## Laser Diode Bar Modules



## High optical output power and high conversion efficiency

Laser diode (LD) bar modules consist of LD bars with their light-emitting points arranged on a linear array and integrated with an efficient cooling mechanism and other components. We provide LD bar modules that deliver kilowatt-class output power by stacking high-performance LD bars with high-power and high-reliability.


Applications

## Solid state laser pumping

Side pumping


The laser is pumped in the lateral direction. This pumping method is used for high-power lasers since a high-power LD bar can be easily arranged along the side.

## I Consistent in house development and manufacturing

Our LD bar modules are developed and manufactured consistently in house from epitaxial growth of LD to modularization.
Therefore, we can supply high-quality and high-reliability products by getting quick feedback and make improvements in the development and manufacturing processes. And this allows us to respond to requests for custom designs such as wavelength adjustment and optimal packaging selection. We also make proposals that incorporate our unique technology called "jet cooling".


## $\square$ End pumping



The laser is pumped from the end of the crystal. This pumping method is used for lasers that require higher pumping efficiency and higher beam quality.

## Annealing



The laser can be used as a light source for laser heaters that heat the target objects such as semiconductor wafers.

## Products Lineup Matrix

We manufacture LD bars with a wide variety of specifications. LD bars are stacked or arrayed to achieve higher radiant power. These stacked and arrayed LD bars are modularized into a basic unit. We propose an appropriate combination according to your own request

## LD bar modules



## Fiber output LD bar modules



[^0]Custom $\cdots$....See the customized products on page 5 for details.
Custom $\cdots \cdots$. Please contact us for details.

## Products Lineup

## CW laser diode bar modules

■ Jet cooled stack module

| Type no. | Radiant power | Cooling | Wavelength | Operation mode | Operating current | Stacks | Duty ratio | Collimated type |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| L11408-15-940 | 1200 W | Jet cooling | $940 \mathrm{~nm} \pm 5 \mathrm{~nm}$ | CW | 86 A | 1.58 mm | - | Available ${ }^{* 1}$ |

*1 Attachment of FAC lens is optional. A module attached FAC lens is regarded as a customized product.
■ CW single bar modules

| Type no. | Radiant power | Cooling | Wavelength | Operation mode | Operating current | Stacks | Duty ratio | Collimated type |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| L8413-50-808 | 50 W | Passive cooling | $808 \mathrm{~nm} \pm 5 \mathrm{~nm}$ | cW | 60 A | - | - | Not available |
| L8413-60-940 | 60 W |  | $940 \mathrm{~nm} \pm 5 \mathrm{~nm}$ |  | 61 A |  |  |  |

## Pulsed laser diode bar modules

$\square$ Water cooled stack module

| Type no. | Peak radiant power | Cooling | Wavelength | Operation mode | Operating current | Stacks | Duty ratio | Collimated type |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| L13713-25P940 | 8000 W | Water cooling | $940 \mathrm{~nm} \pm 5 \mathrm{~nm}$ | QCW | 310 A | 2.14 mm | 1\% | Available ${ }^{\text {* }}$ |

*1 Attachment of FAC lens is optional. A module attached FAC lens is regarded as a customized product.
$\square$ Passive cooled stack modules

| Type no. | Peak radiant power | Cooling | Wavelength | Operation mode | Operating current | Stacks | Duty ratio | Collimated type |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| L11398-16P808 | 1600 W | Passive cooling | $808 \mathrm{~nm} \pm 5 \mathrm{~nm}$ | QCW | 105 A | 0.4 mm | 1\% | Not available |
| L11398-16P940 |  |  | $940 \mathrm{~nm} \pm 5 \mathrm{~nm}$ |  |  |  |  |  |
| L14001-01 | 650 W |  | $808 \mathrm{~nm} \pm 3 \mathrm{~nm}$ |  | 130 A | 1.2 mm | 2.5\% |  |

Fiber output laser diode bar module

| Type no. | Radiant power | Cooling | Wavelength | Operation mode | Operating current | Stacks | Duty ratio | Collimated type |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| L15856-01 | 240 W | Water cooling | $940 \mathrm{~nm} \pm 3 \mathrm{~nm}$ | cW | 50 A | - | - | - |



## Customized Products

We provide various customizations according to the customer's request.

