Mid-Infrared Diode Lasers

Single Emitters, Laser Bars and Fiber Coupled Modules

1850 – 2300 nm

m2k Laser

High-Brightness Diode-Lasers

Mid-Infrared Diode Lasers based on GaSb

Applications

Lasers emitting at wavelengths between 1.85µm and 2.3µm open up a wide range of applications as compact and efficient light sources due to the specific absorption characteristics of many materials within this wavelength regime.

Civilian applications:
- laser surgery
- medical diagnostics
- dermatological treatments
- direct materials processing of plastics
- aqueous varnish processing

Military applications:
- infrared countermeasures
- pumping of solid state lasers
- pumping of optically pumped semiconductor lasers emitting in the 2-4µm regime
- low probability of intercept communication links
- trace gas analysis

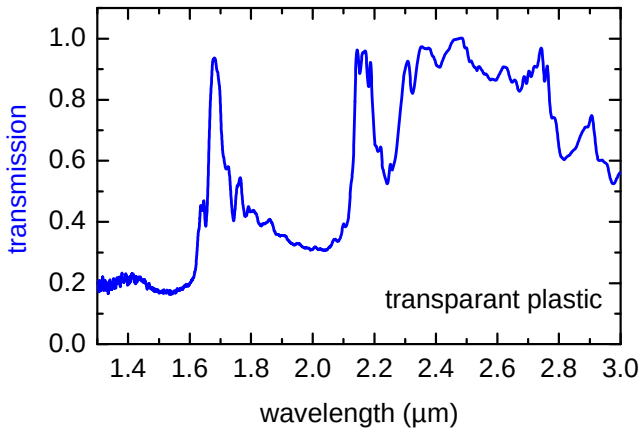
GaSb based high-power diode lasers

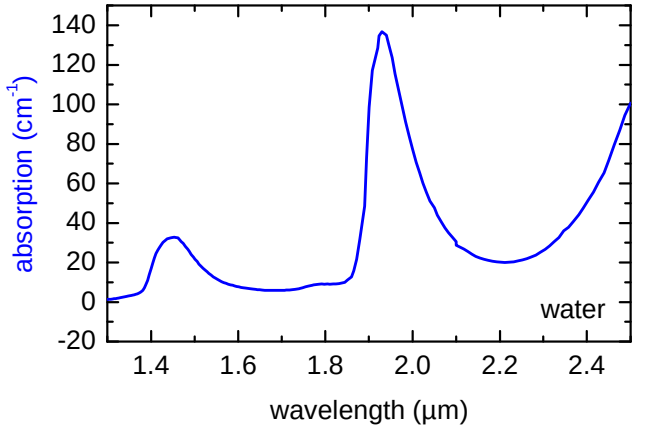
In contrast to well established solid-state lasers used so far, diode laser technology offers great benefits for the above mentioned applications:

- compact and efficient light sources
- wavelengths tunable by current and temperature
- power scalability by bar and stack technology
- long lifetimes
- maintenance-free

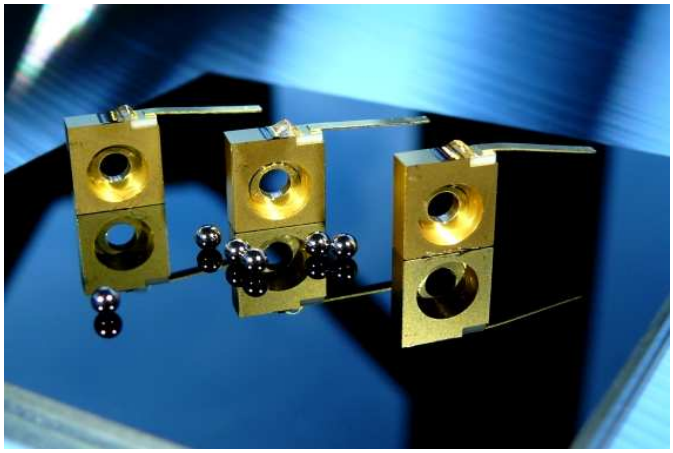
GaSb based Quantum Well (QW) diode lasers fabricated using the GaSb based (AlGaIn)(AsSb) materials system are naturally predestined for this wavelength range and offer clear advantages in terms of output power and wall-plug efficiency in comparison to other laser solutions, e.g. based on InP.

