Spirit®

HIGH REPETITION RATE, HIGH AVERAGE POWER ULTRAFAST LASERS

The Spirit Advantage

- *High average power (>16 W) and high pulse energy (40 µJ)*
- *User adjustable repetition rate (single shot – 1 MHz)*
- *Integrated pulse-picker with analog-in triggering*
- *Integrated SHG module (optional)*
- *Superb beam pointing stability (<20 µrad for 100 hours)*
- *Fully automated and computer controlled*
- *Proven, dependable performance under 24/7 operation*



The Spirit® femtosecond laser is a flexible, high repetition rate one box ultrafast amplifier. With direct diode pumped technology developed by Spectra-Physics, Spirit's innovative and simple architecture offers truly unique performance.

The Spirit platform offers impressive versatility to serve the needs of scientific and industrial customers. The laser's high average power (>16 W) and high repetition rate enable fast data acquisition in complex time resolved spectroscopy experiments. Pulse energy and repetition rate adjustability (single shot – 1 MHz) make the Spirit laser ideal for medical device manufacturing and femtosecond micromachining. The amplifier is optimized for one factory calibrated repetition rate between 400 kHz (40 µJ) and 1 MHz (16 µJ). This basic repetition rate can be chosen by the customer. Additional pre-set repetition rates are optional and can be configured in the factory during assembly upon request. The integrated pulse picker offers the possibility for fast pulse selection and power control by an analog input signal. This simplifies the integration of the laser and offers fast process throughput.

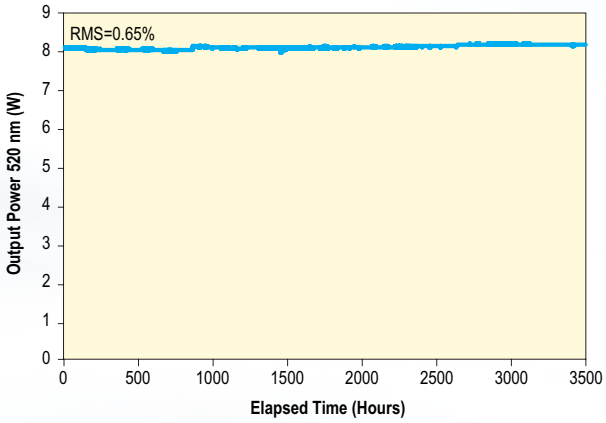
The optional, high efficiency Second Harmonic Generation (SHG) module enables the fabrication of smaller and more accurate structures. The fundamental and SHG output beams are collinear at the laser exit for easy integration and beam delivery. The end user can easily switch between the 1040 nm and 520 nm outputs by software.

Fully automated and computer controlled, Spirit is manufactured with high reliability and quality in mind. Spirit's design is optimized for easy integration and for the superb power and beam pointing stability (typically <20 µrad for 100 hours) during 24/7 operation, ensuring high precision and reproducibility in every application

Applications

- *Femtosecond micromachining*
- *Material processing*
- *Medical device fabrication*
- *Microsurgery*
- *Time resolved femtosecond spectroscopy*
- *Optical parametric amplifier pumping*

Long-term Measurement >3,000 hours[1] – Spirit 1040-16-SHG



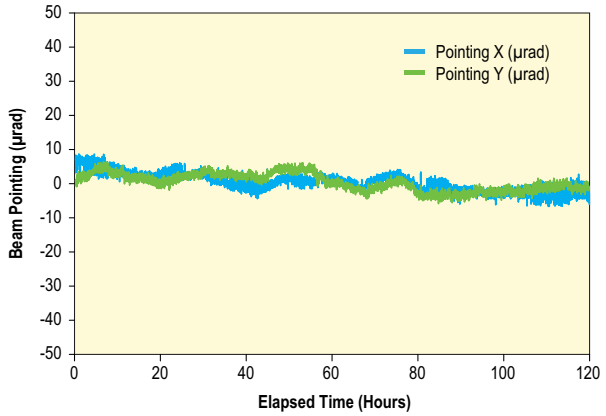
1. Typically measured performance; not a guaranteed or warranted specification.

