	Minimum	Typical	Maximum
Laser Characteristics				
CW output power	P_o	-	-	10 W
Mean wavelength[2]	$\lambda_{p\ 976\ nm}$	973 nm	976 nm	979 nm
Spectral width (90% of maximum)	$\Delta\lambda$	-	3 nm	6 nm
Slope efficiency	$\eta_{D\ 976\ nm}$	-	0.90 W/A	-
Conversion efficiency	η	-	48%	-
Threshold current	I_{th}	-	600 mA	850 mA
Operating current (BOL)	$I_{op\ 976\ nm}$	-	11.8 A	13.0 A
Forward voltage	V_f	-	1.81 V	2.0 V
Series resistance	R_s	-	0.04 Ω	-
Recommended case temperature	T_c	20°C	25°C	40°C
Wavelength tuning vs. temperature[3]	$\Delta\lambda/\Delta T$	-	0.35 nm/°C	-
Wavelength tuning vs. output power	$\Delta\lambda/\Delta P$	-	1.0 nm/W	-
Fiber Characteristics				
Fiber core diameter	d_c	-	105 µm	-
Fiber numerical aperture	NA	0.20	0.22	0.24
Fiber cladding	d_{cl}	-	125 µm	-
Fiber buffer	d_b	-	250 µm	-
Fiber length	l_f	0.9 m	1 m	-

1. All performance data measured at 10 W, 25°C, beginning of Life (BOL).
2. Weighted average "center of mass" spectral point at 25°C at P_O
3. Change in $\Delta\lambda$ mean with case temperature over T_{op}

Specification for 0.15 NA[1]

Parameter	Symbol	Minimum	Typical	Maximum
Laser Characteristics				
CW output power	P_o	-	-	10 W
Mean wavelength[2]	$\lambda_{p\ 976\ nm}$	973 nm	976 nm	979 nm
Spectral width (90% of maximum)	$\Delta\lambda$	-	3 nm	6 nm
Slope efficiency	$\eta_{D\ 976\ nm}$	-	0.90 W/A	-
Conversion efficiency	η	-	46%	-
Threshold current	I_{th}	-	600 mA	850 mA
Operating current (BOL)	$I_{op\ 976\ nm}$	-	12.3 A	13.5 A
Forward voltage	V_f	-	1.81 V	2.0 V
Series resistance	R_s	-	0.04 Ω	-
Recommended case temperature	T_c	20°C	25°C	40°C
Wavelength tuning vs. temperature[3]	$\Delta\lambda/\Delta T$	-	0.35 nm/°C	-
Wavelength tuning vs. output power	$\Delta\lambda/\Delta P$	-	1.0 nm/W	-
Fiber Characteristics				
Fiber core diameter	d_c	-	105 µm	-
Fiber numerical aperture	NA	0.135	0.15	0.165
Fiber cladding	d_{cl}	-	125 µm	-
Fiber buffer	d_b	-	250 µm	-
Fiber length	l_f	0.9 m	1 m	-

1. All performance data measured at 10 W, 25°C, beginning of Life (BOL).
2. Weighted average "center of mass" spectral point at 25°C at P_O
3. Change in $\Delta\lambda$ mean with case temperature over T_{op}

Fiber Laser Feedback Isolation Specification for -100E and -100F Options

Wavelength Range (nm)	Isolation (dB)	Reflectivity (%)
1060–1100	> 30	> 99.9%
1050–1150	> 25	> 99.7%

Absolute Maximum Ratings

Parameter	Symbol	Minimum	Typical	Maximum
Operating current	I_{op}	-	-	14 A
Reverse voltage	V_{rvs}	-	-	2.0 V
Case operating temperature[1]	T_{op}	15°C	-	50°C
Storage temperature[2]	T_{stg}	-30°C	-	70°C
Lead soldering temperature, 10 s max	T_{ls}	-	-	300°C
Relative humidity, non-condensing, ambient < 45°C	RH	-	-	85%
Electrostatic discharge (ESD)[3]	V_{esd}	-	-	500 V
Fiber bend radius (long term deployment)[4]		30 mm	-	-
Fiber axial pull force, 15 s		-	-	5 N
Fiber side pull force, 15 s		-	-	2.5 N

1. Noncondensing, maximum
2. Noncondensing, 2000 hours
3. C = 100 pF, R = 1.5 kΩ, human body model, shown to be not damaging to its LI characteristics or its reliability, I-V curves may change in this ESD environment
4. Minimum bend radius of 30 mm is for long term mechanical fiber reliability; however for 0.15 NA some optical loss may occur and a minimum bend radius of 45 mm is recommended for layout with multiple fiber coils.

Configurations

Product Code	Wavelength Range	Fiber NA	Feedback Protection
L4-9897603-100E	973 – 979 nm	0.22	Yes
L4-9897603-100F	973 – 979 nm	0.15	Yes

Ordering Information

For more information on this or other products and their availability, please contact your local JDSU account manager or JDSU directly at 1-800-498-JDSU (5378) in North America and +800-5378-JDSU worldwide or via e-mail at customer.service@jdsu.com.

Sample: L4-9897603-100E

User Safety

Safety and Operating Considerations

The laser light emitted from this diode laser is invisible and may be harmful to the human eye. Avoid looking directly into the diode laser or into the collimated beam along its optical axis when the device is in operation.

CAUTION: THE USE OF OPTICAL INSTRUMENTS WITH THIS PRODUCT WILL INCREASE EYE HAZARD.

Operating the diode laser outside of its maximum ratings may cause device failure or a safety hazard. Power supplies used with the component must be employed such that the maximum peak optical power cannot be exceeded. CW diode lasers may be damaged by excessive drive current or switching transients. When power supplies are used, the diode laser should be connected with the main power on and the output voltage at zero. The current should be increased slowly while the diode laser output power and the drive current are monitored.

Device degradation accelerates with increased temperature, and therefore careful attention to minimizing the case temperature is advised. For example, life expectancy will decrease by a factor of four if the case is operated at 50°C rather than 25°C.

A proper heatsink for the diode laser on a thermal radiator will greatly enhance laser life. Firmly mount the laser on a radiator with a thermal impedance of less than 0.5°C/W for increased reliability.

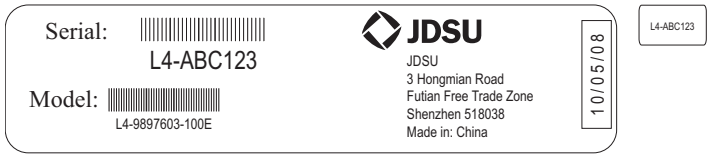
ESD PROTECTION—Electrostatic discharge is the primary cause of unexpected diode laser failure. Take extreme precaution to prevent ESD. Use wrist straps, grounded work surfaces, and rigorous antistatic techniques when handling diode lasers.

Labeling

21 CFR 1040.10 Compliance

Because of the small size of these devices, each of the labels shown is attached to the individual shipping container. They are illustrated here to comply with 21 CFR 1040.10 as applicable under the Radiation Control for Health and Safety Act of 1968.

Serial Number Identification Label



Output Power Danger Label