

Spitfire® Ace™ PA

High Power. Maximum Stability.



The Spectra-Physics Spitfire Ace PA is the most technically advanced Ti:Sapphire regenerative amplifier available. Equipped with our proprietary Ace cavity design, the Spitfire Ace has set the new standard for long term performance, low noise, and day-to-day reproducibility.

The Spitfire Ace PA incorporates multiple elements to ensure optimal performance: Spectra-Physics optomechanics and proprietary optical coatings deliver unmatched stability and day-to-day reliability.

To support today's demanding experiments, the system performance is guaranteed over extended periods of time, placing the Spitfire Ace PA in a class by itself.

The Spitfire Ace PA incorporates an additional amplification stage to produce even higher energy and output power. The Spitfire Ace PA system produces twice the average power of the regen-only Spitfire Ace. Thanks to the patented Ace cavity, the beam quality is excellent, providing $M^2 < 1.45$ even at the highest energy configuration.

The Spitfire Ace PA Advantage

- Revolutionary Ace regenerative cavity design
- More than 16.0 W of output power
- Superior mode quality ($M^2 < 1.3$)
- Digital synchronization electronics
- Supported by the most knowledgeable service team in the industry

Applications

- Multicolor pump-probe spectroscopy
- Coherent control
- Nonlinear optics
- 2D IR spectroscopy
- Four-wave mixing spectroscopy
- High harmonics generation
- Optical parametric amplification
- Material processing



The Spitfire Ace PA can be seeded using Spectra-Physics' wide range of ultrafast oscillators including Mai Tai® SP and Element™. The Mai Tai SP laser is a truly hands-free system that does not require alignment, cleaning or adjustments, and its specifications are guaranteed over an impressive 20°C temperature range. Element provides outstanding stability and can be equipped with Femtolock™ 2 to provide leading edge repetition rate stability of <100 fs jitter when synchronized to an external source.

To produce maximum output, the Spitfire Ace PA system is pumped with two Ascend™ 60 high power DPSS green lasers that together deliver over 120 W of average power. The Ascend pump laser produces high average power with exceptional beam quality. The low noise, diode-pumped solid state design means high reliability and high performance.

Spitfire Ace PA Specifications^{1, 9, 10}

	SPFIRE ACE-PA-40			SPFIRE ACE-PA-100		
Output Characteristics						
Pulse Width ^{2, 3}	<40 fs			<120 fs		
Repetition Rate ⁴	1 kHz	5 kHz	10 kHz	1 kHz	5 kHz	10 kHz
Average Power	>13.0 W	>16.0 W	>14.0 W	>14.0 W	>16.0 W	>14.0 W
Pulse Energy	>13.0 mJ	>3.2 mJ	>1.4 mJ	>14.0 mJ	>3.2 mJ	>1.4 mJ
Pre-Pulse Contrast Ratio ⁵	>1000:1					
Post-Pulse Contrast Ratio ⁶	>100:1					
Energy Stability	<0.75% rms over 24 hours					
Beam Pointing Stability	<7 μrad rms ⁷					
Wavelength ⁸	795–805 nm			780–820 nm		
Spatial Mode	TEM ₀₀ (M ² <1.45 on both axes)					
Beam Diameter (1/e ²)	12 mm (nominal)					
Polarization	Linear, Horizontal					

1. Due to our continuous product improvements, specifications are subject to change without notice. The specifications only apply when operated with recommended Spectra-Physics seed and pump lasers.

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

3. For alternative pulse widths, please contact Spectra-Physics.

4. The desired optimum repetition rate must be specified at time of purchase. If additional repetition rates are required, additional optic sets may be required. Any system can be operated (with the same energy per pulse) 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. For higher contrast ratio, please contact Spectra-Physics.

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. For higher contrast ratio, please contact Spectra-Physics.

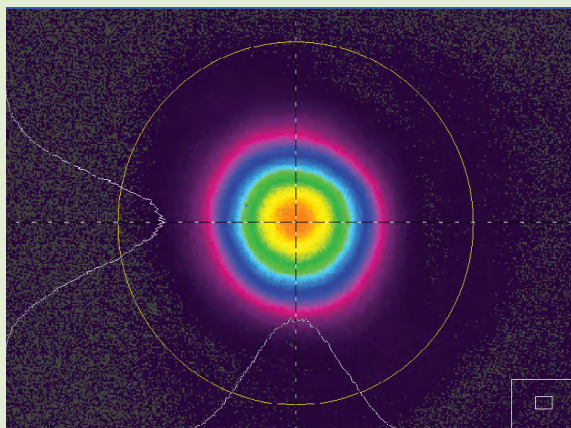
7. At constant temperature. Variable temperature specifications <25 µrad/°C, peak-to-peak.

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

9. Performance specifications apply at peak of gain curve when pumped with two Ascend 60 lasers.

10. The Spitfire Ace PA 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.

Spitfire Ace PA Beam Profile¹



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

Spitfire Ace PA Dimensional Drawing

