

IceFyre®

Versatile Game-Changing UV and IR Picosecond Lasers for Precision Micromachining



IceFyre redefines picosecond micromachining lasers with a patent-pending design to achieve exceptional UV and IR performance and unprecedented versatility at industry leading cost-performance. Based on Spectra-Physics' *It's in the Box™* design, IceFyre integrates laser and controller into the industry's smallest package.

Exceptional Performance and Unprecedented Versatility

The new IceFyre 355-30 provides >30 W of typical UV output power at 500 kHz (>60 μ J) and delivers exceptional performance from single shot to 3 MHz. The IceFyre 1064-50 provides >50 W of IR output power 400 kHz single pulse and delivers exceptional performance from single shot to 10 MHz.

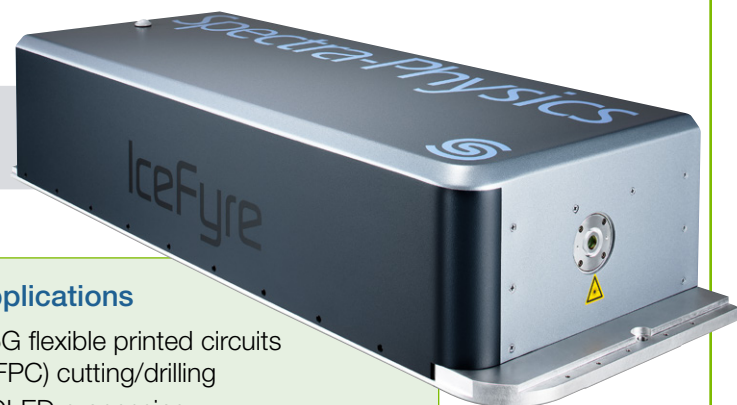
IceFyre's unique design exploits fiber laser flexibility and Spectra-Physics' exclusive power amplifier capability to enable TimeShift™ ps programmable burst-mode technology and wide adjustability of repetition rates. A standard set of waveforms is provided with each laser; an optional TimeShift ps GUI is available for creating custom waveforms. The laser provides pulse-on-demand and position synchronized output (PSO) triggering with the lowest jitter in its class for high quality processing at high scan speeds, e.g. when using a polygon scanner.

The IceFyre Advantage

- High power UV and IR models
- Industry leading cost-performance
- Unprecedented pulse control
 - TimeShift ps technology
 - Adjustable number of pulses in burst
 - Programmable burst shape (envelope of burst)
 - Adjustable burst mode pulse separation
 - Full power available with burst mode adjustments
 - Widest adjustable repetition rate range
 - Best pulse-on-demand and position synchronized output (PSO) triggering
 - Lowest jitter variability in pulse timing
- Most compact, *It's in the Box* laser
- 24/7 industrial reliability

Applications

- 5G flexible printed circuits (FPC) cutting/drilling
- OLED processing
- ITO drilling/scribing
- Glass and sapphire cutting and drilling
- Semiconductor scribing and dicing
- PCB processing
- Ceramic cutting, drilling and scribing
- Solar cell scribing and drilling
- LED scribing, dicing and patterning
- Metal cutting, drilling and marking
- Medical device cutting, drilling and marking

