ML-Series Microlaser Devices

Standard Microlaser
ML-00005 - Standard 1064nm Microlaser

Enhanced Microlaser Devices
ML-00024 - Standard 532nm Microlaser
ML-00039 - Megachip™ 532nm
ML-00040 - Megachip™ 1064nm

Features Common To Microlasers

- Single Longitudinal Mode
- Polarization Ratio 100:1
- Tunable Pulse Frequency
- Stable Output Energy (< 0.5% Amplitude Jitter)
- Single Transverse Mode
- Short Pulse Width (< 1 ns)
- Good Beam Quality ($M^2 < 1.3$)
- Low Beam Divergence ($\theta_{½} < 6$ mrad)

Standard Microlaser Features

IR(1064 nm) or Green (532 nm) Output Options
High Peak Power (Up to 10 kW at 1064 nm)

MegaChip™ Microlaser Features

IR(1064 nm) or Green (532 nm) Output Options
Very High Peak Power (Up to 40 kW at 1064 nm)

Electrical, Thermal, and Physical Properties – All Products

Electrical and Thermal Characteristics	Symbol	Min.	Typ.	Max	Units
Diode Operating Current (I_{th}=Threshold Current of 1064 nm laser emission)	I_d	I_{th}		1.6	A
Diode Operating Voltage	V_d	1.7	1.85	2.2	V
Diode Series Resistance	R_d		0.15		Ω
Thermal Resistance	R_{th}	0.5			°C/W
TEC Drive Current	I_{TEC}	-3.5	0.8	3.5	A
TEC Drive Voltage	V_{TEC}	-3.5	0.9	3.5	V
Thermistor Resistance	R_{th}	7	10	18	kΩ

These devices are designed to be OEM products. There will be laser radiation emitted at any or all of the following wavelengths: 532 nm, 808 nm, 1064 nm. It is the responsibility of the end user to integrate appropriate safety measures into the final product into which these devices are inserted.

Electrical, Thermal, and Physical Properties – All Products Contd.

Absolute Maximum Ratings	Symbol	Min.	Typ.	Max	Units
Diode Reverse Voltage	V_r			0.2	V
Diode Forward Voltage	V_f			1.9	V
Case Temperature	T_c	-20	25	50	°C
Storage Temperature	T_{sto}	-30		80	°C
Lead Soldering Temperature (5 seconds)	T_{solder}			250	°C
Relative Humidity	RH			95	%

Specifications Common to All Microlasers

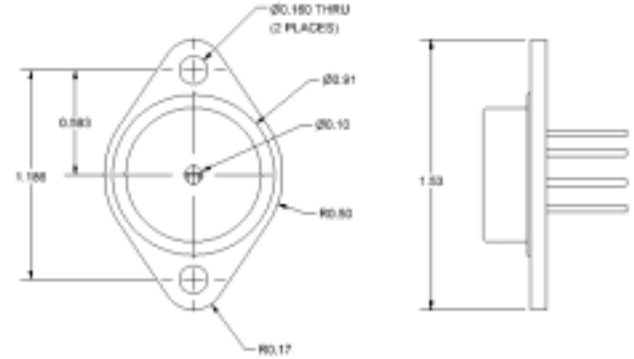
Optical Characteristics	Symbol	Typ.	Units	Notes
Energy Jitter	ΔQ_{pp}	0.5	%	Percent difference between two adjacent pulses.
Energy Drift	ΔQ_{24hr}	<5	%	24 hour difference between typical pulses.
Pulse-Pulse Stability	$\Delta\nu$	<1	%	Percent difference between two adjacent pulses.
Linear Polarization Ratio		100:1		Linear polarization plane horizontal as pictured.
Beam Quality	M^2	≤1.3		
Beam Divergence	$\theta_{½}$	6	mrad	Half angle divergence.
Beam Ellipticity	ε	1.1		

