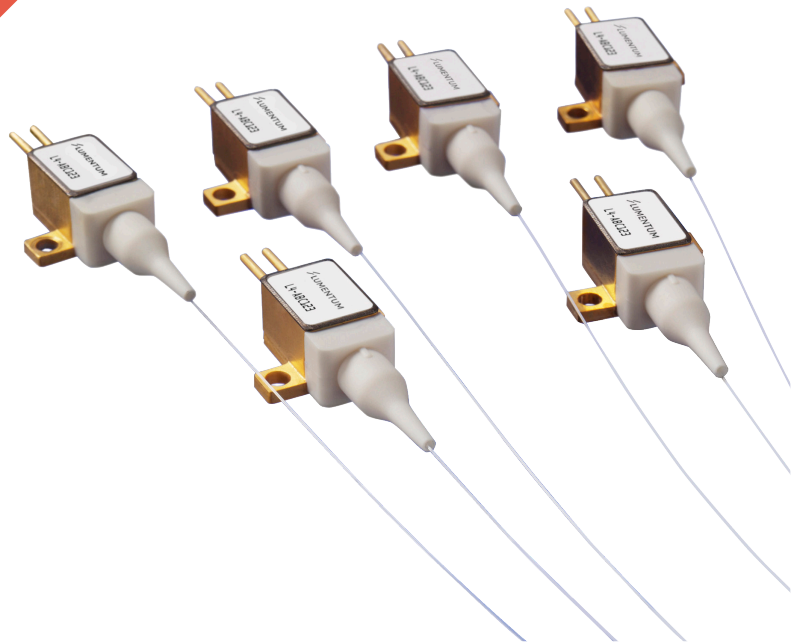


# 915/940 nm Fiber-Coupled Diode Lasers

## L4S-Series



L4S-Series diode lasers offer up to 12 W of power through a 105  $\mu\text{m}$  fiber. The L4S leverages the low-cost L4 platform while introducing a high-power proprietary chip, incorporating a highly-reliable design scalable into a commercial product.

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

The L4S-Series is a unique solution for the fiber-coupled pump-laser market, offering powerful technical attributes in a cost-effective package.

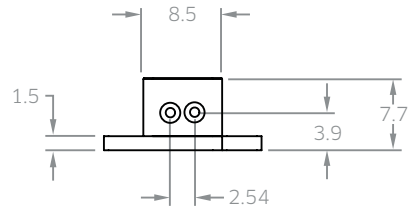
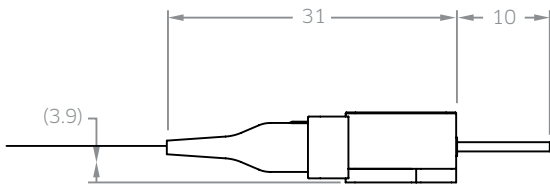
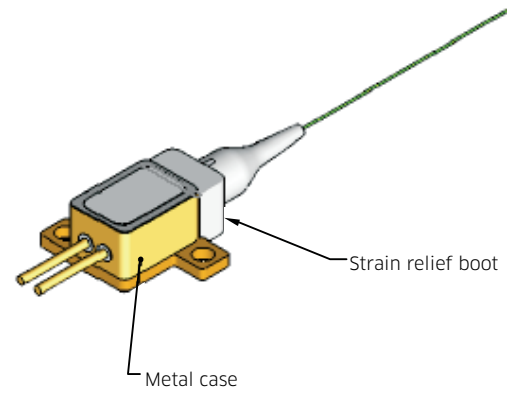
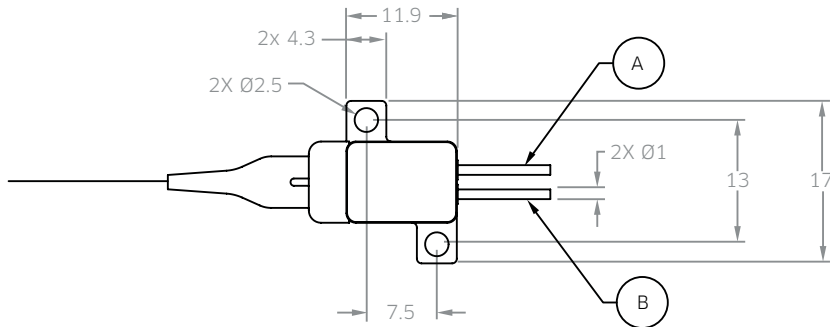
#### **Key Features**

