



PRESS RELEASE

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Onefive nominated for the SPIE Prism Awards 2016 for its orange, high power, picosecond laser Katana – 06 HP



Regensdorf, Switzerland – [Onefive](#) is pleased to announce that it has been selected as a finalist for the SPIE Prism Awards 2016 in the Industrial Lasers category. The [Prism Awards](#), also referred to as the “Oscar of Photonics”, is a leading international competition, celebrating the most innovative photonics solutions, which are newly available on the market and have the potential to tackle the biggest challenges of our time. The Prism Awards consist of nine categories. Applications are judged by a panel of leading industry experts, venture capitalists, luminaries and visionaries, who this year made their selection out of a pool of more than 130 applicants.

Onefive has been nominated for its [Katana – 06 HP](#) picosecond laser, which can deliver short pulses from 70 ps to 10 ns in the spectral range of 556-660 nm (yellow, orange and red) and up to 1 W of average power. The repetition rate can be adjusted from single pulse up to 100 MHz, triggered from either an internal or an external source (master or slave operation), making synchronization to external equipment a breeze. Katana – 06 HP is an industrial-grade laser module, it is alignment-free, compact, and incredibly robust.



*Fig. 1: Katana - 06 HP laser.
The laser head is as small as 39 x 100 x 162 mm³. The laser control unit is enclosed in a 19”/3U rack mount (133 x 483 x 400 mm³).*

Up until now there has been very few laser architectures that could deliver picosecond to nanosecond pulses in the spectral range 532 – 635 nm, and this has limited the development of several applications, especially in life sciences research. State-of-the-art semiconductor laser diodes cannot provide this wavelength range. Solid-state laser solutions like OPOs can offer wavelength tunability, but they require complicated and expensive synchronously-pumped schemes. Dye lasers from 561 to 594 nm have been the industry favourites, but they usually provide little output power. High power Raman fiber lasers have been available on the market for a few years, but they only operate in continuous-wave regime. Supercontinuum fiber lasers can cover the 532-635 nm spectral range in pulsed operation, but the spectral power density is quite low.

Katana – 06 HP is an innovative and unique laser source that can provide both pulsed operation over a broad range of pulse durations, as well as watt-level output power in a spectral range that is otherwise very difficult to achieve. The laser provides excellent pulse quality and pulse energy stability, no Kelly side-bands and no spectral ripple as well as outstanding pointing stability and low timing jitter. Like all Onefive products, the laser is compact, maintenance-free and turn-key. It is air-cooled and can be controlled remotely by RS232. Katana – 06 HP complies with all relevant international standards like IEC-60825-1:2014 (laser safety), IEC-60068-2-27:2008 (shock test) and IEC-60068-2-6:2007 (vibration test).

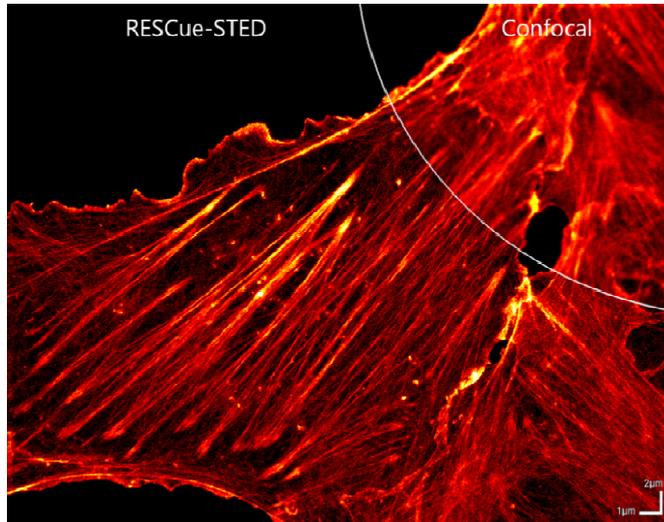


Fig.12 Image of a Vero Cell from a RESCue-STED microscope realized with Katana – 06 HP as STED laser. Top right corner: detail observed with a standard confocal microscope. Courtesy of Abberior Instruments GmbH, Göttingen, Germany

