Explorer® One™

Compact and Lightweight UV and Green ns Lasers

mks | Spectra-Physics®

The Spectra-Physics Explorer® One™ is the most compact series of UV and green diode pumped solid state (DPSS) q-switch lasers in its class. The *It's in the Box*™ design incorporates features such as the very compact air cooled design, short pulse width, high peak power and a feature rich software into one single package to satisfy customer needs with benefits such as ease-of-use and handling, high process quality and short time-to-market in cost sensitive tools.

The Explorer One laser models are available on three platforms. The standard platform provides up to 800 mW and 355 nm, 2 W at 532 nm. High energy models are available with pulse energies exceeding 120 µJ at 349 nm, 80 µJ at 355 nm and 180 µJ at 532 nm. The extended power platform, Explorer One XP, is available with power exceeding 2 W at 355 nm and 5 W at 532 nm. The high power platform, the Explorer One HP, is available with a power exceeding 6 W at 355 nm.

The Explorer One Advantage

- High Power – Up to >6 W at 355 nm and 5 W at 532 nm
- Lightweight – only 1.5 and 4.1 kg, air cooled design
- Unique *It's in the Box*™ design – smaller than any competitive product
- Feature rich software for ease-of-use and simplified integration
- E-Track™ active pulse energy and power control on selected models
- Single pulse energy measurement from single shot to 500 kHz
- Rugged, reliable design and construction for demanding 24/7 applications

Applications

- LED manufacturing processes
- OLED manufacturing processes
- Intra-glass and glass surface marking
- UID marking (on plastics, glass, metals, semiconductors)
- Functional marking (on plastics, glass, metals, inside glass)
- Wafer marking and processing
- Resistor and inductance trimming
- Micromachining – drilling, cutting of thin foils
- Thin film scribing and processing
- Additive manufacturing – stereolithography
- MALDI-TOF mass spectrometry
- Laser microdissection
- Flat panel display (FPD) repair
- UV titling
- LIDAR

It's in the Box™

The Explorer One Family consists of rugged and durable industrial laser designed for longevity and long-term stability in 24/7 applications. Exceptional performance including short pulse width for minimum heat affected zone, unmatched pulse-to-pulse stability and superior beam quality (M^2 typically <1.1) makes this laser the perfect tool for precision manufacturing. The lasers' very compact *It's in the Box* design offers a single package solution that allows fast and low cost integration for machine tool builders especially when space is a limiting factor. The very small dimensions of the all-in-one concept as well as low heat dissipation make this laser family the technology of choice for a small tabletop-like instrument. The combination of high output power and air cooled design reduces complexity, thereby resulting in short product development cycles and fast return of investment for our customers.

Versatility and flexibility are realized by integrating advanced and value-added hardware and software elements such as E-Pulse™ pulse energy control, burst mode, on-demand auto-calibration and single pulse energy measurements up to 500 kHz. The new E-Track™ dynamic pulse energy control feature actively measures and controls the laser for continual energy and power stabilization even under rapidly changing operating set points or environments. E-Track enables "on-the-fly" adjustments and fast gating for precision micromachining applications such as scribing marking, and drilling of tiny features.

In addition the Explorer One laser's output power is adjustable to optimize the laser performance to the application needs. The system can be operated using TTL and analog control signals. Real-time pulse energy values are available on the integrated analog port.

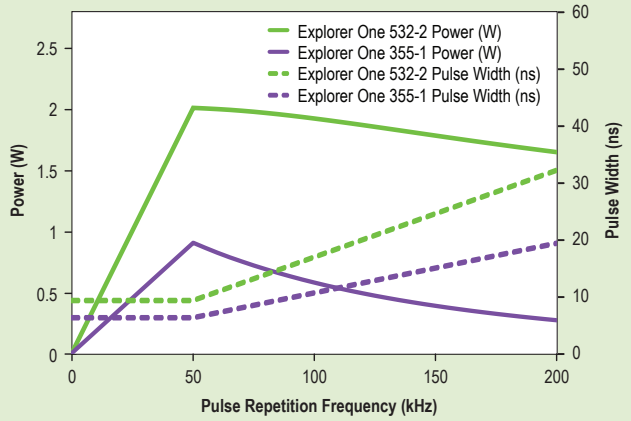
Explorer One Specifications[1, 4]

