NL940 SERIES

High Energy Temporaly Shaped Nanosecond Nd:YAG Lasers

FEATURES

- *Variable temporal pulse shape*
- *Up to **10 J** output energy*
- ***10 Hz** repetition rate*
- ***3–10 ns** adjustable pulse duration*
- *1064 or 532 nm output wavelength*
- *Spatial flat top beam profile*
- *Fiber front end output amplified in diode pumped regenerative amplifier*

Main laser feature is output of temporaly shaped pulses based on electrooptical modulator driven by programmable arbitrary waveform generator (AWG). Pulse shaping resolution is 125 ps, while maximum pulse length is 10 ns. Start of the system is single mode CW laser. Then light is amplified in fiber amplifier, later AWG driven modulator transmits only required temporal shape and duration pulse which is amplified in diode pumped regenerative amplifier in order to reach energy sufficient to amplify in single-pass flash-lamp pumped amplifiers. Power amplifier is a chain of single-pass amplifiers where pulse is amplified up to required energy. During amplification spatial beam shaping is used in order to get flat top shape at the output. Optional second/third harmonic generators are based on angle tuned nonlinear crystals placed in temperature stabilized heaters.

APPLICATIONS

- *OPCPA pumping*
- *Front end for power amplifiers*
- *Ti: Sapphire pumping*
- *Laser peening – material hardening by laser-induced shock wave*
- *Plasma and shock physics*

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SPECIFICATIONS [1]

Model	NL944	NL945	NL949
Pulse energy (rectangular pulse in time domain 5 ns FWHM)			
at 1064 nm	1.6 J	5 J	10 J
at 532 nm [2]	1.0 J	2.5 J	6 J
Pulse energy stability (Std Dev) [3]			
at 1064 nm	0.5 %		
at 532 nm	1.0 %		
Power drift [4]	± 2 %		
Pulse duration [5]	3–10 ns, variable with 125 ps resolution		
Repetition rate	10 Hz		
Polarization @ 1064 nm	vertical, > 90 %		
Optical pulse jitter [6]	< 30 ps		
Linewidth	< 0.1 cm^{-1}		
Beam profile	Hat-Top" (at laser output), without diffraction rings		
Typical beam diameter [7]	~ 11 mm	~ 22 mm	~ 33 mm
Beam divergence [8]	< 0.5 mrad		
Beam pointing stability	±50 µrad		
PHYSICAL CHARACTERISTICS			
Laser head (W × L × H)	750 × 1350 × 300 mm	700 × 2100 × 300 mm	1000 × 2100 × 300 mm
Power supply unit (W × L × H)	550 × 600 × 840 mm – 1 unit 550 × 600 × 670 mm – 1 unit	550 × 600 × 1220 mm - 2 units	550 × 600 × 1220 mm - 2 units 550 × 600 × 670 mm – 1 unit
Umbilical length	3 m		
OPERATING REQUIREMENTS			
Water consumption (max 20 °C)	< 8 l/min		< 40 l/min
Ambient temperature	22 ± 2 °C		
Relative humidity	20 – 80 % (non-condensing)		
Power requirements [9]	208/240 V AC, single phase, 50/60 Hz or 220, 380 or 400 V AC, three phases, 50/60 Hz		220, 380 or 400 V AC, three phases, 50/60 Hz
Power consumption	5.5 kW		13.2/6.6 kW

[1] Due to continuous improvement, all specifications subject to change without notice. Parameters marked typical may vary with each unit we manufacture.Unless stated otherwise, all specifications are measured at 1064 nm and for basic system without options.

[2] For NL94X-SH harmonic generator option. Harmonic outputs are not simultaneous; only single wavelength beam is present at the output at once. Manual reconfiguration is required to switch wavelength. Third harmonic available on request.

[3] Standard deviation value averaged from 1000 shots after 20 minutes of warm-up.

[4] Deviation from average value measured over 8 hours of operation when room temperature variation is less than ±2 °C.

[5] Measured with photodiode with 100 ps rise time and oscilloscope with 600 MHz bandwidth.

[6] Standard deviation value, measured with respect to triggering pulse.

[7] Beam diameter is measured at 1064 nm at laser output at the $1/e^2$ level and can vary with each unit we manufacture.

[8] Full angle measured at the $1/e^2$ level at 1064 nm.

[9] Mains voltage should be specified when ordering.

BEAM PROFILE

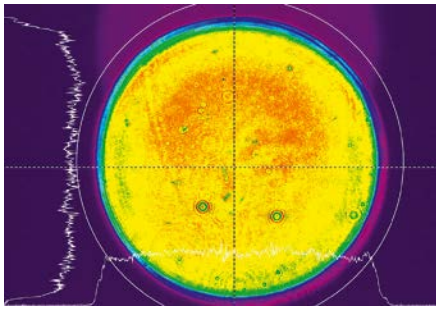

Fig 1. Typical NL949-SH near field beam profile at 5 J at 532 nm

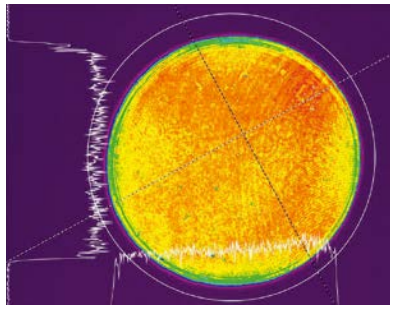

Fig 2. Typical NL945-SH system output beam profile at 532 nm

PERFORMANCE

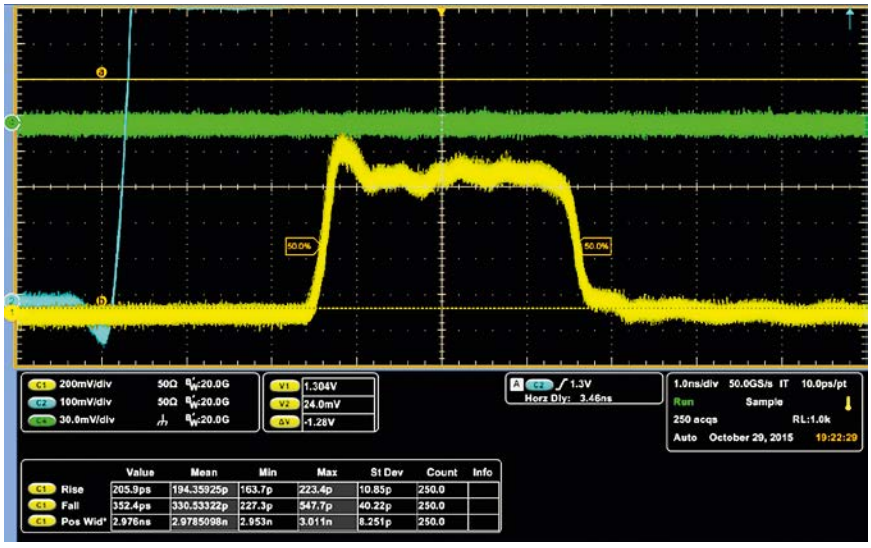

Fig 3. Example of temporal pulse shape, stability of pulse shape and optical pulse jitter

Note: Laser must be connected to the mains electricity all the time. If there will be no mains electricity for longer that 1 hour then laser (system) needs warm up for a few hours before switching on.

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