

## Timing at Its Best: We'll Count for You COUNT® T – Single Photon Counter for Time-correlated Applications

**WEB** US35-029 In time-correlated single photon counting (TCSPC), single photons are not only counted, but the time of detection is also determined based on a reference signal. Here, a laser pulse generally serves as a reference. This method is a statistical counting method.

TCSPC is used in particular in fluorescence lifetime measurements. This method is often compared to a stop watch: A laser pulse excites a sample (time start); just a few pico or nanoseconds later, a "fluorescence photon" is released (time stop). This time is recorded in a histogram. After many start-stop passes, a conclusive histogram is created that displays the intensity of the fluorescence depending on time.

The COUNT® T is equipped with an avalanche photodiode (active area of 150  $\mu\text{m}$ ) produced in house and features a high detection efficiency of >80% and a temporal resolution of up to 350 ps.

In addition to fluorescence lifetime measurement (FLIM), the timing module is used in time-resolved fluorescence and single-molecule spectroscopy, as well as LIDAR applications. The technical data of the COUNT® T is given in the datasheet, which can be downloaded under the link provided. ■

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## SPIE. PHOTONICS WEST

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MASSIVE IMPACT



We look forward to welcoming you to our booth at Photonics West in San Francisco, the biggest event in the photonics industry. An amazing show is guaranteed and you will see – "small components really do have a MASSIVE IMPACT"! Come check it out at Booth 2023.

Starting at BiOS, we will present numerous new products like the PbS and PbSe detectors and also, large laser optics. Visit our Booth – 8939.

In this edition of our Photonics Newsletter, you will enjoy a preview of some of our new products to be displayed during Photonics West 2016. Please feel free to contact us any time to request product information, or using the web-codes at the beginning of each article, you can obtain the information on our website.

Sincerely,

Gary B. Hayes  
CEO/General Manager

# May It Be a Bit Larger?

## Homogeneous Coatings up to a Diameter of 390 mm

WEB US35-001

In laser optics, most people are familiar with the trend toward smaller and smaller components and, thus, toward laser systems that are more and more compact; however, there is another trend toward larger and larger optics. The maximum power of lasers at large research institutes continues to increase; the optics must, therefore, also increase in size in order to handle these power densities. In such cases, one requires huge mirrors that are very homogeneously coated.

At Laser Components a new coater for such laser optics was just recently set up. The first coatings have already been completed, and the unit has been integrated into production.

With this coater, plasma ion-assisted deposition (PIAD) coatings can be fabricated and very homogeneous and compact layers created using an advanced plasma source (APS). The coatings are manufactured fully automated and

computer controlled. The layer thickness is permanently monitored and controlled during the entire process using an online monitoring system. This system makes it possible to achieve layer thicknesses with a precision of  $<0.5$  nm.

This unit ensures particularly high process reliability: Coatings can be precisely fabricated and a specific design very precisely reproduced. This means that you can rely on consistently high quality. In addition, you can achieve very complex layer systems that would not have been possible otherwise using conventional technology.

This coater has been optimized to coat substrates that have a diameter of up to 390 mm with a layer thickness that is homogeneous across the entire surface (deviation:  $<1\%$ ). This is essential for customers who use such large optics. The coater can stock a maximum of three pieces with a diameter of 390 mm.

Another advantage is the vastly increased capacity of smaller optics. With the new PIAD unit, a batch of up to 100 mirrors with a diameter of 50.8 mm ( $=2$ " ) can be coated. This increased capacity is a price advantage for customers who use such optics in large quantities.

The wavelength range of the layer systems comprises the UV, visible, and IR from 248 nm to 3000 nm; thus, this covers the majority of laser applications. You, too, will profit from our possibilities. We look forward to your inquiries. ■

Carol Howard  
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Uwe Schallenberg, Head of Production Laser Optics  
„We use high-tech technology  
to produce high-tech laser optical coatings.“



# Laser Components Measure Damage Thresholds!

## We Measure in House – Here You Can See “How”

Our damage threshold measuring station is designed according to ISO 21254: For this purpose, we have a laser available with wavelengths of 1064 nm and 532 nm, pulses of 7 ns to 10 ns, and a repetition rate of 10 Hz. On the sample, the damage profile is recorded objectively.

### Preparing Measurements

Prior to each measurement, a so-called typical pulse is characterized that portrays

the temporal and spatial averaging of a pulse sequence. This must meet defined stability criteria to ensure a reproducible measurement process.

