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PART NUMBER 0450L-11A ITEM NAME 450 NM LASER (DIODE; FREE-SPACE)

## PRODUCT DATASHEET



## DESCRIPTION

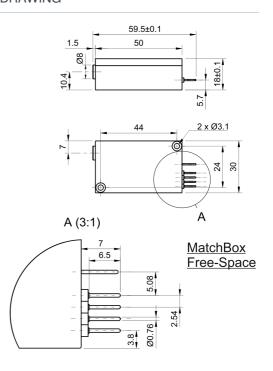
450 nm laser diode module is an excellent choice for flow cytometry, fluorescence, and biomedical applications. Small footprint, stable power, low power consumption are only a few advantages of this laser.

## **SPECIFICATIONS**

Specifications updated: 22 January 2021

Central Wavelength, nm         442         450         458           Longitudinal modes         -         Multiple         -           Spectral line width FWHM, nm         -         0.8         1           Output power, mW         -         60 1         -           Power stability, % (RMS, 8 hrs)         -         0.2 2         1           Power stability, % (peak-to-peak, 8 hrs)         -         2 3         3           Noise, % (RMS, 20 Hz to 20 MHz)         -         0.4 4         1           Transversal modes         -         TEM00         -           Beam Diameter at Aperture (1/e2), mm         -         1         -           Beam divergence (full angle), mrad         -         1.1         -           M²-borizontal axis         -         1.1         1.4           M²-vertical axis         -         1.2         1.5           M²-effective         -         1.3         -           Polarization direction         -         Horizontal 5         -           Polarization contrast         1000         2000         5000           Control interface type         -         UART 6         -           Operation mode         -         APC (CW)	Parameter	Minimum Value	Typical Value	Maximum Value
Spectral line width FWHM, nm         -         0.8         1           Output power, mW         -         60 ¹         -           Power stability, % (RMS, 8 hrs)         -         0.2 ²         1           Power stability, % (peak-to-peak, 8 hrs)         -         2 ³         3           Noise, % (RMS, 20 Hz to 20 MHz)         -         0.4 ⁴         1           Transversal modes         -         TEM00         -           Beam Diameter at Aperture (1/e2), mm         -         1.1         -           Beam divergence (full angle), mrad         -         1.1         -           M ² horizontal axis         -         1.2         1.5           M ² vertical axis         -         1.2         1.5           M ² effective         -         1.3         -           Polarization direction         -         Horizontal 5         -           Polarization contrast         1000         2000         5000           Control interface type         -         UART 6         -           Operation mode         -         APC (CW)         -           Input voltage, VDC         4.8         5         5.3           External power supply requirement         -         4	Central Wavelength, nm	442	450	458
Output power, mW       -       60 ¹       -         Power stability, % (RMS, 8 hrs)       -       0.2 ²       1         Power stability, % (peak-to-peak, 8 hrs)       -       2 ³       3         Noise, % (RMS, 20 Hz to 20 MHz)       -       0.4 ⁴       1         Transversal modes       -       TEM00       -         Beam Diameter at Aperture (1/e2), mm       -       1       -         Beam divergence (full angle), mrad       -       1.1       -         M² horizontal axis       -       1.1       1.4         M² vertical axis       -       1.2       1.5         M² effective       -       1.3       -         Polarization direction       -       Horizontal ⁵       -         Polarization contrast       1000       2000       5000         Control interface type       -       UART ⁶       -         Operation mode       -       APC (CW)       -         Modulation bandwidth, MHz       -       10 ²       -         Input voltage, VDC       4.8       5       5.3         External power supply requirement       -       50 x 30 x 18 ²       -         Dimensions, mm       -       50 x 30 x 18 ²	Longitudinal modes	-	Multiple	-
Power stability, % (RMS, 8 hrs)         -         0.2 2         1           Power stability, % (peak-to-peak, 8 hrs)         -         2 3         3           Noise, % (RMS, 20 Hz to 20 MHz)         -         0.4 4         1           Transversal modes         -         TEM00         -           Beam Diameter at Aperture (1/e2), mm         -         1         -           Beam divergence (full angle), mrad         -         1.1         -           M ² horizontal axis         -         1.1         1.4           M ² vertical axis         -         1.2         1.5           M ² effective         -         1.3         -           Polarization direction         -         Horizontal 5         -           Polarization contrast         1000         2000         5000           Control interface type         -         UART 6         -           Operation mode         -         APC (CW)         -           Modulation bandwidth, MHz         -         10 7         -           Input voltage, VDC         4.8         5         5.3           External power supply requirement         -         +5 V DC, 1.5A         -           Dimensions, mm         - <t< td=""><td>Spectral line width FWHM, nm</td><td>-</td><td>0.8</td><td>1</td></t<>	Spectral line width FWHM, nm	-	0.8	1
