

Talon® Ace™

High-Power UV Lasers with
TimeShift™ Programmable Pulse Capacity



Talon Ace UV100 is a powerful new pulsed nanosecond laser, delivering an industry-leading >100 W UV power with compelling cost-performance in a small form factor. The new laser delivers unprecedented flexibility, including TimeShift programmable pulse capability and a wide pulse repetition-rate range, to enable micromachining process optimization. Talon Ace UV100 is ideal for high-speed and high-quality manufacturing in micromachining of advanced electronics packaging, PC boards, photovoltaics, ceramics, semiconductors, and other materials and components.

Talon Ace UV100 leads the industry with the highest single-mode nanosecond UV power (>100 W) and >500 µJ pulse energy. Pulse widths are adjustable from <2 ns to >50 ns, and pulse repetition rates are adjustable from single shot to 5.0 MHz. The architecture

decouples pulse width and repetition rates while providing high UV power for maximum processing flexibility, enabling process customization for competitive advantage in advanced electronics packaging, industrial micromachining and clean energy applications. Fully automated and computer controlled, Talon Ace UV100 delivers excellent beam pointing stability and pulse-to-pulse energy stability, ensuring high precision, high throughput, and operational consistency.

Based on our decades of proven experience in high-power UV ns lasers, Talon Ace UV100 excels in demanding 24/7 industrial applications. All Talon Ace lasers pass extensive environmental qualification testing to ensure high reliability. The built-in ALPS (Active Laser Purification System) helps sustain that performance for

The Talon Ace Advantage

- >100 W UV at 200 kHz 10 ns (>500 µJ/pulse)
- TimeShift Technology
 - Adjustable pulse widths
 - Pulse shaping
 - Pulse splitting and burst mode operation
 - Constant pulse width over wide range of repetition rates
- Repetition rates up to 5 MHz for fast processing
- Lowest \$/W and COO for high-power ns UV
- Robust and reliable for OEM tools
- 24x7 industrial reliability
- Small form factor



Applications

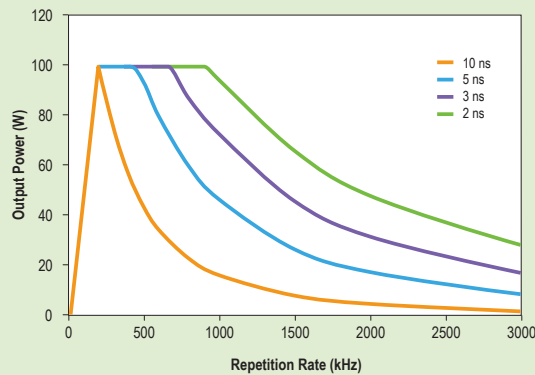
- Flex PCB Cutting and Drilling
- Advanced Electronics Packaging Cutting and Drilling
- Photovoltaics Processing
- LED Processing
- OLED Drilling and Lift-Off
- Li-Ion Battery Processing
- Through Glass Via (TGV) Drilling
- High-Speed Marking
- CFRP Cutting, Drilling and Surface Texturing

long life. And finally, Talon Ace's automatic data logging software monitors all key laser performance parameters over the life of the laser, providing a powerful service feature and product reliability tool.

TimeShift Technology – Programmable Pulses in the Time Domain to Enhance Utilization

Talon Ace offers TimeShift technology, which enables pulse energy programmability in the time domain. By controlling the laser pulse (width and shape) in time and repetition rate, material removal and/or modification in micromachining becomes more efficient, thereby increasing process speed and quality. Utilizing TimeShift in conjunction with high UV power at high repetition rates means Talon Ace can process more materials faster, and with greater quality. TimeShift enables pulse width variation, as well as pulse splitting and burst mode operation. For the Talon Ace UV100 model, pulse widths from <2 ns to >50 ns can be created at a constant repetition rate or conversely, the user can maintain constant pulse width with varying repetition rate from single shot to 5 MHz. A set of standard TimeShift waveforms is provided with each Talon Ace. The TimeShift GUI, which enables users to develop custom waveforms, is available at an additional cost.

Talon Ace UV100 Power vs Repetition Rate Performance¹



1. Talon Ace UV100 specified power is >100 W at 200 kHz 10 ns. Other points on graph are not a guaranteed or warranted specification.

Talon Ace Specifications^{1, 5}

	Talon Ace UV100
Output Characteristics²	
Wavelength	343 nm
Power	>100 W
Pulse Energy	>500 μ J
Repetition Rate	0–5.0 MHz
TimeShift Programmable Pulse Capability	Yes
Pulse Width, FWHM (TimeShift programmable) ³	<2 to >50 ns
Waveform Switching Time	<20 μ s
Pulse-to-Pulse Energy Stability	<3%, 1 σ
Beam Characteristics²	
Spatial Mode	TEM ₀₀
M ²	<1.3
Polarization Ratio	>100:1 vertical
Beam Diameter (D4 σ)	5.0 \pm 0.5 mm
Beam Divergence (full angle)	<0.2 mrad
Beam Asymmetry	<1.1
Boresight Tolerance	\pm 0.5 mm; \pm 5 mrad
Beam Pointing Stability	< \pm 25 μ rad/ $^{\circ}$ C
Operating Conditions / Environmental Range	
AC Input	190–240 VAC, 50/60 Hz, single phase
Warm-up Time (typical)	<40 min from standby; <60 min from cold start
Temperature Range	15 to 35 $^{\circ}$ C operating; 0 to 50 $^{\circ}$ C non-operating
Altitude	0–2,000 m operating; 0–10,000 m non-operating
Humidity	0–90% non-condensing, dew point <19 $^{\circ}$ C operating; 0–90% non-condensing, dew point < 22 $^{\circ}$ C non-operating
Cooling Water Temperature (laser inlet)	20 $^{\circ}$ C \pm 1.0 $^{\circ}$ C, stable to \pm 0.2 $^{\circ}$ C
Cooling Water Flow (at laser head)	\geq 13 l/min (35 psi typical)
Thermal Load (to water)	<1700 Watts
Total Power Consumption	<2000 Watts