Several cutting edge applications will benefit from the use of Katana – 06 HP. The laser has been primarily developed to enhance the performance of the Nobel prize awarded STED super-resolution microscopy. STED microscopy technique can achieve nano-scale imaging resolution that is well below the diffraction limit of light. It is based on the ability to control the fluorescence emission of the markers in time and space by the superposition of a red-shifted STED laser beam to the excitation beam. Katana - 06 HP has been streamlined to deliver 600 ps at 592 nm to enhance the performance of STED fluorescence microscopy. Most setups used so far were based on expensive femtosecond pulsed laser systems whose pulses were stretched to achieve about 150 ps pulse duration.

The use of 600ps longer pulses dramatically increases the photo-stability of the markers by strongly reducing the photo-bleaching and photo-toxicity [1, 2]. Katana – 06 HP replaces complicated fs setups at a much lower price which finally allows to bring the STED microscopy out of the research labs and onto the market [3]. Pulsed operation of the STED laser will also replace the use of cw depletion lasers because it allows for a reduced multi-photon excitation, suppression of undesired polarization effects, a better spatial confinement of fluorescence, hence a better contrast and imaging resolution [4]. 592 nm wavelength (orange) Katana - 06 HP has been specifically developed for STED microscopy since the stimulated fluorescence of a great number of fluorophores in the green is more efficient at these wavelengths than at longer wavelengths commonly used so far.

The broad range of pulse durations and wavelengths offered by Katana – 06 HP can open up the way to new developments in laser treatment and life science research. Long pulses (> 1 ns) at 577 nm, which is the maximum absorption peak of oxyhemoglobin, might be tested as alternative to dye lasers for laser photocoagulation. Diabetic retinopathy treatment for example significantly benefits from pulsed-laser photocoagulation because the reduced heat conduction can strongly decrease the retina damage and increase localization of the treatment effects [5]. The short pulse version of Katana – 06 HP (< 100 ps) can be used as excitation laser for fluorophores excited in the yellow and orange. This can substantially enhance the capabilities of fluorescence microscopy and flow cytometry techniques [6].

Katana - 06 HP is only one of the models of the Katana – HP series. All based on a similar architecture, this series can offer a broad choice of wavelengths from the visible to the infrared. Available at the moment are the Katana – 05 HP (515-532 nm), Katana – 06 HP (556-660 nm), Katana - 08 HP (775 nm), Katana – 10 HP (1030-1064 nm), Katana – 12 HP (1100-1300 nm) and Katana – 15 HP (1550 nm). The Katana HP series has been specifically designed for demanding high-precision applications and 24/7 operation. High quality standards are assured by the ISO-certified quality management systems ISO-9001:2008 (regulatory requirements for service conformity, customer satisfaction and continual improvement) and ISO-13485:2007 (regulatory requirements for medical devices and related services).

References:

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- [3] I. Coto Hernández et al., "[Gated STED microscopy with time-gated, single photon, avalanche diode](#)", Biomedical Opt. Express, Vol. 6, No. 6, 2015
- [4] G. Vicidomini et al., "[STED nanoscopy with time-gated detection: theoretical and experimental aspects](#)", PLoS, Vol. 8, No. 1, 2013
- [5] J. Augusto Cardillo and M. E. Farah, "[Micropulse laser for treatment of DME and CSC](#)", Retina Today, July/August 2011
- [6] W. G. Telford et al., "[Flow cytometry of fluorescent proteins](#)", Methods, Vol. 57, No. 3, 2012

About Onefive GmbH:

Founded in 2005, Onefive GmbH is dedicated to innovations in the growing OEM ultrafast laser market by introducing a novel generation of advanced laser modules. The lasers rely on a unique packaging technology which allows a combination of compactness, stability and efficiency as well as a high ease of use. To assure the best laser performance and satisfaction of its demanding industrial customers, the company has implemented a strict Quality Management System and has been certified ISO 9001:2008 and ISO 13485:2003. The areas of application range from medical and biological applications, environmental to homeland security applications, sensing, communication, material processing and R&D. Onefive is strongly committed to combine precise ultrafast laser technology with industrial-grade performance and reliability.

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