Innolume GmbH
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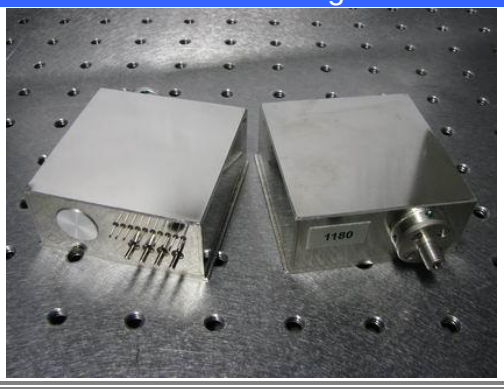
LD-1064-MCP-30W

High Power Diode Laser – multi-chip package



Features:

- High brightness, high efficiency
- Built-in electronic driver for laser diodes
- Power control box
- SMA 905 connector adapts multimode fiber patch cords with minimum core diameter of 200um and minimum NA 0.16

- Multi-chip package
- Small form factor - 83 x 30 x 64 mm
- Optional: multimode fiber patchcord
- Optional: window for aiming laser

Specification for engineering samples	DATE: 29th Apr. 2009

SPECIFICATIONS

Parameters	Min.	Typ.	Max.	Unit
Ex-fiber* optical output power**	30			W
Mean wavelength (25°C case temperature)	1054	1064	1074	nm
Temperature induced wavelength shift	0.35	0.4	0.45	nm/°C
Spectral width (FWHM)	5	7	12	nm
DC input voltage	11.5	12	14	V
DC input current		8	10	A
Case operating temperature	10	25	35	°C
Module heatload at max current			<80	W

FIBER PATCHCORD SPECIFICATION (optionally supplied)

Parameter	Typical	Unit
Fiber core diameter	275	µm
Numerical Aperture (NA)	0.22	
Connector	SMA 905	
Length	2.0±0.2	m
Minimum bending radius	160	mm

ABSOLUTE MAXIMUM RATINGS

Parameters	Min.	Max.	Unit
DC input current		10	A
DC input voltage	11	14	V
Case operating temperature	10	60	ºC
Storage temperature	5	60	ºC

* Supplied with, 275um-core diameter, 0.22NA patch-cord with SMA 905 connectors
**Warm Up time - time of the device temperature stabilization <10min (at constant ambient temperature)