- 0.22 numerical aperture (NA) fiber: 12 W output power
- 0.15 NA fiber: 11 W output power
- High reliability
- 105  $\mu\text{m}$  aperture
- 1060 nm feedback protection (L4Si)
- Isolated electrical contacts

#### **Applications**

- Fiber laser pumping
- Material processing
- Graphic arts
- Medical

**Dimensions Diagram**  
(Specifications in mm)



**Pinout**

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

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

Parameter		Symbol	Minimum	Typical	Maximum
<b>Laser Characteristics</b>					
CW output power		$P_o$	—	—	12 W
Mean wavelength <sup>2</sup>	915 nm	$\lambda_p$	905 nm	917 nm	928 nm
	940 nm	$\lambda_p$	928 nm	939 nm	950 nm
Spectral width (FWHM)		$\Delta\lambda$	—	3 nm	6 nm
Slope efficiency	915 nm	$\eta_D$	—	0.93 W/A	—
	940 nm	$\eta_D$	—	0.92 W/A	—
Conversion efficiency		$\eta$	—	46%	—
Threshold current		$I_{th}$	—	700 mA	950 mA
Operating current (BOL)	915 nm	$I_{op}$	—	13.6 A	14.6 A
	940 nm	$I_{op}$	—	13.8 A	15.0 A
Forward voltage		$V_f$	—	1.89 V	2.2 V
Series resistance		$R_s$	—	0.04 W	—
Recommended case temperature		$T_c$	20°C	25°C	40°C
Wavelength tuning vs. temperature <sup>3</sup>		$\Delta\lambda/\Delta T$	—	0.35 nm/°C	—
Wavelength tuning vs. output power		$\Delta\lambda/\Delta P$	—	1.0 nm/W	—
Power in 0.17 NA		95%	—	—	—
<b>Fiber Characteristics</b>					
Fiber core diameter		dc	102 $\mu\text{m}$	105 $\mu\text{m}$	108 $\mu\text{m}$
Fiber numerical aperture		NA	0.20	0.22	0.24
Fiber cladding		$d_{cl}$	—	125 $\mu\text{m}$	—
Fiber buffer		$d_b$	—	250 $\mu\text{m}$	—
Fiber length		$l_f$	0.9 m	1 m	—

