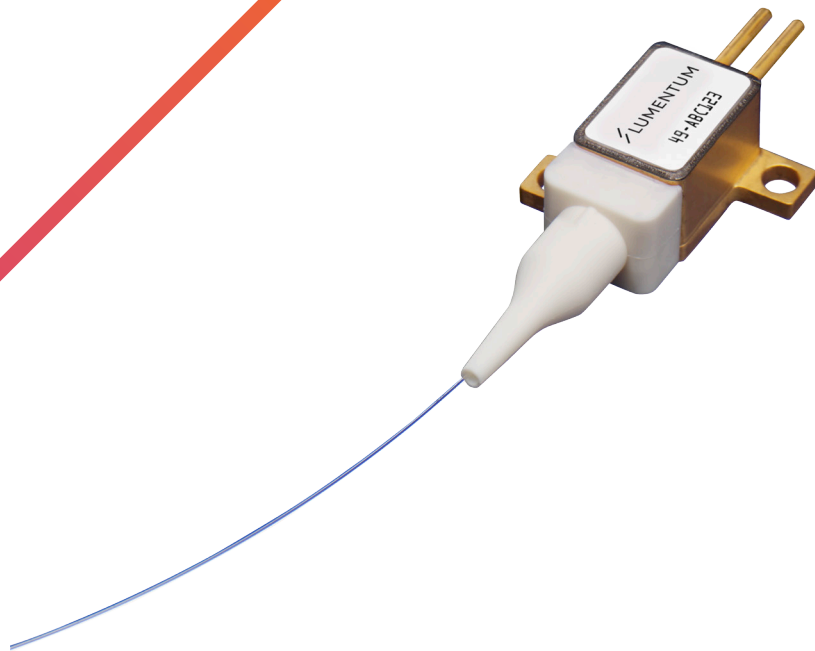


# Uncooled Multimode Pump Module

4900 Series



The Lumentum 4900 Series uncooled multimode pump modules simplify next-generation, high-power erbium doped fiber amplifier (EDFA) designs for CATV and FTTx applications by eliminating the need for thermoelectric coolers and their control circuitry.

The 4900 Series builds upon the field-proven success of the Lumentum 4800 Series. The new pump features higher power in a smaller, coolerless footprint with isolated electrical pins for simplified thermal and electrical management. Up to 10 W of optical power from a 105  $\mu\text{m}$  fiber pigtail makes the 4900 Series the ideal solution for the FTTx and CATV high-power EDFA pumping market. In addition, the 4900 Series takes advantage of existing global Lumentum infrastructure to combine a highly reliable design with cost-effective manufacturing.

**Key Features**

- High output power up to 10 W
- 105  $\mu\text{m}$  aperture
- 0.22 NA
- Isolated electrical contacts
- High reliability

**Applications**

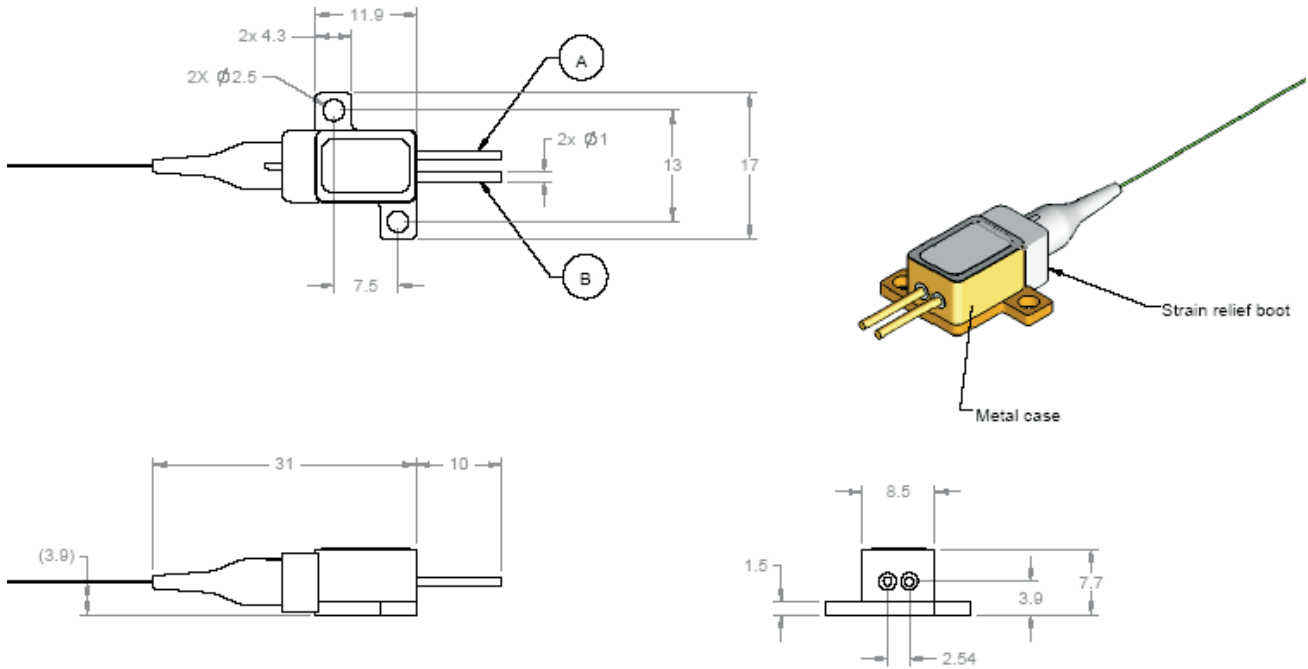
- Er/Yb co-doped, double-clad fiber amplifiers
- High-power EDFAs for CATV and FTTx

