

Solstice® Ace™

High Energy, Industrial One Box
Ultrafast Amplifier

mks | Spectra-Physics

The Spectra-Physics® Solstice Ace was the industry's first femtosecond ultrafast amplifier designed, built and tested using rigorous industrial practices. Solstice Ace incorporates adjustment-free mounting hardware, individual modular components, and industry proven pump and seed lasers. The result is the most advanced, hands-free ultrafast light source for a wide range of ultrafast applications.

Solstice Ace is capable of reliable operation over a 10°C temperature range. Unlike traditional lasers that utilize standard optomechanics, Solstice Ace employs adjustment-free EternAlign™ optical mounts to maximize long-term stability and performance. The regenerative

amplifier and the stretcher/compressor are housed in 2 independently temperature stabilized enclosures to ensure optimal stability. The Solstice Ace is designed to operate in a wide range of environments to provide industrial level stability.

Using Spectra-Physics' patented Ace regenerative amplifier cavity, the Solstice Ace delivers >7 W at 1 kHz, >8 W at 5 kHz and >7 W at 10 kHz with pulse width configurations ranging from <35 fs to <120 fs. For every configuration of Solstice Ace, the beam quality is exceptional ($M^2 < 1.25$) making it perfect for OPA pumping and a wide range of nonlinear spectroscopy applications.

The Solstice Ace Advantage

- Unsurpassed operating stability and stable operation over a 10°C temperature range
- Patented Ace regenerative amplifier cavity design
- Configurable pulse width, <35 fs – <120 fs
- Configurable repetition rate, 1–10 kHz
- Exceptional beam quality ($M^2 < 1.25$)



Applications

- OPA pumping
- 2D IR spectroscopy
- Ultrafast pump-probe spectroscopy
- Nonlinear optics
- Four wave mixing spectroscopy
- Ultrafast micromachining on a wide variety of materials

Solstice Ace Specifications^{1, 10}

Solstice Ace				
Output Characteristics				
Pulse Width ^{2, 3}		<35 fs – <120 fs		
Repetition Rate ⁴		1 kHz	5 kHz	10 kHz
Average Power	Ascend 60:	>7.0 W	>8.0 W	>7.0 W
	Ascend 40:	>5.0 W	>6.0 W	>5.0 W
Pulse Energy	Ascend 60:	>7.0 mJ	>1.6 mJ	>0.7 mJ
	Ascend 40:	>5.0 mJ	>1.2 mJ	>0.5 mJ
Pre-Pulse Contrast Ratio ⁵		1000:1		
Post-Pulse Contrast Ratio ⁶		100:1		
Operating Temperature Range		±5°C		
Energy Stability		<0.5% rms over 24 hours		
Beam Pointing Stability		<5 μ rad (rms) ⁷		
Wavelength ^{8, 9}		780–820 nm ⁹		
Spatial Mode		TEM ₀₀ (M ² <1.25, both axes)		
Beam Diameter (1/e ²)		10–11 mm (nominal)		
Polarization		Linear, Horizontal		

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

2. A Gaussian pulse shape (0.7 deconvolution factor) is used to determine pulse width (FWHM) from autocorrelation signal as measured with a Newport PulseScout® autocorrelator.

3. Pulse width must be specified at time of purchase.

4. The desired optimum repetition rate can be specified at the time of purchase or additional optics sets can be used to reconfigure the amplifier. Any system can be operated at reduced repetition rates through internal divide-down electronics.

5. Defined as the ratio between peak intensity of output pulse to peak intensity of any pre-pulse that occurs >1 ns before the output pulse.

6. Defined as the ratio between peak intensity of output pulse to peak intensity of any post-pulse that occurs >1 ns after the output pulse.

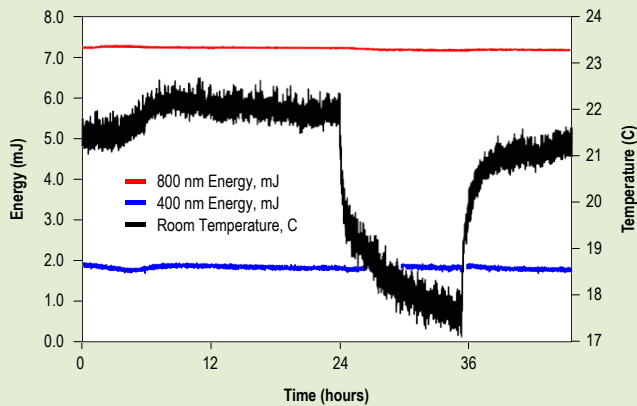
7. At constant temperature. Variable temperature specification <20 μ rad/°C, peak-to-peak.

8. For wavelength extension through SHG, THG, FHG or OPA, please contact Spectra-Physics.

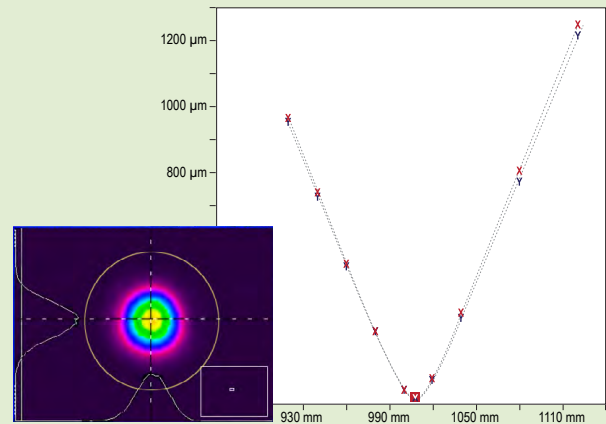
9. Performance specifications apply at peak of gain curve. Tuning range for <35 fs version: 795–805 nm.

10. The Solstice Ace 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.

Fundamental and SHG Stability Solstice Ace 35 fs, 1 kHz, 7 mJ¹

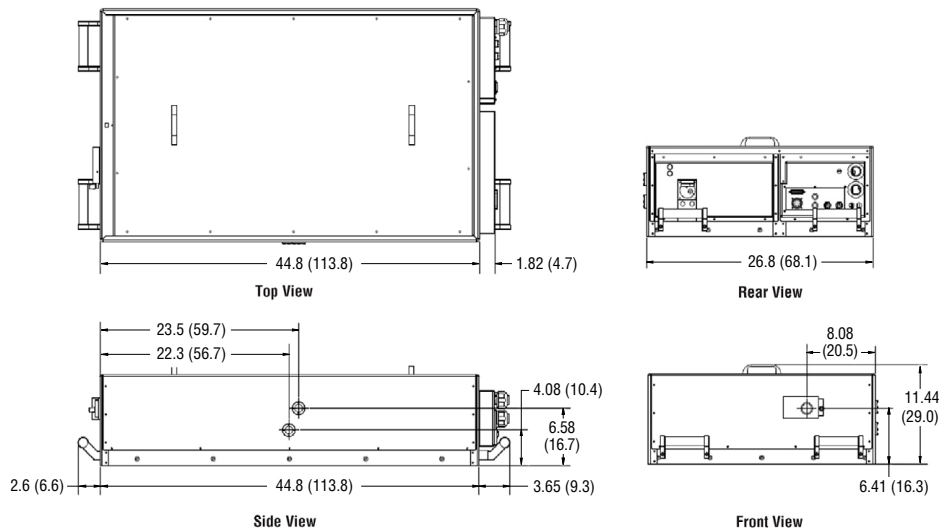


Solstice Ace Beam Quality¹



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

Solstice Ace Dimensional Drawing



Dimensions in inch (cm)