

Symphotic TII Corporation

Laser Products Catalog, 2007



“Take a Closer Look”

www.NdYAG.com

www.symphotic.com

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Laser Products Catalog

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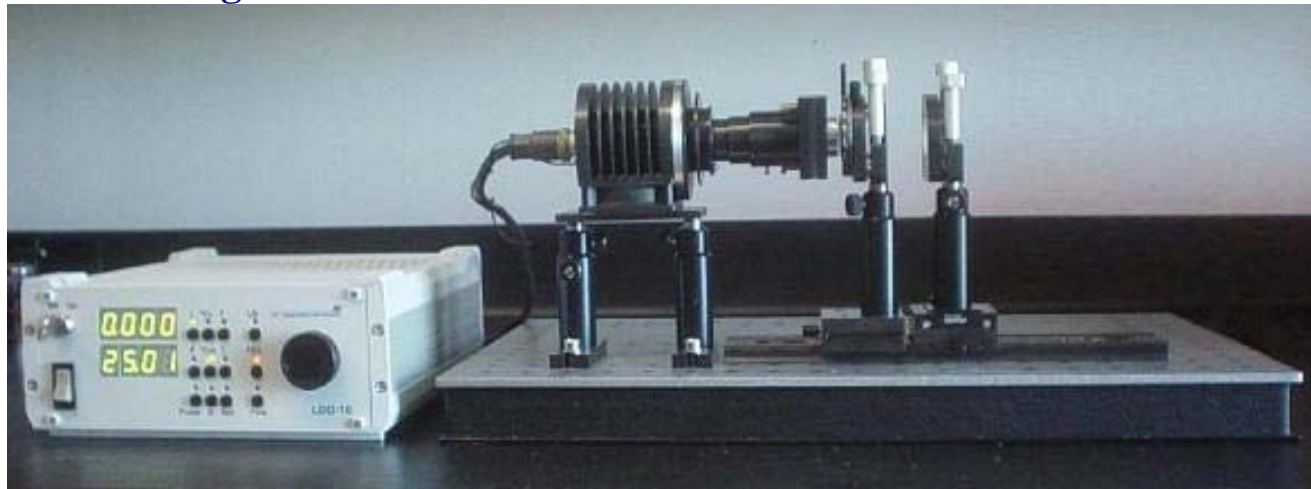
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The Teaching Laser



Our Solid state laser kit for teaching laser theory, operation and technology. Also recommended for general laboratory use.

A versatile laser together with course materials designed to enhance university and college level curricula in laser physics and laser technology. Equally at home in laboratories where a simple laser is required



Key Benefits

- Diode pumped Nd:KGW laser is both rugged and simple to operate
- Workbook includes fourteen basic and advanced laser experiments that demonstrate laser principles
- Operates in C9W and Q-switched mode
- Modular, portable design
- Operates in fundamental frequency (1067 nm), second harmonic (533.5 nm), and in Raman shifted mode (1180 nm)

Parameter	Specification
Active Crystal	Potassium Gadolinium Tungstate doped with Nd ³⁺ (Nd:KGW)
Pump type	Longitudinal Diode Pumpin
Diode Pump Power, 808 nm	0 to 1.6 W, Tunable
Laser Cavity Length	Demi-confocal, 75.0 or 50.0 mm, adjustable
Output wavelength	1067 nm fundamental 533.5 nm second harmonic 1180 nm Raman conversion
Output power, (0.95 W pump power)	≥330 mW CW at 1067 nm ≥130 mW Q-Switch at 1067 nm ≥25 mW CW at 533.5 nm ≥25 mW Q-Switch at 533.5 nm ≥0.1 mW Q-Switch at 1180 nm
Repetition Rate in Q-switch mode	40 kHz
Power requirements	Single phase 110V/220V, 50–60 Hz, 100 W

Laser experiments included with the Teaching Laser Workbook:

Experiment 1: Measuring the relaxation time of the upper laser level of $\text{Nd}^{3+}\text{KGd}(\text{W}_4)_2$

Experiment 2: CW laser operation

Experiment 3: Single mode laser operation and resonator Stability

Experiment 4: Laser threshold and output power in CW operation

Experiment 5: Passive Q-Switch operation and laser output characterization

Experiment 6: Passive Q-Switch pulse rate and pulse duration

Experiment 7: Intracavity CW second harmonic generation

Experiment 8: Intracavity Q-switched second harmonic generation.

Experiment 9: Intracavity Raman self-conversion using Q-switched operation

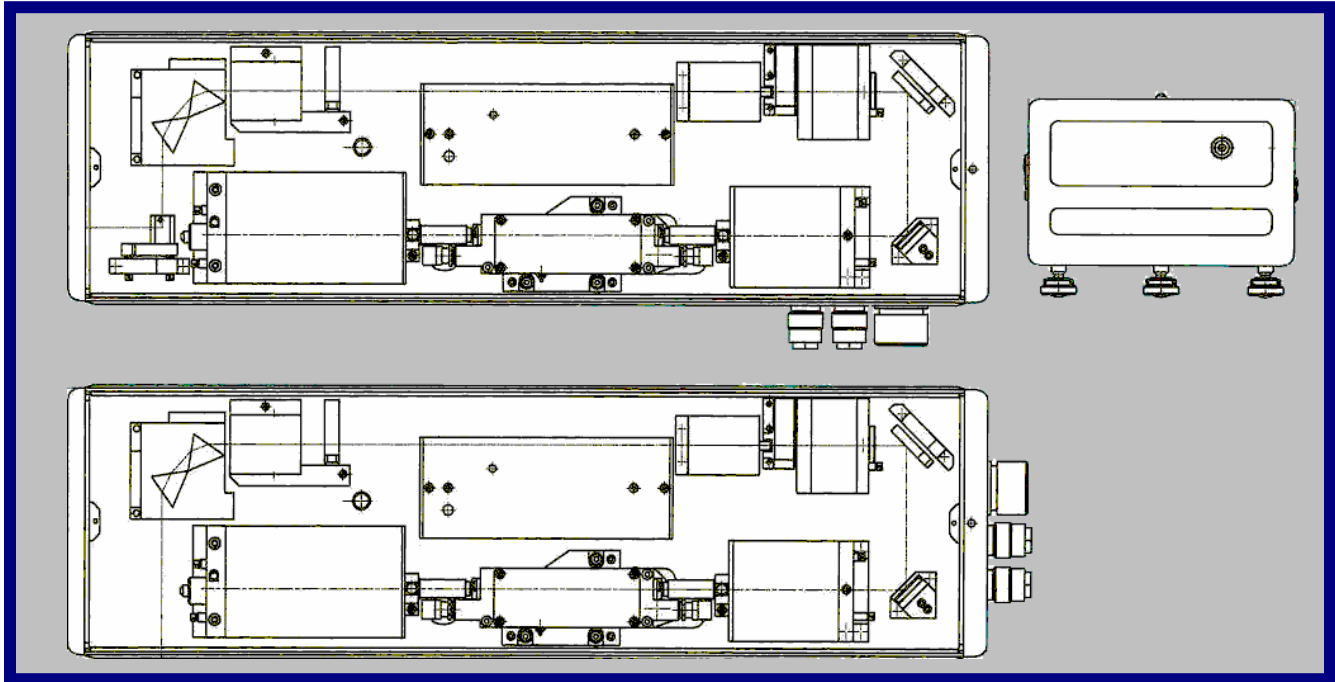
For more information visit www.ndyag.com

The Teaching Laser is produced in collaboration with the Institute for Lasers, Photonics, and Biophotonics of SUNY/at Buffalo and Laser Photonics Technology, Inc.

Lotis TII Laser Products Nd:YAG lasers and accessories

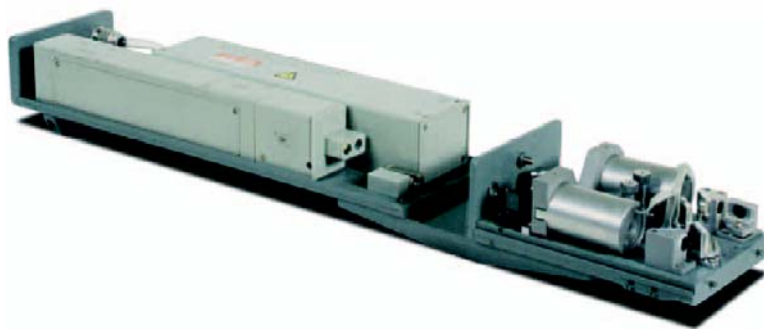
Custom Laser Systems from Symphotic TII and LOTIS TII

Let our engineers work with you to build a custom laser system for your OEM or research application. Our lasers have been designed into commercial laser ablation systems, laser range finding, medical devices, spectroscopy systems, laser marking systems, and laser engraving devices.



Example OEM Product: High Power 213 nm Compact Laser System for Laser Ablation with two output configurations

Our lasers, with their high reliability, modular design, ease of service, and rugged construction, are highly suited to your OEM requirements, and we can offer powerful and economical solutions wherever you need a solid state laser. Please contact us and let us exchange ideas.



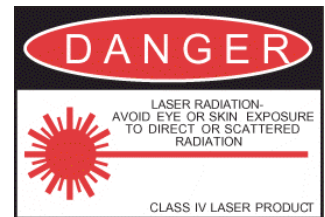
NEW: Picosecond lasers from Symphotic TII: The LS-2151



High Power Picosecond Mode-Locked Nd:YAG Laser: LS-2151

Features:

- Separate MO and PA pump power control in single unit
- Water to air heat exchanger without external water cooling
- TEM₀₀ master oscillator
- Computer-controlled laser operation via RS-232 or USB port
- Third and fourth harmonic generators (optional)
- Autocorrelator for laser adjustment and pulse duration monitoring (optional)
- Built-in MO, PA and SH energy monitoring



The master oscillator operates using comprehensive cavity Q-control which provides mode locking at feedback pre-lase stabilization, Q-switching and selection of the single optical ultrashort pulse from the master oscillator cavity. Pulse formation at feedback stabilized pre-lasing provides highly reproducible generation of 70 ps pulses.

Synchronization to external devices

The triggering of the flash lamps and all Q-control events in the laser (mode locking rf-pulse, Q-switching and cavity dumping) are monitored by the control unit with a multichannel timing circuit phase locked to the signal of the reference oscillator. This keeps system time in the cavity roundtrip units. The use of such timing circuit allows new possibilities for the optical pulse synchronization to external devices:

TTL output sync pulse either forthcoming or delayed relative to an optical pulse in the range $\pm 120\mu\text{s}$ with a 1 ns resolution and timing jitter of less than 200ps;

Laser triggering by external TTL sync pulse with the optical pulse delay is in the range 110-140 μs with timing jitter of $\pm 10\text{ns}$;

Two LS-2151 lasers synchronization to an accuracy about of $\pm 15\text{ ps}$.

Energy monitoring

The LS-2151 has built in photo-detectors monitoring the energies of the MO, PA and SH output pulses. Energy values are indicated in the laser control window of the remote control PC. Independent discharge circuits for MO and PA flash lamps allow adjustment of the output energy of laser system to optimize for the application requirements.

Specifications (as of August, 2006 and subject to change)

Parameter	Value	Comments
Energy		
1064 nm	70	
532 nm	35	
355 nm	15	With harmonic generator
266 nm	15	With harmonic generator
Pulse duration at 1064 nm	70 – 80 ps	
Pulse repetition rate	15 Hz	
Beam divergence	$\leq 0.7\text{ mrad}$	full angle for 86% of energy
Beam diameter	9 mm	
Delay between laser pulses		
Jitter	$\pm 10.0\text{ ns}$	RMS Relative to external triggering
Energy stability		
1064 nm	± 2.5	
532 nm	± 3.5	
355 nm	± 4.0	
266 nm	± 3.0	requires automatic phase matching control
Size and Weight		
Laser Head	820 x 406 x 136	
Power Supply	512 x 485 x 177	
Cooling System	542 x 485 x 266	
Control Unit	512 x 485 x 133	
Power requirements	Single phase 220 \pm 20 V, 50–60 Hz, 600 W	

Q-switched Nd:YAG Lasers: LS-2130, LS-2131, LS-2132, LS-2134, LS-2135



The LOTIS TII pulsed Nd: YAG lasers LS-2130–LS-2135 are designed to provide years of trouble free operation in even the most demanding environments.

Our unique folded resonator allows these lasers to feature compact size and highly stable output characteristics. The ruggedly mounted optics are virtually immune to the thermal and physical shocks. Although these lasers are compact in size, all components and service parts are easily accessible. The diffuse close-coupled pumping chamber provides for efficient and uniform pumping of laser rod.

As with all our lasers, these compact lasers have been designed for quick and easy interchange of the flashlamp without readjustment of the laser resonator. The flashlamp operates in idle mode to provide stability and long life. The cooling system consists of hermetic water pump, flow, temperature and level sensors and water-to-air heat exchanger. A commercial off the shelf water purification filter is used for long-term operation.

Key Features:

- Repetition rate: 1 to 20 Hz, Small divergence
- Compact size
- Menu-driven remote control
- RS-232C Interface
- Rugged and reliability



Specifications (as of August, 2006 and subject to change)

Parameter	LS-2130	LS-2131	LS-2132	LS-2134	LS-2135
Energy					
1064 nm	50 mJ	100 mJ	180 mJ	250 mJ	340 mJ
532 nm	25	50	100	150	170
Pulse duration (1064 nm) (FWHM)	9–11 ns	9–11 ns	10–12 ns	10–12 ns	10–12 ns
Pulse repetition rate	1–20 Hz	1–20 Hz	1–15 Hz	1–15 Hz	1–10 Hz
Beam divergence	1.0 mrad	1.5 mrad	2.0 mrad	2.5 mrad	2.5 mrad
Beam diameter, mm	3 mm	4 mm	5 mm	6.3 mm	8 mm
Jitter	±1.0 ns(w.r.t external trigger of Q-switch)				
Energy Stability,	±2.5 % (shot to shot for 99 % of pulses)				
Dimensions	LxWxH, mm (weight, kg)			LxWxH, in. (weight, lbs)	
Laser Head	567 x 152 x 90 (9.5)			22.3 x 6 x 35.5 (21)	
Power Supply	363 x 364 x 192 (15.5)			14.3 x 14.3 x 7.6 (34)	
Cooling System	363 x 364 x 192 (12.5)			14.3 x 14.3 x 7.6 (27.5)	
Remote Control	130 x 180 (0.5)			5 x 7 (1)	
Power requirements	Single phase 220±20 V, 50–60 Hz, 500 W				

Double Pulsed Nd:YAG Lasers: LS-2131D, LS-2132D, LS-2134D



The LOTIS TII double pulsed lasers (DPL) are designed to provide highly stable pulsed IR and visible light. These lasers incorporate two independent laser resonators pumped by a single flash lamp and integrated into one laser emitter. A single power supply and single cooling unit are used in the DPL. LOTIS TII DPLs provide stable, pulsed IR and green output for Particle Image Velocimetry (PIV), Laser Induced Breakdown Spectroscopy (LIBS) and other kinetic applications.