**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 (+)

**Absolute Maximum/Minimum Ratings**

Parameter	Symbol	4W		6W		8W		10W	
		Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
Operating current	$I_{op}$	—	8.0 A	—	11.0 A	—	13.0 A	—	15.0 A
Reverse voltage	$V_{rvs}$	—	2.0 V	—	2.0 V	—	2.0 V	—	2.0 V
Case operating temperature	$T_{op}$	-10°C	75°C	-10°C	75°C	-10°C	75°C	-10°C	75°C
Storage temperature	$T_{stg}$	-40°C	85°C	-40°C	85°C	-40°C	85°C	-40°C	85°C
Lead soldering temperature, 10s max	$T_{ls}$	—	300°C	—	300°C	—	300°C	—	300°C
Relative humidity, non-condensing, ambient < 45°C	$R_H$	—	85%	—	85%	—	85%	—	85%
Electrostatic discharge (ESD)	$V_{esd}$	—	500 V	—	500 V	—	500 V	—	500 V
Fiber bend radius (long term deployment)		30mm	—	30mm	—	30mm	—	—	—
Fiber axial pull force, 15s		—	5 N	—	5 N	—	5 N	—	5 N
Fiber side pull force, 15s		—	2.5 N	—	2.5 N	—	2.5 N	—	2.5 N

**Operating Powers**

(Over -5 to 70°C case temperature.)

Product Code	Operating Powers $P_{op}$	Maximum $I_{op}$ (BOL) at $P_{op}$	Maximum $I_{op}$ (EOL) at $P_{op}$
49-3940-4000-B	4.0 W	6500 mA	7200 mA
49-1540-6000-B	6.0 W	9000 mA	10000 mA
49-3940-6000-B	6.0 W	9100 mA	10100 mA
49-1540-8000-B	8.0 W	11000 mA	12200 mA
49-3940-8000-B	8.0 W	11100 mA	12300 mA
49-1540-10000-B	10.0 W	14400 mA	15000 mA
49-3940-10000-B	10.0 W	14400 mA	15000 mA

**Available Wavelength Selection**

(Over -5 to 70°C case temperature and rated power.)

Product Code	Minimum Wavelength	Maximum Wavelength
49-3940-4000-B	912 nm	961 nm
49-1540-6000-B	891 nm	941 nm
49-3940-6000-B	914 nm	963 nm
49-1540-8000-B	893 nm	943 nm
49-3940-8000-B	916 nm	965 nm
49-1540-10000-B	895 nm	945 nm
49-3940-10000-B	918 nm	967 nm

**Electro-Optical Performance**

(Over -5 to 70°C case temperature unless otherwise noted.)