Diode laser single emitters as well as linear arrays consisting of 19 emitters on a 1cm long bar are available. Emitting wavelengths of 1870nm, 1908nm, 1940nm and 2200nm are on stock. Other wavelengths are available on request. Based on these single emitters and laser bars, fiber coupled modules and laser stacks can be also offered.





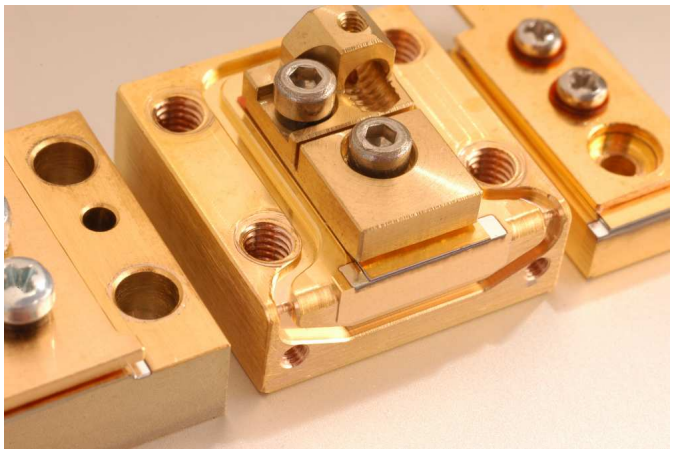
Product Portfolio



Single Emitters

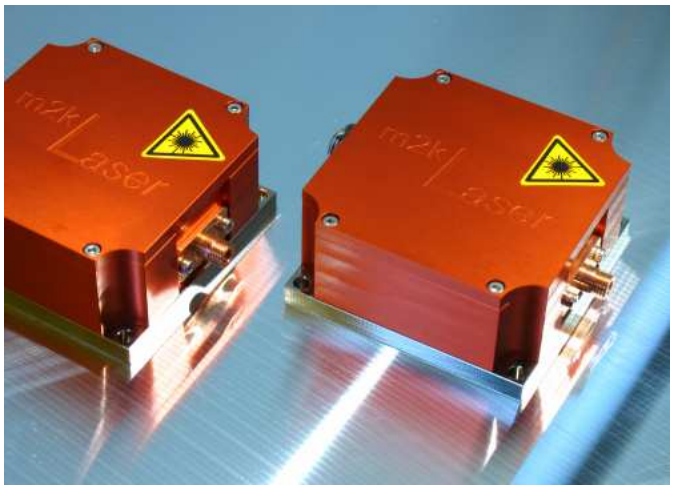
wavelengths	1870nm … 2200nm
output power	0.5W … 1W
type	multi-mode
packaging	c-mount or customized

wavelengths	2090nm, 2300nm
Output power	30 … 50mW
type	single-mode
packaging	c-mount or customized



Laser bars

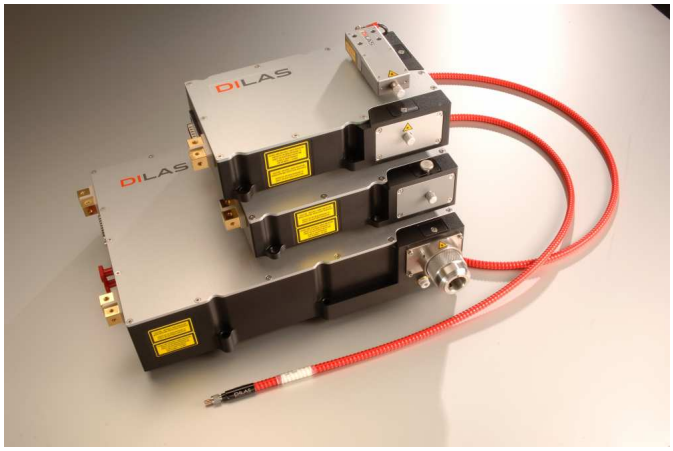
wavelengths	1870nm … 1960nm
output power	10W … 15W
type	multi-mode
packaging	M-mount
FAC lensing	optional