Dual output ports allow each oscillator to operate independently when desired. The DPL can be fitted with all LOTIS harmonic generators and tunable solid state lasers.

Key Features:

- Double pulsed output
- Small divergence
- Compactness
- Menu-driven remote control
- Rugged reliability
- Multiple triggering options: remote control, external TTL, external computer control.



Specifications (as of August, 2006 and subject to change)

Parameter	LS-2131D	LS-2132D	LS-2134D
Energy			
1064 nm	100 mJ	140 mJ	200 mJ
532 nm	50	75	110
Pulse duration (1064 nm) (FWHM)	9–11 ns	10–12 ns	10–12 ns
Pulse repetition rate	1–15 Hz	1–15 Hz	1–10 Hz
Beam divergence	1.5 mrad	2.0 mrad	2.5 mrad
Beam diameter, mm	4 mm	5 mm	6.3 mm
Delay between pulses	1-80 μ s with 1 μ s step. Other steps (10 or 100 ns) available on special order		
Jitter (w.r.t external trigger of Q-switch)	\pm 1.0 ns		
Energy Stability, shot to shot for 99 % of pulses	\pm 3.0 %		
Dimensions		LxWxH, mm (weight, kg)	LxWxH, in. (weight, lbs)
Laser Head		755 x 270 x 113 (20) (21 for LS-2134D)	29.7 x 10.6 x 4.5 (44) (46 for LS-2134D)
Power Supply		363x364x192 (15.5) (16.6 for LS-2134D)	14.3x14.3x7.6 (34) (36.5 for LS-2134D)
Cooling System		363x364x192 (12.5)	14.3x14.3x7.6 (27.5)
Remote Control		130x180 (0.5)	5.1x7.1 (1)
Power requirements	Single phase 220 \pm 20 V, 50–60 Hz, 600 W		

Double Pulsed Two Color Nd:YAG Laser: LS-2134D-C



The LOTIS TII LS-2134D-C is a new enhanced model from our family of LOTIS double pulsed Nd:YAG lasers. Like all our dual pulse laser systems, LS-2134D-C provides operation with two output pulses of equal energy and adjustable temporal separation between pulses. Unlike other models, the LS-2134D-C generates two pulses: one in the VIS and one in the UV. The LS-2134D-C3 (standard configuration) has SH output (532 nm) and TH output (355 nm). It is ideally suited for two color particle image velocimetry (PIV), laser induced breakdown spectroscopy, Differential Absorption LIDAR (DIAL), Laser Induced Fluorescence Spectroscopy (LIFS), and

pumping tunable lasers.

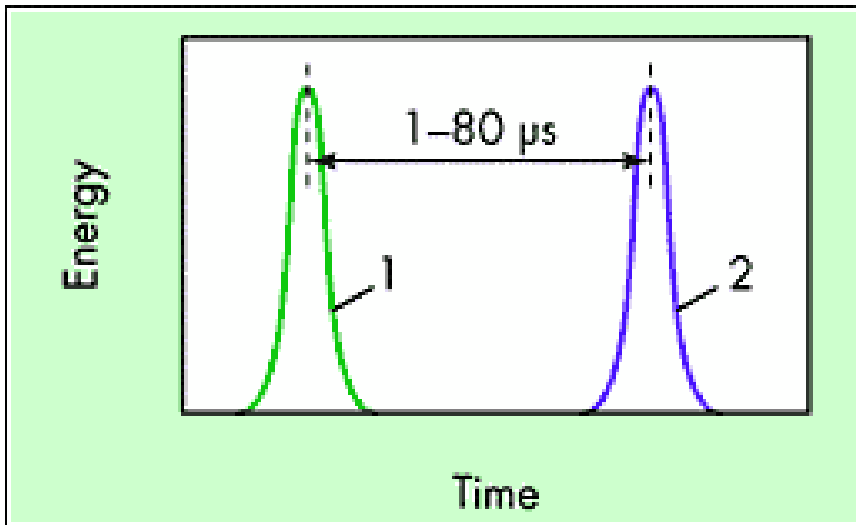
Key Features:

- Double pulsed, 2 color
- Menu-driven remote control
- RS-232 interface
- Storing and recalling parameter function for different operation modes



Specifications (as of August, 2006 and subject to change)

Parameter	Value		Comments
Energy	LS-2134D-C3	LS-2134D-C4	
1064 nm	200 mJ	200 mJ	
532 nm	100	100	
355 nm	30	—	
266 nm	—	30	
Pulse duration at 1064 nm	14–16 ns		FWHM
Pulse repetition rate	1–10 Hz		
Beam divergence	≤1 mrad		Full angle for 86% of energy
Beam diameter	6 mm		
Delay between laser pulses	1–80 μs		1 μs steps, other steps (10–100 ns) are available on request
Jitter	±1.0 ns		w.r.t. external trigger of Q-switch
Energy stability at 1064 nm	±3.0 %		shot to shot for 99% of pulses
Size and Weight	Size LxWxH, mm(Weight, kg)		Size LxWxH, in. (Weight, lbs)
Laser Head	755x270x113 (21.0)		29.7x10.6x4.4 (46.3)
Power Supply	363x364x192 (15.5)		14.3x14.3x7.6 (34.2)
Cooling System	363x364x192 (15.5)		14.3x14.3x7.6 (34.2)
Remote Control	130x180 (0.5)		5.1x7.1 (1.1)
Power requirements	Single phase 220±20 V, 50–60 Hz, 600 W		



LS-2134D

Temporal diagram of output pulses

1. 532 nm (green)

2. 355 nm (ultraviolet)

Q-switched Nd:YAG Laser, Short Pulse: LS-2132U



The LOTIS TII LS-2132U is a compact, short pulse laser with a variable reflectivity mirror (VRM) resonator gives excellent harmonic conversion due to increased spatial uniformity of output beam, low divergence and short pulse duration. The sealed beam path eliminates the possibility of contamination of resonator optics. The LS-2132U the ideal tool for research (LIDAR, spectroscopy including LIF, LIBS) and OEM applications.

Key Features:

- Pulse repetition rate up to 15 Hz
- Output energy up to 100 mJ
- Short pulse length
- Menu-driven remote control
- RS-232 interface



Specifications (as of August, 2006 and subject to change)

Parameter	Value	Comments
Energy:		
	1064 nm	180mJ
	532 nm	100
Pulse duration		
	1064 nm	5-6 ns
	532 nm	4-5
Pulse repetition rate	1-15 Hz	
Beam divergence	≤0.7 mrad	Full angle for 86% of energy
Beam diameter	≤5 mm	
Jitter	±1.0 ns	w.r.t external trigger of Q-switch
Pointing stability	0.1 mrad	
Energy stability at 1064 nm	±3.0 % max	shot to shot for 99% of pulses
Size and Weight	LxWxH, mm (Weight, kg)	LxWxH, in. (Weight, lbs)
	Laser Head	647 x 185 x 113 (16.0)
	Power Supply	363 x 364 x 192 (15.5)
	Cooling System	363 x 364 x 192 (12.5)
	Remote Control	130 x 180 (0.5)
Power requirements	(220±20) V, (50-60) Hz; single phase, 0.5 A	5.1 x 7.1 (1.1)



Q-switched Nd:YAG Laser, Short Pulse, with Built-in Harmonics: LS-2131UF, LS-2131UTF, LS2131UF5

The LOTIS TII LS-2131UX series includes compact, short pulse lasers with built-in second, third, fourth, and fifth harmonics. The VRM resonator gives excellent harmonic conversion due to increased spatial uniformity of output beam, low divergence and short pulse duration. The sealed beam path eliminates the

possibility of contamination of resonator optics. These lasers are ideal tools for research, scientific and OEM applications.

Key Features:

- Pulse repetition rate up to 15 Hz
- Output energy up to 100 mJ
- Short pulse length
- Menu-driven remote control
- RS-232 interface



Specifications (as of August, 2006 and subject to change)

Parameter	Value			Comments
	2132UF	2132UTF	2132UF5	
Energy:				
1064 nm	100 mJ	100 mJ	100 mJ	
532 nm	50 mJ	50 mJ	50 mJ	
355 nm	--	25 mJ	--	
266 nm	12 mJ	12 mJ	12 mJ	
213 nm	--	--	5 mJ	
Pulse duration				
1064 nm	5-6 ns			
532 nm	4-5 ns			
355 nm	4-5 ns			
266 nm	4-5 ns			
213 nm	4-5 ns			
Pulse repetition rate	1-15 Hz			
Beam divergence	≤0.7 mrad			Full angle for 86% of energy
Beam diameter	≤5 mm			
Jitter	±1.0 ns			w.r.t external trigger of Q-switch
Pointing stability	0.1 mrad			
Energy stability at 1064 nm	±3.0 % max			shot to shot for 99% of pulses
Size and Weight	LxWxH, mm (Weight, kg)			LxWxH, in. (Weight, lbs)
Laser Head	647 x 185 x 113 (16.0)			25.5 x 7.3 x 4.5 (30.9)
Power Supply	363 x 364 x 192 (15.5)			14.3 x 14.3 x 7.6 (34.2)
Cooling System	363 x 364 x 192 (12.5)			14.3 x 14.3 x 7.6 (27.6)
Remote Control	130 x 180 (0.5)			5.1 x 7.1 (1.1)
Power requirements	220±20 V, 50-60 Hz; single phase, 0.5 A			220±20 V, 50-60 Hz; single phase, 0.5 A upon request



Q-switched Nd:YAG Laser, Short Pulse, with Built-in Harmonics: LS-2132UF, LS-2132UTF, LS2132UF5

The LOTIS TII LS-2132UX series includes compact, short pulse lasers with built-in second, third, fourth, and fifth harmonics. The VRM resonator gives excellent harmonic conversion due to increased spatial uniformity of output beam, low divergence and short pulse duration. The sealed beam path eliminates the

possibility of contamination of resonator optics. These lasers are ideal tools for research, scientific and OEM applications.

Key Features:

- Pulse repetition rate up to 15 Hz
- Output energy up to 180 mJ
- Short pulse length
- Menu-driven remote control
- RS-232 interface



Specifications (as of August, 2006 and subject to change)

Parameter	Value			Comments
	2132UF	2132UTF	2132UF5	
Energy:				
1064 nm	180 mJ	180 mJ	180 mJ	
532 nm	120 mJ	120 mJ	120 mJ	
355 nm	--	40 mJ	--	
266 nm	25 mJ	25 mJ	25 mJ	
213 nm	--	--	4 mJ	
Pulse duration				
1064 nm	5-6 ns			
532 nm	4-5 ns			
355 nm	4-5 ns			
266 nm	4-5 ns			
213 nm	4-5 ns			
Pulse repetition rate	1-15 Hz			
Beam divergence	≤0.7 mrad			Full angle for 86% of energy
Beam diameter	≤5 mm			
Jitter	±1.0 ns			w.r.t external trigger of Q-switch
Pointing stability	0.1 mrad			
Energy stability at 1064 nm	±3.0 % max			shot to shot for 99% of pulses
Size and Weight	LxWxH, mm (Weight, kg)			LxWxH, in. (Weight, lbs)
Laser Head	647 x 185 x 113 (16.0)			25.5 x 7.3 x 4.5 (30.9)
Power Supply	363 x 364 x 192 (15.5)			14.3 x 14.3 x 7.6 (34.2)
Cooling System	363 x 364 x 192 (12.5)			14.3 x 14.3 x 7.6 (27.6)
Remote Control	130 x 180 (0.5)			5.1 x 7.1 (1.1)
Power requirements	(220±20) V, (50-60) Hz; single phase, 0.5 A			

Q-switched Nd:YAG Laser, Long Pulse, with Built-in Harmonics: LS-2132LP, LS-2132LPF, LS2132LPTF



The LOTIS TII LS-2132LPX series includes compact, long pulse lasers with built-in second, third, and fourth harmonics. The sealed beam path eliminates the possibility of contamination of resonator optics. These lasers are ideal tools for research, scientific and OEM applications.

Key Features:

- Pulse repetition rate up to 15 Hz
- Output energy up to 150 mJ
- Long pulse length
- Menu-driven remote control
- RS-232 interface

Preliminary Specifications (as of September, 2006 and subject to change)

Parameter	Value			Comments
	2132UF	2132UTF	2132UF5	
Energy:				
1064 nm	180 mJ	180 mJ	180 mJ	
532 nm	120 mJ	120 mJ	120 mJ	
355 nm	--	40 mJ	--	
266 nm	25 mJ	25 mJ	25 mJ	
213 nm	--	--	4 mJ	
Pulse duration				
1064 nm	>20 ns			
532 nm	> 20 ns			
355 nm	> 20 ns			
266 nm	> 20 ns			
Pulse repetition rate	1–15 Hz			
Beam divergence				Full angle for 86% of energy
Beam diameter				
Jitter	±1.0 ns			w.r.t external trigger of Q-switch
Pointing stability	0.1 mrad			
Energy stability at 1064 nm	±3.0 % max			shot to shot for 99% of pulses
Size and Weight	LxWxH, mm (Weight, kg)			LxWxH, in. (Weight, lbs)
Laser Head	647 x 185 x 113 (16.0)			25.5 x 7.3 x 4.5 (30.9)
Power Supply	363 x 364 x 192 (15.5)			14.3 x 14.3 x 7.6 (34.2)
Cooling System	363 x 364 x 192 (12.5)			14.3 x 14.3 x 7.6 (27.6)
Remote Control	130 x 180 (0.5)			5.1 x 7.1 (1.1)
Power requirements	(220±20) V, (50–60) Hz; single phase, 0.5 A			

Specifications are preliminary



Q-switched Nd:YAG Laser, Short Pulse: LS-2134U

The LOTIS TII LS-2134U is improved modification of our highly reliable LS-2134 laser. This modification includes a Variable Reflectivity Mirror (VRM), and features rugged design, high stability and user friendly operation. The VRM resonator gives excellent harmonic conversion due to increased spatial uniformity of output beam, low divergence and short pulse duration. The sealed beam path eliminates the possibility of contamination of resonator optics. The LS-2134U the ideal tool for research (LIDAR, spectroscopy including LIF, LIBS) and OEM applications.