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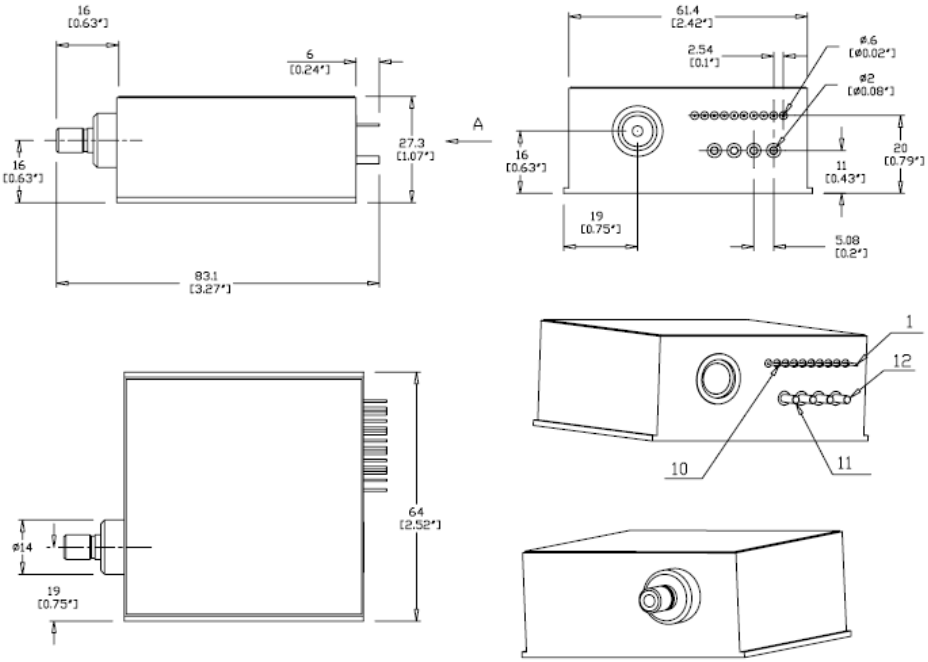
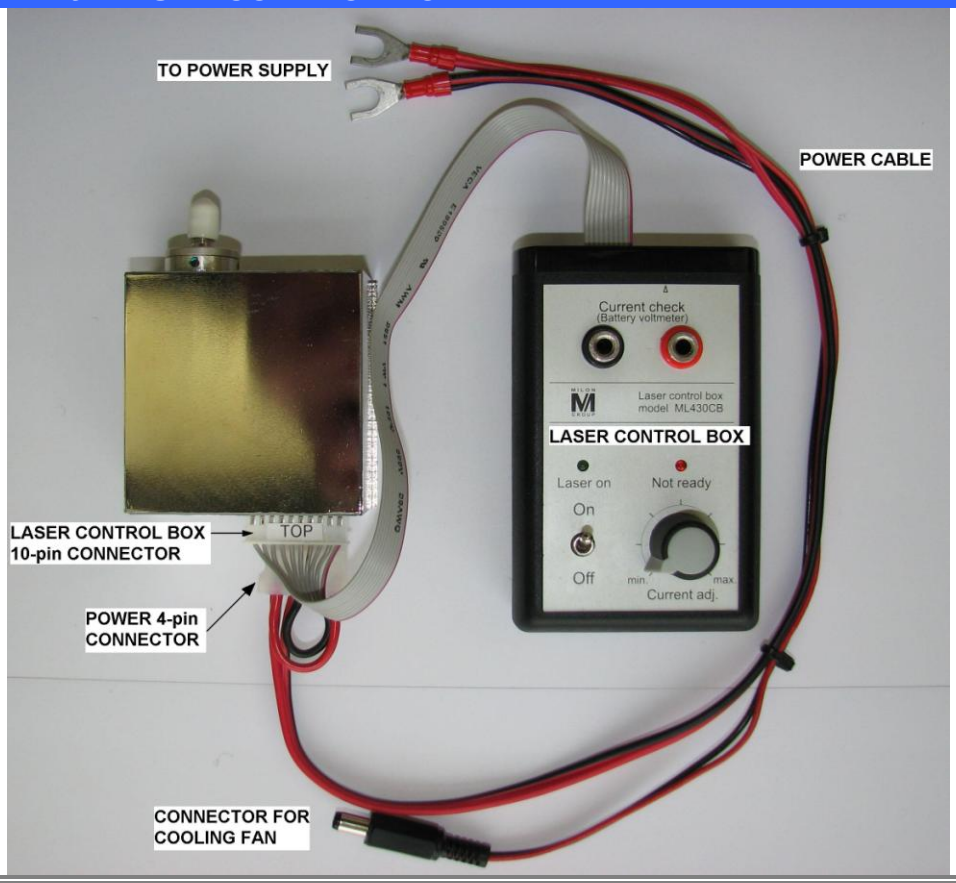
DIMENSIONS

All sizes in mm



THE MODULE with LASER CONTROL BOX



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Power supply requirements.
A stabilized constant-current power supply should be used with the laser module.
Voltage of 12.0±0.5V is required for laser operation. Maximum current is not more than 7A.

Cooling system requirements.
Active cooling system is required for heat dissipation from laser module in case if wavelength position adjusting is neccesary. Active cooling system must have power capability of 3 times higher compare to the "Module Heatload" value. For temperature stabilized operation the cooling system should use external temperature monitor installed on the cooled surface in the vicinity of the module. The wavelength position may be adjusted by changing temperature with the "Wavelength temperature tunability" coefficient. If wavelength position adjusting is not neccesary, passive air or water cooled system can be used. The thermal resistance of the radiator must be less than 0.12°C/W.

It is extremely important to have a smooth high quality radiator surface under the laser module. The deviation from flatness must be less than 0.05mm. It is necessary to apply a thermo-conductive film or paste between the laser module and the radiator surface. Thermo-conductive paste must be uniformly distributed over the bottom surface of the module. It is desirable to minimize the thickness of thermo-conductive film. This can be done by gently rubbing and pressing the module and the radiator against each other with the paste between them. The maximum operational temperature of the laser module is 40°C. If the external cooling is inadequate and the module internal temperature reaches preset value of 45oC, the power of LDs will be turned OFF automatically.
Laser control box or external electrical circuit (in case OEM application) should be used for operating with laser module.

Operating with laser control box
Laser control box allows switching on/off the module and controlling the output power. It contains a variable resistor for the LD current control ("Current adj."), an On/Off switch of power supply, a LED indicator for laser operating ("Laser on") and error ("Not ready"), and a socket for measurement of voltage on LD current sensor ("Current check") that is proportional to the LD current.