	Explorer One 349-60	Explorer One 349-120	Explorer One 355-1	Explorer One HE 355-100	Explorer One HE 532-200	Explorer One 532-2
Output Characteristics						
Wavelength	349 nm		355 nm		532 nm	
Gain Medium	Nd:YLF		Nd:YVO_4	Nd:YAG	Nd:YAG	Nd:YVO_4
Pulse Energy	60 µJ @ 1 kHz	120 µJ @ 1 kHz	25 µJ @ <30 kHz	80 µJ @ 10 kHz	180 µJ @ 10 kHz	40 µJ @ 50 kHz
Output Power	60 mW @ 1kHz	120 mW @ 1 kHz	800 mW @ 50 kHz	800 mW @ 10 kHz	1.8 W @ 10 kHz	2 W @ 50 kHz
Pulse Width (FWHM)	<5 ns		<10 ns	<15 ns		
Pulse Energy Noise (rms)[2]	<3%					
Long Term Stability (rms)	<2%					
Repetition Rate Range	Single shot to 5 kHz		Single shot to 200 khz	Single shot to 60 kHz		Single shot to 200 khz
Jitter, Laser Pulse to Opto-Sync	< ±0.5 ns	—				
Beam Characteristics[2]						
Spatial Mode	M^2 <1.3, TEM_{00}				M^2 <1.2, TEM_{00}	
Beam Diameter, at waist ($1/e^2$)	0.145 mm ±0.02 mm	0.16 mm ±0.025 mm	0.19 mm ±0.035 mm	0.182 mm ±0.037 mm	0.18 mm ±0.020 mm	0.21 mm ±0.021 mm
Beam Divergence, full angle ($1/e^2$)	3.2 ±0.5 mrad	3.0 ±0.5 mrad	2.5 ±0.6 mrad	2.5 ±0.6 mrad	3.8 ±0.5 mrad	3.5 ±0.5 mrad
Beam Ellipticity[2]	1 ±0.1					
Polarization Ratio	>100:1 (vertical)		>100:1 (vertical)		>100:1 (horizontal)	
Operating Conditions						
Warm-up Time (cold start to >95% full power)	<10 min					
Operating Voltage	24 VDC ±2 V					
Maximum Inrush Current	<4 A					
Maximum Power Consumption	<75 W					
Typical Power Consumption	<50 W					
Laser Head Thermal Heat Dissipation	<75 W					
Operating Temperature						
Laser Head	18–40°C (relative humidity <80%; dew point <20°C)[3]					
Storage Temperature Range	-20 to 60°C (<90% relative humidity, non-condensing)					
Physical Characteristics						
Laser Head (L × W × H)	6.5 x 3.74 x 3 in (165 x 95 x 76.1 mm)					
Beam Hight	25.4 mm		24.5 mm		25.4 mm	
Weight	2.87 lbs (1.3 kg)					
Static Alignment Tolerance						
Beam Position	<±0.25 mm					
Beam Angle	<±1 mrad					
Software Features						
First Pulse Suppression (FPS)	✓	✓	✓	✓	✓	✓
E-Pulse (Constant Energy Mode)	✓	✓	✓	✓	✓	✓
E-Track (Closed Loop Energy Control	✓[5]	✓[5]	✓	✓[5]	✓[5]	✓[5]