- Pulse repetition rate up to 15 Hz
- Output energy up to 270 mJ
- Menu-driven remote control
- RS-232 interface

Key Features:



Specifications (as of August, 2006 and subject to change)

Parameter	Value	Comments
Energy:		
1064 nm	270 mJ	
532 nm	170	
355 nm	60	with Harmonic Generator Assembly
266 nm	40	with Harmonic Generator Assembly
213 nm	6	with Harmonic Generator Assembly
Pulse duration		
1064 nm	7–8 ns	
532 nm	6–7	
355 nm	5–7	with Harmonic Generator Assembly
266 nm	5–6	with Harmonic Generator Assembly
213 nm	5–6	with Harmonic Generator Assembly
Pulse repetition rate	1–15 Hz	
Beam divergence	≤0.8 mrad	Full angle for 86% of energy
Beam diameter	≤6 mm	
Jitter	±1.0 ns	w.r.t external trigger of Q-switch
Pointing stability	0.1 mrad	
Energy stability at 1064 nm	≤±3.0 %	shot to shot for 99% of pulses
Size and Weight	LxWxH, mm (Weight, kg)	LxWxH, in. (Weight, lbs)
Laser Head	674x146x120 (14.0)	26.5x5.7x4.7 (30.9)
Power Supply	363x364x192 (15.5)	14.3x14.3x7.6 (34.2)
Cooling System	363x364x192 (12.5)	14.3x14.3x7.6 (27.6)
Remote Control	130x180 (0.5)	5.1x7.1 (1.1)
Power requirements	(220±20) V, (50–60) Hz; single phase, 0.5 A	

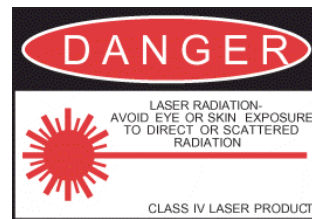
Q-switched Nd:YAG Laser, Short Pulse, with Built-in Harmonics: LS-2134UF, LS- 2134UTF



The LOTIS TII LS-2134UF and LS-2134UTF are compact, short pulse laser with built-in second, third, and fourth harmonics. The VRM resonator gives excellent harmonic conversion due to increased spatial uniformity of output beam, low divergence and short pulse duration. The sealed beam path eliminates the possibility of contamination of resonator optics. These lasers are ideal tools for research, scientific and OEM applications.

Key Features:

- Pulse repetition rate up to 15 Hz
- Output energy up to 270 mJ
- Short pulse length
- Menu-driven remote control
- RS-232 interface



Specifications (as of August, 2006 and subject to change)

Parameter	Value		Comments
	2134UF	2134UTF	
Energy:			
1064 nm	270	270 mJ	
532 nm	170	170	
355 nm	--	60	
266 nm	40	40	
213 nm	6	6	With 5 th harmonic generator
Pulse duration			
1064 nm	7–8 ns		
532 nm	6–7		
355 nm	5–7		
266 nm	5–6		
213 nm	5–6		
Pulse repetition rate	1–15 Hz		
Beam divergence	≤0.8 mrad		Full angle for 86% of energy
Beam diameter	≤6 mm		
Jitter	±1.0 ns		w.r.t external trigger of Q-switch
Pointing stability	0.1 mrad		
Energy stability at 1064 nm	≤±3.0 %		shot to shot for 99% of pulses
Size and Weight	LxWxH, mm (Weight, kg)		LxWxH, in. (Weight, lbs)
Laser Head	674x146x120 (14.0)		26.5x5.7x4.7 (30.9)
Power Supply	363x364x192 (15.5)		14.3x14.3x7.6 (34.2)
Cooling System	363x364x192 (12.5)		14.3x14.3x7.6 (27.6)
Remote Control	130x180 (0.5)		5.1x7.1 (1.1)
Power requirements	(220±20) V, (50–60) Hz; single phase, 0.5 A		

Q-switched, High Repetition Rate Nd:YAG Laser: LS-2136



The LOTIS TII LS-2136 laser is a high repetition rate Q-switched Nd: YAG laser emitting at the fundamental (1064 nm) and second (532 nm) harmonic.

The telescopic stable resonator gives the benefits of uniform beam quality, high energy and low beam divergence. The intracavity mode controlling telescope compensates for thermal lensing of the Nd: YAG rod and limits the irreducible beam divergence of the laser by decreasing the transverse mode content of the beam.

There is no need for external water supply: the cooling system is totally self-contained with water-to-air heat exchanger. The digital display remote control can be programmed to run in either auto or manual modes. It gives fingertip control of all laser functions.

Key Features:

- Pulse repetition rate up to 50 Hz
- Small divergence
- Output energy up to 140 mJ
- Menu-driven remote control
- RS-232 interface
- Storing and recalling of parameter function for different operating modes



Specifications (as of August, 2006 and subject to change)

Parameter	Value	Comments
Energy		
1064 nm	140 mJ	
532 nm	75	
355 nm	25	with Harmonic Generator Assembly
266 nm	18	with Harmonic Generator Assembly
Pulse duration (1064 nm) (FWHM),	15–18 ns	
Pulse repetition rate	1–50 Hz	
Beam divergence	0.7 mrad	full angle for 86% of energy
Beam diameter	≤5 mm	
Jitter	±1.5 ns	w.r.t. external trigger of Q-switch
Energy stability at 1064 nm	±3.0 %	shot to shot for 99% of pulses
Size and Weight	Size LxWxH, mm (Weight, kg)	Size LxWxH, in (Weight, lbs)
Laser Head	815x185x113 (21)	32.1x7.3x4.4 (46.3)
Power Supply	446x449x177 (20)	17.6x17.7x7 (44.1)
Cooling System	446x449x266 (23)	17.6x17.7x10.5 (50.7)
Remote Control	130x180 (0.5)	5.1x7.1 (1.1)
Power requirements	Single phase 220±20 V, 50–60 Hz, 1500 W	



Q-switched, High Repetition Rate Nd:YAG Laser, Long Pulse: LS-2136 LP

The LOTIS TII LS-2136 LP laser is a high repetition rate Q-switched Nd:YAG laser emitting at the fundamental wavelength (1064 nm) and featuring a longer pulse duration.

The telescopic stable resonator gives the benefits of uniform beam quality, high energy and low beam divergence. The intracavity mode controlling telescope compensates for thermal lensing of the Nd:YAG rod and limits the irreducible beam divergence of the laser by decreasing the transverse mode content of the beam.

There is no need for external water supply: the cooling system is totally self-contained with water-to-air heat exchanger. The digital display remote control can be programmed to run in either auto or manual modes. It gives fingertip control of all laser functions.

Key Features:

- Pulse repetition rate up to 50 Hz
- Small divergence
- Output energy 40 mJ, or up to 100 mJ in near TEM₀₀
- Menu-driven remote control
- RS-232 interface
- Storing and recalling of parameter function for different operating modes



Specifications (as of August, 2006 and subject to change)

Parameter	Value	Comments
Energy		
1064 nm	40 mJ	
Pulse duration (FWHM)	24 ns	
Pulse repetition rate	1–50 Hz	
Beam divergence	0.7 mrad	full angle for 86% of energy
Beam diameter	≤3 mm	
Jitter	±1.5 ns	w.r.t. external trigger of Q-switch
Energy stability at 1064 nm	±3.0 %	shot to shot for 99% of pulses
Size and Weight	Size LxWxH, mm (Weight, kg)	Size LxWxH, in (Weight, lbs)
Laser Head	815x185x113 (21)	32.1x7.3x4.4 (46.3)
Power Supply	446x449x177 (20)	17.6x17.7x7 (44.1)
Cooling System	446x449x266 (23)	17.6x17.7x10.5 (50.7)
Remote Control	130x180 (0.5)	5.1x7.1 (1.1)
Power requirements	Single phase 220±20 V, 50–60 Hz, 1500 W	



Q-switched Compact, High Power Nd:YAG Laser: LS-2137BBO

The LOTIS TII LS-2137 combines the compactness of LS-2134 laser with increased energy and smaller divergence by means of an intracavity telescope and special double rod laser pumping chamber.

This design allows operation in the mode of an oscillator-amplifier with a single power supply and a cooling system. The unique laser chamber design reduces undesired parasitic oscillations that can limit output energy. The closed and rigid folded structure of laser emitter provides small dimensions, stable and dust free operation of laser components. There is no

need for external water supply since the cooling system is totally self-contained with water-to-air heat exchanger.

The crystals of the second (KTP), third (KDP) and fourth (BBO) set in the precise temperature controlled ovens and harmonic separators provide highly efficient generation and high spectral purity of the output radiation.

The fifth harmonic assembly (213 nm) can be accessed by using a BBO crystal to mix the fourth harmonic with the fundamental frequency as well as to mix the second and the third harmonics.

It gives a convenient and cost effective source of a short UV radiation.

Key Features:

- Double rod laser pumping chamber
- Small divergence
- Output energy up to 600 mJ
- Menu-driven remote control
- RS-232 interface
- Storing and recalling parameter function for different operation modes



Specifications (as of August, 2006 and subject to change)

Parameter	Value	Comments
Energy		
1064 nm	600 mJ	
532 nm	330	
355 nm	120	
266 nm	90	
213 nm	25	with Harmonic Generator Assembly HG-Fifth
Pulse duration at 1064 nm	15–20 ns	FWHM
Pulse repetition rate	1–10 Hz	
Beam divergence	0.6 mrad	Full angle for 86% of energy
Beam diameter	<=7.5 mm	
Jitter	±1.5 ns	w.r.t. external trigger of Q-switch
Energy stability at 1064 nm	±3.0 %	shot to shot for 99% of pulses
Dimensions	LxWxH, mm (Weight, kg)	LxWxH, in (Weight, lbs)
Laser Head	970x200x113 (24)	38.2x7.9x4.4 (52.9)
Power Supply	363x364x192 (16.5)	14.3x14.3x7.6 (36.4)
Cooling System	363x364x280 (15.5)	14.3x14.3x11.0 (34.2)
Remote Control	130x180 (0.5)	5.1x7.1 (1.1)
Power requirements	Single phase 220±20 V, 50–60 Hz, 750 W	

Q-switched Compact, High Power Nd:YAG Laser: LS-2137



The LOTIS TII LS-2137 combines the compactness of LS-2134 laser with increased energy and small divergence by means of an intracavity telescope and special double rod laser pumping chamber.

This design allows operation in the mode of an oscillator-amplifier with a single power supply and a cooling system. The unique laser chamber design reduces undesired parasitic oscillations that can limit output energy. The closed and rigid folded structure of laser emitter provides small dimensions, stable and dust free operation of laser components. There is no need for external water supply since the cooling system is totally self-

contained with water-to-air heat exchanger.

Key Features:

- Double rod laser pumping chamber
- Small divergence
- Output energy up to 650 mJ
- Menu-driven remote control
- RS-232 interface
- Storing and recalling parameter function for different operation modes



Specifications (as of August 2006, subject to change)

Parameter	Value			Comments
Energy	2137	2137/2 ¹	2137/3 ²	
1064 nm	650 mJ	650 mJ	650 mJ	
532 nm	400	400	400	
355 nm	120	--	120	
266 nm	90	--	--	
Pulse duration at 1064 nm	15–18 ns			FWHM
Pulse repetition rate	1–10 Hz			
Beam divergence	≤0.7 mrad			Full angle for 86% of energy
Beam diameter	≤8 mm			
Jitter	±1.5 ns			w.r.t. external trigger of Q-switch
Energy stability at 1064 nm	±3.0 %			shot to shot for 99% of pulses
Dimensions	LxWxH, mm (Weight, kg)			LxWxH, in (Weight, lbs)
Laser Head	857 x 200 x 110 (24)			33.7 x 7.9 x 4.4 (52.9)
Power Supply	363 x 364 x 192 (16.5)			14.3 x 14.3 x 7.6 (36.4)
Cooling System	363 x 364 x 280 (15.5)			14.3 x 14.3 x 11.0 (34.2)
Remote Control	130 x 180 (0.5)			5.1 x 7.1 (1.1)
Power requirements	Single phase 220±20 V, 50–60 Hz, 750 W			

¹The LS2137/2 is the recommended laser for pumping our oscillator/amplifier Ti:Sapphire systems

²The LS2137/3 is the recommended laser for pumping our OPO systems



Q-switched Compact, High Power Short Pulse Nd:YAG Laser: LS-2137U, LS2137-U/2 and LS2137U/3

The LOTIS TII LS-2137U is an improved, short pulse modification of our power laser LS-2137 laser with VRM, which keeps such advantages of this model as rugged design, high stability and friendly used operation. VRM resonator gives excellent harmonics conversion due to increased spatial uniformity of output beam, low divergence and short pulse duration.

LS-2137U the ideal tool for research (LIDAR, spectroscopy including

LIF, LIBS) and OEM applications.

