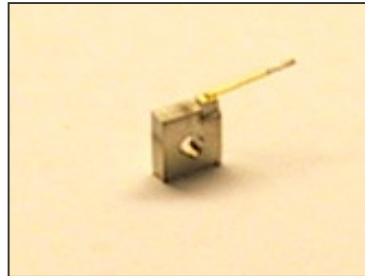




ATC - SEMICONDUCTOR DEVICES

4,0 W CW Laser Diode Model ATC-C4000-500



Key features

- 4.0 W CW output power
- 500 μm emitting aperture
- High efficiency MOCVD InAlGaAs quantum well design
- High reliability
- C-mount and ATC packages

Applications

- Solid-state laser pumping
- Medical, ophthalmic and dental application
- Free-space communication
- Beacons and illumination
- Testing and measuring applications
- Material processing

Description

The ATC series laser diodes are manufactured on the base of the MOCVD grown InAlGaAs quantum well heterostructures. It provide a very accurate control of the chemical composition and grown layer thickness and ensure high reproducibility of the main device parameters: threshold current density, differential quantum efficiency, etc.

Innovative post-growth technology enables to develop a highly efficient technological cycle for the laser diode manufacturing. Laser diodes are soldered on to the heat sink with the epitaxial layers down, which ensures efficient heat removal and provides high optical output power. ATC-SD carries out testing of each device (up to 500 hours of operation in CW mode) and one-off certification after the test. This procedure ensures the selection of highly reliable samples.

Lasers of the following configurations are manufactured: C-mount and ATC package. C-mount types are preferable if the user carries out different manipulations with the laser crystal. In this case user should provide an additional radiator and encapsulates the entire unit by himself. The ATC package is a hermetically sealed case with a flat output window. This unit allows operation without a complementary heat sink in a pulsed mode. The small heat resistance of the ATC package provides a low temperature difference between external package surface and laser diode. The

The ATC package may contain a monitor photodiode as an option, which ensures stabilization of the radiation power. Photodiode characteristics are linear with a wide power range. The photodiode operates without opposite bias and the response time is about 50 ns. The photodiode current is a relative value which may be used as a feedback for control and adjustment of the emitted optical power. The maximum photodiode current is 10 mA.

All packages may contain a cylindrical microlens as an option, which reduces the radiation divergence in 20 times (in off-axis plane). With this option customer can work without additional optical systems or can use an inexpensive long focus lens.



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Safety

The laser light emitted from the laser diode is invisible and may be harmful to the human eye. When in use, safety precautions should be taken, to avoid possibility of eye damage. These laser diodes are classified as **Class IV lasers**. It means that user should not exposure of the eye or skin to direct or scattered radiation. If viewing is required, the beam should be observed by reflection from matte surface utilizing an image converter or suitable fluorescent screen. Refer to operations manual for additional precautions and procedures.

Caution: the use of optical instruments with this product will increase eye hazard.

ESD: Laser diodes are very sensitive to the electrostatic discharge. Caution should be taken when using these devices.

Specification

Parameter ($T_{OP}=25^{\circ}C$)	Symbol	Values			Unit
		Min.	Typ.	Max	
Output power (continuous wave) ¹⁾	P_{CW}	---	4.0	---	W
Emission wavelength ²⁾	λ	804	807	810	nm
Spectral width (FWHM) ²⁾	$\Delta\lambda$	---	3	---	nm
Differential quantum efficiency	η_D	0.90	1.05	1.20	W/A
Emitting dimensions	W x H	---	500 x 1.0	---	μm
Threshold current	I_{TH}	0.8	1.0	1.2	A
Operating current ¹⁾²⁾	I_{OP}	---	5.1	6.0	A
Operating voltage ¹⁾²⁾	U_{OP}	---	2.2	2.7	V
Differential series resistance	R_S	---	0.05	0.10	Ω
Beam divergence (FWHM)	$\Theta_{ } \times \Theta_{\perp}$	---	6x35	10x40	Deg.
Temp. coefficient of threshold current ³⁾	T_0	---	220	---	K
Temp. coefficient of operating current	$I_{OP2}/I_{OP1}T$	---	0.2	---	%/K
Temp. coefficient of wavelength	$\Delta\lambda/\Delta T$	---	0.27	0.3	nm/K
Thermal resistance	R_T	---	6	---	K/W

Maximum ratings

Output power (continuous wave) ¹⁾	P_{CW}	---	---	4.8	W
Reverse voltage	U_R	---	---	2	V
Operating temperature (for sealed case)	T_{OP}	- 10	---	+ 50	K
Storage temperature (for sealed case)	T_{ST}	- 40	---	+ 60	K
Lead soldering temperature (for 5 sec)	T_S	---	---	250	K