1. All performance data is measured at 12 W, 25°C, beginning of life (BOL), with anti-reflective coating output.

2. Weighted average "center of mass" spectral point at 25°C at  $P_o$ .

3. Change in  $\Delta\lambda$  mean with case temperature over  $T_{op}$ .

**Specifications for 0.15 NA<sup>1</sup>**

Parameter		Symbol	Minimum	Typical	Maximum
<b>Laser Characteristics</b>					
CW output power		$P_o$	—	—	11 W
Mean wavelength <sup>2</sup>	915 nm	$\lambda_p$	905 nm	917 nm	928 nm
	940 nm	$\lambda_p$	928 nm	939 nm	950 nm
Spectral width (FWHM)		$\Delta\lambda$	—	3 nm	6 nm
Slope efficiency	915 nm	$\eta_D$	—	0.91 W/A	—
	940 nm	$\eta_D$	—	0.90 W/A	—
Conversion efficiency		$\eta$	—	46%	—
Threshold current		$I_{th}$	—	700 mA	950 mA
Operating current (BOL)	915 nm	$I_{op}$	—	13.2 A	14.4 A
	940 nm	$I_{op}$	—	13.6 A	14.6 A
Forward voltage		$V_f$	—	1.90 V	2.2 V
Series resistance		$R_s$	—	0.04 W	—
Recommended case temperature		$T_c$	20°C	25°C	40°C
Wavelength tuning vs. temperature <sup>3</sup>		$\Delta\lambda/\Delta T$	—	0.35 nm/°C	—
Wavelength tuning vs. output power		$\Delta\lambda/\Delta P$	—	1.0 nm/W	—
<b>Fiber Characteristics</b>					
Fiber core diameter		$d_c$	102 $\mu\text{m}$	105 $\mu\text{m}$	108 $\mu\text{m}$
Fiber numerical aperture		NA	0.135	0.15	0.165
Fiber cladding		$d_{cl}$	—	125 $\mu\text{m}$	—
Fiber buffer		$d_b$	—	250 $\mu\text{m}$	—
Fiber length		$l_f$	0.9 m	1 m	—

1. All performance data is measured at 12 W, 25°C, beginning of life (BOL), with anti-reflective coating output.

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 Specifications for -120E and -120F Options**

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

### Absolute Maximum Ratings

Parameter	Symbol	Minimum	Typical	Maximum
Operating current	$I_{op}$	—	—	15 A
Reverse voltage	$V_{rvs}$	—	—	2.0 V
Case operating temperature <sup>4</sup>	$T_{op}$	15°C	—	50°C
Storage temperature <sup>5</sup>	$T_{stg}$	-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) <sup>6</sup>	$V_{esd}$	—	—	500 V
Fiber bend radius (long term deployment) <sup>7</sup>		30 mm	—	—
Fiber axial pull force, 15 s		—	—	5 N
Fiber side pull force, 15 s		—	—	2.5 N

4. Noncondensing, maximum

5. Noncondensing, 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 layout with multiple fiber coils.

### Operating Considerations

Power supplies used with the component must be employed so 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 thus the case temperature should be minimized.

A proper heatsink for the diode laser on a thermal radiator will greatly enhance laser life. Refer to the product application note for more information regarding heat sinking and mounting the product.

### ESD Protection

Electrostatic discharge (ESD) 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.

### Laser Safety



Note: This component requires provisions of drive and control electronics before emitting laser radiation.

Laser classification depends on the system control circuit and laser safety features provided.

This diode-pumped laser module is not 21CFR 1040.10 or IEC 60825-1:2014 certified. It is a component intended for system integration. Compliance with 21CFR 1040.10 and/or IEC 60825-1:2014 will need to be determined at the system level.

Lumentum has registered this laser with the FDA/CDRH as an OEM component. Please contact Lumentum for an FDA/CDRH accession number for this laser component.

## Serial Number Identification Label



## Ordering Information

For more information on this or other products and their availability, please contact your local Lumentum account manager or Lumentum directly at [customer.service@lumentum.com](mailto:customer.service@lumentum.com).

Wavelength Range	Connector	Fiber NA	Feedback Protection	Product Code	Part Number
905 - 928 nm	No	0.22	No	L4S-91510-120B	21176737
905 - 928 nm	No	0.15	No	L4S-91510-110C	21176738
905 - 928 nm	No	0.22	Yes	L4S-91510-120E	21176739
905 - 928 nm	No	0.15	Yes	L4S-91510-110F	21176740
928 - 950 nm	No	0.22	No	L4S-94010-120B	22012885
928 - 950 nm	No	0.15	No	L4S-94010-110C	22012886
928 - 950 nm	No	0.22	Yes	L4S-94010-120E	22012887
928 - 950 nm	No	0.15	Yes	L4S-94010-110F	22012888



North America  
Toll Free: 844 810 LITE (5483)

Outside North America  
Toll Free: 800 000 LITE (5483)

China  
Toll Free: 400 120 LITE (5483)

© 2021 Lumentum Operations LLC  
Product specifications and descriptions in this document are subject to change without notice.