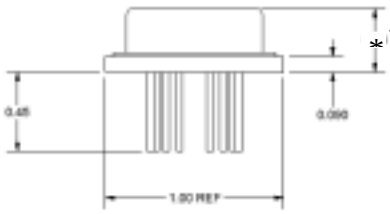
ML-00005 Standard 1064 nm Microlaser	Symbol	Min.	Typ.	Max	Units	Notes
Output Wavelength	λ		1064		nm	
Peak Power	Φ_p	5		10	kW	$\Phi p = Q/\Delta t$
Pulse Energy	Q		5		µJ	
Pulse Repetition Frequency	ν		10		kHz	
Pulse Width	Δt	600		1000	ps	Full-width at half maximum

ML-00024 Standard 532 nm Microlaser	Symbol	Min.	Typ.	Max	Units	Notes
Output Wavelength	λ		532		nm	
Peak Power	Φ_p	2		4	kW	$\Phi p = Q/\Delta t$
Pulse Energy	Q		2		µJ	
Pulse Repetition Frequency	ν		10		kHz	
Pulse Width	Δt	600		1000	ps	Full-width at half maximum

ML-00039 Megachip™ 532 nm Microlaser	Symbol	Min.	Typ.	Max	Units	Notes
Output Wavelength	λ		532		nm	
Peak Power	Φ_p	4		10	kW	$\Phi p = Q/\Delta t$
Pulse Energy	Q		4		µJ	
Pulse Repetition Frequency	ν		8		kHz	
Pulse Width	Δt	500		900	ps	Full-width at half maximum

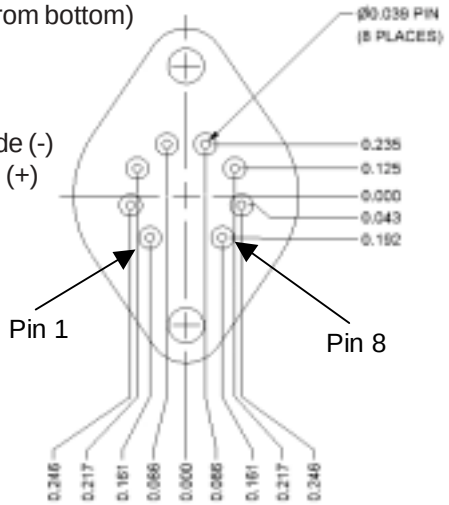
ML-00040 Megachip™ 1064 nm Microlaser	Symbol	Min.	Typ.	Max	Units	Notes
Output Wavelength	λ		1064		nm	
Peak Power	Φ_p	10		40	kW	$\Phi p = Q/\Delta t$
Pulse Energy	Q		12		µJ	
Pulse Repetition Frequency	ν		8		kHz	
Pulse Width (FWHM)	Δt	500		900	ps	Full-width at half maximum





All dimensions in inches
*The lid height varies by part number.
0.42 or 0.85 for ML-00005
0.85 for ML-00024
0.85 for ML-00039
0.42 for ML-00040

Pin-out (view is from bottom)
1. TEC(+)
2. Thermistor
3. Thermistor
4. Laser Cathode (-)
5. Laser Anode (+)
6. NC
7. NC
8. TEC (-)



Note:
Case ground is Connected to Laser Anode

- For P/N's ML-00005 and ML-00040, the direction of the polarization is perpendicular to the mounting holes.
- For P/N's ML-00024 and ML-00034, the direction of the polarization is clocked 45 degrees to the mounting holes.

Product Warranty

ML Series Microlasers

ML Series Devices are warranted to be free of materials and manufacturing defects for a period of one year from receipt of the device by the Purchaser. During the warranty period, failed products may be returned to Poly-Scientific for free replacement if, in the opinion of Poly-Scientific, the product failed due to material or manufactuing defect. All end users are expected to:

- Handle all devices using proper ESD prevention techniques.
- Never exceed the maximum drive current specified by the test report of the device.
- Never exceed the maximum TE temperature specified by the test report of the device.
- Properly heat-sink active devices to provide an appropriate level of heat dissipation.

