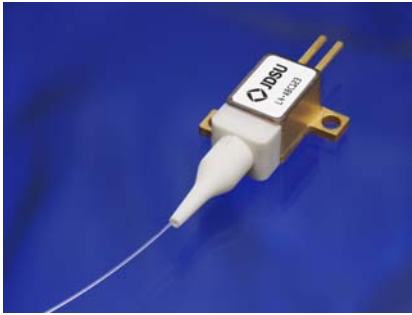


# High-Power 10 W 9xx nm Fiber-Coupled Diode Laser

## 6398-L4 Series



- Key Features**
- 10 W output power
  - High reliability
  - 105  $\mu\text{m}$  aperture
  - 0.22 or 0.15 NA

### Applications

- Fiber laser pumping
- Material processing
- Graphic arts
- Medical
- Remote power generation
- Pyrotechnic ignition

JDSU 6398-L4 series diode lasers offer 10 W of power from a 105  $\mu\text{m}$  fiber. The L4 is a revolutionary platform based on a long history of existing fiber-coupled L2 and L3 packages, incorporating a highly reliable design into a scalable commercial product.

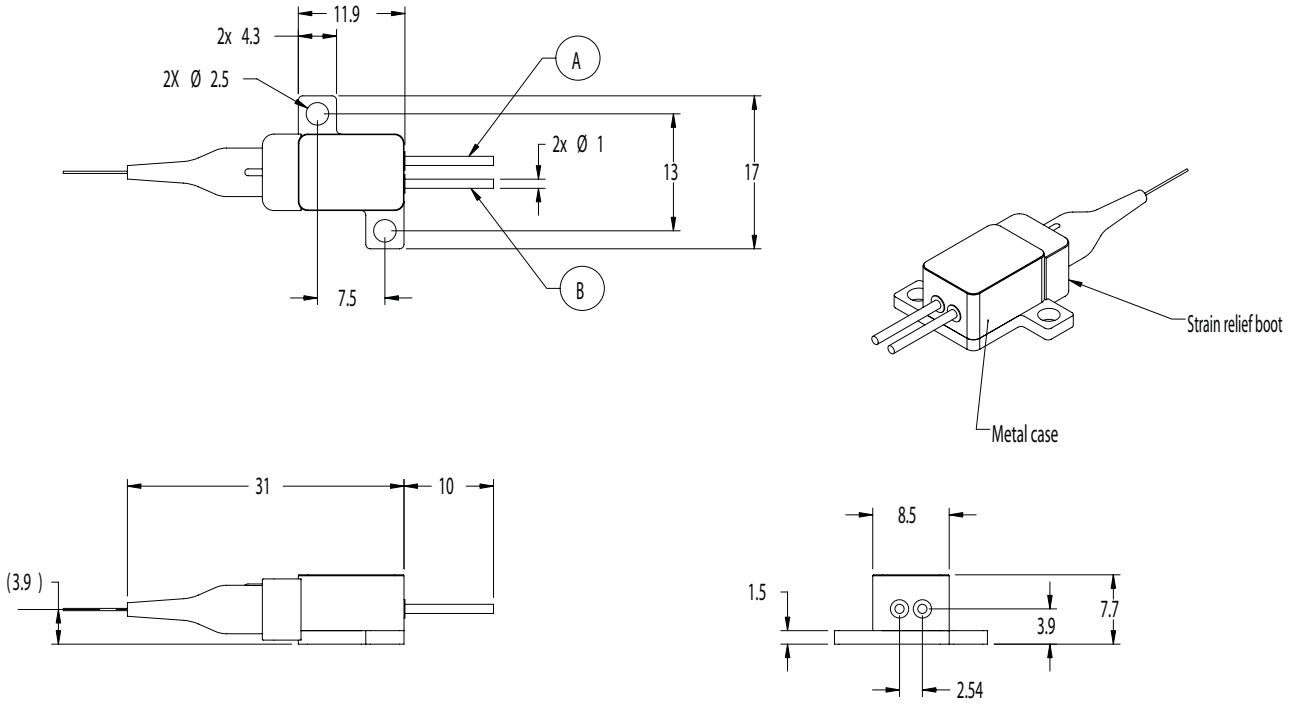
L4 multimode pump modules offer high brightness, a small footprint and simplified thermal management by distributing the diodes (heat sources), allowing the use of either air- or water-cooled architectures with predictable high reliability.

