Fiber lasers for industrial micro machining, marking & medical therapeutics

Focused

on your success

SPI Lasers

inspiring your products & manufacturing

Focused on you

Listening to you

SPI Lasers leads the world in fiber laser technology. The company is focused on development of highly effective laser solutions for micro machining, marking and medical therapeutic applications.

Since our first fiber lasers were launched in 2004, we have worked to achieve a global reputation for excellence in applications engineering. We pride ourselves on our ability to add value to our customers' processes through our expertise and innovation.

Over the years, our product portfolio has grown to include a wide range of laser types, power levels and box formats. We have 1000s of units in the field with millions of operating hours behind them.

And we have never stopped listening to our customers.

Now, we have combined our fiber laser expertise with your customer feedback to create the next generation fiber lasers – the R4 and G3.

Image: courtesy of LEISTER

Cutting and welding for manufacturing

Medical therapeutics

Consumer electronics

Micro machined components

Understanding your application

More than 250 companies in Asia, USA and Europe already use SPI Lasers fiber laser technology to add value to their manufacturing processes.

Our customers include end-users looking to improve an existing laser-based application or to introduce a new laser process, as well as machine builders interested in the advantages of the latest laser engine to boost sales of their own systems offering.

To each and every customer project, we bring our considerable knowledge, field expertise and the resources of our dedicated applications facility, where our materials scientists can create a proof of principle solution, using the actual materials supplied by you.

Fine wire joining with SPI's CW/M lasers, made possible by high beam quality.

Focused on your needs

Raising your game

SPI Lasers' business is built on the development of productive customer relationships. We like to roll up our sleeves and work alongside our customers, wherever they may be in the world. It is this grass roots input that has influenced the development of the new R4 and G3 lasers.

For example, on our new G3 pulsed laser we have increased the number of pre-set waveforms from five to 25 and included on-board fast controllers and fully integrated isolators and beam expanders built into the beam delivery optic.

New options on the R4 series of CW/M micro-machining lasers include CanBus industrial controls and high stability processing at 100kHz, a first on a CW/M fiber laser. Modulated pulses of a few micro-seconds can now be created from a CW system.

The R4 and G3 ranges are stable, flexible and fast, helping you to make real productivity improvements to your process.

Our continuous wave (CW) and modulated/pulse-to-pulse laser power stability is second to none. Our system lasers can run at 100khz repetition rates and our pulsed lasers at 500kHz – faster than any comparable product – and all the models can be used for a wide range of different machining tasks, making them an excellent manufacturing investment.

And, like all our lasers, the new R4 and G3 ranges are simple to use, require low maintenance and are robust enough for the most aggressive industrial environments.

Samples and analysis provided to you

Proof of concept report

Free evaluation laser

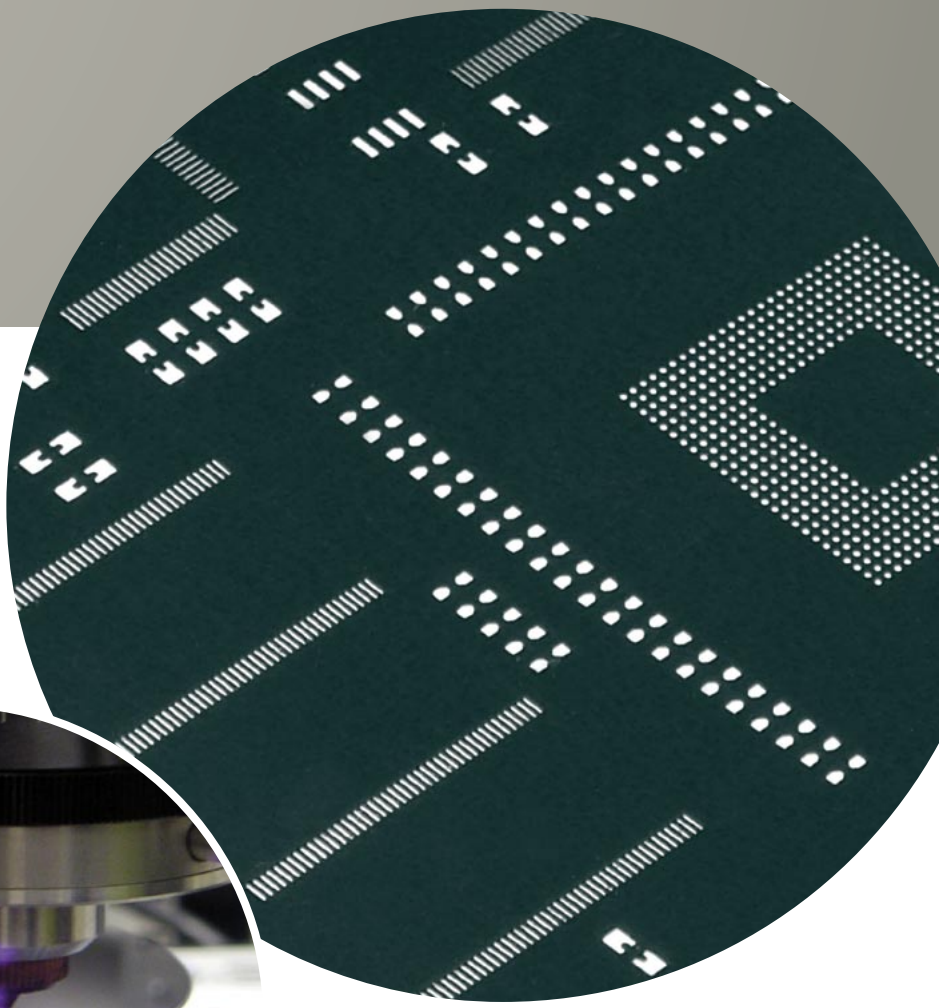
Repeat and refine in your own environment