Spectra-Physics®
A Newport Company

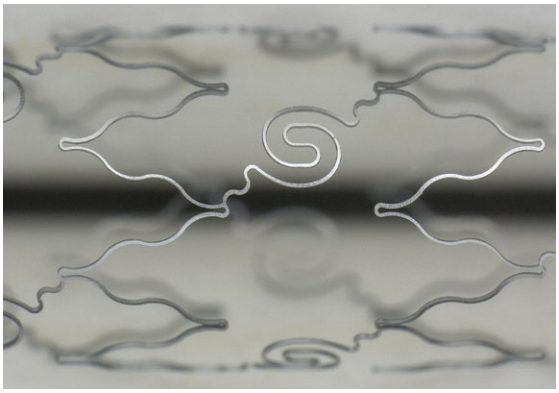
Spirit®

Spirit Typical Performance

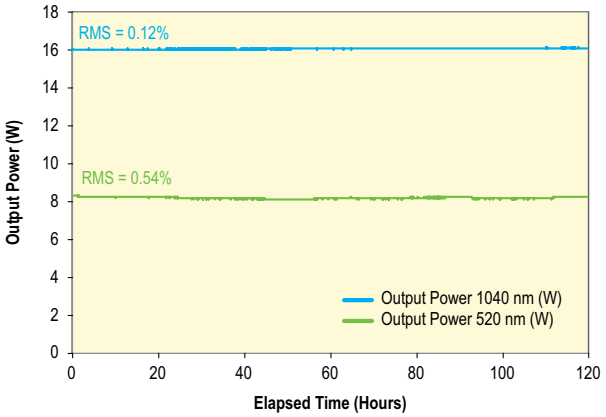
Long-term Beam Pointing Stability >100 hours[1] – Spirit 1040-16



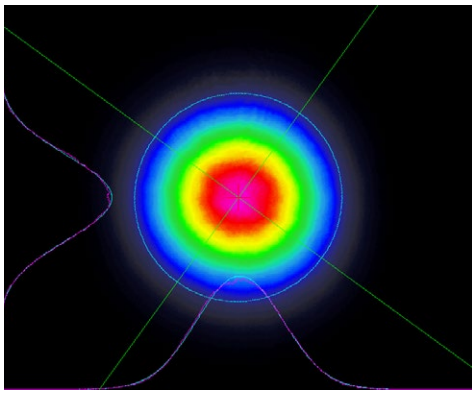
Application Example: Nitinol Stent Machining



Long-term Performance >100 hours[1] – Spirit 1040-16-SHG

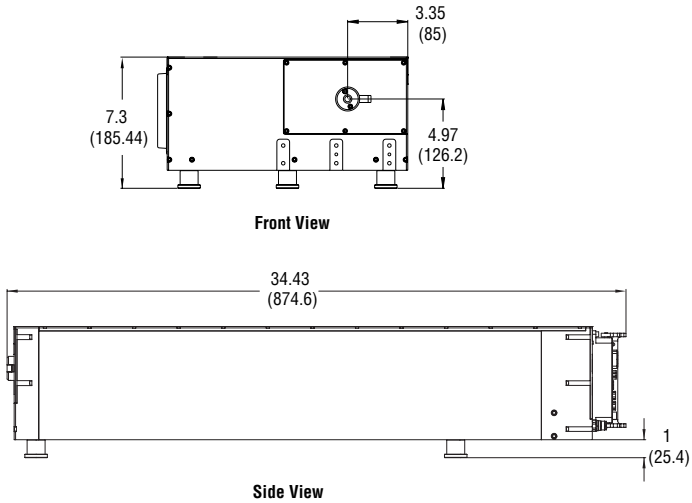


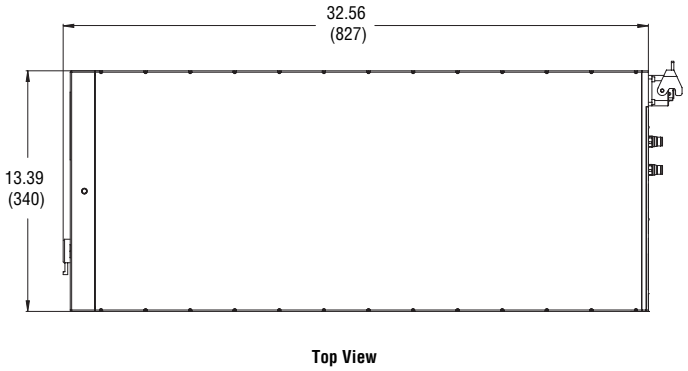
Spirit Beam Profile



1. Typically measured performance; not a guaranteed or warranted specification.

Spirit Dimensions





Dimensions in inch (mm)