Talon Ace Specifications^{1, 5}

	Talon Ace UV100
Physical Characteristics	
Dimensions (Laser) (L x W x H) ⁴	33.5 x 14.1 x 9.7 in (850 x 358 x 246 mm)
Weight (Laser)	147 lbs (66.5 kg)
Dimensions (Utility Module) (L x W x H, 3U rack mount)	21.5 x 19.0 x 4.0 in (545 x 482 x 102 mm)
Weight (Utility Module)	29 lbs (13.2 kg)
Features	
Optional Safety Shutter	Externally mounted for easy field service and customer replaceable
Internal Power Monitor	May be calibrated against an external power meter
E-Pulse Pulse Energy Control	TimeShift
CW Alignment Beam Mode	Lower power CW UV beam for installation and alignment in a tool
Sacrificial Window	Customer replaceable to maintain power in harsh environments
ALPS Optics Protection System	Maintains internal optics cleanliness for long term, reliable operation
Precision Position Registration	Hardened steel receptacles for indexing pins for repeatable, precision alignment from unit to unit

1. Due to our continuous product improvement, all specifications are subject to change without notice.

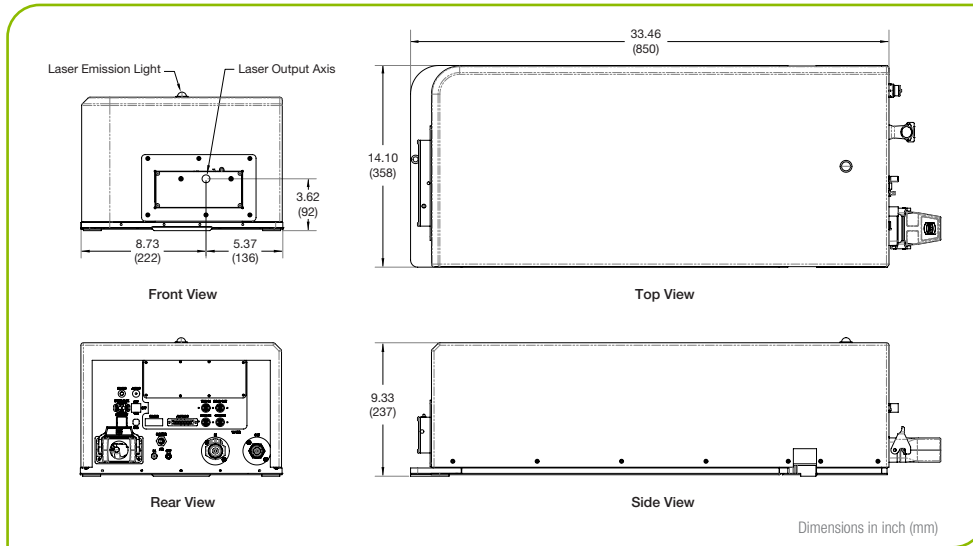
2. All specifications are at 10 ns at 200 kHz with the diode current set to achieve 101 W.

3. Talon Ace UV100 nominal pulse width is 10 ns. Alternative/programmable pulse widths using TimeShift will change power and beam parameter performance. Contact Spectra-Physics for more information.

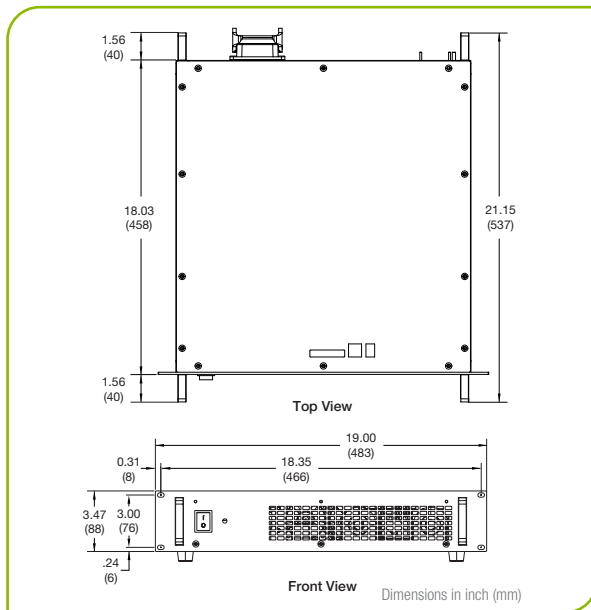
4. Talon Ace UV100 includes removable lift handles, as well as a removable lifting hoist exoskeleton.

5. Talon Ace UV100 is 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 can cause severe skin or eye damage.

Talon Ace Dimensional Drawings



Talon Ace Laser Head Dimensions



Utility Module Dimensions