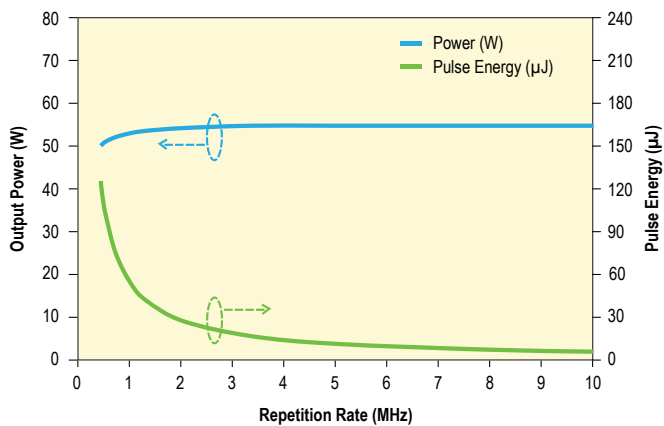


IceFyre

24/7 Industrial Reliability

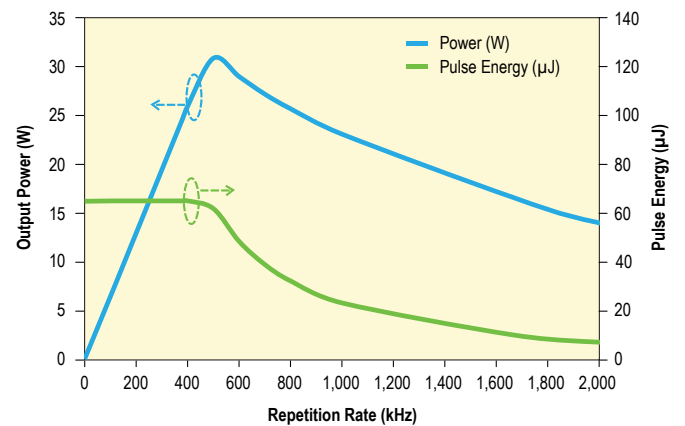
IceFyre is designed, built, and tested to stringent quality standards for reliable continuous operation in demanding 24/7 manufacturing environments. IceFyre lasers' automatic data logging software monitors all key laser performance parameters over the life of the laser, providing a powerful service/preventative maintenance diagnostics feature and product reliability tool.

IceFyre 1064-50 Typical Power and Pulse Energy¹



1. Typically measured performance without optional AOM, not a guaranteed or warranted specification.

IceFyre 355-30 Typical Power and Pulse Energy²



2. Typically measured performance, not a guaranteed or warranted specification.

IceFyre Specifications^{1, 2, 10}

	IceFyre 1064-50	IceFyre 355-30
Output Characteristics		
Wavelength	1064 nm	355 nm
Power ^{2, 3}	>50 W @ 400 kHz	>30 W typical @ 500 kHz >25 W @ 800 kHz >20 W typical @ 1 MHz
Maximum Pulse Energy, typical (greater pulse energy per burst possible with TimeShift ps)	>200 µJ single pulse @ 200 kHz	>60 µJ typical @ 500 kHz >31 µJ @ 800 kHz >20 µJ typical @ 1 MHz
Repetition Rate Range ⁵	Single shot to 10 MHz	Single shot to 3 MHz
Pulse Width, FWHM ²	<20 ps (15 ps typical)	
TimeShift ps	yes	
Pulse-to-Pulse Energy Stability ²	<1.5%, 1 σ	<2.0%, 1 σ
Power Stability (after warm-up) ²	<1%, 1 σ , over 8 hours	
Beam Characteristics		
Spatial Mode ²	TEM ₀₀ (M ² <1.3)	
Polarization	>100:1, vertical	
Beam Diameter (D4 σ) ²	3.0 ±0.3 mm	3.5 ±0.35 mm
Beam Divergence, full angle ²	<0.75 mrad	<0.20 mrad
Beam Asymmetry ²	≤1.10 (≥90% circularity)	
Boresight Tolerance ²	±0.5 mm, ±5 mrad	
Beam Pointing Stability ²	<±25 µrad/°C	
Operating Conditions⁸		
Warm-up Time, typical	<15 min from warm start mode, <40 min from cold start ⁷	<45 min from warm start mode, <60 min from cold start ⁷
Temperature Range	15–30°C	
Altitude	0–2000 m	
Humidity ⁷	0–90% non-condensing, dew point <19°C	
Storage Conditions⁸		
Temperature Range	0–50°C	
Altitude	0–10,000 m	
Humidity ⁷	0–90% non-condensing, dew point <22°C	
Electrical and Chiller Requirements⁷		
Water Temperature (laser inlet)	20 ±1°C, stable to ±0.5°C	
Water Flow Rate (at laser head)	1.8 GPM (6.8 LPM)	
AC Input	100–240 VAC, 1000 W Max, 50/60 Hz, single phase	
Heat Load (at laser head)	<800 W (600 W typical)	
Heat Load (at power supply)	<200 W	
Total Power Consumption	<1000 W	
Physical Characteristics⁵		
Laser Dimensions (L x W x H) ⁴	29.50 x 12.13 x 7.50 in (749.5 x 308.0 x 190.6 mm)	35.00 x 12.13 x 7.63 in (889.0 x 308.0 x 193.8 mm)
Laser Weight	95 lbs (43 kg)	108 lbs (49 kg)
Features		
EU RoHS 2 Compliant, China RoHS 2, CE Compliant	Product compliant with restriction of hazardous substances	
Internal Power Monitor	May be calibrated against an external power meter	
Alignment Beam Mode	Lower power beam for installation and alignment in a tool (IR requires optional AOM)	
Replaceable Output Window	Customer replaceable to maintain power in harsh environments	
Data Log (includes customer version as well) ⁹	Long and short term recording for diagnostics and equipment maintenance	
Optional Safety Shutter	Externally mounted for easy field service and customer replaceable	
Optional Output AOM	Provides power attenuation at constant power, used with trigger, gate and pulse on demand, use as a process shutter	NA
Optional Timeshift ps GUI	Enables waveform customization	