Spirit®

Specifications[1,4]

	Spirit 1040-16	Spirit 1040-16-SHG
Output Characteristics		
Wavelength	1040 nm ±5 nm	
Output Power at 1040 nm	>16 W	
Pulse Energy at 1040 nm	>40 µJ at 400 kHz	
Wavelength	520 nm ±3 nm	
Output Power at 520 nm[2]	NA	>8 W
Pulse Energy at 520 nm[2]	NA	>20 µJ at 400 kHz
Basic Repetition Rate[3]	400 kHz–1 MHz	
Pulse Selection	Integrated pulse picker (AOM) for single shot to 1 MHz operation	
Pulse Width[4]	<400 fs	
Power Stability	<1% rms over 100 hours (for 1040 nm and 520 nm) <0.5% rms over 24 hours (for 1040 nm)	
Pulse-to-Pulse Stability	<2% rms over 5 min	
Spatial Mode	TEM_{00}, M^2 <1.2	
Beam Diameter	2.3 mm ±0.3 mm (1040 nm and 520 nm)	
Beam Divergence	<1 mrad (1040 nm); <0.5 mrad (520 nm)	
Pre-Pulse Contrast Ratio	>250:1	
Polarization	Horizontal	
Cold Start Time	<30 min	
Warm Start Time	<15 min	
Environmental Specifications		
Operating Temperature	18–30°C (64–86°F)	
Humidity	<65%, non-condensing	
Cooling Requirements		
Laser Head	Closed-loop chiller included	
Power Supply	Air cooled	
Utility Requirements		
Voltage	100–230 V, 50 Hz / 60 Hz	
Power Supply	<16 A	
Laser Head Physical Characteristics		
Dimensions (L × W × H)	32.5 × 14 × 6.5 in (875 x 340 x 160 mm)	
Weight	155 lbs (70 kg)	
Power Supply Physical Characteristics		
Dimensions (L × W × H)	23.6 x 22.0 x 29.4 in (600 x 560 x 746 mm)	
Weight	176 lb (80 kg)	

1. Due to our continuous product improvement program, specifications are subject to change without notice.
2. Maximum conversion efficiency of 50% for SHG at 400 kHz (Spirit 1040-16).
3. Spirit is configured with one basic repetition rate in the above mentioned range by default; additional pre-calibrated repetition rates are available upon request. Please contact Spectra-Physics.
4. Spirit is a Class IV – High-Power Laser, whose beam is, by definition, a safety and fire hazard. Take precautions to prevent exposure to direct and reflected beams. Diffuse as well as specular reflections can cause severe skin or eye damage.

Spectra-Physics
A Newport Company

www.spectra-physics.com

3635 Peterson Way, Santa Clara, CA 95054, USA
PHONE: 1-800-775-5273 1-408-980-4300 FAX: 1-408-980-6921 EMAIL: sales@spectra-physics.com

Belgium	+32-(0)0800-11 257	belgium@newport.com	Korea	+82-31-8069-2401	korea@spectra-physics.com
China	+86-10-6267-0065	info@spectra-physics.com.cn	Netherlands	+31-(0)30 6592111	netherlands@newport.com
France	+33-(0)1-60-91-68-68	france@newport.com	Singapore	+65-6664-0040	sales.sg@newport.com
Germany / Austria / Switzerland	+49-(0)6151-708-0	germany@newport.com	Taiwan	+886 -(0)2-2508-4977	sales@newport.com.tw
Japan	+81-3-3794-5511	spectra-physics@splasers.co.jp	United Kingdom	+44-1235-432-710	uk@newport.com

© 2017 Newport Corporation. All Rights Reserved. Spirit, Spectra-Physics, the Spectra-Physics logo and the Newport logo are registered trademarks of Newport Corporation. Spectra-Physics Santa Clara, California, Stahnsdorf, Germany, Rankweil, Austria and Tel Aviv, Israel have all been certified compliant with ISO 9001.