Key Features:

- Variable Reflectivity Mirror
- High Stability
- Output energy up to 700 mJ
- Menu-driven remote control
- RS-232 interface
- Storing and recalling parameters for different operating modes



Specifications (as of August 2006, subject to change)

Parameter	Value			Comments
	LS-2137U	LS-2137U/2	LS-2137U/3	
Energy	1064 nm	700 mJ	700 m J	700 mJ
	532 nm	400	400	400
	355 nm	140		140
	266 nm	100		
Pulse duration, 1064 and 532 nm	6-7 ns			FWHM
Pulse duration, 355 and 266 nm	5-6 ns			FWHM
Pulse repetition rate	1-10 Hz			
Beam divergence	≤0.8 mrad			FWHM
Beam diameter	≤8 mm			
Jitter	±1.0 ns			w.r.t. external trigger of Q-switch
Energy stability at 1064 and 532 nm	±3.0 %			shot to shot for 99% of pulses
Energy stability at 355 and 266 nm	±5.0 % ±4.0 % for 355 with LBO			shot to shot for 99% of pulses
Dimensions	LxWxH, mm (Weight, kg)			LxWxH, in (Weight, lbs)
Laser Head	820x206x113 (18)			32.3x7.9x4.4 (40.0)
Power Supply	363x364x192 (15.0)			14.3x14.3x7.6 (33)
Cooling System	363x364x280 (12.0)			14.3x14.3x11.0 (25.6)
Remote Control	130x180 (0.5)			5.1x7.1 (1.1)
Power requirements	Single phase 220±20 V, 50-60 Hz, 750 W			

Q-switched, High Energy Nd: YAG Laser: LS-2138



A new, enhanced energy laser from LOTIS TII.

The double rod laser chamber and rigid folded laser resonator with intracavity telescope provide stable, reliable, and high efficiently operation. A single power supply and self-contained cooling unit with water-to-air heat exchanger are used in LS-2138.

All the laser functions, as well as the external trigger and synchronization facilities, are controlled using a compact remote control. This remote controller features a scrolling menu with an adjusting thumbwheel, clear LCD and audible tone to indicate changed settings.

Key Features:

- Pulse repetition rate up to 50 Hz
- Small divergence
- Output energy up to 220 mJ
- Menu-driven remote control
- RS-232 interface
- Storing and recalling parameter function for different operation modes



Specifications (as of August, 2006 and subject to change)

Parameter	Value	Comments	
Energy			
	1064 nm	220 mJ	
	532 nm	110 mJ	
	355 nm	37 mJ	With Harmonic Generator HG-TF
	266 nm	25 mJ	With Harmonic Generator HG-TF
Pulse duration at 1064 and 532 nm	14-16 ns	FWHM	
Pulse repetition rate	1-50 Hz		
Beam divergence	≤ 0.7 mrad	FWHM	
Beam diameter	≤ 5 mm		
Jitter	±1.5 ns	w.r.t. external trigger of Q-switch	
Energy stability at 1064 and 532 nm	±3.0 %	shot to shot for 99% of pulses	
Dimensions	L x W x H, mm (Weight, kg)	L x W x H, in (Weight, lbs)	
	Laser Head	657 x 185 x 113 (20)	25.9 x 7.2 x 4.4 (44.0)
	Power Supply	446 x 449 x 177 (22)	17.6 x 17.7 x 7.0 (44)
	Cooling System	446 x 449 x 266 (23)	17.6 x 17.7 x 10.5 (50.)
	Remote Control	130x180 (0.5)	5.1 x 7.1 (1.1)
Power requirements	Single phase 220±20 V or 110±10 V, 50-60 Hz, 750 W		

100 Hz Q-switched Nd:YAG Laser: LS-2139

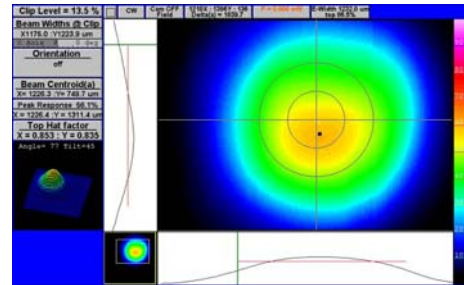


The LOTIS TII High Pulse Repetition Laser.

The unique design of power supply and laser cavity provides high output parameters and reliability. The totally self-contained cooling system with water-to-air heat exchanger allows laser operation in different environmental conditions.

LS-2139 uses a special stable resonator configuration providing thermal

and birefringence compensation. All cavity spaces are sealed, thus preventing contamination of optical surfaces.



lens

Key Features:

- Pulse repetition rate up to 100 Hz
- Menu-driven remote control
- RS-232 interface
- Storing and recalling parameter function for different operation modes

Beam profile at 1064 nm



Specifications (as of August, 2006 and subject to change)

Parameter	Value		Comments
Energy	Near TEM ₀₀	TEM ₀₀	
1064 nm	90 mJ	45 mJ	
532 nm	45 mJ	25 mJ	
355 nm	10 mJ	8 mJ	With Harmonic Generator HG-TF
266 nm	8 mJ	6 mJ	With Harmonic Generator HG-TF
Pulse duration at 1064	15-18 ns	15-18 ns	FWHM
Pulse repetition rate	1-100 Hz	1-100 Hz	
Beam divergence	≤0.7 mrad	≤0.5 mrad	Full angle for 86% of energy
Beam diameter	≤4 mm	≤2.5 mm	
Jitter	≤±1.5 ns	≤±1.5 ns	w.r.t. external trigger of Q-switch
Energy stability at 1064 and 532 nm	≤±3.0%	≤±2.5%	shot to shot for 99% of pulses
Dimensions	LxWxH, mm (Weight, kg)		LxWxH, in (Weight, lbs)
Laser Head	815x185x113 (22)		32.1 x 7.3 x 4.4 (48.5)
Power Supply	446x449x177 (22)		17.6 x 17.7 x 7 (48.5)
Cooling System	446x449x266 (23)		17.6 x 17.7 x 10.5 (50.7)
Remote Control	130x180 (0.5)		5.1x7.1 (1.1)
Power requirements	Single phase 220±20 V or 110±10 V, 50–60 Hz, 750 W		

New in 2007

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High Energy Q-switched Nd:YAG Laser: LS-2145T, LS-2145TOPO, LS-2145F

The LS-2145T and LS-2145F are our latest designs featuring the high reliability and simplicity found in our compact laser series LS-2130-2145, and with improved output parameters as well as built in UV converters. The two variations of this laser are model LS-2145T, lasing at 1064, 532, 355 nm and model LS-2145F, lasing at 1064, 532, 266 nm.

These advanced lasers feature remote switching of the laser output frequencies without manual intervention in the laser head. The changeover of output channels (fundamental frequency to second harmonic and third or fourth harmonics) is motorized and is provided by remote control (PC

control). A color coded LED indicator shows at a glance the laser output setting in use. Compact, easy to operate, simple to maintain, highly reliable.

Key Features:

- One touch changeover from NIR to visible to UV
- Output energy up to 330 mJ
- Menu-driven remote control
- RS-232 interface
- Storing and recalling parameter function for different operation modes



Model LS-2145TOPO is recommended as a pump laser for our OPO systems

Specifications (as of April 2007 and subject to change)

Parameter	Value	Comments	
Energy			
	1064 nm	330 mJ	
	532 nm	210	
	355 nm	85	LS-2145T
	355 nm	75	LS-2145TOPO
	266 nm	70	LS-2145F
Pulse duration at 1064 nm	13–15 ns	FWHM	
Pulse repetition rate	1–10 Hz		
Beam divergence	≤1.0 mrad	Full angle for 86% of energy	
Beam diameter	≤6.3 mm		
Jitter	±1.0 ns	w.r.t. external trigger of Q-switch	
Energy stability at 1064 nm	±2.5 %	shot to shot for 99% of pulses	
Energy stability, visible and UV	±3 %	shot to shot for 99% of pulses	
Size and Weight	Size L x W x H, mm(Weight, kg)	Size L x W x H, in (Weight, lbs.)	
	Laser Head	815 x 206 x 136 (27) 38.2 x 7.9 x 4.4 (52.9)	
	Power Supply	363 x 364 x 192 (16.5) 14.3 x 14.3 x 7.6 (36.4)	
	Cooling System	363 x 364 x 280 (15.5) 14.3 x 14.3 x 11.0 (34.2)	
	Remote Control	130 x 180 (0.5) 5.1 x 7.1 (1.1)	
Power requirements	Single phase, 110 or 220±20 V, 50–60 Hz, 750 W (Please Specify Voltage)		



High Energy Q-switched Nd:YAG Laser: LS-2147

The LOTIS TII LS-2147 continues the series of LOTIS oscillator-amplifier lasers with increased energy up to 850 mJ at 1064 nm. The special double rod laser pumping chamber allows operation in the mode of oscillator-amplifier with a single power supply and a cooling system.

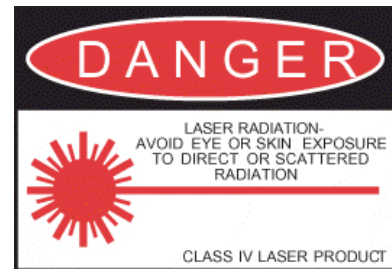
LS-2147 is enhanced model of the LS-2137 and shares its powerful features. The closed and rigid folded structure of the laser emitter provides stable and dust free operation of laser components in a compact configuration.

The crystals of the second (KTP), third (KDP) and fourth (KDP) are enclosed in precise temperature controlled chambers. The harmonic separators provide highly efficient generation and high spectral purity of the output radiation. There is no need for external water supply as the cooling system is totally self-contained with a water-to-air heat exchanger.

The fifth harmonic assembly (213 nm) can be produced by a BBO crystal to mix the fourth harmonic with the fundamental frequency. This design gives a convenient and cost effective source of a short UV radiation.

Key Features:

- Double rod laser pumping chamber
- Small divergence
- Output energy up to 850 mJ
- Menu-driven remote control
- RS-232 interface
- Storing and recalling parameter function for different operation modes



Specifications (as of August, 2005 and subject to change)

Parameter	Value	Comments
Energy		
1064 nm	850 mJ	
532 nm	480	
355 nm	180	
266 nm	120	BBO option for high repeatability
213 nm	30	With Harmonic Generator HG-5TH
Pulse duration at 1064 nm	16–18 ns	FWHM
Pulse repetition rate	1–10 Hz	
Beam divergence	≤ 0.7 mrad	Full angle for 86% of energy
Beam diameter	≤ 7 mm	
Jitter	±1.5 ns	w.r.t. external trigger of Q-switch
Energy stability at 1064 nm	±3.0 %	shot to shot for 99% of pulses
Size and Weight	Size L x W x H, mm(Weight, kg)	Size L x W x H, in (Weight, lbs.)
Laser Head	970 x 200 x 113 (24)	38.2 x 7.9 x 4.4 (52.9)
Power Supply	363 x 364 x 192 (16.5)	14.3 x 14.3 x 7.6 (36.4)
Cooling System	363 x 364 x 280 (15.5)	14.3 x 14.3 x 11.0 (34.2)
Remote Control	130 x 180 (0.5)	5.1 x 7.1 (1.1)
Power requirements	Single phase, 110 or 220±20 V, 50–60 Hz, 750 W (Please Specify Voltage)	

Ordering Information:

02147LS00 LS2147

02147LS10 LS2147 BBO. BBO required for use with 5th harmonic generator.

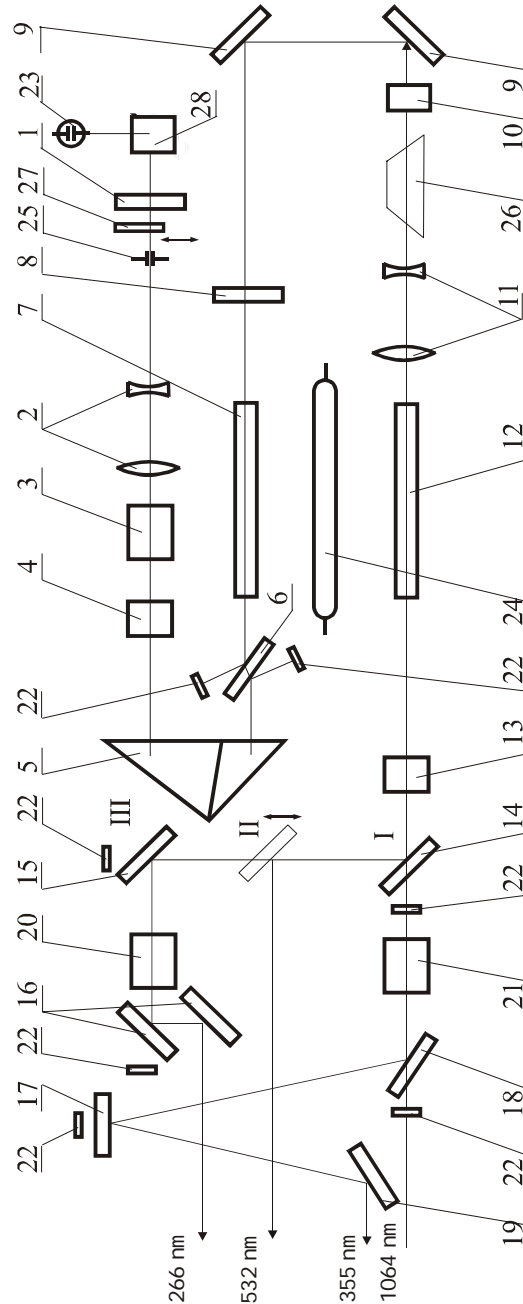


Fig. 3 . Optical diagram of the laser cavity:

- 1 - rear mirror R>99.9% (1064nm); 2 - intracavity telescope; 3 - Pockels cell; 4 - rotator; 5 - corner cube prism;
- 6 - polarizer; 7 - AE of the oscillator; 8 - output mirror; 9 - turning mirrors; 10 - rotator 45°; 11 - telescope;
- 12 - AE of the amplifier; 13 - SH crystal (KTP); 14 - 19 - WS; 20 - FH crystal; 21 - TH crystal; 22 - absorption filters;
- 23 - light detector; 24 - flash lamp; 25 - intracavity pinhole; 26 - Dove prism (removable); 27 - shutter;
- 28 - right angle prism.

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High repetition rate Q-switched Nd:YAG Laser with high energy UV output.: LS-2148

The LS-2148 is a new model of high energy Q-switched laser with built-in second, third and fourth harmonics. This laser has demonstrated applications in research (spectroscopy, photochemistry, biology, medicine, pumping tunable lasers and OPO and LIDAR) and technological application (UV marking, ablation etc.)

