

# HIGH REPETITION RATE Nd:YAG LASER WITH HIGH ENERGY UV OUTPUT

## LS-2148



*LS-2148 is a new model of high energy Q-switched laser.*

### THE KEY FEATURES:

- 50 Hz repetition rate
- High energy UV output
- High stability and efficiency of third harmonic provided by temperature control of LBO crystal
  - Increased stability of fourth harmonic provided by automatic phase matching control.
  - Remote control and PC control using RS232

The laser has built-in second, third and fourth harmonics and it is a very good tool for scientific research (spectroscopy, photochemistry, biology, medicine, pumping tunable lasers and OPO and LIDAR) and for technological applications, such as UV marking, ablation etc.

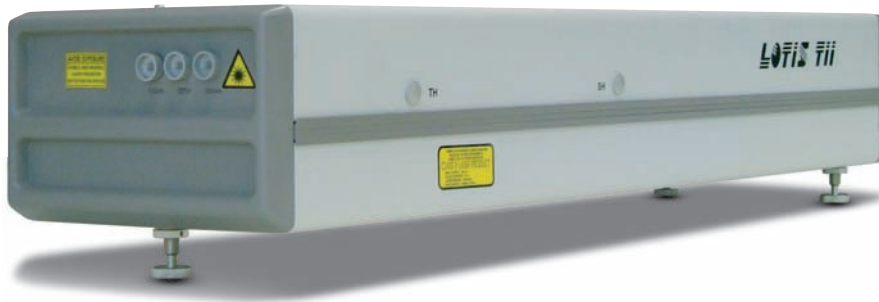
## SPECIFICATIONS

Model	LS-2148	
Energy, mJ	1064 nm	700
	532 nm	350
	355 nm	120
	266 nm	100
Pulse duration (FWHM), ns		14-16
Pulse repetition rate, Hz		50
Beam divergence, mrad full angle for 86% of energy		1.0
Beam diameter, mm		10
Jitter *,ns		±1.0
Energy stability**, %	1064 nm	±3.0
	532 nm	±3.0
	355 nm	±4.0
	266 nm	±4.5
Size LxWxH, mm (Weight, kg)		
Laser Head		870x410x140 (45.0)
Power Supply (2pcs)		446x449x177 (22.0)
Cooling System (2pcs)		446x449x266 (23.0)
Controller of AFM		260x160x115 (3.0)
Remote Control		105x175 (0.5)
Power requirements	Single Phase, 220±20 V, 50-60 Hz, 2000 W	

\*with respect to external trigger of Q-switch

\*\*shot to shot for 99% of pulses

# Q-SWITCHED Nd:YAG LASER WITH STABLE UV OUTPUT LS-2132T LBO, LS-2138T LBO



*The lasers LS-2132T-LBO, LS-2138T-LBO are the special models for technological application such as UV laser marking, LIDARs, etc.*

These lasers have built-in second and third harmonic generators.

The main advantage of these models is high efficiency and stability of UV radiation provided by temperature control of LBO crystal. UV laser gives the possibility of almost all insulation materials marking without any material damage.

The special modification LS-2138T-LBO-75 (75 Hz repetition rate version) is possible on custom's request.

## SPECIFICATIONS

Model		LS-2132T	LS-2138TF
Energy, mJ	1064 nm	200	220
	532 nm	105	110
	355 nm	40	50
Pulse duration (FWHM), ns		10	12-14
Pulse repetition rate, Hz		20	50
Beam divergence, mrad full angle for 86% of energy		1.2	1.0
Beam diameter, mm		5	
Jitter *,ns		±1.0	
Energy stability**, %	1064 nm	±2.5	
	532 nm	±3.0	
	355 nm	±3.0	
Size LxWxH, mm (Weight, kg)			
Laser Head		655x236x123 (25.0)	890x236x123 (30.0)
Power Supply		363x364x192 (15.5)	446x449x177 (22.0)
Cooling System		363x364x280 (15.5)	446x449x266 (23.0)
Remote Control		105x175 (0.5)	105x175 (0.5)
Power requirements		Single Phase, 220±20 V, 50-60 Hz	
		1000 W	2000 W

\*with respect to external trigger of Q-switch

\*\*shot to shot for 99% of pulses

## Q-SWITCHED AUTOMATED Nd:YAG LASER WITH UV OUTPUT LS-2145T, 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.

### SPECIFICATIONS

Model		LS-2145T	LS-2145F
Energy, mJ	1064 nm	350	350
	532 nm	230	230
	355 nm	85/75*	-
	266 nm	-	70
Pulse duration (FWHM), ns		13-15	
Pulse repetition rate, Hz		10	
Beam divergence, mrad full angle for 86% of energy		1.0	
Beam diameter, mm		6.3	
Jitter **, ns		±1.0	±1.0
Energy stability ***, %	1064 nm	±2.5	±2.5
	532 nm	±3.0	±3.0
	355 nm	±3.0	-
	266 nm	-	±3.0
Size LxWxH, mm (Weight, kg)			
Laser Head		815x206x136 (30.0)	
Power Supply		363x364x192 (15.5)	
Cooling System		363x364x280 (15.5)	
Remote Control		105x175 (0.5)	
Power requirements		Single Phase, 220±20 V, 50-60 Hz, 750 W	

