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World's First All-Solid-State cw 568 nm Laser

Cher client,

In 2001 Sapphire™ ushered in a new era of laser technology: based on its OPSSL (Optically Pumped Semiconductor Laser) technology Coherent introduced the first all-solid-state lasers with a wavelength of 460 and 488nm. Only a few months later Sapphire™ had replaced the ion laser as 488nm standard. Today more than 15,000 blue Sapphires have been installed. Beginning of 2009 Coherent introduced Sapphire™ 561, the first yellow OPS laser. Compared to the standard Nd:YAG 561 nm approach, this technology needs four times less energy to generate the same optical output resulting in four times less heat to dissipate.

Now again Coherent turns over a new leaf in laser history: with [Sapphire™ 568](#) the company introduces the worldwide first commercial cw solid-state laser with a wavelength of 568nm, a wavelength which is traditionally obtained from ion lasers. However, their large size, low efficiency, high power consumption and high heat dissipation, background discharge light, limited lifetime and high costs pose significant practical and cost disadvantages to systems builders.



Compared to this Sapphire™ 568 operates "in a different world": the lasers are drastically smaller, much more efficient, reliable and longer living. In addition they come with significantly better beam parameters, e.g. $M^2 < 1.1$, noise $< 0.25\%$ rms at 20Hz to 2MHz. With its 50mW, 75mW, 100mW, 150mW and 200mW versions output powers are now available which were technically and/or economically not accessible for most of the applications (typically applied ion laser powers: ca. 20mW). Due to the wavelength compatibility with legacy ion laser technology, instrument manufacturers can integrate Sapphire™ 568 directly with no or only minor modification of the optics and filters in their existing designs.

All Sapphire™ LP models (460nm, 488nm, 561nm, 568nm) come with identical optical parameters, identical mechanical design and electrical demands, identical controlling/interfacing. The consequent realization of this concept of "Form-Fit-Function compatibility" through the Sapphire family brings a considerable simplification for system integrators who for example have to incorporate multiple lasers of different wavelength. Apart from this: Sapphire™ lasers are easily and quickly to integrate among others due to their compact modules (the laser head for example is measuring just 125x70x34mm), low power consumption ($< 60W$) and last but not least their flexible, future-safe interface concept: it is up to the user to select either analog, RS232 or USB-interface for the system.

It is beyond question: with its outstanding technical features, its unsurpassed reliability and economy Sapphire™ 568 will quickly become the new standard e.g. for life science applications such as flow cytometry, confocal microscopy, genomics/ proteomics, diagnostic imaging.

Matrix Lasers for High-Throughput Processing: now also at 532 nm

MATRIX™ is a family of diode-pumped, solid-state, Q-switch lasers, with output powers up to 10W at 1064nm and up to 2W at 355nm. Now Coherent has expanded this family with a new 532nm series. The [MATRIX™ 532](#) models can be operated in single-pulse and repetition mode with pulse frequencies up to 150kHz. Their high powers in conjunction with the high repetition rate (e.g. MATRIX™ 532-8-100: 8W at 100kHz) allows for high-throughput applications in material processing.



The green MATRIX™ series not only targets at high process speeds but also at high process quality and improved economy. High power stability (<2%), industries lowest pulse-to-pulse noise (typically <2%), high-finesse output beam ($M^2 < 1.3$) and superior pointing stability (max. 15 $\mu\text{rad}/^\circ\text{C}$) set the standard in materials processing. Extreme peak powers and short pulses (<35ns) significantly reduce thermal effects and therewith heat affected zones. The specific controller concept allows the complete control of every laser pulse: energy and timing, from the first to the last pulse. The user can select the optimum pulse mode from a broad spectrum for his application. Here only 3 examples: 1. In the acceleration/ deceleration phase of e.g. a coordinate table, gantry, galvanometer system (to generate a relative movement between workpiece and laser beam) every laser pulse can be adjusted individually. 2. The pulse energy can be set to constant and will stay constant even if the repetition rate is varied. 3. Effective first pulse suppression in the start phase of a trace. All these features result in superior process performance: homogeneity, μm resolution and precision.

MATRIX™ 532 lasers are manufactured utilizing Coherent's PermAlign™ technology, a special process for optimal adjustment and fixation of optical components by a soldering process. This guarantees best optical alignment and stability over the whole lifetime of the product. For pumping Coherent's AAA™ (Aluminum Free Active Area) pump diodes with MTBFs > 40,000 hours are applied. The Matrix™ lasers are manufactured in cleanrooms and then hermetically sealed. The result is reliable, hands- and maintenance-free operation over thousands of hours.

MATRIX™ 532 is optimized for cost-sensitive applications with high throughput which do not allow compromises in process quality. These are applications such as thin film patterning of a:Si, CdTe and CIGS solar panels, trimming, drilling, scribing of semiconductor materials respectively products, cutting and drilling of polymers e.g. for medical techniques. Further applications are marking of ident cards, solar cells, wafers, LCDs, FPDs, hard disks, electronic components.

About Coherent, Inc.

Founded in 1966, Coherent, Inc. is a world leader in providing laser-based solutions to the commercial and scientific research markets.

To find out more about Coherent, visit our website at www.coherent.fr or call +33 (0) 1 69 85 51 45.

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Superior Reliability & Performance

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