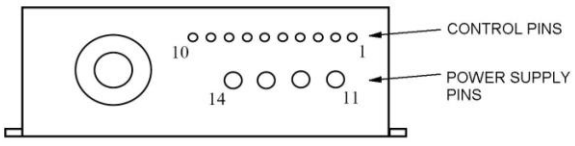
Preparation for operating

Install module on cooling system.
Connect the module to power supply with attached power cable. Appearance of power cable can be different from shown on picture above. Ensure red wire connects to positive ("+") lead of power supply unit and red-black (or dark green) to negative ("-"). Optionally there can be possibility of supplying cooling fan (in case of using it in cooling system) with this cable. It depends on type of attached cable (with or without connector for fan).
Connect laser control box cable with 10-pin connector to module's control pins. Labeled side of connector must point to the top of module.

Turning the module on.
Switch "ON" the power supply unit. The LED "Not ready" will be "ON" for 5–30 seconds.
After the LED "Not ready" turns off, desired LD power can be set with the variable resistor.
LD power set point can be defined from L-I curve and voltage measurement on current sensor (socket "Current check") or direct power measurement from fiber output.

Turning the module off.
Switch "OFF" the power supply unit. The variable resistor may be left at any position. When the unit is switch "ON" next time, the same LD power will appear.

PIN IDENTIFICATON



1 - 10		Control Pins
11		(+) Power supply
12		Ground
13		Ground
14		(+) Power supply

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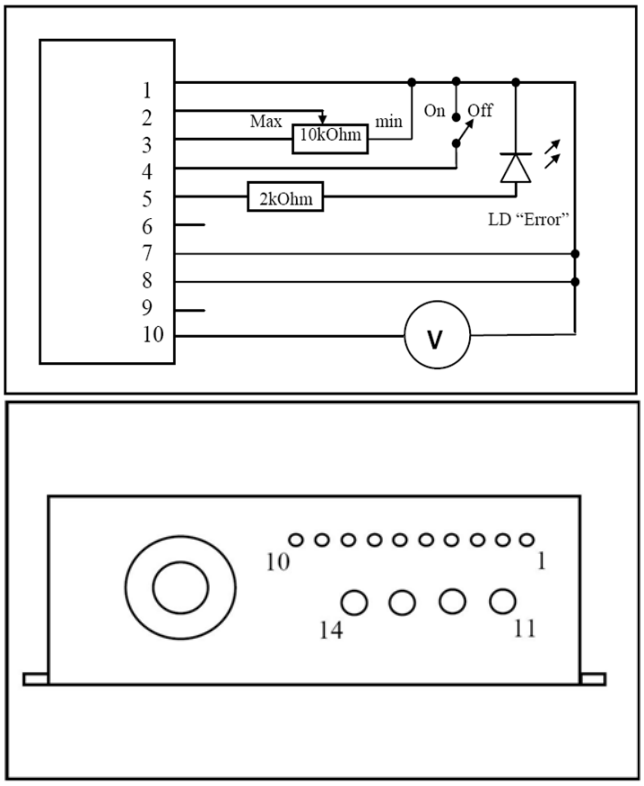
CIRCUIT DIAGRAMM AND PIN IDENTIFICATON



Pin	Symbol	Type Description
1	VL	Input Digital control of the LDs by current
2	VA	Input Analog control of the LDs by current
3	REF	Output Reference voltage 5V/2mA max
4	STB	Input Switch on/off LDs
5	ERROR	Output Signal of the error
6	RE	Input The permission of the automatic error of the trigger off
7	Gnd	Common (analog signal)
8	Gnd	Common (analog signal)
9	---	
10	CON	Output Signal that is proportional to the current of LDs
11		(+) Power supply
12		Common (power supply and digital signal)
13		Common (power supply and digital signal)
14		(+) Power supply

VL Input:
This is a digital input. Logic 0 corresponds to a voltage between 0V and 0.8V while logic 1 corresponds to a voltage between 4V and 5V. In the formula for ILD (see below), values of VL = 0, or VL = 1 should be substituted. When Pin1 and Pin3 are connected, VL = 1. When Pin1 and Pin7 (or Pin8) are connected, VL = 0. It is possible to use the VL input for a smooth control of LD current. For this purpose, it is necessary to apply a signal from a digital generator (alternating logic 0 and logic 1) with frequency between 2 kHz and 10 kHz to Pin1. In this case, VL is equal to the ratio of pulse duration and period.