Power stability, % (peak-to-peak, 8 hrs)         -         2 ³         3           Noise, % (RMS, 20 Hz to 20 MHz)         -         0.4 ⁴         1           Transversal modes         -         TEM00         -           Beam Diameter at Aperture (1/e2), mm         -         1         -           Beam divergence (full angle), mrad         -         1.1         -           M ² horizontal axis         -         1.1         1.4           M ² vertical axis         -         1.2         1.5           M ² effective         -         1.3         -           Polarization direction         -         Horizontal ⁵         -           Polarization contrast         1000         2000         5000           Control interface type         -         UART ⁶         -           Operation mode         -         APC (CW)         -           Modulation bandwidth, MHz         -         10 ²         -           Input voltage, VDC         4.8         5         5.3           External power supply requirement         -         +5 V DC, 1.5A         -           Dimensions, mm         -         50 x 30 x 18 ³         -           Beam height from the base, mm         9.9	Output power, mW	-	60 <sup>1</sup>	-
Noise, % (RMS, 20 Hz to 20 MHz)       -       0.44       1         Transversal modes       -       TEM00       -         Beam Diameter at Aperture (1/e2), mm       -       1       -         Beam divergence (full angle), mrad       -       1.1       -         M ² horizontal axis       -       1.1       1.4         M ² vertical axis       -       1.2       1.5         M ² effective       -       1.3       -         Polarization direction       -       Horizontal ⁵       -         Polarization contrast       1000       2000       5000         Control interface type       -       UART ⁶       -         Operation mode       -       APC (CW)       -         Modulation bandwidth, MHz       -       10 ²       -         Input voltage, VDC       4.8       5       5.3         External power supply requirement       -       +5 V DC, 1.5A       -         Dimensions, mm       -       50 x 30 x 18 ³       -         Beam height from the base, mm       9.9       10.4       10.9	Power stability, % (RMS, 8 hrs)	-	0.22	1
Transversal modes         -         TEM00         -           Beam Diameter at Aperture (1/e2), mm         -         1         -           Beam divergence (full angle), mrad         -         1.1         -           M ² horizontal axis         -         1.1         1.4           M ² vertical axis         -         1.2         1.5           M ² effective         -         1.3         -           Polarization direction         -         Horizontal ⁵         -           Polarization contrast         1000         2000         5000           Control interface type         -         UART ⁶         -           Operation mode         -         APC (CW)         -           Modulation bandwidth, MHz         -         10 7         -           Input voltage, VDC         4.8         5         5.3           External power supply requirement         -         +5 V DC, 1.5A         -           Dimensions, mm         -         50 x 30 x 18 8         -           Beam height from the base, mm         9.9         10.4         10.9	Power stability, % (peak-to-peak, 8 hrs)	-	2 <sup>3</sup>	3
Beam Diameter at Aperture (1/e2), mm       -       1       -         Beam divergence (full angle), mrad       -       1.1       -         M² horizontal axis       -       1.1       1.4         M² vertical axis       -       1.2       1.5         M² effective       -       1.3       -         Polarization direction       -       Horizontal 5       -         Polarization contrast       1000       2000       5000         Control interface type       -       UART 6       -         Operation mode       -       APC (CW)       -         Modulation bandwidth, MHz       -       10 7       -         Input voltage, VDC       4.8       5       5.3         External power supply requirement       -       +5 V DC, 1.5A       -         Dimensions, mm       -       50 x 30 x 18 8       -         Beam height from the base, mm       9.9       10.4       10.9	Noise, % (RMS, 20 Hz to 20 MHz)	-	0.4 4	1
Beam divergence (full angle), mrad       -       1.1       -         M²horizontal axis       -       1.1       1.4         M²vertical axis       -       1.2       1.5         M²effective       -       1.3       -         Polarization direction       -       Horizontal 5       -         Polarization contrast       1000       2000       5000         Control interface type       -       UART 6       -         Operation mode       -       APC (CW)       -         Modulation bandwidth, MHz       -       10 7       -         Input voltage, VDC       4.8       5       5.3         External power supply requirement       -       +5 V DC, 1.5A       -         Dimensions, mm       -       50 x 30 x 18 8       -         Beam height from the base, mm       9.9       10.4       10.9	Transversal modes	-	TEM00	-