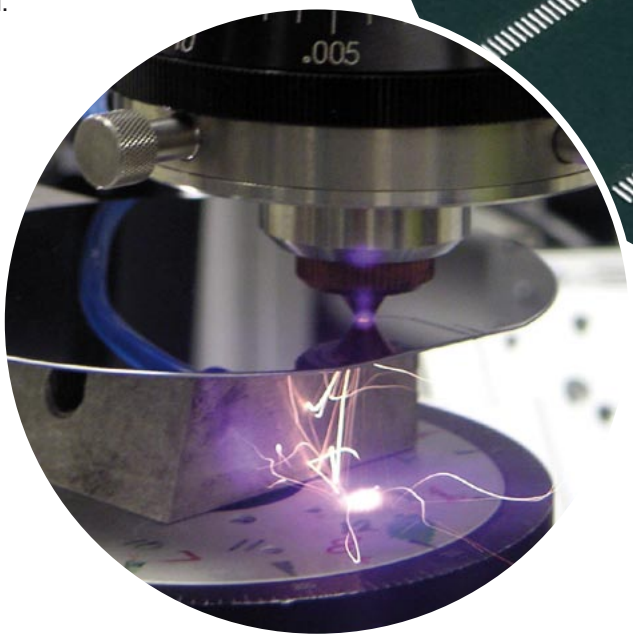
Production

On-site product support

Pushing forward

Our world-leading fiber laser applications laboratory has its own permanent welding, cutting and marking stations, manned by materials science experts. We are experienced in working with a wide variety of materials including silicon, metals, ceramics, plastics, composites and thin films and will be pleased to discuss your application in detail.





Left:
Fiber laser cutting of 0.8mm silicon wafer using SPI's 200W laser.

Above:
Solder mask stencil cutting of stainless steel as used in the electronics industry. This stencil cutting is made by SPI's 100W CW lasers, which benefit from high beam quality and low operational costs.

R4 features

CW or Modulated to 100kHz
(modulated pulses <10µs to CW)

TEM_{00} (M^2 <1.1), BPP <0.37 mm.mrad

Efficiency up to 10x equivalent Nd YAG lasers

Spot size to sub 10µm

High stability laser
(typically <±0.5% output power variation)

Precision dial up of pulse energies

Full comms/analog I-O control options

Optional isolator

Optional pulse generator

2-year standard warranty
(additional warranty options available)

CW/M fiber laser range

with GTWave™ technology

R4 high power 50-200W CW/M

Compact module 10-20W CW/M

G3 10-20W CW/M

Optical

Rated output power (CW)	50W	75W	100W	200W	10W	20W	10W	14W	20W
Central emission wavelength	1070 ± 10nm				1090 ± 5nm		1550 ± 5nm	1565 ± 5nm	
Mode of operation	CW and Modulated				CW and Modulated		CW and Modulated		
Output power variation	<±0.5% (typical to long term)[1,2]				<5%		<5%[2]		
Maximum modulation	100 kHz				<20kHz		<3kHz		
Targeting laser	Standard				—		—		

Pulse characteristics

Pulse to pulse stability	<0.5%[1]				5%[2]		—		
Minimum pulse width	<10µs				25µs		150µs		

Output beam characteristics

Beam diameter	5mm ± 0.5				5mm ± 0.5		4.8mm ± 0.7		
Full angle divergence	<0.4mrad				<0.4mrad		<0.6mrad		
M^2	<1.1 (nominal)				<1.1		<1.2		
Polarization	Random				Random		Random		
Beam parameter product (BBP)	<0.37mm.mrad				0.38mm.mrad		0.6mm.mrad		
Cable length (fiber delivery)[3]	6m ± 0.5m				6.2m ± 0.5		6.2m ± 0.5		