\* for OPO pumping (with protective mirror, cutting back reflection)

\*\* with respect to external trigger of Q-switch

\*\*\* shot to shot for 99% of pulses

# HIGH POWER PICOSECOND MODE-LOCKED Nd:YAG LASER LS-2151

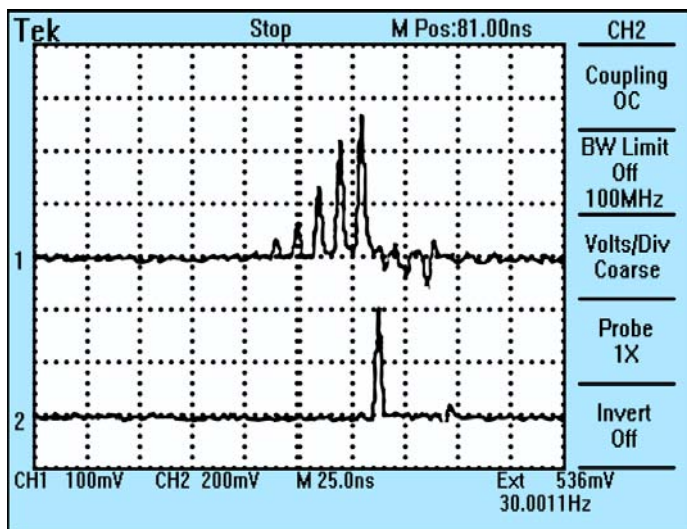
*LS-2151 is an actively mode-locked and Q-switched MOPA laser that incorporates all solid state master oscillator (MO), two-pass amplifier (PA), built-in second harmonic generator (SH), remote control from a PC through an RS-232 or USB interface.*



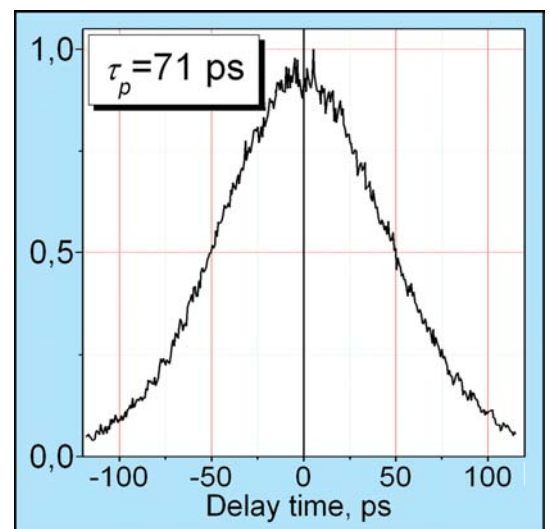
### Features:

- Separate MO and PA pump power control in single unit
- Water to air heat exchanger without external water cooling
- TEM00 master oscillator
- Built-in MO, PA and SH energy monitoring
- 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),

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.



Intracavity oscillations signal (upper trace 1)  
Output signal (lower trace 2)



Autocorrelation function of MO output pulses

# HIGH POWER PICOSECOND MODE-LOCKED Nd:YAG LASER LS-2151

### Synchronization to external devices.

Flash lamps triggering and all Q-control events in laser: mode locking rf-pulse, Q-switching and cavity dumping are monitored by Control Unit with multichannel timer phase-locked to the signal of reference oscillator, keeping system time in the cavity roundtrip units. The use of such timer opens new possibilities for the optical pulse synchronization to external devices:

- output TTL sync pulse either forthcoming or delayed relative to optical pulse in the range  $\pm 120\mu\text{s}$  with 1 ns resolution and timing jitter less than 200ps;
- laser triggering by external sync pulse with the optical pulse delay is in the range 110-140  $\mu\text{s}$  at timing jitter  $\pm 10\text{ns}$ ;
- two LS-2151 lasers synchronization with the accuracy about  $\pm 15\text{ ps}$ .

### Energy monitoring.

LS-2151 has built-in photo-detectors monitoring the energies of MO, PA and SH output pulses. Energy values are indicated in laser control window of remote control PC.

Independent discharge circuits for MO and PA flash lamps open the opportunity to adjust the output energy of laser system according to application requirements.

## SPECIFICATIONS

Model	LS-2151	
Energy, mJ	1064 nm	70
	532 nm	35
	355 nm	15*
	266 nm	15*
Pulse duration (FWHM), ps		70-80
Pulse repetition rate, Hz		15
Beam divergence, mrad		0.7
full angle for 86% of energy		
Beam diameter, mm		9
Jitter (RMS), ns		
Relative to external triggering		$\pm 10.0$
Relative to service sync pulse		$\pm 0.2$
Energy stability****, %	1064 nm	$\pm 2.5$
	532 nm	$\pm 3.5$
	355 nm	$\pm 4.0$
	266 nm	$\pm 10.0 (\pm 3.0^{**})$
Size LxWxH, mm (Weight, kg)	Laser Head	820x356x136 (48.0)
	Power Supply	512x485x177 (23.0)
	Cooling System	542x485x266 (20.0)
	Control Unit	512x485x133 (9.0)
	Power requirements	Single Phase, 220 $\pm$ 20 V, 50-60 Hz, 1000 W

\* Harmonic generator HG-TF is optional as separate unit

\*\* FH with automatic phase matching control (Autotracker FH) is optional as separate unit