M²horizontal axis       -       1.1       1.4         M²vertical axis       -       1.2       1.5         M² effective       -       1.3       -         Polarization direction       -       Horizontal <sup>5</sup> -         Polarization contrast       1000       2000       5000         Control interface type       -       UART <sup>6</sup> -         Operation mode       -       APC (CW)       -         Modulation bandwidth, MHz       -       10 <sup>7</sup> -         Input voltage, VDC       4.8       5       5.3         External power supply requirement       -       +5 V DC, 1.5A       -         Dimensions, mm       -       50 x 30 x 18 <sup>8</sup> -         Beam height from the base, mm       9.9       10.4       10.9	Beam Diameter at Aperture (1/e2), mm	-	1	-
M ² vertical axis       -       1.2       1.5         M ² effective       -       1.3       -         Polarization direction       -       Horizontal 5       -         Polarization contrast       1000       2000       5000         Control interface type       -       UART 6       -         Operation mode       -       APC (CW)       -         Modulation bandwidth, MHz       -       10 7       -         Input voltage, VDC       4.8       5       5.3         External power supply requirement       -       +5 V DC, 1.5A       -         Dimensions, mm       -       50 x 30 x 18 8       -         Beam height from the base, mm       9.9       10.4       10.9	Beam divergence (full angle), mrad	-	1.1	-
M ² effective       -       1.3       -         Polarization direction       -       Horizontal 5       -         Polarization contrast       1000       2000       5000         Control interface type       -       UART 6       -         Operation mode       -       APC (CW)       -         Modulation bandwidth, MHz       -       10 7       -         Input voltage, VDC       4.8       5       5.3         External power supply requirement       -       +5 V DC, 1.5A       -         Dimensions, mm       -       50 x 30 x 18 8       -         Beam height from the base, mm       9.9       10.4       10.9	M <sup>2</sup> horizontal axis	-	1.1	1.4
Polarization direction         -         Horizontal 5         -           Polarization contrast         1000         2000         5000           Control interface type         -         UART 6         -           Operation mode         -         APC (CW)         -           Modulation bandwidth, MHz         -         10 7         -           Input voltage, VDC         4.8         5         5.3           External power supply requirement         -         +5 V DC, 1.5A         -           Dimensions, mm         -         50 x 30 x 18 8         -           Beam height from the base, mm         9.9         10.4         10.9	M <sup>2</sup> vertical axis	-	1.2	1.5
Polarization contrast         1000         2000         5000           Control interface type         -         UART <sup>6</sup> -           Operation mode         -         APC (CW)         -           Modulation bandwidth, MHz         -         10 <sup>7</sup> -           Input voltage, VDC         4.8         5         5.3           External power supply requirement         -         +5 V DC, 1.5A         -           Dimensions, mm         -         50 x 30 x 18 <sup>8</sup> -           Beam height from the base, mm         9.9         10.4         10.9	M <sup>2</sup> effective	-	1.3	-
Control interface type         -         UART <sup>6</sup> -           Operation mode         -         APC (CW)         -           Modulation bandwidth, MHz         -         10 <sup>7</sup> -           Input voltage, VDC         4.8         5         5.3           External power supply requirement         -         +5 V DC, 1.5A         -           Dimensions, mm         -         50 x 30 x 18 <sup>8</sup> -           Beam height from the base, mm         9.9         10.4         10.9	Polarization direction	-	Horizontal <sup>5</sup>	-
Operation mode         -         APC (CW)         -           Modulation bandwidth, MHz         -         10 7         -           Input voltage, VDC         4.8         5         5.3           External power supply requirement         -         +5 V DC, 1.5A         -           Dimensions, mm         -         50 x 30 x 18 8         -           Beam height from the base, mm         9.9         10.4         10.9	Polarization contrast	1000	2000	5000
Modulation bandwidth, MHz         -         10 7         -           Input voltage, VDC         4.8         5         5.3           External power supply requirement         -         +5 V DC, 1.5A         -           Dimensions, mm         -         50 x 30 x 18 8         -           Beam height from the base, mm         9.9         10.4         10.9	Control interface type	-	UART <sup>6</sup>	-
Input voltage, VDC         4.8         5         5.3           External power supply requirement         -         +5 V DC, 1.5A         -           Dimensions, mm         -         50 x 30 x 18 8         -           Beam height from the base, mm         9.9         10.4         10.9	Operation mode	-	APC (CW)	-
External power supply requirement - +5 V DC, 1.5A -  Dimensions, mm - 50 x 30 x 18 8 -  Beam height from the base, mm 9.9 10.4 10.9	Modulation bandwidth, MHz	-	10 <sup>7</sup>	-
Dimensions, mm         -         50 x 30 x 18 8         -           Beam height from the base, mm         9.9         10.4         10.9	Input voltage, VDC	4.8	5	5.3
Beam height from the base, mm 9.9 10.4 10.9	External power supply requirement	-	+5 V DC, 1.5A	-
	Dimensions, mm	-	50 x 30 x 18 <sup>8</sup>	-
Heat-sinking requirement, °C/W - 1 - 1	Beam height from the base, mm	9.9	10.4	10.9
	Heat-sinking requirement, °C/W	-	1	-