REF Output:
This is a "Reference" voltage output. The maximal current in this line is 2mA. It can be used only in the formation of control voltage VA (see the Circuit Diagram above). For this purpose, it is recommended to use a variable resistor not less than 3kOhm.

ERROR Output:
When ERROR=1 (voltage 4- 5V), the laser is locked and it is impossible to turn it on. When ERROR = 0 (voltage 0-0.8V) the laser is unlocked and operating according to the values of VA, VL, and STB inputs. The maximum current in the ERROR line is 2mA. The condition ERROR=1 arises in the following cases: when turning on the power, when the laser module is overheated, and when the power supply voltage is too low.

RE Input:
In order to turn the laser ON apply logic 1 (4 - 5V) to Pin6. Then the error condition (ERROR=1) will automatically change to the error-free condition (ERROR=0), provided there are no other reasons for ERROR=1. When logic 0 (0-0.8V) is applied to Pin6, the condition ERROR=1 will be kept indefinitely. (This feature may be convenient when it is desirable to turn on the laser and leave it unattained. If overheating takes place, the laser will be switched off and will not be turned on automatically even when the temperature is restored).

CON Output:
For measuring of this voltage (proportional to the LD current) use a voltmeter with independent power supply (batteries). Connect it between Pin10 (CON) and Pin7 or Pin8. Minimum voltage is 0V (Current=0). Maximum voltage is approximately 0.2V (Maximum current). Laser current can be calculated with the formula ILD = VCON*R. Each laser head has its own value of R (0.07-0.11 Ohm).

Laser diode current control

LD current is controlled by values of VA, VL, and STB.
Signal STB is used to turn the LDs on and off (logic 1 corresponds to LD “OFF”; logic 0 corresponds to LD “ON”). Current of the LDs (ILD) is given by
ILD= VA/5V x (1- VL) x Imax
Where,
VA is analog voltage at Pin2 (0-5V)
VL digital signal at Pin 1(see above);
Imax maximum current of the LD.
Current of the LD can be controlled by both analog signal VA (in this case VL should be 0) and digital signal VL (in this case VA should be 5V), or by means of both signals.
Adjustments in voltages VA and VL alter the value of the current with the time delay within 10ms. When using STB Input, the time delay for switching the LDs “ON” is less than 0.1ms and the time delay for switching the LDs “OFF” is not more than 0.01ms.

Operating

The electrical circuit shown above is recommended for operating of the laser module. It contains a variable resistor for the LD current control, an On/Off switch, a LED indicator for error signal, and a voltmeter for measurements of voltage that isproportional to the LD current.

Turning the laser module on

Turn “ON” the power supply unit. The LED “ERROR” will be “ON” for 5–30 seconds. During this time the LD power will be locked at 0. After the LED “ERROR” turns “OFF”, a desired LD power can be set with the variable resistor. The maximum operational temperature of the laser module is 40°C. If the external cooling is inadequate and the module internal temperature reaches 45oC, the power of LDs will be turned OFF automatically.
Turn "OFF" the power supply unit. The variable resistor may be left at any position. When the unit is turned "ON" next time, the same LD power will appear.

LD current control

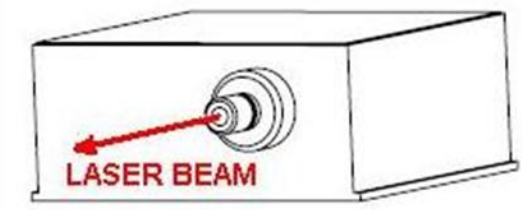
All the LDs are connected together in series and same current carries through all of them. The voltage at the output "CON" is proportional to the current through LDs.
This voltage can be measured with a battery-powered voltmeter connected between outputs "Gnd" and "CON". The internal resistance of the voltmeter must be higher than 1MOhm. The current of LDs can be calculated according to the equation ILD= Vcon/ΣRx. The value Rx is individual for each laser module.

SAFETY AND OPERATING INSTRUCTIONS

The laser light emitted from this module is invisible and will harmful to the human eye. Avoid looking directly into the fiber output or into the collimated beam along its optical axis when the device is in operation. Proper laser safety eyewear must be worn during operation.

Absolute Maximum Ratings may be applied to the Laser Diode for short period of time only. Exposure to maximum ratings for extended period of time or exposure above one or more max ratings may cause damage or affect the reliability of the device. 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. A proper heatsink for the laser diode module on thermal radiator is required.

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.



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