The crystals of the second, third, and fourth enclosed in precise temperature controlled chambers. The harmonic separators provide highly efficient generation and high spectral purity of the output radiation. There is no need for external water supply as the cooling system is totally self-contained with a water-to-air heat exchanger.

Key Features:

- 50 Hz repetition rate
- High energy UV output
- Output energy up to 700 mJ
- Menu-driven remote control
- Automatic phase matching for increase 4th harmonic stability

Specifications (as of May, 2007 and subject to change)

Parameter	Value	Comments
Energy		
1064 nm	700 mJ	
532 nm	350	
355 nm	120	High stability LBO crystal
266 nm	100	Automated phase matching
Pulse duration at 1064 nm	14–16 ns	FWHM
Pulse repetition rate	1–50 Hz	
Beam divergence at 1064 nm	≤ 1 mrad	Full angle for 86% of energy
Beam diameter	≤ 10 mm	
Jitter	±1.5 ns	w.r.t. external trigger of Q-switch
Energy stability at 1064 nm and 532 nm	±3.0 %	shot to shot for 99% of pulses
Energy stability at 355 nm	±4.0 %	
Energy stability at 266 nm	±4.5 %	
Size and Weight	Size L x W x H, mm(Weight, kg)	
Laser Head	810 x 410 x 140 (45)	
Power Supply	446 x 449 x 177 (22)	2 pieces
Cooling System	446 x 449 x 266 (23)	2 pieces
Controller for AFM	260 x 160 x 115	
Remote Control	105 x 170 (0.5)	5.1 x 7.1 (1.1)
Power requirements	Single phase, 220±20 V, 50–60 Hz, 15A	

For more information visit www.ndyag.com

880 Calle Plano, Unit K, Camarillo, CA 93012 U.S.A. Tel: 805-484-6639 www.ndyag.com

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High Energy Tunable Nd:YAG pumped Ti:Sapphire Laser System: The Tatyana-2 Amplified Ti:Sapphire Laser

Our new Tatyana Nd:YAG pumped tunable laser incorporates the LS-2137/2 laser for optimum pump laser output at 532 nm, coupled with an advanced tunable amplified Ti:Sapphire module, the LT-2211A. Together with our computer controlled tuning module, this system is capable of providing

high output in the visible and near IR range.

Key Features:

- Double rod laser pumping chamber for the pump laser
- Ti:Sapphire oscillator/amplifier design.
- Computer control of output wavelength (optional)
- RS-232 interface control of pump laser
- Output switchable between low power (oscillator) or high power (amplified) modes.
- Second harmonic optics available



Specifications (as of August 2005, subject to change)

Parameter	Value	Comments
Energy –pump laser		
1064 nm	650 mJ	Not used for Ti:Sapphire pump
532 nm	400	Used as pump laser for Ti:Sapphire
Ti:Sapphire Tuning Range:	690-1000 nm	Standard
Second Harmonic Tuning Range	345-500 nm	Optional
Pulse duration over tunable range, ns	8 – 25 ns	Shortest duration at peak conversion efficiency
Pulse repetition rate	<1–10 Hz	User selectable, without re-adjustment of optics
Beam divergence	≤ 1.5 mrad	Full angle for 86% of energy
Line Width	≤ 0.1 nm	At peak conversion efficiency
Size and Weight	Size L x W x H, mm(Weight, kg)	Size L x W x H, in (Weight, lbs.)
Pump Laser Head	857 x 200 x 110 (24)	33.7 x 7.9 x 4.4 (52.9)
Ti:Sapphire Module	470 x 260 x 90 (10.5)	
Power Supply	363 x 364 x 192 (16.5)	14.3 x 14.3 x 7.6 (36.4)
Cooling System	363 x 364 x 280 (15.5)	14.3 x 14.3 x 11.0 (34.2)
Remote Control	130 x 180 (0.5)	5.1 x 7.1 (1.1)
Power requirements	Single phase 220±20 V or 110V for pump laser, 110 VAC for tuning module 50–60 Hz, 750 W	



High Power, Narrow Line Tunable Ti:Sapphire Laser: LT-2211A

The new LT-2211A uses a high gain oscillator and double-pass amplifier to

produce short, high energy pulses with narrow linewidth.

Key Features:

- Output switchable between low power (oscillator) or high power (amplified) modes.
- Easy upgrade by adding to existing Nd:YAG laser (LS-2137)
- Wide tuning range
- Simple operation

Options

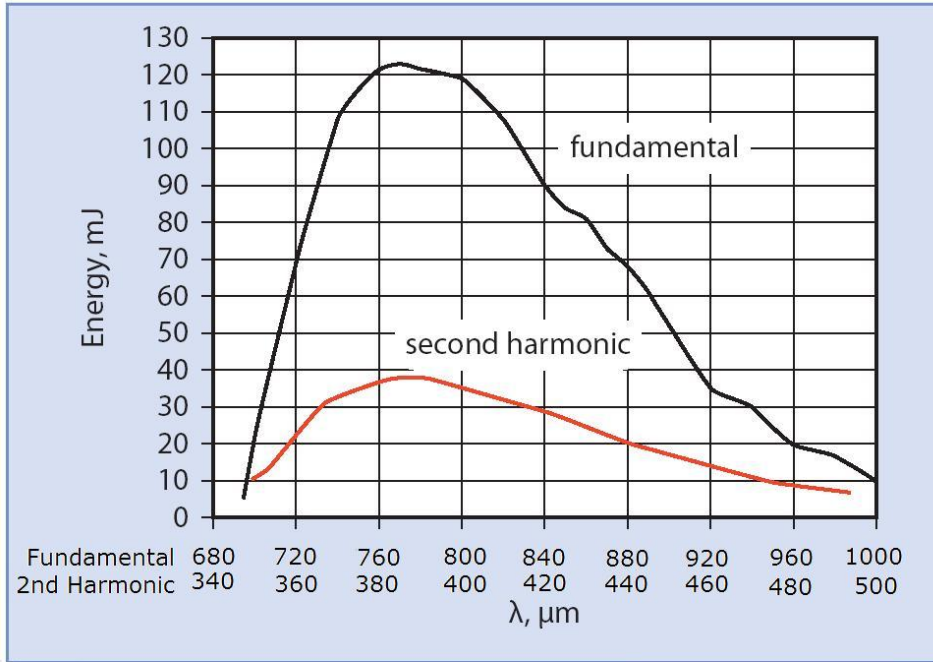
- Intracavity Fabry-Perot etalon providing narrow linewidth.
- Control of tuning via external PC
- Internal second harmonic unit for violet and blue wavelengths
- Third and fourth harmonic generator modules

Specifications (as of August, 2006 and subject to change)

Parameter	Value	Comments
Ti:Sapphire Tuning Range:	690-1000 nm	Standard
Second Harmonic Tuning Range	345-500 nm	Optional
Third Harmonic Tuning Range	235 – 305 nm	Optional
Pulse duration over tunable range, ns	8 – 25 ns	Determined by pump pulse duration and output λ
Beam divergence	≤ 1.5 mrad	Full angle for 86% of energy
Line Width		
Standard	≤ 0.1 nm	At maximum tuning range of fundamental frequency
With intracavity Fabry-Perot etalon	≤ 0.01 nm	
Polarization		Pump laser (532 nm) must be horizontally polarized
Fundamental Frequency	Linear Horizontal	
Second Harmonic	Linear Vertical	
Size and Weight	Size L x W x H, mm(Weight, kg)	Size L x W x H, in (Weight, lbs.)
LT- 2211A Ti:Sapphire Module	470 x 260 x 90 (8)	19 x 10 x 3.5 (4)
LT-2211A with internal second harmonic generator	570 mm x 260 mm x 90 mm (9)	22.5 x 10 x 3.5 (4)
Control Unit for LT2211A	256 x 257 x 111 (2)	10 x 10 x 4.5 (1)

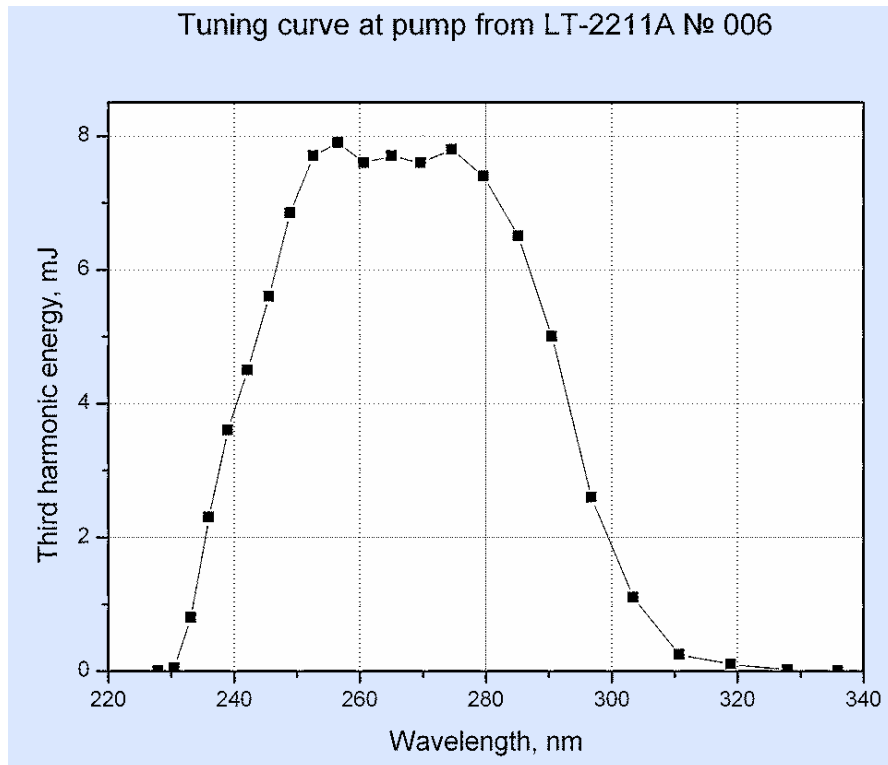
Harmonic Generators for LT-2211A

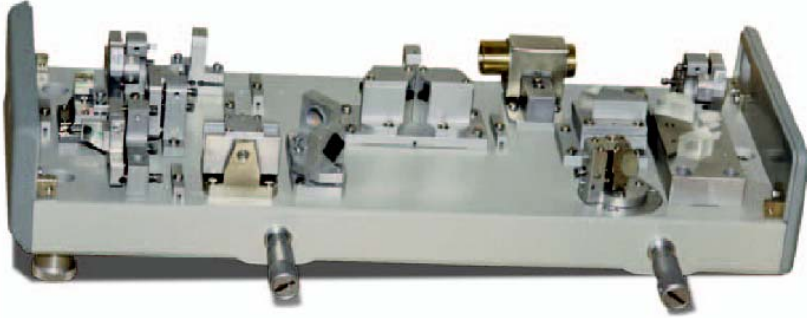
Tuning Curve LT-2211A



Pumped with LS-2137, $E_{532}=450$ mJ

Tuning curve at pump from LT-2211A № 006





The LOTIS TII Tunable Solid State Lasers: Ti:Sapphire and Forsterite

The LOTIS TII LT-2211–LT-2212 tunable solid state lasers convert the fundamental frequency (LT-2212) and second harmonic (LT-2211) radiation of our Nd: YAG lasers to widely tunable radiation in the UV, visible and near IR spectral ranges. Unlike most Ti:sapphire and forsterite lasers, our LT-22 series lasers require only one set of optics for all tuning ranges to eliminate the downtime associated with changing and realigning the optics during an experiment. The special design of the active element improves the beam alignment stability and reliability of laser operation.

Both models have a highly efficient built-in second harmonic generator to provide operation in the IR, visible and UV spectral ranges. LT-2211 can be fitted with the third and the fourth harmonics units, increasing the total tuning range of Ti:Sapphire laser.

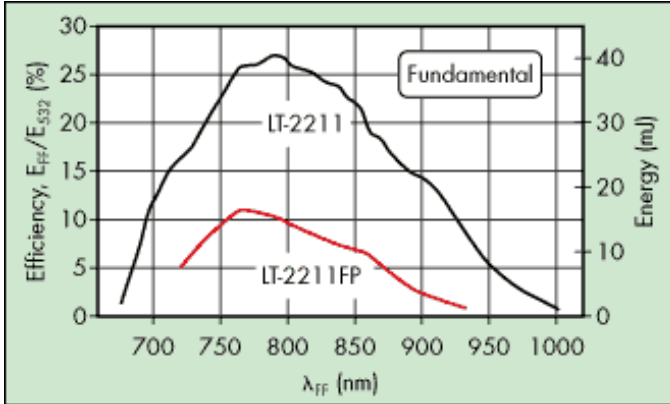
For narrow line width applications, the LT-2211 can be fitted with an intracavity Etalon Fabry-Perot (model LT-2211FP). Producing a narrow line width of 0.01 nm (see the tuning curves on the following page.)