## **DRAWING**



Optimum heatsink temperature, °C	15	20	30
Warm up time, mins (cold start)	-	0.5	1
Temperature stabilization	-	Internal TEC	-
External fan control	-	No <sup>9</sup>	-
Overheat protection	-	Yes	-
Storage temperature, °C (non-condensing)	-10	-	50
Net weight, kg	0.1	0.12	0.14
Max. power consumption, W	0.4	2	10
Warranty, months (op. hrs)	-	14 (10000) <sup>10</sup>	-
RoHS	-	Yes	-
CE compliance	-	- General Product Safety Directive (GPSD) 2001/95/EC - (EMC) Directive 2004/108/EC	-
Laser Safety Class	-	3B	-
OEM lasers are not compliant with	-	IEC60825- 1:2014 (compliant using additional accessories)	-
Country of origin		Lithuania	

<sup>&</sup>lt;sup>1</sup> The optical power can be tuned from virtually 0% to 100%. However, other specifications, such as central wavelength, power stability, noise, polarization ratio, beam shape, quality and circularity are not guaranteed at power levels other than factory preset power. Significantly worse power stability is to be expected at very low power levels, e.g. <3% from specified nominal power.

Note: Product specifications are subject to change without prior notice to improve reliability, function or design or otherwise.

<sup>&</sup>lt;sup>2</sup>The long term power test is carried out at constant laser body temperature (+/-0.1 °C) using an optical power meter with an input bandwidth of 10 Hz. The actual measurement rate has a period of about 20 seconds to 1 minute.

<sup>&</sup>lt;sup>3</sup>The long term power test is carried out at constant laser body temperature (+/-0.1 °C) using an optical power meter with an input bandwidth of 10 Hz. The actual measurement rate has a period of about 20 seconds to 1 minute.

<sup>&</sup>lt;sup>4</sup> Noise level is measured with a fast photodiode connected to an oscilloscope. The overall system bandwidth is from 2 kHz to 20 MHz.

 $<sup>^{5}\,\</sup>mbox{For lasers}$  without integrated optical isolators.

 $<sup>^{6}</sup>$  Break-out-boxes AM-C8 and AM-C3 can be used for conversion of UART communication to either USB or RS232.

 $<sup>^7 {</sup>m TTL}$  digital modulation up to 10 MHz.

<sup>&</sup>lt;sup>8</sup> Excluding control interface pins and an output window/fiber assembly.

<sup>&</sup>lt;sup>9</sup>This function can be enabled in hardware only if the fast modulation option is disabled. The customer must specify this before ordering the laser.

 $<sup>^{\</sup>rm 10}$  Whichever occurs first. The laser has an integrated operational hours counter.