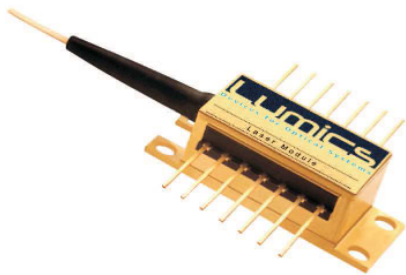




# LU0975M500

## 975 nm Single Mode Laser Module

## up to 500 mW c.w. Operating Power



### Description:

The Lumics single mode laser module contains an optimized GaAs substrate based quantum well high power laser diode. It has been designed for customer specific applications and is available with special FBG's and fibers. The extremely stringent reliability requirements are achieved through our patent pending innovative technology. This includes careful design, exactly defined manufacturing and extensive testing. The qualification contains a set of optoelectronic, thermal and mechanical tests. Each laser diode module is individually serialized for traceability and is shipped with a specified set of test data.

### Features & Functions:

- Single mode pigtail
- Cooled 14pin package
- Telcordia compliant package
- RoHS compliant

### Options:

- FBG-options
- Low rise <1 ns
- Narrow and ultranarrow linewidth
- Connector incl. 900µm protection tube

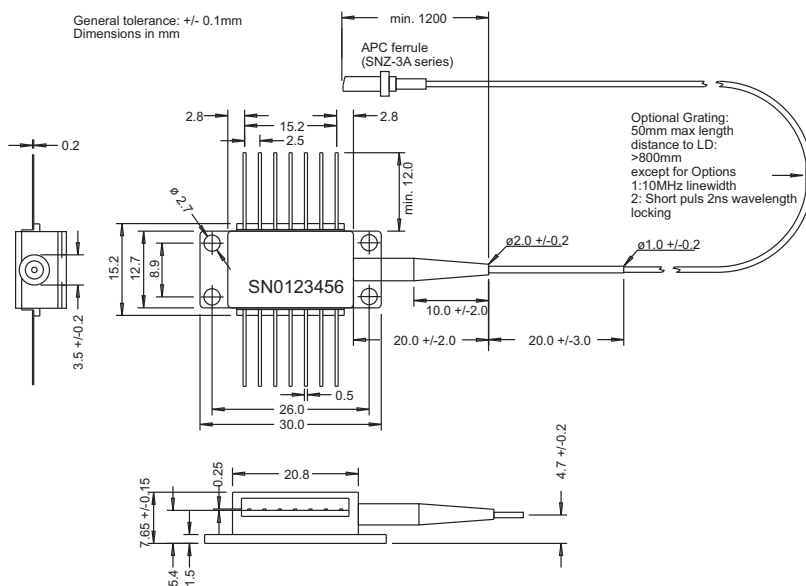
### Benefits:

- All laser welded
- Field proven reliability
- Hermetic sealing

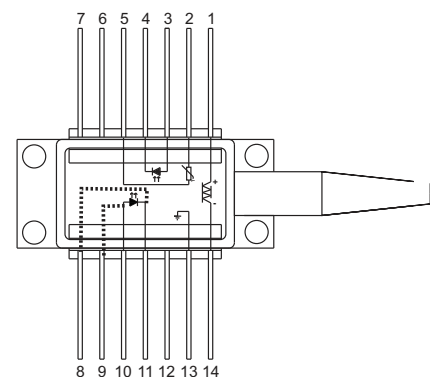
### Applications:

- Sensor applications
- Analytical instruments
- Pumping and seeding
- Printing

### Module Drawing (Dimensions in mm)



## Pin Connections



Pin	Function	Pin	Function
1	Cooler (+)	8	(*) LD Cathode (-)
2	Thermistor	9	(*) LD Anode (+)
3	PD Anode (+)	10	LD Anode (+)
4	PD Cathode (-)	11	LD Cathode (-)
5	Thermistor	12	nc
6	nc	13	Case ground
7	nc	14	Cooler (-)