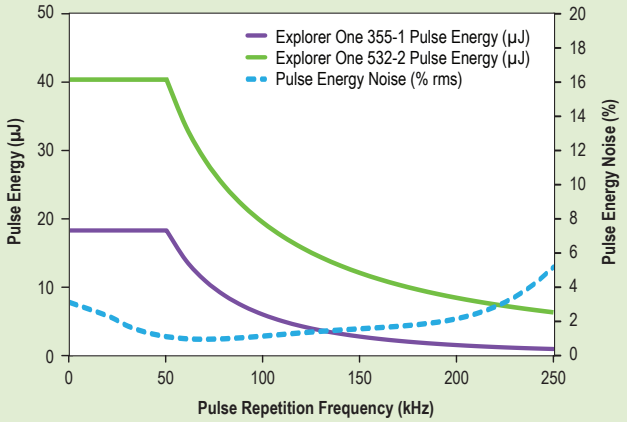
1. Due to our continuous product improvement program, specifications may change without notice.
2. Specified at nominal power/energy and repetition rate (see power/energy specifications)
3. Housing temperature at base.
4. Explorer One is a Class IV - High Power Laser, whose beam is, by definition, a safety and fire hazard. Take precautions to prevent exposure to the direct and reflected beams. Diffuse as well as specular reflections cancause severe skin or eye damage.
5. E-Track available upon request.

Explorer One

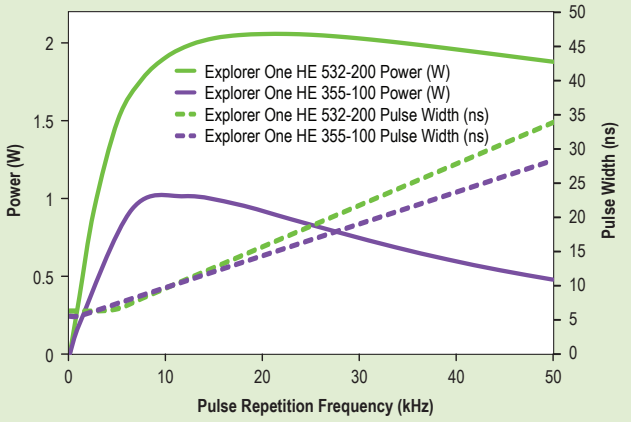
Explorer One - Power and Pulse Width[1]



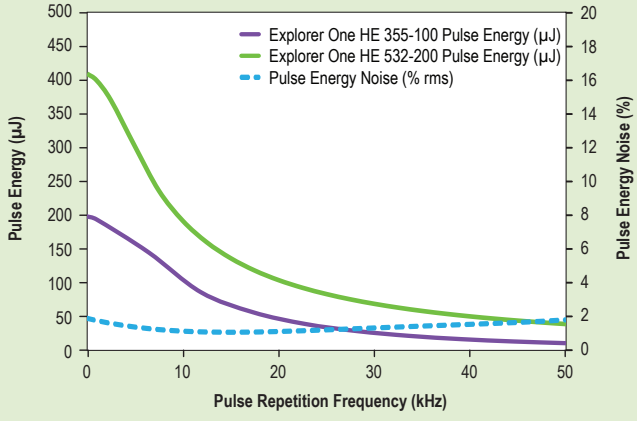
Explorer One - Pulse Energy and Noise[1]



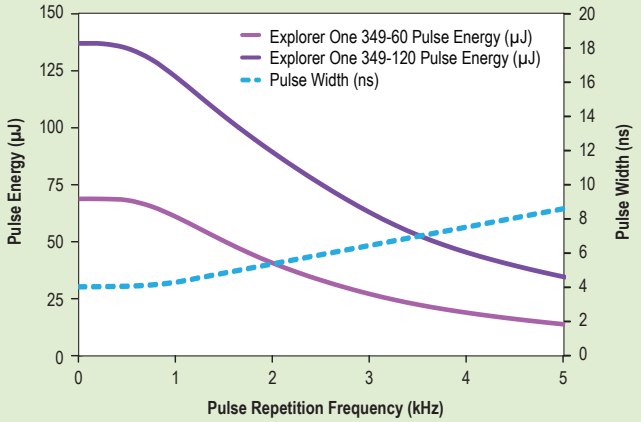
Explorer One - Power and Pulse Width[1]