1. Due to our continuous product improvement program, specifications may change without notice.

2. IR specifications are at 400 kHz single pulse with the diode current set to achieve 51 W, unless otherwise noted. UV specifications are at 800 kHz single pulse with the diode current set to achieve 25.5 W, unless otherwise noted.

3. IR power shown is without optional AOM.

4. Dimensions noted do not include the removable lift handles.

5. AC to DC converter module included with standard system.

6. Please consult factory for IR operation below 400 kHz without output AOM option.

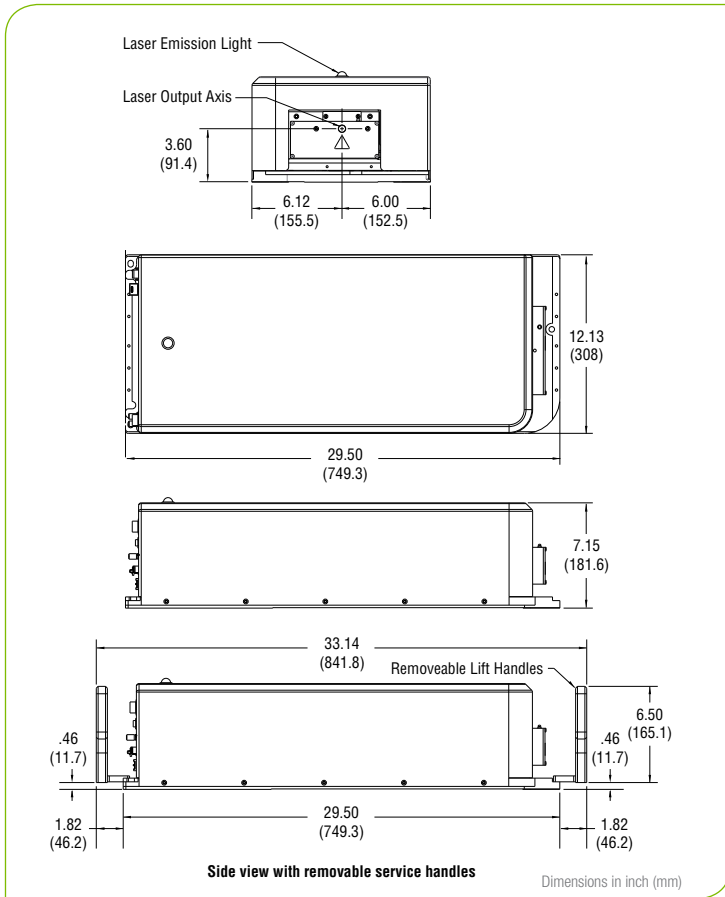
7. Warm start: AC, chiller and GUI on, all diodes off.