Laser Modules (Single Emitter Based)

wavelengths	1870nm … 2200nm
output power	250mW … 600mW
type	multi-mode
packaging	suitable for 200µm, 0.22NA fiber

wavelengths	2090nm, 2300nm
Output power	3mW … 10mW
type	single-mode
packaging	fiber coupled, butterfly



Laser Modules (Laser Array Based)

wavelengths	1870nm … 1960nm
output power	6W … 8W
type	multi-mode
Fiber packaging	400µm … 800µm, 0.22NA

wavelengths	1870nm … 1960nm
output power	10W … 15W
type	multi-mode
Fiber packaging	400µm … 800µm, 0.22NA

wavelengths	1870nm … 1960nm
output power	15W … 20W
type	multi-mode
Fiber packaging	400µm … 800µm, 0.22NA

Specifications

Detailed data sheets for each wavelength can be downloaded at www.m2k-laser.de

Optical and spectral data		
Center wavelength	nm	1870 / 1908 / 1940 / 2200
CW nominal output power	W	0.5 / 0.7 / 1.0
Center wavelength variation	nm	±10
Spectral bandwidth (FWHM)	nm	<10
Wavelength temperature coefficient	nm/K	1.2
Polarisation	TE/TM	TE
Divergence parallel (FWHM)	Degree	<11
Divergence perpendicular (FWHM)	Degree	<45
Design data		
Emitter stripe width	µm	100 / 150
Cavity length	mm	1.0 / 1.5
Electrical data (typical)		
operation current	A	<3
threshold current	A	<0.4
slope efficiency	W/A	>0.26
operation voltage	V	<1.2
power conversion efficiency	%	>20
Thermal data		
Operating temperature	°C	15 … 30
Storage temperature (non-condensing atmosphere)	°C	-20 … 60
Operating environment conditions		non-condensing atmosphere
Package		
Heat sink type		c-mount
Cathode (-)		wire flag
Anode (+)		base plate

Laser bars		
CW nominal output power	W	10
Fill factor	%	20 /30
Heat sink type		M-mount (passively cooled)

Laser modules (SE based)			
CW nominal output power	mW	600	250 @ 2200nm
Fiber core / NA	µm	200, NA= 0.22	

Laser modules (bar based)			
CW nominal output power	W	6 / 12 / 18	2 @ 2200nm
Fiber core / NA	µm	400/600/800, NA=0.22	

Safety

This is a laser class IV product according to IEC - Standard International Commission (Publication 825, 1993). The laser light emitted from this laser diode is invisible and/or visible and is harmful to the human eye. The safety regulations for eye and personell protection included in the IEC Standard must be observed to avoid any harm to operating personell. Avoid direct exposure and looking into the laser diode, into the collimated beam or into the fiber when it is linked to the module.

