

## LuOcean Mini 4

### LU1064Dyyy Diode Laser with up to 65 W at 1064nm



#### Description:

The Lumics LuOcean Mini 4 diode laser series offers OEM integrators an excellent product to manufacture state-of-the-art end-user laser systems.

The easy integration and safe use of these laser components in combination with several accessories and features give the chance to be cost-efficient in development and manufacturing.

#### Features & Functions:

- Wavelength 1064nm
- (105/200/400/600)µm NA 0.22 fiber
- Emitter electrically in series
- Temperature sensor

#### Options:

- Exchangeable window
- Red or green pilot
- Fiber & Power monitor
- OEM LD driver & cooler
- Controllable pilot intensity

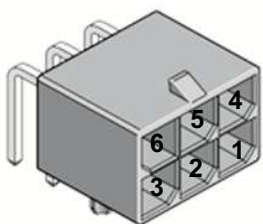
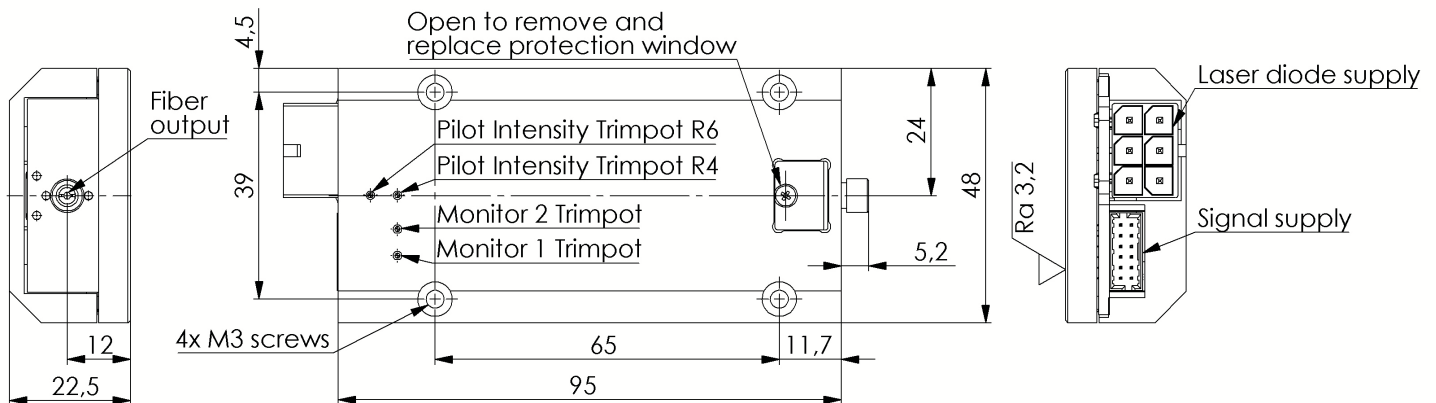
#### Benefits:

- Single emitter long lifetime
- Passive cooling
- Sealed housing
- Small foot print
- SMA connector

#### Applications:

- Therapeutic
- Dental
- Dermatology
- Veterinary
- Pumping

#### Module Drawing (Dimensions in mm)



#### Connector - laser diode supply

Molex<sup>TM</sup> connector (Part No. 172064-0006).  
Pin connection dependant on individual electro-optical configuration. Maximum current per pin is 26 A if total current to cathode exceeds 26 A two pins must be connected to cathode of driver board

#### Counterparts for external cable

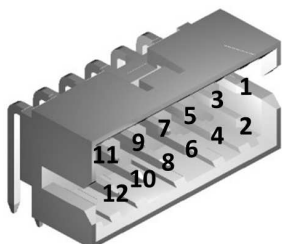
Molex Mega-Fit Receptacle Housing Part No. 171692-0106  
Molex Mega-Fit Female Crimp Terminal Part No. 76823-0322

#### Connector - signals

Connector on laser module Part No. (Mini revision 3 3M 159112-5012) (Mini revision 4 with locking Molex 87833-1231)

#### Counterpart for external cable

Molex Milli Grid Cable to Board Receptacle Part No. 87568-1273 with locking ramp.  
Flat ribbon cable with pitch of 1mm and AWG28



Pin	Configuration
1	Laser diode cathode (-)
2	no connection
3	no connection
4	no connection
5	no connection
6	Laser diode anode (+)