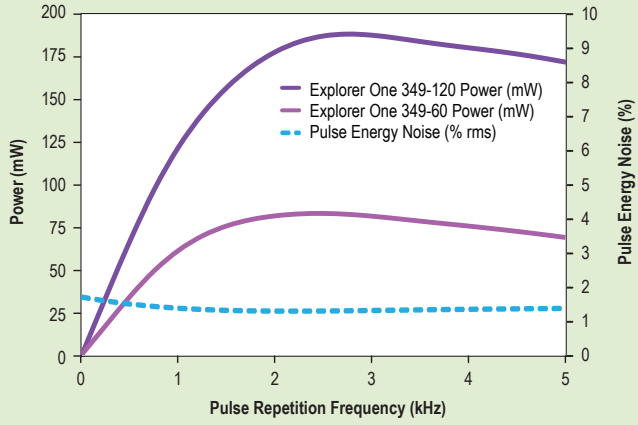
Explorer One - Pulse Energy and Noise[1]



Explorer One - Pulse Energy and Pulse Width[1]



Explorer One - Power and Pulse Energy Noise[1]



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

Explorer One XP/HP Specifications[1, 4]

	Explorer One XP 532-5	Explorer One XP 355-2	Explorer One HP HE 355-200	Explorer One HP 355-4	Explorer One HP 355-6
Output Characteristics					
Wavelenght	532 nm	355 nm			
Gain Medium	Nd:YVO_4	Nd:YVO_4	Nd:YAG	Nd:YVO_4	
Pulse Energy	63 µJ@ 80 kHz	25 µJ @ 80 kHz	>200 µJ @ 20 kHz	>50 µJ @ 80 kHz	>60 µJ @ 100 kHz
Output Power	5 W @ 80 kHz	2 W @ 80 kHz	>4 W @ 20 kHz	>4 W @ 80 kHz	>6 W @ 100 kHz
Pulse Width (FWHM)	<12 ns @ 80 kHz	<10 ns @ 80 kHz	<15 ns @ 20 kHz, 4 W	<15 ns @ 80 kHz, 4 W	<12 ns @ 100 kHz, 6 W
Pulse Energy Noise (rms)[2]	<3%	<4%	<2%		
Long Term Stability (rms)	<±2%		<2%		
Repetion Rate Range	Single shot to 500 kHz		Single shot to 200 kHz	Single shot to 500 kHz	
Jitter, Laser Pulse to Opto-Sync	—				
Beam Characteristics[2]					
Spatial Mode	M^2 <1.3, TEM_{00}				
Beam Diameter, at waist ($1/e^2$)	0.18 mm ±0.027 mm	0.16 mm ±0.024 mm	1.3 mm ±0.33 mm	1.1 mm ±0.25 mm	1.3 mm ±0.33 mm
Beam Divergence, full angle ($1/e^2$)	3.9 ±0.8 mrad	3.5 ±0.8 mrad	0.5 ±0.2 mrad		0.4 ±0.2 mrad
Beam Ellipticity[2]	1 ±0.1	1 ±0.2	1 ±0.1		
Polarization Ratio	>100:1 (horizontal)	>100:1 (vertical)			
Operating Conditions					
Warm-up Time (cold start to >95% full power)	<10 min				
Operating Voltage	24 VDC ±2 V				
Maximum Inrush Current	<9 A		<10 A		
Maximum Power Consumption	<150 W		<160 W		<200 W
Typical Power Consumption	<100 W		<120 W		<130 W
Laser Head Thermal Heat Dissipation	<150 W		<160 W		<200 W
Operating Temperature					
Laser Head	18–40°C (relative humidity <80%; dew point <20°C)[3]		18–45°C (relative humidity <80%; dew point <20°C)[3]		
Storage Temperature Range	-20 to 60°C (<90% relative humidity, non-condensing)				
Physical Characteristics					
Laser Head (L × W × H)	9.45 x 3.74 x 3.7 in (240 x 95 x 94 mm)		11.42 x 5.51 x 3.35 in (280 x 130 x 85.1 mm)		
Beam Height	35 mm	34.1 mm	43.2mm		
Weight	6.84 lb (3.1 kg)		9.25 lb (4.2 kg)		
Static Alignment Tolerance					
Beam Position	<±0.3 mm		<±0.5 mm		
Beam Angle	<±1 mrad				
Software Features					
First Pulse Suppression (FPS)	✓	✓	✓	✓	✓
E-Pulse (Constant Energy Mode)	✓	✓	✓	✓	✓
E-Track (Closed Loop Energy Control)	—	—	✓	✓	✓