## Jet cooled modules

These LD bar modules employ our unique jet cooling. In jet cooling, the heatsink serves as both an electrical current path and heat dissipation path and exhibits very high cooling efficiency. This ensures stable output of high energy and high power laser light.

| Type | Radiant power | Cooling | Wavelength | Operation mode | Stacks | Duty ratio | Collimated type | Package example |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Stack type | 2400 W | Jet cooling | $940 \mathrm{~nm} \pm 5 \mathrm{~nm}$ | CW | 30 |  | Available ${ }^{* 1}$ |  |
|  | 1500 W |  | $808 \mathrm{~nm} \pm 5 \mathrm{~nm}$ |  |  |  |  | (1) |
|  |  |  |  | QCW |  | 20 \% |  |  |
|  | 15000 W |  | $938 \mathrm{~nm} \pm 5 \mathrm{~nm}$ |  |  | 5 \% |  | (2) |
| Array type | 160 W |  | $807 \mathrm{~nm} \pm 5 \mathrm{~nm}$ | CW | 4 | - | Not available | (3) |

*1 Attachment of FAC lens is optional.

## Water cooled modules

These LD bar modules utilize water cooling ideal for pulse oscillation modules.

| Type | Radiant power | Cooling | Wavelength | Operation mode | Stacks | Duty ratio | Collimated type | Package example |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Stack type | 3000 W | Water cooling | $808 \mathrm{~nm} \pm 5 \mathrm{~nm}$ | QCW | 10 | 1 \% | Available ${ }^{* 1}$ | (4) |
|  | 6500 W |  | $934 \mathrm{~nm} \pm 5 \mathrm{~nm}$ |  |  |  |  |  |

*1 Attachment of FAC lens is optional.


## Wavelength stabilization and spectral narrowing technology



Example of VBG technology implementation

Mounting a VBG (Volume Bragg Grating) element is an effective way to narrow the spectral bandwidth of LD and also to reduce temperature-induced wavelength fluctuations. This improves the efficiency in laser pumping and spectroscopic applications.

Example of oscillation wavelength (wavelength: 880 nm )


## Main Products

- Single Chip Laser Diodes
- Laser Diode Bar Modules
- Quantum Cascade Lasers
- Direct Diode Lasers
- Applied Products of Semiconductor Lasers
- Solid State Lasers / Fiber Lasers
- Laser Related Products


## Be sure to read the following precautions before using laser products.

To use laser products safely and effectively always read the "Precautions and notes on laser products" thoroughly from beginning to end. Also carefully read the user's manual and precautions that come with the product and comply with those instructions and related laws and regulations.

## . WARNING

## - Caution points regarding laser radiation exposure

When using laser products, classify laser products according to IEC 60825-1 and take safety measures for the applicable laser classes. In addition, observe the latest laws and standards of each country.

- Harmful substances

This product may contain substances harmful to the human body. These cause no problems during normal use. However, when disposing of these products, be sure to comply with the regulations enforced by the relevant local government.

## - Safety measures

When using this product, take appropriate measures including designing safety features to avoid potential risks that might occur during normal use. The user must evaluate and install a safe laser system that complies with the regulations and standards in each country and the precautions needed for using the product.

Examples of labels


DANGER- INVISIBLE AND VISIBLE LASER RADIATION AVOID EYE OR SKIN EXPOSURE TO
 maximum power pulse duration waveleng
CLASS 4 LASER PRODUCT IEC 60825-1: 2014

Class 4 laser product
Warning label Explanatory label

## - Safety and handling precautions

- When using laser products always check the information that we provide on each product and comply with the instructions and precautions to ensure safe use.
- We do not guarantee the integrity and complete safety of the products listed in this document. When a product is used in equipment or systems that might cause injury or death or property damage, take appropriate measures including a design with ample safety features to avoid potential trouble that might occur during normal use.
- Precautions and notes on laser products
https://www.hamamatsu.com/jp/en/support/disclaimer/index.html
- Information described in this material current as of March 2021. Specifications are subject to change without notice.


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[^0]:    Product ....See the product lineup on page 4 for details.