Pin	Configuration
1	Supply +12V
2	Fiber Sensor 1 Out (0-12V) (*)
3	GND1
4	Fiber Sensor 2 Out (0-12V) (*)
5	Monitor Photo Diode 1 Out (0-4)V (*)
6	Pilot Supply (5 V red, 8 V green) (*)
7	Monitor Photo Diode 2 Out (0-4)V (*)
8	Pilot GND2
9	NTC / PT100 / LM35 Supply 5V (*)
10	Pilot intensity control In (0-5)V (*)
11	NTC / PT100 / LM35 Signal (*)
12	No connection

\* optional

**We manufacture diode lasers.**

## Electrical and Optical Characteristics (Typical laser specifications at 25° C \*)

Parameter	Symbol (Conditions)	105µm	200µm	400µm	600µm	Unit
<b>Optical Characteristics</b>						
Maximum output power (1)	$P_{op}$ (c.w.)	27	40	60	65	W
Peak wavelength (at $P_{op}$ )	$\lambda_{peak}$ (c.w.)	1064 ± 10	1064 ± 10	1064 ± 10	1064 ± 10	nm
Spectral width (FWHM)	$\lambda_{FWHM}$	2-9	2-9	2-9	2-9	nm
Spectral shift with temp.	$\lambda_{T\_shift}$	0.3	0.3	0.3	0.3	nm/K
Spectral shift with current	$\lambda_{I\_shift}$	0.8	0.6	0.5	0.4	nm/A
<b>Electrical Characteristics</b>						
Forward current at maximum power	$I_{op}$ (c.w. at $P_{op}$ )	10	14.5	24	26	A
Absolute maximum forward current	$I_{op}$ (c.w. at $P_{op}$ )	11	15.5	25	27	A
Forward voltage	$V_{op}$ (c.w. at $P_{op}$ )	6	6	6.5	6.5	V
Threshold current	$I_{th}$	< 0.5	< 1	< 2	< 2	A
Conversion efficiency	(c.w. at $P_{op}$ )	40	40	40	40	%
<b>Fiber</b>						
Fiber core diameter		105	200	400	600	µm
Fiber centricity		+/-10	+/-10	+/-10	+/-10	µm
Numerical Aperture	NA	0.22	0.22	0.22	0.22	

## Options / General Parameter / Accessories

Parameter	Symbol	Min	Typ	Max	Unit
<b>Pilot Beam (Option)</b>					
Pilot Beam Output Power	red/green - adjustable	0	3/0.5	3/1	mW
Pilot Beam Wavelength	red/green		650±10 / 520±10		nm
Pilot Beam Operating Voltage	red/green		4/7	5/8	V
Pilot Beam Operating Current	red/green			<35/125	mA
Pilot Beam Intensity Control Voltage	red/green	0(max. Intensity)		5(min. Intensity)	V
<b>Sensors (Options)</b>					
Power Monitor Supply Voltage		10	12	14	V
Power Monitor Signal Voltage		0		4 (at max. Power)	V
Fiber Detection Sensor Supply Voltage		10	12	14	V
Fiber Detection Sensor Signal Voltage		0		12	V
Temperature Sensor		Standard NTC (10k) or optional (PT100 or LM35)			

Notes: \* taken at internal temperature sensor, Laser wavelength **880nm - 920nm for any fiber core and 930nm - 1000nm for fiber core <=105(200)µm** require an AR <0.7% (+10nm around peak wavelength) coated fiber facet or end cap on fiber facet module side or power reduction of 30(15)%. Avoid direct feedback from materials like mirrors, optics, processed material etc. back into laser module via the fiber cable by more than 10%.

(1) Power is measured ex fiber according to given fiber specifications including measures and tolerances of fiber and ferrules for uncoated fiber facets (exception see \*).

Minimum repeatable power with internal temperature and current accuracy of +/-0% is <=+/-3% of maximum power. Please add tolerance of your temperature and current control.

(2) Do not exceed maximum forward current for rated power as given above by more than 5% otherwise the laser diode may be damaged

(3) Rule of thumb: Power ex fiber decreases by app. 5% (<1100nm), 7% (>1400nm) and 12% (>1900nm) every 10 °C temperature increase at internal temperature sensor. Lifetime decreases by about factor of two every 10 °C. Required flatness of customer heat sink 0.05mm over entire bottom surface to achieve necessary contact to the heat sink.

(4) Red and green minimum pilot power is set at factory by customer request. Standard is 3/0.5 mW.