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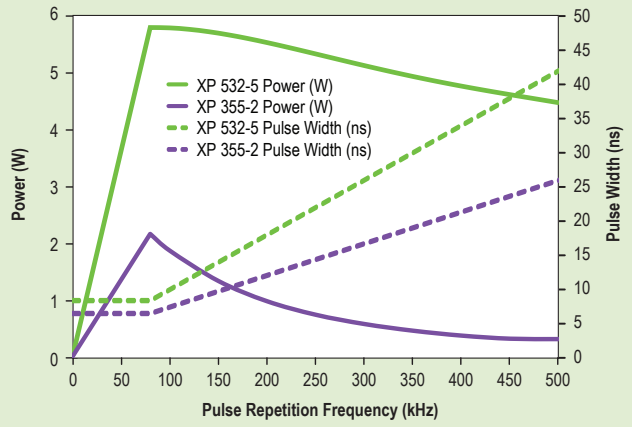
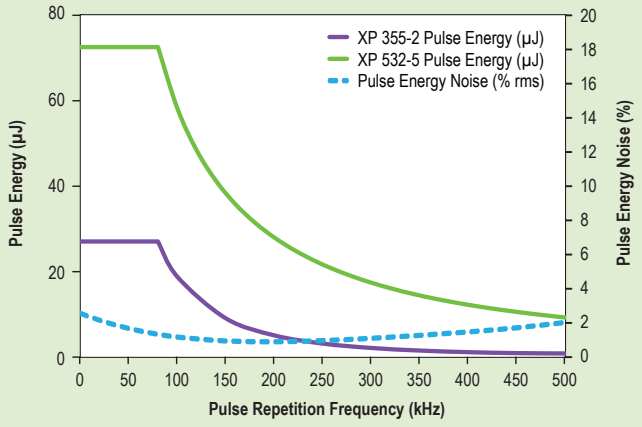
Explorer One

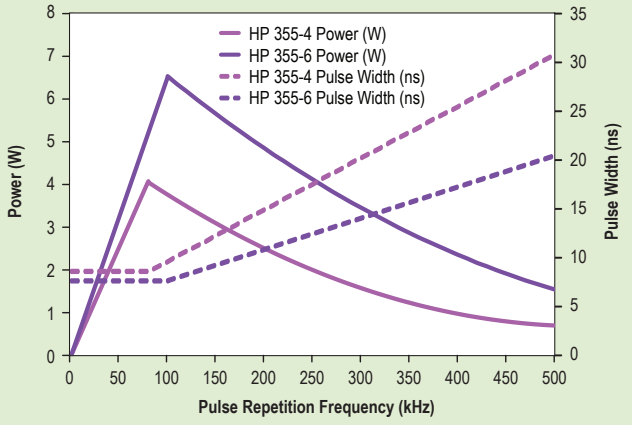
Explorer One XP - Power and Pulse Width[1]



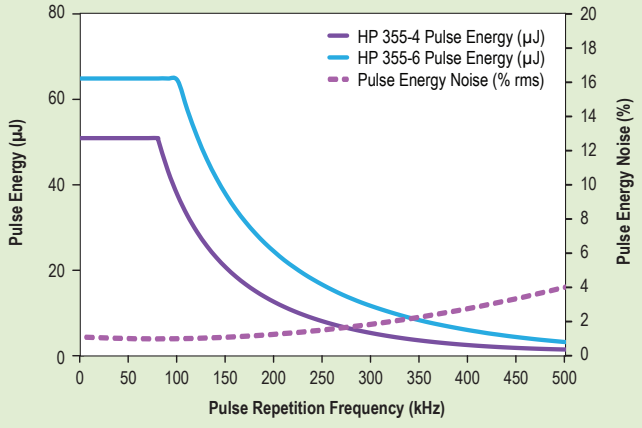
Explorer One XP - Pulse Energy and Noise[1]