Specifications (as of August, 2006 and subject to change)

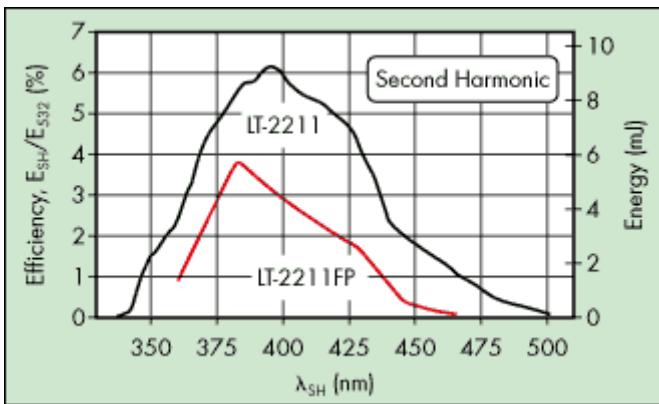
Model:	LT-2211	LT-2211FP	LT-2212
Active medium	Al ₂ O ₃ :Ti ³⁺ (Ti:Sapphire)	Al ₂ O ₃ :Ti ³⁺ (Ti:Sapphire)	Mg ₂ SiO ₄ :Cr ⁴⁺ (Forsterite)
Tuning Range, nm			
at Fundamental	690 – 1000 nm	720 – 910 nm	1160 – 1360 nm
at Second Harmonic	350 – 500	360 – 450 nm	580 – 680
at Third Harmonic	235 – 330		--
at Fourth Harmonic	209 – 245		--
Line width, nm	0.1	0.01 nm	0.1
Pump radiation conversion efficiency at peak wavelength			
at Fundamental	25 %	11%	9%
at Second Harmonic	5	3.5%	2
at Third Harmonic	up to 30 (E _{TH} /E _{SH})*		--
at Fourth Harmonic	up to 25 (E _{FH} /E _{SH})*		--
Pulse duration, FWHM	8 – 30 ns	8 – 30 ns	8 – 30 ns
Beam divergence (full angle for 86% of energy)	1.5 mrad	1.5 mrad	1.5 mrad
Size, L x W x H, mm/Weight, kg FH, TH Unit for LT-2211		425 x 160 x 80 mm/ 6.5 152 x 105 x 55/ 3.0	

* with Harmonic Generators HG-T, HG-F

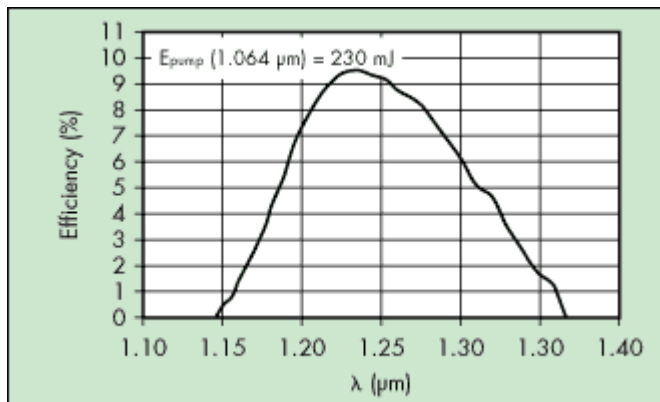
Tuning curves of LT-2211 and LT-2211FP (Fundamental frequency) pumped with LS-2134, $E_{532} = 150$ mJ, 2.5 mrad, 10 ns,



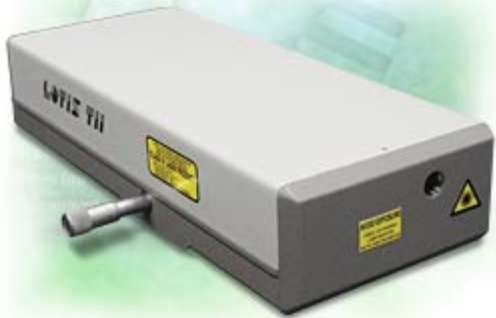
Tuning curves of LT-2211 and LT-2211FP (Second harmonic) pumped with LS-2134, $E_{532} = 150$ mJ, 2.5 mrad, 10 ns



Efficiency curve of LT-2212



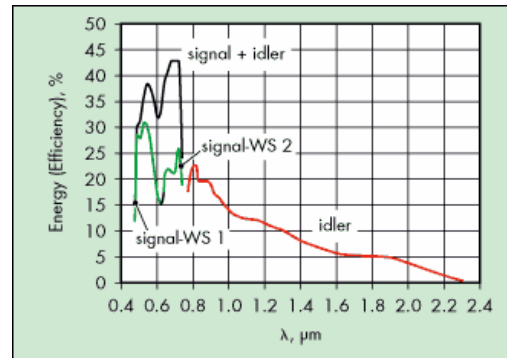
Optical Parametric Oscillator: LT-2214 OPO



The LOTIS TII BBO- OPO (optical parametric oscillator) combines the advantages of a solid state laser with a wide tuning spectral range, high peak and average power and high conversion efficiency

Key Features:

- Reliable and efficient operation
- One set of cavity mirrors for total tuning range
- Installation and adjustment without additional aiming lasers and spectral devices
- Compensation beam displacement during tuning
- BBO crystal protected from humidity by heating



Specifications (as of August, 2006, subject to change)

Parameter	Value	Comments
Tuning range, $\Delta\lambda$ m at Signal Wave	415-690 nm	
Tuning range, $\Delta\lambda$ m at Idler Wave	715-2300 nm	
Typical Linewidth, $\delta\lambda$	≤ 0.5 nm	At 500 nm, varies with pump laser
Beam Divergence	4-8 mrad	Varies with pulse duration and wavelength
Phase Matching	Type I	
Pump conversion efficiency at tuning curve max. (at 10Hz):		
At SW+IW	Up to 45 %	Typical for pump energy > 70 mJ
At SW	Up to 30 %	Typical for pump energy > 70 mJ
Pulse duration (FWHM)	1-2 ns less than pump pulse duration	Varies with pulse duration and wavelength
Pulse Repitition Rate	≤ 50 Hz	
Polarization at Signal and Idler wave	Linear horizontal	
Size and Weight	Size L x W x H, mm (Weight, kg) 380 x 160 x 80 (6.5)	Size L x W x H, in (Weight, lbs.) 15 x 6.3 x 3.2 (14.3)
Pump Laser Requirements:		
Wavelength	355 nm	
Pulse duration	6-20 ns	
Pulse energy	40-150 mJ	
Repetition rate	≤ 50 Hz	
Beam Diameter	≤ 8 mm	
Polarization	Vertical	
Beam quality	Hole free, no hot spots	

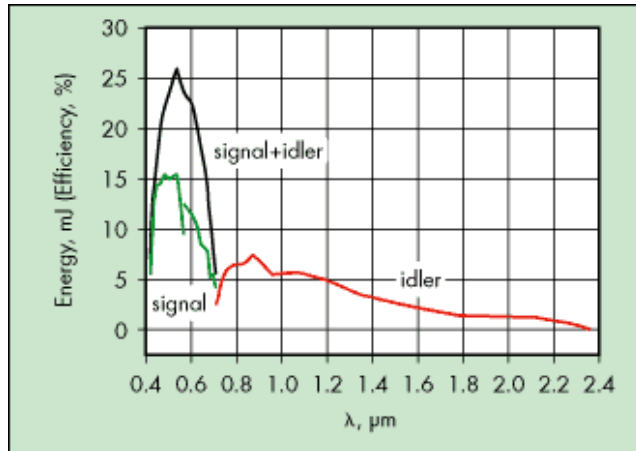


Optical Parametric Oscillator: LT-2215 – Midband BBO-OPO

The LOTIS TII LT-2215 — Type II BBO-OPO (optical parametric oscillator) combines the efficiency of LT-2214 with narrow linewidth and gapless tuning of the output wavelength.

Features:

- ❑ Single BBO crystal for full tuning band
- ❑ One set of cavity mirrors for total tuning range
- ❑ Installation and adjustment without additional aiming lasers and spectral devices
- ❑ Compensation beam displacement during tuning
- ❑ BBO crystal protected from humidity by heating



Key

Specifications (as of August, 2006, subject to change)

Parameter	Value	Comments
Tuning range, $\Delta\lambda$ m	415-2300 nm	
Typical Linewidth, $\delta\lambda$	≤ 0.15 nm	At 500 nm, varies with pump laser
Beam Divergence	4-8 mrad	Varies with pulse duration and wavelength
Phase Matching	Type II	
Pump conversion efficiency at tuning curve max. (at 10Hz):		
At SW+IW	Up to 30 %	Typical for pump energy > 70 mJ
At SW	Up to 20 %	Typical for pump energy > 70 mJ
Pulse duration (FWHM)	1-2 ns less than pump pulse duration	Varies with pulse duration and wavelength
Pulse Repetition Rate	≤ 50 Hz	
Polarization at Signal and Idler Wave	Linear horizontal	
Size and Weight	Size L x W x H, mm(Weight, kg)	Size L x W x H, in (Weight, lbs.)
	380 x 160 x 80 (6.5)	15 x 6.3 x 3.2 (14.3)
Pump Laser Requirements:		
Wavelength	355 nm	
Pulse duration	6-20 ns	
Pulse energy	40-150 mJ	
Repetition rate	≤ 50 Hz	
Beam diameter	≤ 8 mm	
Polarization	Vertical	
Beam quality	Hole free, no hot spots	

Fifth Harmonic Generator



The LOTIS TII fifth harmonic generator (213 nm) can be employed with LS-2136, LS-2137, LS-2138 lasers as well as with commercial or researcher built lasers.

Beta-BBO crystals are used for conversion of the FF (1064 nm) + FH (266 nm) or SH (532 nm) + TH (355 nm) as required.

A nonlinear crystal is sealed in a temperature controlled oven. Original dispersive harmonic separator provides total separation of the output (213 nm) from the pump harmonic radiation.



Specifications (as of August, 2006 and subject to change)

	LS-2136	LS-2137
Energy, mJ at 213 nm	5	25
Pulse duration, (1064 nm), ns	11 – 13	12 – 14
Pulse repetition rate, Hz	1 – 50	1 – 10
Beam diameter, mm	5	8
Size, L x W x H, mm	235 x 150 x 55	
L x W x H, in.	9.25 x 5.9 x 2.2	
Weight, kg	2	
Weight, lbs	4.4	
Power requirements	220 or 110 VAC single phase 50.60 Hz, 20 W	

Laser Safety Goggles for use with Lotis TII Nd:YAG lasers

We supply Trinity Technologies Laser Eye Protection, specially selected for your laser.



20016LS01 Laser Eye Protection for Nd:YAG	20016LS00 Laser Eye Protection for Nd:YAG and Ti:Sapphire lasers
Applications:	Applications:
All Nd:YAG lasers	All Nd:YAG lasers
All harmonic generators	All harmonic generators
→	Ti:Sapphire (690 – 1000 nm)
	
OD 6+ @ 190-540 nm	OD 6+ @ 190-540 nm
OD 3+ @ 850-900 nm	OD 2+ @ 632 nm
OD 4+ @ 900-950 nm	OD 3+ @ 650-690 nm
OD 5+ @ 950-1000 nm	OD 6+ @ 690-710 nm
OD 7+ @ 1000-1600 nm	OD 8+ @ 710-1200 nm
OD 5+ @ 1600-2400 nm	OD 5+ @ 10,600 nm
OD 5+ @ 2940-10,600 nm	
Good visibility	Fair visibility

Enwave Optronics, Inc. and Symphotic TII Corporation Lasers for Raman Spectroscopy



In 1930, C.V. Raman of the Indian Institute of Science at Bangalore was awarded the Nobel Prize for his discovery of the Raman Effect. His original experiments used filtered sunlight, concentrated by a telescope, to demonstrate two types of light scattering: ordinary scattering at the same wavelength as the incident light, and modified scattering of light with a “degraded frequency”¹. According to legend, C.V. Raman did not have a heliostat to keep a continuous beam of sunlight directed into the telescope, so he asked his wife to stand on the roof of the building with a mirror and direct the sunlight down the barrel of the telescope! With the subsequent invention of lasers, this effect has become the basis of a powerful analytical technique: Raman Spectroscopy.

Enwave Optronics has teamed together with **Symphotic TII Corporation** to supply a new generation of affordable, high power, narrow linewidth, and frequency-stabilized diode lasers for use as a Raman excitation source that promises to make Raman Spectroscopy simpler and more powerful than ever. In honor of C.V. Raman—and his wife—we call this new laser source “DivyaTM”—a Hindi name signifying “the Brilliance of the Heavens”.

Headquartered in Irvine, California, Enwave Optronics, Inc. provides full design, prototyping, R&D, manufacturing, and technical support. Together with Symphotic TII Corporation, we are committed to assist you resolve your most challenging application needs, and to provide you with the best performance and quality solutions at the most affordable prices.



¹ C. V. Raman and K. S. Krishnan, *Nature*, 121(3048), 501, March 31, 1928



The Divya™ 785-M Laser: Narrow Linewidth Frequency Stabilized Lasers for Raman Spectroscopy

Divya™ lasers for Raman spectroscopy

The design has inherently reduced amplified spontaneous emission (ASE), narrow line width, and stabilized frequency output, making it an ideal Raman spectroscopy excitation source. The Divya™ features

a stand alone for easy adaptation to existing Raman systems, simplified operation and convenience of monitoring. This design offers unparalleled reliability and robustness.

Key Features:

- Output power up to 400 mW
- Amplified spontaneous emission (ASE) reduced design (For -M & fiber coupled version only)
- Ultra stable center wavelength
- Narrow linewidth
- Fiber coupled or free space
- Robust, durable, cost effective design
- One year warranty



-SL

Specifications (as of August, 2005 and subject to change)

Parameter	Value	Comments
LASER OUTPUT	Divya 785-M	
Output wavelength	785 nm standard	670 nm and 830 nm available
Wavelength Accuracy	± 0.2 nm	
Linewidth	<0.07 nm (<1.0 cm ⁻¹)	0.04 nm (0.5 cm ⁻¹) Typical
Output Power	300 to 400 mW (free space)	Higher power options available
Laser output coupling	Coupled to 100 μm, 0.22 NA optical fiber, SMA or FC Connector	Free space laser output optional
Amplified Spontaneous Emission Reduction	Inherent ASE reduced design.	Suitable for Raman spectroscopy without additional filtering.
LASER OPERATION		
Temperature Control	Thermoelectric cooler	
Operating Temperature	10 to 40 °C with thermal overload protection	
Environmental Isolation	Sealed laser diode and optics	
Estimated Lifetime	>10,000 hrs	
DIMENSIONS	8.5 in. x 4.0 in. 2.1 in	Custom design available
POWER REQUIREMENTS	5 VDC, 4 Amp	

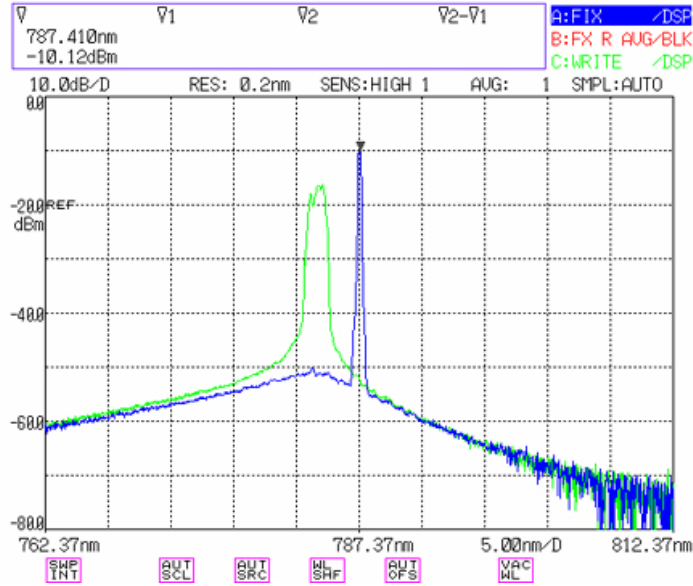


Figure 1. Line Narrowing

Line narrowing of a semiconductor laser. The green trace shows laser line before line narrowing: line width, approx. 2.2 nm (39 cm^{-1}). The blue line shows the line after line narrowing: typical line width, approx. 0.04 nm (0.5 cm^{-1}) (Less than the resolution of the optical spectrum analyzer used for this illustration.)