Parameter	Symbol	4W			6W			8W			10W		
		Min.	Typ.	Max.	Min.	Typ.	Max.	Min.	Typ.	Max.	Min.	Typ.	Max.
Optical power (fiber)	$P_o$	—	—	4 W	—	—	6 W	—	—	8 W	—	—	10 W
Mean wavelength, 25°C, $P_o$	$\lambda_p$ 915 nm	—	—	—	902 nm	914 nm	925 nm	904 nm	916 nm	927 nm	906 nm	918 nm	929 nm
	$\lambda_p$ 939 nm	923 nm	934 nm	945 nm	925 nm	936 nm	947 nm	927 nm	938 nm	949 nm	929 nm	940 nm	951 nm
Spectral width (90% integrated Power), 25°C, $P_o$	$\Delta\lambda$	—	3 nm	6 nm	—	3 nm	6 nm	—	3 nm	6 nm	—	3 nm	6 nm
Threshold current, 25°C, $P_o$	$I_{th}$	—	600 mA	900 mA	—	600 mA	900 mA	—	600 mA	900 mA	—	700 mA	950 mA
Operating current, 25°C, $P_o$	$I_{op}$ 915 nm	—	—	—	—	6.8 A	7.5 A	—	8.8 A	9.7 A	—	11.0 A	11.7 A
	$I_{op}$ 939 nm	—	4.5 A	5.5 A	—	6.9 A	7.6 A	—	8.9 A	9.8 A	—	11.0 A	11.7 A
Operating current, 70°C, $P_o$	$I_{op}$ 915 nm	—	—	—	—	7.7 A	9.0 A	—	10.3 A	11.0 A	—	13.7 A	14.4 A
	$I_{op}$ 939 nm	—	5.5 A	6.5 A	—	7.8 A	9.1 A	—	10.4 A	11.1 A	—	13.7 A	14.4 A
Forward voltage	$V_f$	—	1.6 V	1.95 V	—	1.7 V	1.95 V	—	1.8 V	1.95 V	—	1.89 V	2.2 V
Series resistance	$R_s$	—	0.04 $\Omega$	—	—	0.04 $\Omega$	—	—	0.04 $\Omega$	—	—	0.04 $\Omega$	—
Recommended case temperature	$T_c$	-5°C	25°C	70°C	-5°C	25°C	70°C	-5°C	25°C	70°C	-5°C	25°C	70°C
Wavelength shift with temperature	$\Delta\lambda/T$	—	0.35 nm/°C	—	—	0.35 nm/°C	—	—	0.35 nm/°C	—	—	0.35 nm/°C	—
Wavelength shift with power exit fiber	$\Delta\lambda/P_f$	—	1.0 nm/W	—	—	1.0 nm/W	—	—	1.0 nm/W	—	—	1.0 nm/W	—
Laser diode forward voltage	$V$	—	—	—	—	—	2.0 V	—	—	2.0 V	—	—	2.0 V

Note:  
All performance data measured at Po W, 25°C, Beginning of Life (BOL)

**Fiber Pigtail Properties**

Parameter	Symbol	Minimum	Typical	Maximum
Fiber core diameter	$d_c$	—	105 $\mu\text{m}$	—
Fiber NA	NA	0.20	0.22	0.24
Fiber cladding diameter	$d_{cl}$	—	125 $\mu\text{m}$	—
Buffer diameter	$d_b$	—	250 $\mu\text{m}$	—
Fiber length	$l_r$	0.9 m	1.0 m	—

**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).

**Sample: 49-3940-6000-B**

Product Code	Description
49-3940-4000-B	912 to 961 nm, 4 W, 0.22 NA
49-1540-6000-B	891 to 941 nm, 6 W, 0.22 NA
49-3940-6000-B	914 to 963 nm, 6 W, 0.22 NA
49-1540-8000-B	893 to 943 nm, 8 W, 0.22 NA
49-3940-8000-B	916 to 965 nm, 8 W, 0.22 NA
49-1540-10000-B	895 to 945 nm, 10 W, 0.22 NA
49-3940-10000-B	918 to 967 nm, 10 W, 0.22 NA

**User Safety****Safety and Operating Considerations**

The laser light emitted from this laser diode is invisible and may be harmful to the human eye. Avoid looking directly into the laser diode 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 laser diode 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 laser diodes may be damaged by excessive drive current or switching transients. When power supplies are used, the laser diode should be connected with the main power on and the output voltage at zero. The current should be increased slowly while the laser diode 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 30°C.

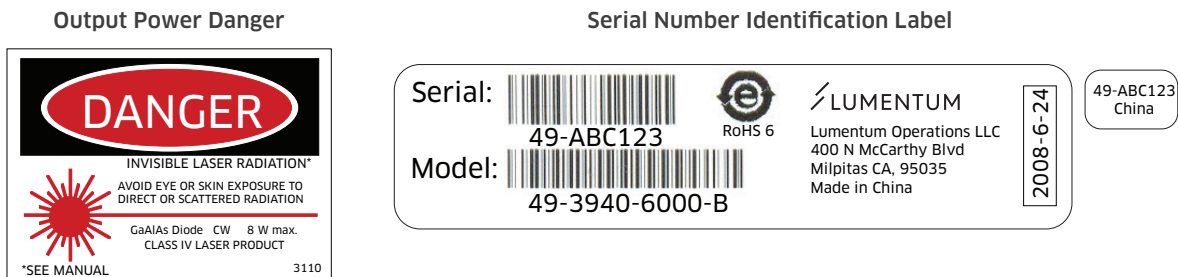
A proper heatsink for the laser diode on a thermal radiator will greatly enhance laser life. Firmly mount the laser on a radiator with a thermal impedance of less than 0.5°C/W for increased reliability.

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

## 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.



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