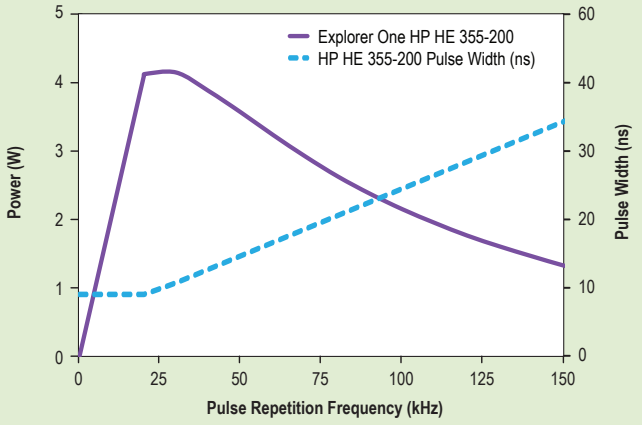
Explorer One HP 355 - Power and Pulse Width[1]



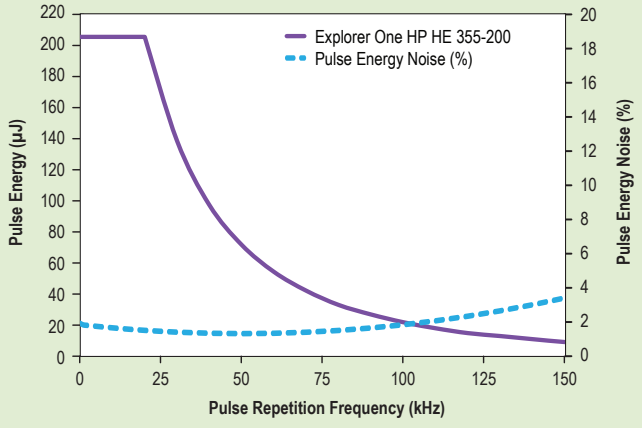
Explorer One HP 355 - Pulse Energy and Noise[1]



Explorer One HP HE - Power and Pulse Width[1]

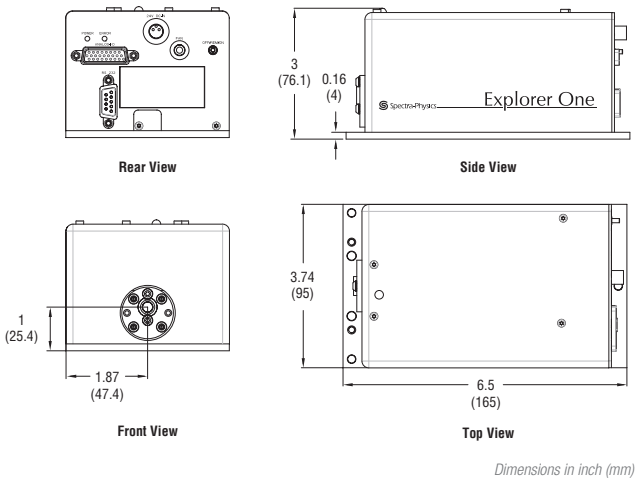


Explorer One HP HE - Pulse Energy and Noise[1]