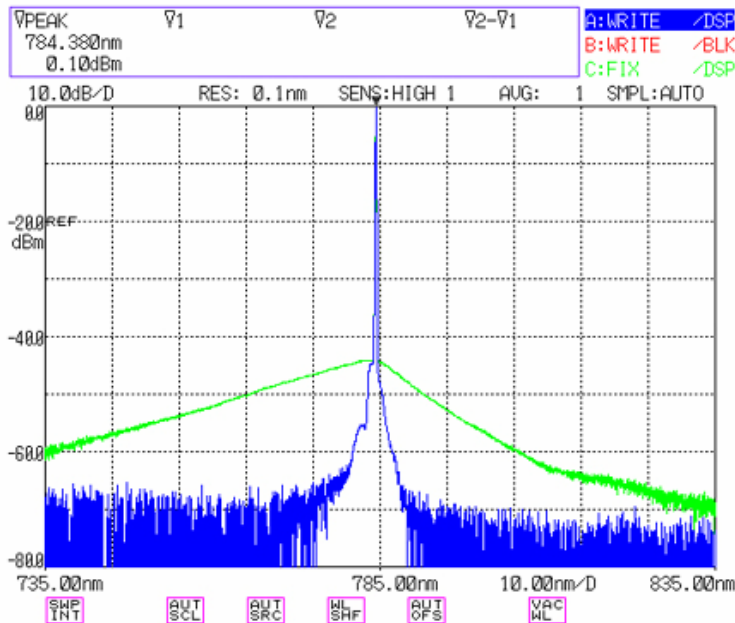


Figure 2. ASE Reductions

ASE reduction in semiconductor lasers. The green trace shows broad Amplified Spontaneous Emission from 735 to 835 nm. The blue trace shows the reduction of ASE with emission at the peak wavelength of 784.34 nm.



The Divya™ 670 M Laser: Narrow Linewidth Frequency Stabilized Lasers for Raman Spectroscopy

Divya™ lasers for Raman spectroscopy

The design has inherently reduced amplified spontaneous emission (ASE), narrow line width, and stabilized frequency output, making it an ideal Raman spectroscopy excitation source. The Divya™ features

a stand alone for easy adaptation to existing Raman systems, simplified operation and convenience of monitoring. This design offers unparalleled reliability and robustness.

Key Features:

- Output power up to 200 mW
- Amplified spontaneous emission (ASE) reduced design (For -M & fiber coupled version only)
- Ultra stable center wavelength
- Narrow linewidth
- Fiber coupled or free space
- Robust, durable, cost effective design
- One year warranty



-SL

Specifications (as of August, 2006 and subject to change)

Parameter	Value	Comments
LASER OUTPUT	Divya 670-M	
Output wavelength	670 nm standard	
Wavelength Accuracy	± 0.2 nm	
Linewidth	<0.05 nm (<1.0 cm ⁻¹)	0.5 cm ⁻¹ typical
Output Power	150 to 200 mW (free space)	
Laser output coupling	Coupled to 100 μm, 0.22 NA optical fiber, SMA or FC Connector	Free space laser output optional
Amplified Spontaneous Emission Reduction	Inherent ASE reduced design.	Suitable for Raman spectroscopy without additional filtering.
LASER OPERATION		
Temperature Control	Thermoelectric cooler	
Operating Temperature	10 to 40 °C with thermal overload protection	
Environmental Isolation	Sealed laser diode and optics	
Estimated Lifetime	>10,000 hrs	
DIMENSIONS	8.5 in. x 4.0 in. 2.1 in	Custom design available
POWER REQUIREMENTS	5 VDC, 4 Amp	



The Divya™ 830 M Laser: Narrow Linewidth Frequency Stabilized Lasers for Raman Spectroscopy

The design has inherently reduced amplified spontaneous emission (ASE), narrow line width, and stabilized frequency output, making it an ideal Raman spectroscopy excitation source. The Divya™ features a stand alone for easy adaptation to existing Raman systems, simplified operation and convenience of monitoring. This design offers unparalleled reliability and robustness.

Key Features:

- Output power up to 400 mW
- Amplified spontaneous emission (ASE) reduced design (For -M & fiber coupled version only)
- Ultra stable center wavelength
- Narrow linewidth
- Fiber coupled or free space
- Robust, durable, cost effective design
- One year warranty



-SL

Specifications (as of August, 2006 and subject to change)

Parameter	Value	Comments
LASER OUTPUT	Divya 830-M	
Output wavelength	830 nm standard	
Wavelength Accuracy	± 0.2 nm	
Linewidth	<0.07 nm (<1.0 cm ⁻¹)	0.04 nm (0.5 cm ⁻¹) typical
Output Power	300 to 400 mW (free space)	Higher power options available
Laser output coupling	Coupled to 100 μm, 0.22 NA optical fiber, SMA or FC Connector	Free space laser output optional
Amplified Spontaneous Emission Reduction	Inherent ASE reduced design.	Suitable for Raman spectroscopy without additional filtering.
LASER OPERATION		
Temperature Control	Thermoelectric cooler	
Operating Temperature	10 to 40 °C with thermal overload protection	
Environmental Isolation	Sealed laser diode and optics	
Estimated Lifetime	>10,000 hrs	
DIMENSIONS	8.5 in. x 4.0 in. 2.1 in	Custom design available
POWER REQUIREMENTS	5 VDC, 4 Amp	



The Divya 785TM-SH High Power Single Transverse Mode Lasers: The Ideal Source for Both Raman Microscopy and Dispersive Spectrometers

The DivyaTM features the highest level of frequency stability and narrow linewidth, making it an ideal Raman spectroscopy excitation source. With the single mode beam quality and high power output, the high power single transverse mode Divya-SH is ideal for use in both Raman microscope and dispersive spectrometer applications. Stand alone or OEM packaging for easy adaptation to existing Raman systems, simplified operation and convenience of monitoring. This design offers unparalleled reliability and robustness.

Key Features:

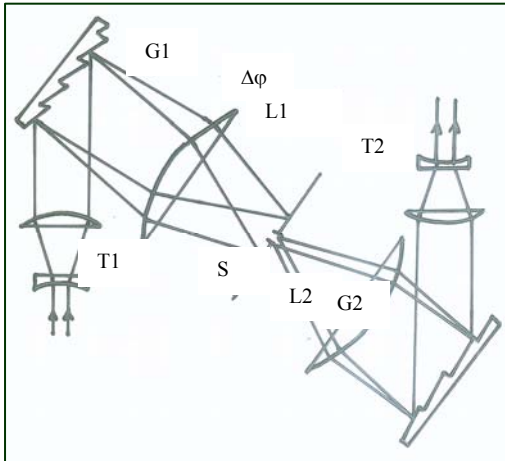
- High Power: Up to 100 mW single transverse mode
- Ultra stable center wavelength
- Narrow linewidth
- Free space or single mode fiber coupled
- Robust, durable, cost effective design
- One year warranty



Specifications (as of August, 2006 and subject to change)

Parameter	Value	Comments
	Divya 785-SH (single transverse mode)	
LASER OUTPUT		
Central wavelength	785 nm	
Central Wavelength Accuracy	< ± 0.3 nm	
Linewidth	<0.03 nm (<0.5 cm ⁻¹)	
Output Power	100 mW (free space), 80 mW (fiber coupled)	50 mW available (Divya-SL)
Beam diameter	< 1 mm	
LASER OPERATION		
Temperature Control	Thermoelectric Cooler	
Operating Temperature	10 to 40 °C with Thermal Overload Protection	
Environmental Isolation	Hermetically Sealed Laser Diode and Optics	
Estimated Lifetime	>10,000 hrs	
DIMENSIONS	8.5 in. x 4.0 in. 2.1 in	Custom Design Welcome
POWER REQUIREMENTS	2 Amp, 5VDC	

**Tokyo Instruments Inc. Laser Products:
Spectral Sharper**



100x30 mm.

Input parameters:

(using a Spectra Physics Hurricane as example)
Pulse duration 130 fs
Spectral width 1.5 TL, estimated as $\Delta\nu_0=220 \text{ cm}^{-1}$
Beam diameter $\varnothing_0=6 \text{ mm}$,
Polarization – horizontal,
Beam divergence 1.5 TEM₀₀, estimated as $\theta_0=0.5 \text{ mrad}$,
Pulse energy <0.1 mJ

Principle of operation:

The input beam is expanded by telescopic optics, T1. This increases the beam size to allow full illumination of the grating, G1. Diffracted light is focused on the slit, S, which is 19 mm in height. The standard grating is

The Diffraction grating G1 has 1,700 grooves/mm. The input spectrum is reflected in the angle $\Delta\phi$ estimated as 42 mrad. Full spectrum is focused in focal plane to the size $L=fx\Delta\phi$. For $f=350 \text{ mm}$ $L=15 \text{ mm}$. The dispersion in the slit plane is $15 \text{ cm}^{-1}/\text{mm}$.

To cut spectral width $\Delta\nu=3 \text{ cm}^{-1}$ the slit width should be $S=0.2 \text{ mm}$. ($S>d$)

The transmission of the Sharper is $T=(S/L)xR^2x\eta$, where R is reflection of grating and η is factor about 2 due to spectrum has near Gaussian shape and its central part is cut. $T\sim 2\%$ for the case.

G2 diffraction grating is the same as G1. It collimates selected spectral components and compensates the space chirp occurred after reflection from G1.

T2 telescope reduces the beam size to the suitable value.

Finally, transmission $T=(\Delta\nu/\Delta\nu_0)xR^2x\eta$,

Output spectrum $\Delta\nu= \Delta\nu_0xS/(fx\Delta\phi)$, $S>fx\theta_0/K_{T1}$, $K_{T1}< D/\varnothing_0$

Spectral Sharper dimensions:

Base plate size: 111 x 53 cm

Slit height: 19 mm

The distance from edge to input/output beam: 105 mm

Lotis TII Components and Specifications:

Laser Control Software

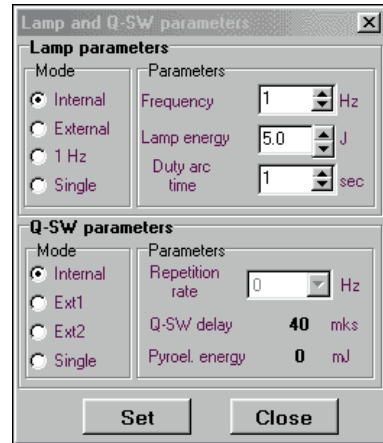
LOTIS TII LS-21xx series lasers are controlled by our powerful Windows® based software via the RS 232 port. All parameters of the laser are computer controlled. You can create control algorithms for execution, scan the parameters of the laser, save them into file or print out. For OEM or automated applications, standard DLL-units of the program may be embedded into a user programs.

Starting the Program

Prior to the program start, connect a laser to a computer serial port and power it. The program will automatically determine the port to which the laser has been connected. The main window will be loaded.

Setting the Laser Operational Parameters

All parameters of the laser are controllable through on screen windows.

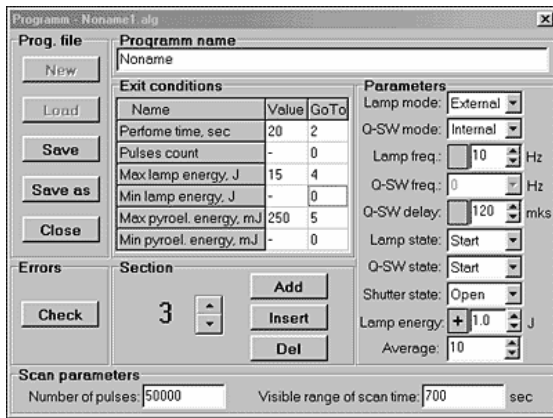


up.

of

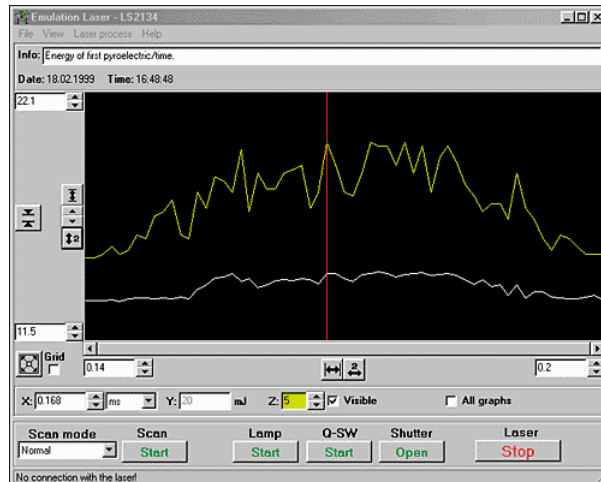
Creation of Control Algorithms

Users may define laser parameters for each period laser operation and conditions for subsequent periods of laser operation. During execution of the algorithm, the program will scan laser energies pulse to pulse. Algorithm and scan results may be saved in a file.



Using The Graphs

Graphs are created when the Program is run in the scan. They can also be loaded from a file using File/Load command.



mode.