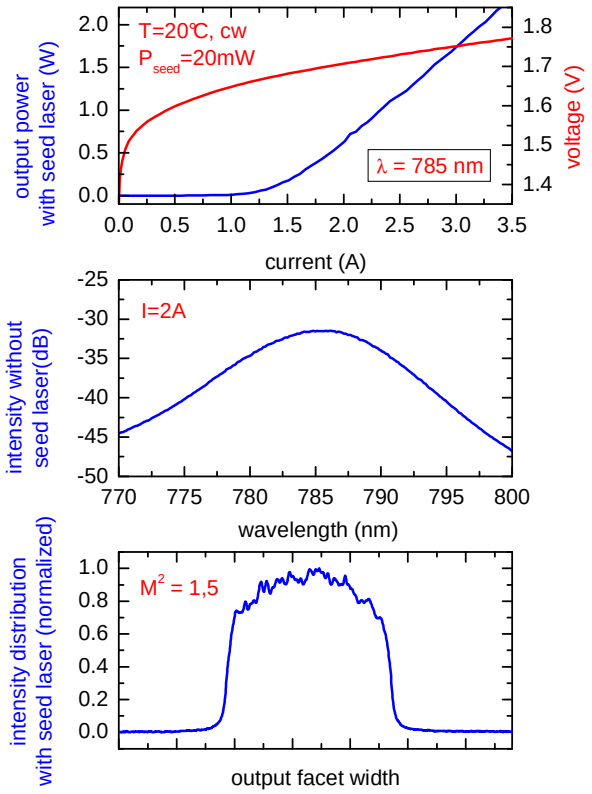
Operation and handling

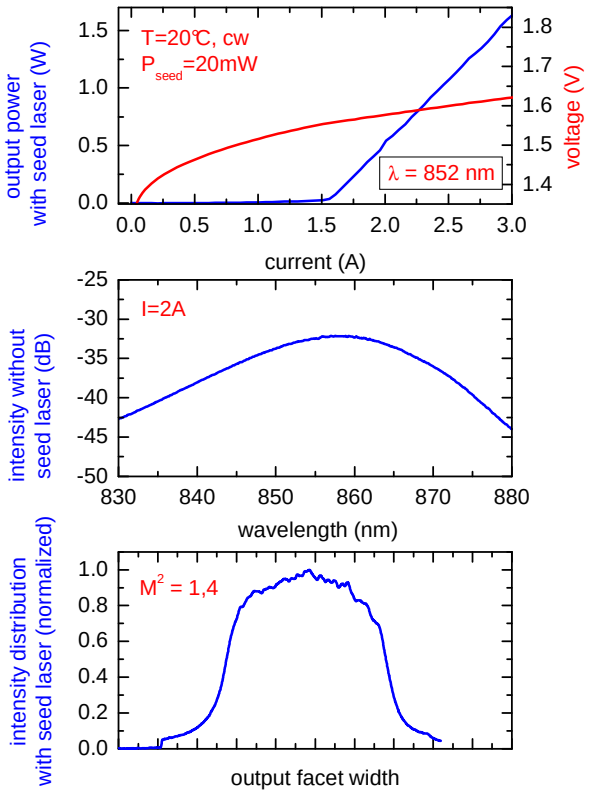
Diode lasers are extremely sensitive to over-voltage. Take extreme precaution to avoid electrostatic charges. Precautions against spiking during switching on and off the power supply must be assured. Correct polarity of power supply must be assured. During handling personell has to wear wrist straps. Grounded work surfaces and additional antistatic techniques are mandatory during handling. Device failure and safety hazard are caused by operation in excess of maximum ratings. Exceeding output power and temperature specification will result in accelerated device ageing.