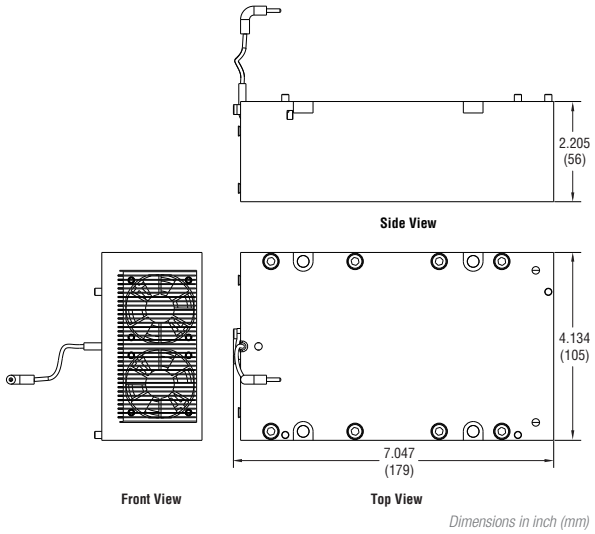


1. Typically measured performance; not a guaranteed or warranted specification.

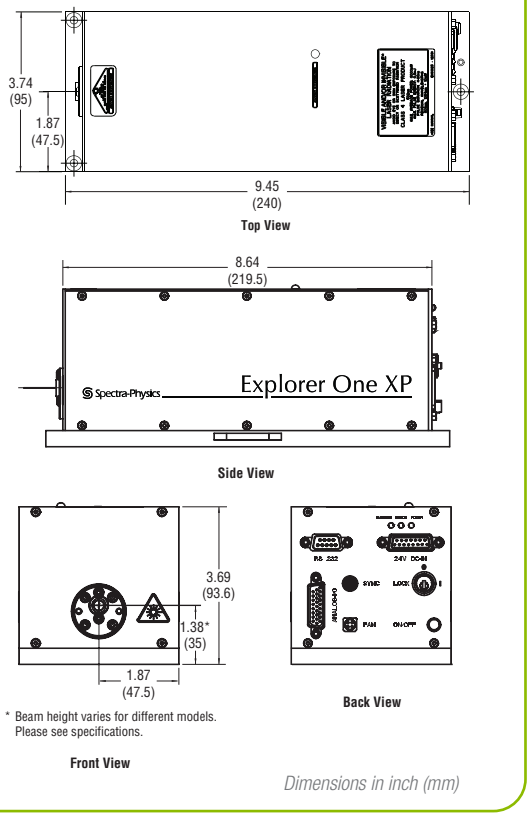
Explorer One Dimensional Drawings



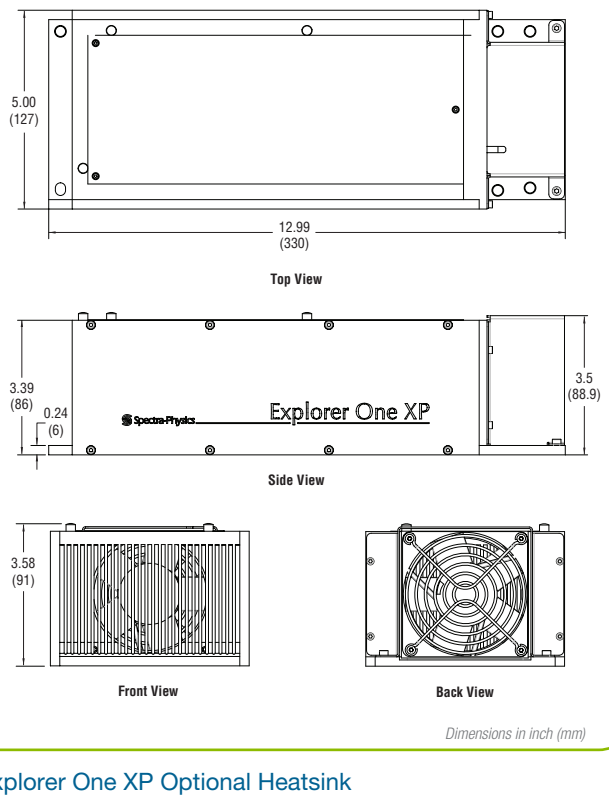
Explorer One Dimensions



Explorer One Optional Heatsink

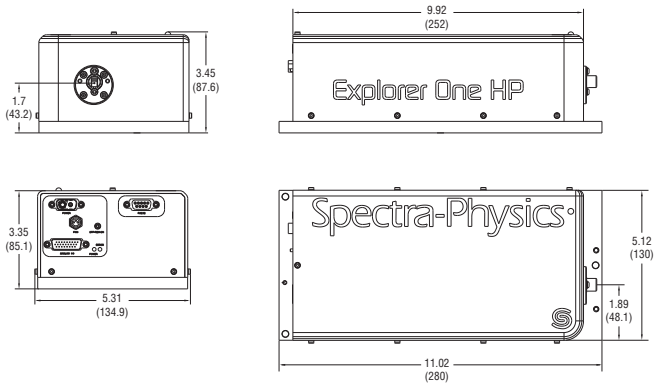