8. High temperature, high humidity operation limited to dew point <19°C; high temperature, high humidity storage limited to dew point <22°C.

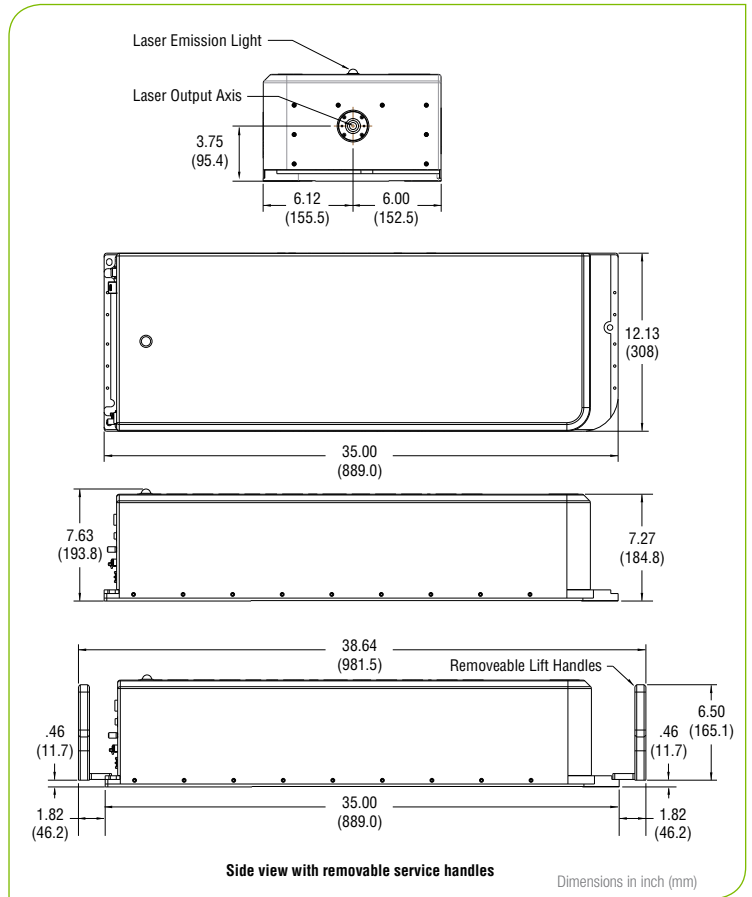
9. Customer version: future release.

10. IceFyre 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.

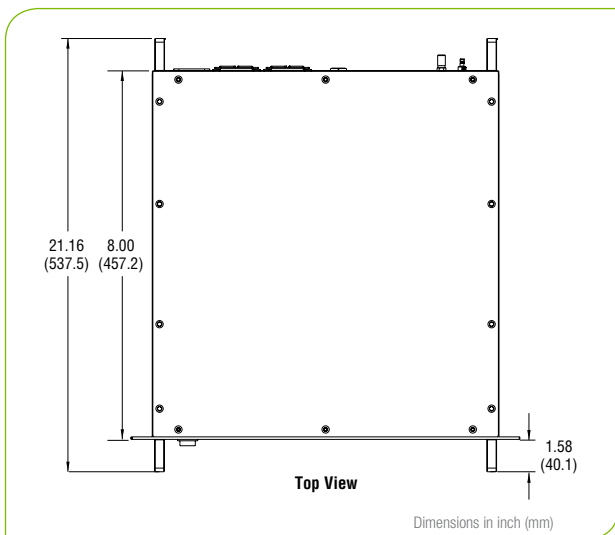
IceFyre



IceFyre 1064-50 Laser Dimensions



IceFyre 355-30 Laser Dimensions



Utility Module Dimensions



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)800-11 257	belgium@newport.com	Korea	+82-31-8021-1600	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	+886-3-575-3040	sales@newport.com.tw
Japan	+81-3-3556-2705	spectra-physics@splasers.co.jp	United Kingdom	+44-1235-432-710	uk@newport.com