By leveraging existing manufacturing facilities around the world, JDSU is able to offer all necessary attributes in a cost-effective solution that is ideal for the laser pumping market.

2

**Dimensions Diagram**

(Specifications in mm unless otherwise noted.)



**Pinout**

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

## 3

Specifications for 0.22NA<sup>1</sup>

Parameter	Symbol	Minimum	Typical	Maximum
<b>Laser Characteristics</b>				
CW output power	P <sub>o</sub>	-	-	10 W
Mean wavelength <sup>2</sup>	λ <sub>p</sub> 915 nm	905 nm	917 nm	928 nm
	λ <sub>p</sub> 940 nm	928 nm	939 nm	950 nm
	λ <sub>p</sub> 975 nm	963 nm	974 nm	985 nm
Spectral width (FWHM)	Δλ	-	3 nm	6 nm
Slope efficiency	η <sub>D</sub> 915 nm	-	0.93 W/A	-
	η <sub>D</sub> 940 nm	-	0.92 W/A	-
	η <sub>D</sub> 975 nm	-	0.90 W/A	-
Conversion efficiency	η	-	48%	-
Threshold current	I <sub>th</sub>	-	600 mA	850 mA
Operating current	I <sub>op</sub> 915 nm	-	11.4 A	12.5 A
	I <sub>op</sub> 940 nm	-	11.7 A	12.8 A
	I <sub>op</sub> 975 nm	-	11.8 A	13.0 A
Forward voltage	V <sub>f</sub>	-	1.81 V	2.0 V
Series resistance	R <sub>s</sub>	-	0.04 Ω	-
Recommended case temperature	T <sub>c</sub>	20°C	25°C	40°C
Wavelength tuning vs. temperature <sup>3</sup>	Δλ/ΔT	-	0.35 nm/°C	-
Wavelength tuning vs. output power	Δλ/ΔP	-	1.0 nm/W	-
<b>Fiber Characteristics</b>				
Fiber core diameter	d <sub>c</sub>	-	105 μm	-
Fiber numerical aperture	NA	0.20	0.22	0.24
Fiber cladding	d <sub>cl</sub>	-	125 μm	-
Fiber buffer	d <sub>b</sub>	-	250 μm	-
Fiber length	l <sub>f</sub>	0.9 m	1 m	-
<b>Absolute Maximum Ratings</b>				
Operating current	I <sub>op</sub>	-	-	14 A
Reverse voltage	V <sub>rvs</sub>	-	-	2.0 V
Case operating temperature <sup>4</sup>	T <sub>op</sub>	15°C	-	50°C
Storage temperature <sup>5</sup>	T <sub>stg</sub>	-30°C	-	70°C
Lead soldering temperature, 10 s max	T <sub>ls</sub>	-	-	300°C
Relative humidity, non-condensing, ambient <45°C	RH	-	-	85%
Electrostatic discharge (ESD) <sup>6</sup>	V <sub>esd</sub>	-	-	500 V
Fiber bend radius (long-term deployment) <sup>7</sup>		30 mm	-	-
Fiber axial pull force, 15 seconds		-	-	5 N
Fiber side pull force, 15 seconds		-	-	2.5 N

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<sub>o</sub>

3. Change in Δλ mean with case temperature over T<sub>op</sub>

4. Non-condensing, maximum

5. Non-condensing, 2000 hours

6. 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

7. 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 layouts with multiple fiber coils.