(5) Adjust trimpot R6 to set maximum intensity with pin 10 control left open or set to 0.5V

(6) Adjust trimpot R4 to set intensity off with pin 10 control set to 5V

(7) Calculation of the thermal load and necessary thermal resistance of a heat sink to maintain internal diode temperature of 25°C :

Thermal load = Output power \* (1/conversion efficiency - 1)

Heat sink thermal resistance = (25 °C - ambient temperature) / thermal load(8) Calculation example of thermal load and necessary thermal resistance of heat sink to maintain internal diode temperature of 25°C :

Thermal load = Output power \* (1/conversion efficiency - 1)

Heat sink thermal resistance = (25 °C - ambient temperature) / thermal load

Example: Output power: 22 W, Conversion efficiency: 0.22, Thermal resistance between bottom of module to internal temperature sensor: 0.1 K/W, Internal temperature: 25 °C

Thermal load = 22 W \* (1/0.22 - 1) = 80 W , Heat sink thermal resistance = (25 °C - 20 °C) / 80 W = 0.06 K/W

## General Parameters / Accessories

Parameter	Symbol	Min	Typ	Max	Unit
Storage Temperature	$T_S$	-10		55	°C
Internal operating * and (Ambient) temp , c.w.-operation **	$T_{op\ c.w.}$	10(5)		35(40)	°C
Humidity / Non-condensing Atmosphere				90	%
Thermal heat sink resistance				0.1	k/W
Maximum fiber flange temperature				50	°C
Weight			160		g
Compliance			CE, ROHS		

**Further Options** (Please ask for quotation if needed)

Optical fiber patchcord, Laser diode drivers for each individual wavelength, Interface cable , OEM laser diode driver and temperature controller

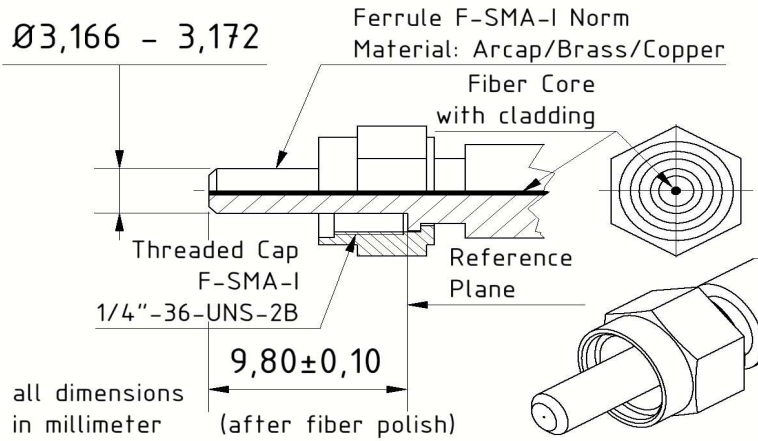
\* taken at internal temperature sensor \*\* we recommend to operate the laser above dew point. Below dew point water condensation on the exit window may damage the window when laser is switched on. If the module was stored below dew point before operation dry the window by pre-heating the module to 25°C

## Fiber Connector

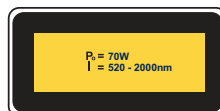
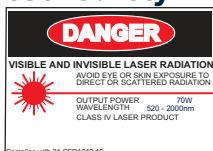
(1) Lumics laser diode fiber coupling technology ensures loss into the fiber cladding of  $<10\%$  (7/8/9/10/14xnm for fiber core  $\leq 105\mu\text{m}$ ),  $<3\%$  (7/8/9/10/14xnm for fiber core  $\geq 200\mu\text{m}$ ) and  $<20/(10)\%$  (19xnm for fiber core  $\geq 200(400)\mu\text{m}$ ) of the total power if the fiber centricity (typically  $\leq 10\mu\text{m}$ ), ferrule diameter and distance of the fiber end facet to the reference plane complies with shown technical drawing and the Lumics fiber data sheet. Use a fiber microscope to check for dust free fiber end facet and fiber centricity.

(2) Free standing fibers suffer from higher risk of fiber damage to the fiber tip due to mechanical stress by handling and the fiber end facet can not be polished as simple as for not free standing fibers.

(3) For more information see the Lumics fiber data sheet [http://www.lumics.de/wp-content/uploads/lu\\_fiber\\_patchcords.pdf](http://www.lumics.de/wp-content/uploads/lu_fiber_patchcords.pdf)



## User Safety



**Important Note** Read and carefully follow operating manual instructions. Especially, whenever power supply is switched on or off, always disconnect from laser module. See manual for details. Uncontrolled on / off switching may cause spikes and result in fatal device damage. This product is not certified with IEC 60825-1 or 21CFR1040.10/21CFR1040.11 and must comply with the applicable regulations by the Purchaser if sold as laser product.

**We manufacture diode lasers.**