Please contact an Applications Engineer if you have any questions regarding the operation or maintenance of Microlaser devices.

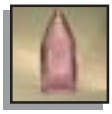
Field of Use Restrictions

ML Series Microlasers

The rights that customers receive through the purchase of these products are restricted and exclude any right to use the product for ranging, positioning, aligning, and the characterization of optical properties of a measurement path (e.g. index of refraction). By way of further explanation of the characterization of optical properties of a measurement path, the optical properties of the path that are affected by changes in temperature, pressure, or chemical composition (for example, fractional mixture of Nitrogen and Oxygen) of elements or molecules in the path. It is understood that the limitation of this field of use explicitly does not include the broad areas of temperature measurement, pressure measurement, chemical analysis, or spectroscopic analysis. Please contact an Applications Engineer if you have any questions regarding the field of use of this product.

This microlaser product is manufactured under a license granted under the U.S. Patent 5,394,413. Features of microlaser products are also covered under U.S. Patents 6,055,815, 6,072,815, and 6,240,113 or foreign equivalent patents. Additional U.S. and foreign patents are pending.

Summary of Laser Crystals



Nd:YAG - Operating wavelengths of 940nm, 1064nm, 1320nm, and 1440nm. Most utilized material over a broad market area. Applications include industrial, medical, military, and scientific. Diameters as small as 1.2mm and lengths up to 250mm with dopant concentrations from 0.25% to 1.3%.

Er:YAG - Operating wavelength of 2940nm. A high optical quality material used in a wide variety of medical and dental applications.

CTH:YAG - Operating wavelength of 2080nm in flashlamp or diode pumped systems. The majority of applications are in the medical field with several military applications.

Alexandrite - Tunable laser material from 700nm to 800nm. Used in a variety of medical applications such as tattoo and hair removal.

Nd:YLF - Operating wavelengths of 1047nm and 1053nm. Nd:YLF offers an alternative to Nd:YAG due to its wider absorption band and performance in pico-second pulse width laser systems. Applications include industrial and scientific.

Nd:YVO4 - Operating wavelength of 1064nm. Promising material for diode pumped laser systems. 18nm absorption band width along with higher gain cross section and lower threshold make this material advantageous over Nd:YAG. Applications include industrial and scientific.

Er, Cr:YSGG - Operating wavelength of 2796nm. The majority of applications today are in the medical field due to its operation in the key primary water absorption band.

KTP - (Potassium Titanyl Phosphate) - Grown by the Hydrothermal method, this nonlinear optical material is mainly used for frequently doubling of near IR light (1 micron) to visible green light. KTP grown by hydrothermal method offers advantages to material grown by the flux method of higher damage threshold, higher conversion efficiency, and better gray track resistance. Applications today are military, medical, industrial, and scientific.

Cr4+:YAG - Used as a saturable absorber in 1064nm laser systems. This material provides high power laser pulses without electro-optic Q-Switches. This enables the user to reduce over-all package size and eliminates the need for a high voltage power supply. Cr4+:YAG is more robust than dyes or color centers.

TGG - Crystal material for use in optical isolators and faraday rotators. TGG has twice the verdet constant of Terbium doped glass, a greater thermal conductivity, and reduced optical losses.

Co2+:Spinel - Used as a saturable absorber in 11540nm (eye safe) laser systems. As with other saturable absorbers, this material offers the ability to reduce package size and eliminate the need for a high voltage power supply.

Nd:GdVO4 - Operating wavelength of 1063nm. The newest material to be offered for use in diode pumped solid state lasers. Like Nd:YVO4, this material exhibits a larger absorption and emission cross section compared to Nd:YAG. Nd:GdVO4 has a 7 times higher absorption cross section at 808nm and a 3 times larger emission cross section at 1064nm with much higher thermal conductivity.

NORTHROP GRUMMAN
Component Technologies

Poly-Scientific

1201 Continental Blvd.
Charlotte, NC 28273
Phone: 704-588-2340
FAX: 704-588-2516
Web: www.polysci.com