## 4

Specification for 0.15 NA<sup>1</sup>

Parameter	Symbol	Minimum	Typical	Maximum
<b>Laser Characteristics</b>				
CW output power	P <sub>o</sub>	-	-	10 W
Mean wavelength <sup>2</sup>	λ <sub>p</sub> 915 nm	905 nm	917 nm	928 nm
	λ <sub>p</sub> 940 nm	928 nm	939 nm	950 nm
	λ <sub>p</sub> 975 nm	963 nm	974 nm	985 nm
Spectral width (FWHM)	Δλ	-	3 nm	6 nm
Slope efficiency	η <sub>D</sub> 915 nm	-	0.91 W/A	-
	η <sub>D</sub> 940 nm	-	0.90 W/A	-
	η <sub>D</sub> 975 nm	-	0.90 W/A	-
Conversion efficiency	η	-	46%	-
Threshold current	I <sub>th</sub>	-	600 mA	850 mA
Operating current	I <sub>op</sub> 915 nm	-	12.0 A	13.0 A
	I <sub>op</sub> 940 nm	-	12.2 A	13.5 A
	I <sub>op</sub> 975 nm	-	12.3 A	13.5 A
Forward voltage	V <sub>f</sub>	-	1.82 V	2.0 V
Series resistance	R <sub>s</sub>	-	0.04 Ω	-
Recommended case temperature	T <sub>c</sub>	20°C	25°C	40°C
Wavelength tuning vs. temperature <sup>3</sup>	Δλ/ΔT	-	0.35 nm/°C	-
Wavelength tuning vs. output power	Δλ/ΔP	-	1.0 nm/W	-
<b>Fiber Characteristics</b>				
Fiber core diameter	d <sub>c</sub>	-	105 μm	-
Fiber numerical aperture	NA	0.135	0.15	0.165
Fiber cladding	d <sub>cl</sub>	-	125 μm	-
Fiber buffer	d <sub>b</sub>	-	250 μm	-
Fiber length	l <sub>f</sub>	0.9 m	1 m	-
<b>Absolute Maximum Ratings</b>				
Operating current	I <sub>op</sub>	-	-	14 A
Reverse voltage	V <sub>rvs</sub>	-	-	2.0 V
Case operating temperature <sup>4</sup>	T <sub>op</sub>	15°C	-	50°C
Storage temperature <sup>5</sup>	T <sub>stg</sub>	-30°C	-	70°C
Lead soldering temperature, 10 s max	T <sub>ls</sub>	-	-	300°C
Relative humidity, non-condensing, ambient <45°C	RH	-	-	85%
Electrostatic discharge (ESD) <sup>6</sup>	V <sub>esd</sub>	-	-	500 V
Fiber bend radius (long-term deployment) <sup>7</sup>		30 mm	-	-
Fiber axial pull force, 15 seconds		-	-	5 N
Fiber side pull force, 15 seconds		-	-	2.5 N

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<sub>o</sub>3. Change in Δλ mean with case temperature over T<sub>op</sub>

4. Non-condensing, maximum

5. Non-condensing, 2000 hours

6. 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

7. 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 layouts with multiple fiber coils.

## 5

**Configurations**

<b>Product Code</b>	<b>Wavelength Range</b>	<b>Connector<sup>1</sup></b>	<b>Fiber NA</b>
L4-9891510-100B	905-928 nm	No	0.22
L4-9891510-100C	905-928 nm	No	0.15
L4-9891510-100M	905-928 nm	SMA	0.22
L4-9894010-100B	928-950 nm	No	0.22
L4-9894010-100C	928-950 nm	No	0.15
L4-9894010-100M	928-950 nm	SMA	0.22
L4-9897510-100B	963-985 nm	No	0.22
L4-9897510-100C	963-985 nm	No	0.15
L4-9897510-100M	963-985 nm	SMA	0.22

1. If a connector option is selected, it is always connectorized. All performance data measured at 10 W, 25°C, Beginning of Life.

**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](mailto:customer.service@jdsu.com).

**Sample: L4-9891510-100B**

**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.

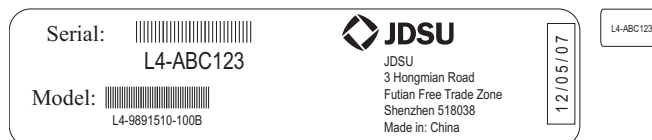
Device degradation accelerates with increased temperature, and therefore careful attention to minimizing the case temperature is advised. For example, life expectancy will decrease by a factor of four if the case is operated at 50°C rather than 25°C.

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**