Electrical

Power supply requirements	Single phase				8V DC / 10A	14V DC / 10A	24V DC / 12A		
Control interface	Analog/RS232[4]				Analogue input for high/low current set points[4]		Analogue input for high/ low current set points[5]		
Operating voltage (Vac 47-63Hz)	100-240			200-240	—		—		

Mechanical

Dimensions	5U (19") rack unit 507 x 483 x 221 mm				230 x 130 x 70.5 mm		352 x 198.2 x 77 mm		
Weight	<45kg				<4kg		<6kg		
Cooling options	Air	Air	Air / Water	Water	Attached to base ≤0.1°C/W		Requires heat sink attached to base ≤0.1°C/W		

Environmental

Operating temperature	5-40°C[6]				10-45°C (case)		10-55°C (case)		
Humidity	15-85%RH (non condensing)				5-85%RH		5-85%RH		

Notes:
1. Under closed loop control
2. At constant temperature
3. 10m cable length option available
4. Other control options available
5. Digital (ttl) diode driver enabled and switching between high/low current set points.
6. Specifications met at 5-35°C

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G3 pulsed fiber laser 10-20W

With GTWave™ and PulseTune technology

Model	10W/G3/RM	20W/G3/RM	12W/G3	20W/G3
Nominal specifications	10W/6kW	20W/12kW[1]	12 W/10 kW[1]	20 W/12 kW[1]
Specifications				
Peak emission wavelength	1064 ± 5 nm			
Modes of operation	Pulsed		Pulsed and CW / modulated CW	
Pulse repetition range				
Full power range	20-100kHz	25-100kHz	20-500kHz	25-500 kHz
Reduced power range	1-20 kHz	1-25 kHz	1-20 kHz	1-25 kHz
Modulation range in CW	N/A		DC to 100 kHz	
Output power stability (typical)	5%			
Output beam characteristics[1]				
Beam diameter, nominal	1-9 mm with selected BET option			
M^2	≤ 2			
Polarization state	Random			
Beam delivery cable length	2 m			
Red alignment laser	Optional		Standard	
Electrical				
Laser head power supply requirement	24 V / 7 A	24 V / 10A	24 V / 7 A	24 V / 10A
Mechanical				
Laser module weight	<6 kg			
Laser module dimensions	352 x 198.2 x 77 mm			
Cooling	Requires heat sink attached to base ≤0.1°C/W			
Environmental				
Module temperature with auto-shutdown	0°C to +45°C[2]			
Humidity	5-95%RH (non condensing)			

Notes:
1. 20W G3 has a maximum 1.25W power drop from nominal over a base plate temperature range of 15-35°C
2. Higher spec option available

G3 features

12kW nominal peak power with 20W average output power

Up to 500 kHz pulse repetition frequency*

Pulsed and CW operation*

First and last pulse equally useable

High speed marking compatible (2000 cps)

Bitmap marking compatible

Pulse width variable (across 25 pre-set waveforms)*

Maximized peak power over full operational repetition rate*

Isolated optical output

High reliability/ repeatability/ stability design

Analogue power control input, pulse gate, and pulse trigger

Hardware-only interface or simple RS-232 software control*

Status monitoring and safe shut down

* Not applicable to 10W/RM & 20W/RM

Focused on applications

Fiber laser type ➔	R4 air cooled 50-100W CW/M	R4 water cooled 100-200W CW/M	Compact module 10-20W CW/M	G3 10-20W CW/M	G3 pulsed 10-20W
Wavelength	1070	1070	1090	1550 or 1565	1064
Applications					
Anilox engraving	■	■			
Annealing	■	■	■		
Atom trapping			■	■	
Bending / tweaking	■	■			■
Cutting / scribing silicon		■			■
Cutting metals	■	■		■	
Cutting sub 100um metals	■	■			■
Cutting/ scribing ceramics		■			■
DAC heating	■	■			
Fine wire welding	■	■			
Flash memory repair					■
Flexi circuit cut outs		■			■
Graphic texturing		■			■
ITO patterning					■
Lapping / polishing					■
Laser tweezers			■	■	
Marking (ablative mark)					■
Marking (sintered mark)	■		■		■
Marking (thermal mark)	■		■		■
Medical asthetics				■	
Metal addition	■	■			
Metal welding (spot / seam)	■	■			
Plastic welding	■	■	■	■	
Resistor trimming					■
Selective layer melting		■			
Soldering / brazing	■	■	■		
Thin film patterning					■

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