Example Measurement Data

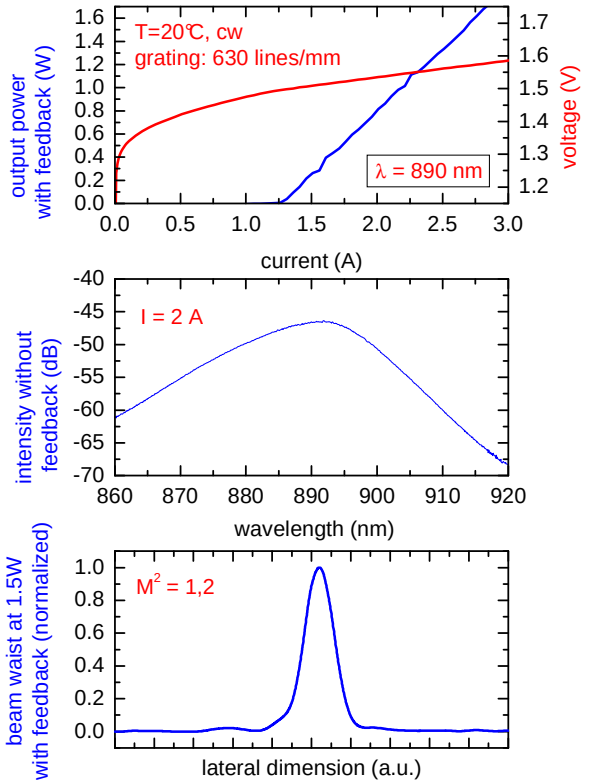
The charts presented only describe typical measurement data examples. All modules are characterised individually, the results being contained in the documentation included. The display options are subject to alteration by m2k-laser. The charts show P(I) and U(I) characteristics and the amplifier output spectrum without external feedback. The intensity distribution at the amplifier output facet (for MOPA) or for the minimal beam waist (ECL) in the slow axis with seed power are shown in the third chart for each wavelength. M2 has been measured using a commercial BeamScope in accordance to ISO 11146.

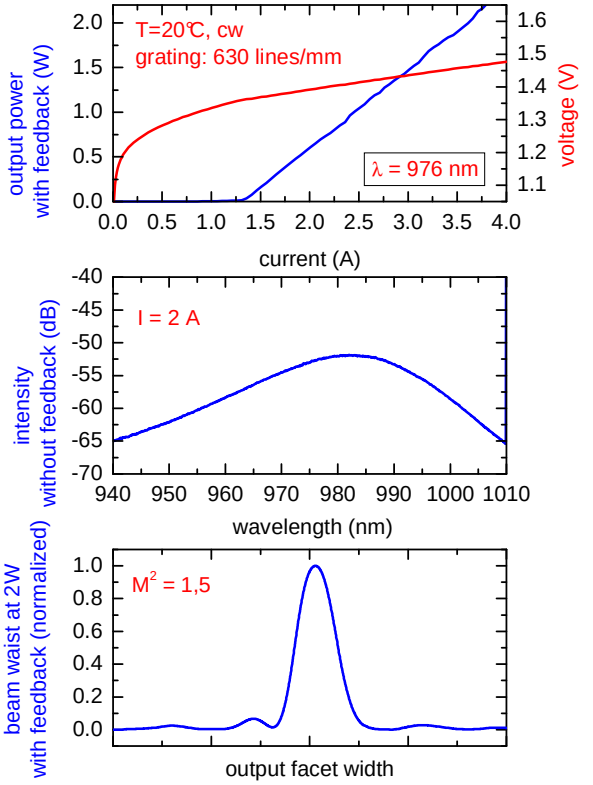
Tapered amplifier used in MOPA configuration





Tapered amplifier used in External Cavity configuration





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High-Brightness Diode-Lasers

Welcome at m2k-laser

Founded in 2001 by several member of the staff from the well-known Fraunhofer Institute for Applied Solid State Physics (IAF) in Freiburg, Germany, m2k-laser is focused on the design, development and manufacturing of innovative high-brightness diode lasers. In 2007, m2k-laser became part of ROFIN-SINAR, which holds majority stake.

Our diode lasers undergo epitaxial growth at several multi wafer MBE systems for GaAs and GaSb in accordance to our in-house laser designs. Our core technology consists of clean room based complete process lines for diode lasers including a facet coating technology of our own. For this purpose, we can rely on the long-standing experience of our staff and on distinguished production technology.

We offer single emitters, laser bars and laser modules based on tapered, broad-area and ridge-waveguide designs. Our diode lasers in the near-infrared (750-1070nm) and mid-infrared (1.85-2.5µm) wavelength regimes are being used globally in the fields of medical treatment, materials processing, spectroscopy and metrology.

Imprint

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