¹⁾ Optical power is measured by coupling with 0.75 NA collection optics

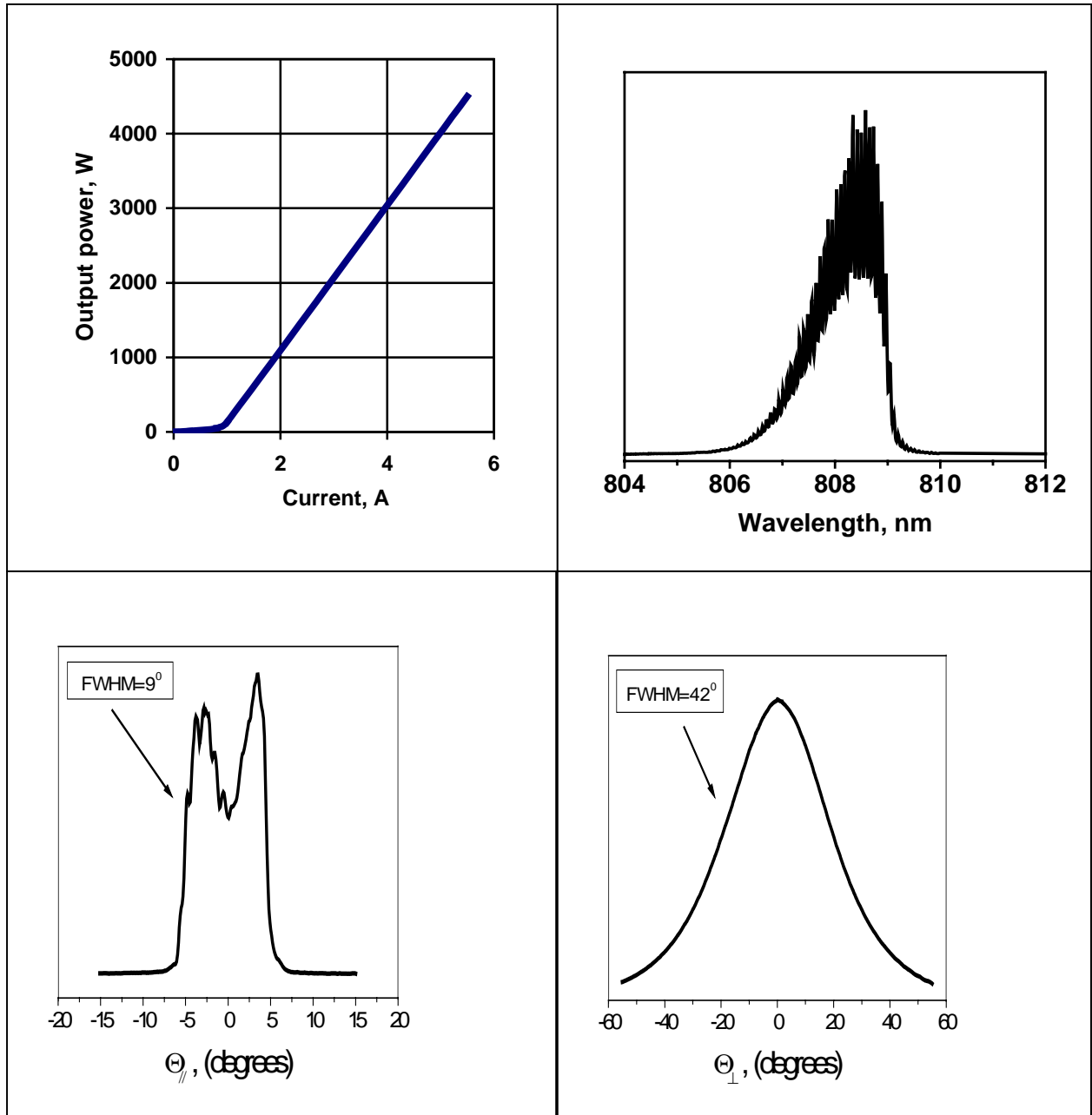
²⁾ The value corresponds to 4.0 W CW optical output power

³⁾ Temp. coefficient of threshold current can be modeled as: $I_{TH2}=I_{TH1}\exp[(T_2-T_1)/T_0]$



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Optical characteristics

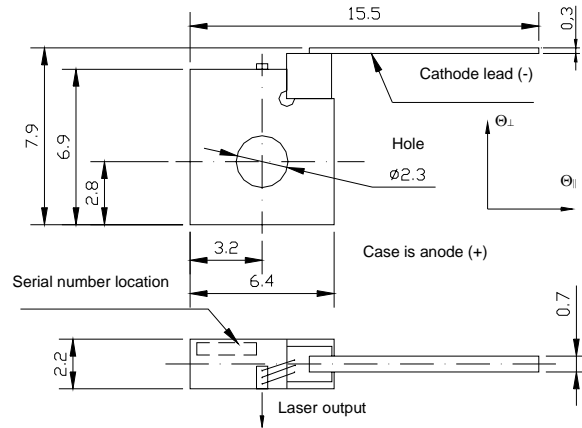




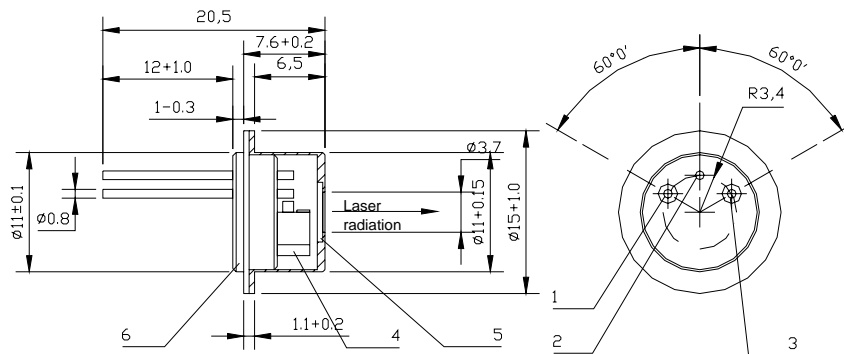
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Package specifications. All dimensions are specified in mm. Tolerances ± 0.25

C-MOUNT



ATC-PACKAGE



- 1 LD cathode (-)
- 2 LD anode (+), Monitor photodiode anode (+), case ground
- 3 Monitor photodiode cathode (-)
- 4 Heat sink with LD chip
- 5 AR coated window
- 6 Case

All devices are pretested and will be delivered with the certificate including measured laser characteristics. For safety, unpacking, handling, mounting, operating and warranty issues, please read attentively our **“Operating manual”**.

Warning: ATC-SD reserves the right to change the design and specification of any product at any time without notice.

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