Explorer One XP Dimensions

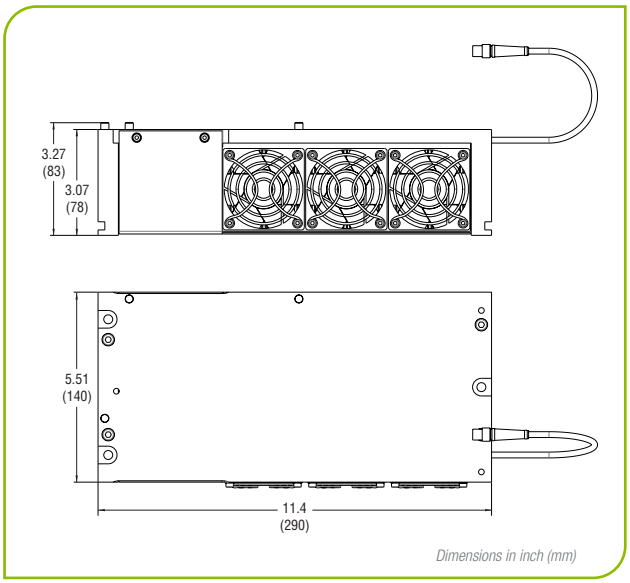


Explorer One XP Optional Heatsink

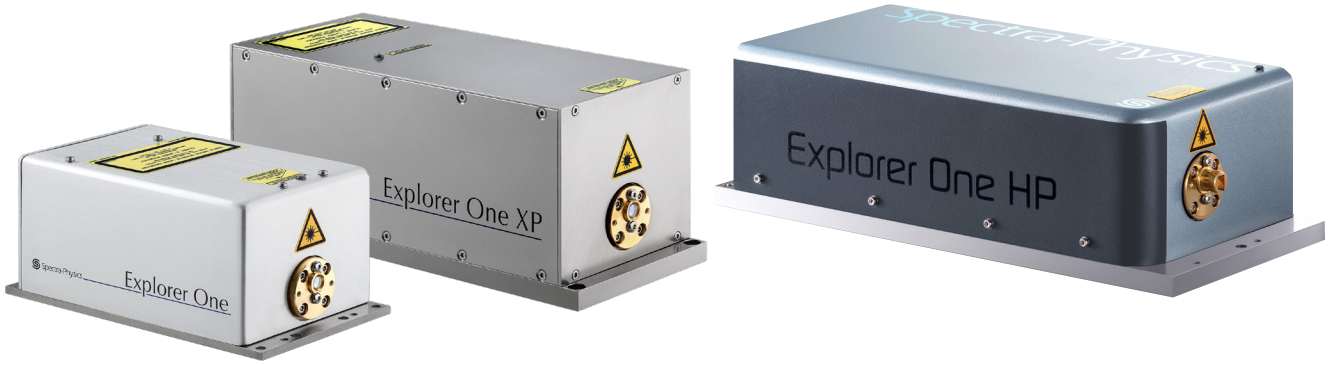
Explorer One Dimensional Drawings



Explorer One HP Dimensions



Explorer One HP Optional Heatsink



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