Laser Power Supply Specifications for LOTIS TII Lasers



The LOTIS TII laser power supplies are designed for supply and control of solid state lasers with flash lamp pumping.

- Laser system remote control.
- Automatic triggering and simmer features.
- Cooling pump system control.
- External and internal pump lamp triggering.
- External and internal Q-switch driver triggering.
- Overheat protection.
- Power factor correction.
- Modular assembly.
- RS-232 interface, software for Windows XP[®], Windows 98[®], Windows NT[®].

Specifications (as of August, 2006 and subject to change)

	PS-2225	PS-2225A	PS-2225M	PS-2241	PS-2242	PS-2243
Output Pump Energy, Joules	5-50	5-30	5-75	5-20	5-30	5-15
Pulse rate accuracy, Hz	±1.0					
Dimensions, LxWxH, mm	363x364x192	386x449x177	363x364x192	446x449x177	446x449x177	446x449x177
LxWxH, in	14.3x14.3x7.6	15.2x17.7x7	14.3x14.3x7.6	17.6x17.7x7	17.6x17.7x7	17.6x17.7x7
Weight, kg	15.5	16.5	16.5	21.0	21.0	22.0
Weight, lbs	34	36.3	36.3	46.2	46.2	48.4
Power Requirements, Watts	900	900	900	1200	1700	1700
Power Supply	220 VAC single phase 50/60 Hz					

Laser Cooling Systems

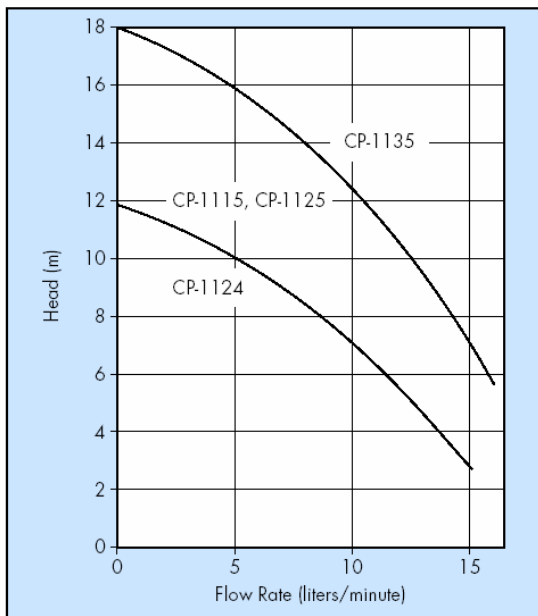


The compact water-to-air heat exchanger provides maximum reliability heat transfer for closed-loop liquid cooling.

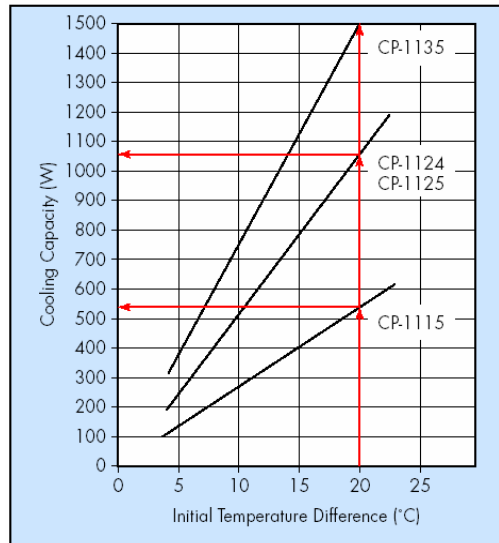
All units consist of flow, temperature and level sensors. Noiseless operation.

LOTIS TII laser cooling systems are highly reliable devices providing efficient cooling without an external water supply.

SYSTEM FLOW CAPACITY



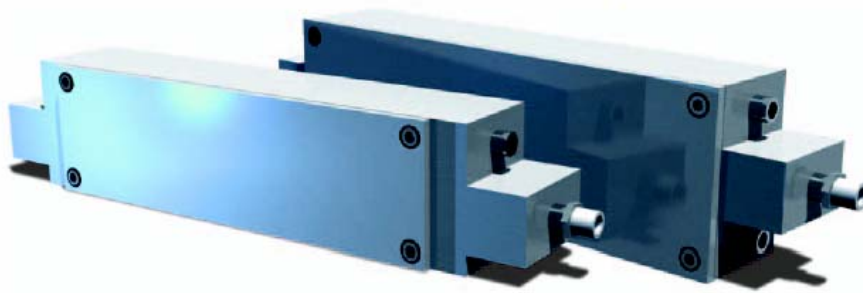
COOLING CAPACITY



Specifications (as of August, 2006 and subject to change)

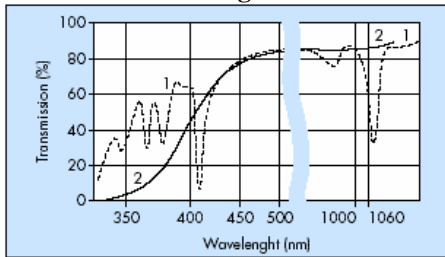
Model:	CP-1115	CP-1124	CP-1125	CP-1135
Cooling Capacity, W	500	1000	1000	1500
Free Pump Pressure, Bar	1.2	1.2	1.2	1.8
Coolant	Deionized water			
Dimensions LxWxH, mm	363 x 364 x 192	386 x 449 x 266	363 x 364 x 280	446 x 449 x 266
In.	14.3 x 14.3 x 7.6	15.2x17.7x10.5	14.3x14.3x11	17.6x17.7x8.9
Weight, kg	12.5	18.0	15.5	23.0
lb.	27.5	39.6	34	51
Power Requirements	220 VAC, 50-60 Hz			
	110 W	90 W	90 W	160 W

High Efficiency Diffuse Pump Chambers



LOTIS HQ Series pump chambers are designed for use with Nd:YAG active elements in Q-Switched and Free Running operation. Double Rod chambers (HQP) allow pumping two active elements simultaneously by a single flash lamp. Close diffuse reflector design provides uniform rod pumping and allows extracting high energy by eliminating ASE (amplified spontaneous emission) losses. Specialized filters are available for optimum energy transfer and UV absorption. Chemically inert materials assure contaminate free operation and maximum useful life.

Custom designed chambers can be made upon request. Please contact us with your specifications.



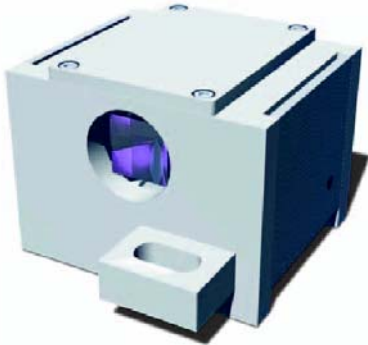
Spectral Transmission
of the Reflector
Materials L=2 mm:

1. Sm-doped glass;
2. Eu-doped fused silica

Specifications (as of August, 2006 and subject to change)

Model	Size	Lamp dimension (bore x arc length)
HQ 4 x 80	4 x 80 mm / single piece	5 x 75 mm
HQ 5 x 80	5 x 80 mm / single piece	5 x 75 mm
HQ 6.3 x 80	6.3 x 80 mm / single piece	5 x 75 mm
HQ 8 x 80	8 x 80 mm / single piece	5 x 75 mm
HQP 4 x 80	4 x 80 mm / two piece	5 x 75 mm
HQP 5 x 80	5 x 80 / two piece	5 x 75 mm
HQP 6.3 x 80	6.3 x 80 / two piece	5 x 75 mm
HQP 6.3-8 x 80	6.3 x 80 and 8 x 80 / one piece each	5 x 75 mm
HQ 6.3 x 100	6.3 x 100 / single piece	5 x 90 mm
HQ 8 x 100	8 x 100 / single piece	5 x 90 mm

KD*P Pockels Cells



The PC-series of KD*P longitudinal Pockels cells have been designed to give highest possible switching times for use with Q-switched lasers.

The cells are manufactured from crystals that have been specially selected for their low optical loss and strain free properties. They can be used in optical range 0.4-1.1 μm and are normally supplied with AR coatings at user specified wavelength.

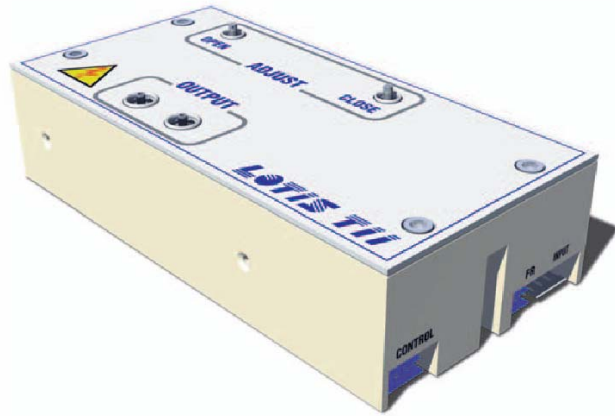
The crystals are set in temperature-stabilized mounts, which accurately maintain the maximum contrast ratio without adjustment of bias voltage and prevent surface degradation by humidity.

KD*P crystals with wedge and Brewster angle surfaces are available on request.

Specifications (as of August, 2006 and subject to change)

Model:	PC-8	PC-10	PC-15
Aperture, mm	8 x 8	10 x 10	15 x 15
Half-wave voltage (1064 nm, 20°C) kV	6.7 – 7.5	6.7 - 7.5	6.7 - 7.5
Contrast Ration (1064 nm)	1000:1	1000:1	1000:1
Crystal Length, mm	16	20	30
Damage Threshold with AR coating, MW/cm ²	400	400	400
Damage Threshold without AR coating, MW/cm ²	500	500	500
Single Pass Insertion Loss, %	≤ 4	≤ 4	≤ 5

Pockels Cell Driver: Model PCD-6601



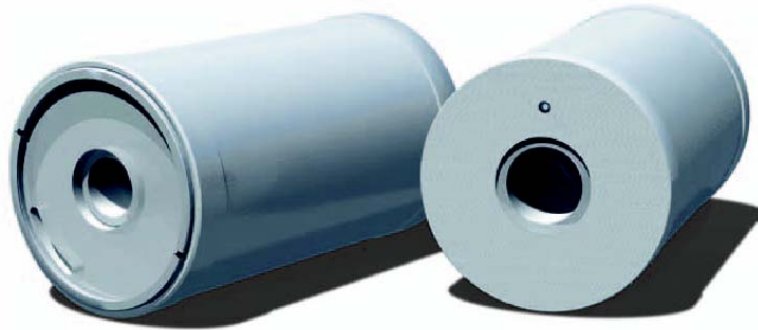
LOTIS TII Pockels Cell Driver for solid state laser Pockels cells.

Specifications (as of August, 2006 and subject to change)

Parameter	Value
Maximum Output Voltage	6 kV
Rise time	<10 ns
Jitter with respect to external trigger	No more than ± 1 ns
External Trigger:	
Amplitude	≥ 4 V into 50 Ω
Polarity	Positive
Maximum Repetition Rate	100 Hz
Duration	≤ 100 μ s
Rise Time	≥ 1 μ s
Dimensions L x W x H	95 mm x 60 mm x 35 mm 3.6 in x 2.4 in x 1.4 in
Power Requirement*	120 mA

*A separate power supply for 110/220 VAC 50/60 Hz is available

Crystal Oven for Nonlinear Crystals: TC-1



The TC-1 Crystal Oven is designed for heating and temperature stabilization of nonlinear crystals. The oven is furnished with a driver capable of supplying two thermostats with different temperatures simultaneously. An adjustable holder is also available.

We can build custom crystal ovens for large crystals to meet your requirements. Please contact us for further information

Specifications (as of August, 2006 and subject to change)

Parameter	Value
Stabilized temperature range	Up to 80 °C
Long Term Stability	±0.1o C
Operating Voltage*	18 – 24 VDC
Maximum Current	0.8 A
Maximum crystal size	12 mm x 12 mm x 12 mm
Driver dimension	70 mm x 50 mm x 20 mm

*Separate 110VAC power supply available

Laser Beam Expanders



LOTIS TII TL Series beam expanders are designed for Nd: YAG laser applications.

A Galilean configuration, entrance fused silica optics and air-spaced optics with AR coatings can withstand the high power of Q-switch Nd:YAG lasers (more than $5\text{J}/\text{cm}^2 - 10\text{ns}$ at 1064nm).

All models are optically corrected for 1064 nm . Some models are also optically corrected for 532 nm . Models for 266 nm and 315 nm are available on request. We can also custom build beam expanders to meet your requirements.

Specifications (as of August, 2006 and subject to change)

Model:	Expansion Ratio	Exit Aperture, mm	Dimensions D x L, mm	Maximum input beam, mm
TL 12-1.3	1.3 x	12	30 x 80	8
TL 12-1.5	1.5 x	12	30 x 80	7
TL 12-1.8	1.8 x	12	30 x 90	6
TL 12-2.1	2.1 x	12	30 x 110	5
TL 27-2.5	2.5 x	27	44 x 100	10
TL 27-3.2	3.2 x	27	44 x 120	7
TL 27-4.6	4.6 x	27	44 x 130	5
TL 36-3.6	3.6 x	36	56 x 130	7
TL 36-4.6	4.6 x	36	56 x 130	9
TL 36-7.3	7.3 x	36	56 x 220	4

Laser Objective Lens Sets



LOTIS OL Series Objectives are designed for industrial applications of high power Nd: YAG lasers (cutting, drilling etc.) All models are optically corrected for 1064 nm. These Air-spaced optics with AR coatings can withstand high power Nd:YAG laser output (more than 5J/cm² – 10ns 1064nm) without damage.

We can design and produce objectives to meet your applications. Please contact us for further information.

Specifications (as of August, 2006 and subject to change)

Model	Focal Length, mm	Clear aperture, mm	Dimensions D x L, mm	Working distance, mm
OL 17-049	56.5	17	38x31	48.6
OL 17-079	90.9	17	38x31	79.1
OL 32-049	56.5	32	68x70	48.6
OL 36-071	80.0	36	68x70	70.7
OL 36-079	90.9	36	68x70	79.1
OL 36-187	195.7	36	68x70	186.5