(\*) Optional low inductive

## We manufacture diode lasers.

## Typical laser specifications at 25°C (\*) (at 25°C (T<sub>chip</sub> and T<sub>case</sub>) and Begin of Life (BOL)):

Parameter	Conditions	Symbol	Min	Typ	Max	Unit
Operating power (1)	c.w.	P <sub>op</sub>		500		mW
Operating current	c.w.	I <sub>op</sub>		770	890	mA
Pulsed operating peak power	< 500ns / duty cycle <5%	P <sub>op</sub>		1200		mW
Pulsed operating peak current	< 500ns / duty cycle <5%	I <sub>op</sub>			2	A
Rise and fall time (2)				2		nsec
Threshold current		I <sub>th</sub>		70		mA
Forward voltage	at I <sub>op</sub>	V <sub>op</sub>		1.75	1.95	V
Peak wavelength λ <sub>peak</sub> (3)	at P <sub>op</sub> , without FBG	λ	970	975	980	nm
Spectral width (FWHM) (3)	at P <sub>op</sub> , without FBG	Δλ	0.05	multiple peaks, 0.1	<2	nm
Spectral width (FWHM) (4)	at P <sub>op</sub> , with FBG only	Δλ	0.05	0.08	0.5	nm
Optical power stability	at I <sub>op</sub> , t = 60 sec	P <sub>op</sub> / t			0.5	%
Spectral shift with internal temp.	without FBG internal T <sub>chip</sub>	Δ / T		0.3		nm/ °C
Spectral shift with temp.	FBG Temp.	Δ / T		0.005	0.01	nm/ °C
Spectral shift with current without FBG (c.w.)				5		nm/A
Spectral shift with current without FBG (100ns / duty cycle 1%)				1		nm/A
Side mode suppression (3)	at P <sub>op</sub> , with FBG			20		dB
Monitor responsivity		R	0.1	0.5	10	μA / mW
Monitor dark current				5	40	nA
TEC current	chip 25°C, case 70°C	I <sub>TEC</sub>		1.2		A
TEC voltage	chip 25°C, case 70°C	V <sub>TEC</sub>		1.9		V
Thermistor resistance	T=25°C	R <sub>th</sub>	9.5	10	10.5	kOhm
Thermistor B constant		B	3850	3950	4050	K
Steinhart-Hart-Equation coefficients	C <sub>1</sub> = 1.1292E-03 / C <sub>2</sub> = 2.3411E-04 / C <sub>3</sub> = 8.7755E-08					
Large signal modulation bandwidth				200		MHz
<b>Fiber Specifications</b>						
Fiber type	single mode (similar to HI 1060)					

### Notes:

- (\*) Wavelength is measured in air. The spectral measurement is always done at operating power and outgoing inspection checks spectral properties at that power value only with the fiber pigtail fully coiled with a radius of about 50mm .
- Ensure sufficient protection against high energy back reflection pulses from solid state lasers. High energy back reflection damages the diode (for example stimulated Brillouin scattering). Typical damage threshold for 8ns pulsed @200KHz is 0.05μJ (this level is not covered under warranty).
  - Rise and fall times depend on appropriate driver and can be lower than 1ns with the low inductive version.
  - Without wavelength stabilisation by a fiber bragg grating(FBG) multiple peaks (side modes) around the average wavelength for a specific current in a range of (1-3) nm are observed. The full width have maximum (FWHM) of those peaks can suddenly narrow or broaden. Side mode suppression counts the first side peaks next to the main peak. A peak is defined by significant lower values left and right to this peak.
  - With wavelength stabilisation by a fiber bragg grating (FBG) a single peak for a specific current is observed. The spectral stability depends on the fiber mechanical stress to the fiber which may change polarization state and peak reflection value of the FBG matching the polarization state of the diode laser. Thus it may be necessary to fix the fiber mechanically to achieve good spectral stability. In order to compensate for a non-locking spectral difference larger than +5nm between diode laser peak wavelength and FBG peak reflection due to the shift (about 5nm/A) of the diode laser peak wavelength with current the customer may tune the internal temperature and peak wavelength (0.3nm/°C) of the diode laser to improve wavelength locking and spectral stability. The full width half maximum (FWHM) of this single peaks is stable over time as long as it is not disturbed by further back reflection from the outgoing optical path.
  - Intensity noise of light from modules with PM fiber after polarizer increases with lower polarization extinction ratio (example 6 /10/13 dB can result in intensity noise as high as 50/20/5 %). The intensity noise is sensitive to varying stress (by mechanical and temperature effects) introduced to the PM fiber.

## General Parameters / Accessories

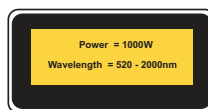
Parameter	Symbol	Min	Typ	Max	Unit
Storage temp.	T <sub>max</sub>	-40		85	°C
Operating case temp.	T <sub>op, case</sub>	-20		70	°C
Operating chip temp.	T <sub>op, chip</sub>	20		40	°C
Soldering temp. (max. 10sec)		260			°C
LD reverse voltage	V <sub>R</sub> , max			2	V
Monitor forward current	I <sub>F</sub> , PD			5	mA
Monitor reverse voltage	V <sub>R</sub> , PD			20	V
TEC current	I <sub>TEC</sub>			2.5	A
TEC voltage	V <sub>TEC</sub>			3.2	V
ESD damage (1)		500		V	
Fiber pigtail bend radius		25			mm

(1) A standard human body model (1.5kOhm, 1000pF) is used for ESD thresholds

### Note:

Absolute maximum rating for the laser diode operating current in cw mode may be applied for short period of time only (<10s). 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.

## 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 by 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.**