### Performing Measurements

The first step is to limit the energy density used for measurements, then to shoot 10 positions on the sample at the same energy density with 200 pulses, and finally to identify potential damage using a

scattered light detector. The ratio of damaged spots to the number of positions in total results in the probability of damage for this energy density. This procedure increases for additional energy densities in order to obtain a characteristic damage curve. This results in the determination of the coating’s damage threshold. ■

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# colorPol® VIS 600 BC5 from CODIXX Has Arrived

## New and Improved

**WEB US35 -085** Popular demand for colorPol® VIS 600 BC4 products has driven development of the next generation for this successful material. colorPol® VIS 600 BC5 is now here, featuring a wider spectral range and higher contrast ratios. High extinction ratios above 100,000:1 (50 dB) over 530 – 640 nm and above 1,000:1 (30 dB) within 510 – 800 nm, in addition to transmittance properties up to 83% (without additional Anti-Reflectance coatings), make this new product a high performance polarizer.

colorPol® polarizers are manufactured using advanced technology, which enables silver nano-particles to be embedded sub-surface in thin glass substrates. This gives colorPol® polarizers a very wide acceptance angle range of +/- 20 degrees, plus high temperature stability from -50 C (-58 F) up to +400 C (+750 F), making this highly durable polarizer suitable for many demanding applications. To improve transmittance properties, Anti-Reflectance coatings can be applied to colorPol® materials, to minimize surface reflectance loss, thereby increasing throughput. These coatings are very robust and are resistant to UV radiation, solvents and most acids and bases.

Laser Components USA is a proud partner of CODIXX AG, serving various markets and providing sales assistance for colorPol® products in North America. In addition to the visible wavelength range, CODIXX also offers products for use in the Ultraviolet and Infrared. Our Sales Associates will be happy to assist you choose the right product for your application! ■

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# Helioworks Is Our New Partner for IR Emitters

## Continuous-Wave and Pulsed Emitters

Our new partner Helioworks manufactures the following types of IR emitters:



**EK series:** In these cw-operated emitters, the emitting element is made of Kanthal™. To increase the output power, a gold-coated parabolic mirror is integrated in the TO housing. The emitter achieves temperatures of between 900°C and 1050°C.

**EF series:** Pulsed emitters with peak temperatures of approximately 700°C. These emitters have three emitting NiCr filaments that can be operated either together (2-pin TO-8 housing) or individually (4-pin TO-8 housing).

**EP series:** These emitters with a tungsten filament are pulsable and achieve temperatures above 1650°C. Thus, they are perfectly suited for NIR applications. They are exclusively available in a TO-8 housing with a sapphire window.

The EK and EF series are available both with and without sapphire, CaF<sub>2</sub>, or ZnSe windows. Detailed information can be found on our website. ■

Jim Dell  
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# It's a Digital World – Our Laser Modules Are Too

## MVmicro DIG Laser Modules for Image Processing Have a Microcontroller

**WEB US35 -074** The FLEXPOINT® laser modules that are equipped with a microcontroller carry the addition "DIG." The MVmicro DIG series was the first series of image processing lasers to be equipped with a microcontroller.

### Communicate and Configure

The microcontroller opens up excellent possibilities for users who can communicate with the module via an RS232 interface and even configure laser parameters. This makes it possible to request the operating hours, temperature, or diode current. A certain output power or shutdown temperature can be programmed, for example. Additional settings are possible via this interface; this includes digital or analog modulation and a variable power adjustment. In addition to the standard parameters, we also carry out custom programming.

### Configure Your MVmicro DIG Laser Module



The MVmicro DIG laser is available in countless designs: The modules project either a single line or parallel multi-lines with a homogeneous power distribution. Further configurations are also available with a particularly thin line or an improved depth of focus. The lines can be easily focused by hand – tools are not required for this adjustment.

These modules are available in the following wavelengths:

- **green** 520 nm, up to 40mW of actual output power
- **blue** 405nm, up to 100mW – 450nm, up to 70mW
- **red** 640nm, up to 30mW – 660nm, up to 100mW
- **near infrared** 785nm or 830nm, up to 100mW

Modules with microcontrollers have housing dimensions that are very compact: 90 mm x 19 mm (length x Ø). The laser modules are operated with a voltage in the range of 5-30VDC. For easy electrical connection, they are equipped with an M12 connector. ■

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# The Green Light Go Ahead

## Focus Your ILM12F Laser Module on Your Own

**WEB** US35  
-174

The brand-new ILM12F laser modules are focusable and equipped with green laser light. They are available as cross-hair lasers, line lasers, and naturally as dot lasers.

These laser modules were created for application in the industrial environment: The metric ISO M12 thread was integrated in the stainless steel housing of the laser. Quick to screw in and connect, it is the perfect tool for the alignment of machines, adjustment work, or the positioning of, for example, the drill core to a workpiece.

The lasers are well protected; they are not affected by dust in damaging amounts or splashing water. In technical jargon, this is referred to as protection class IP54.

Green light is visible, even on dark or structured surfaces: Whether black rubber, gray steel, or painted sheet metal, it may also become wet. Green lines, cross hairs, and dots are always the best choice. To the human eye, green light appears more than twice as bright as red light at the same amount of power. If you still prefer red for any reason, the same model is, of course, also available with red light.

*ILM12F: Focusable Industrial Laser Modules with integrated M12 thread*

The ILM12F laser module is manually focused and quick to adjust. You can respond flexibly to varying working distances between 10 cm and  $\infty$ , without even picking up a tool. ■

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# The CUBE Series – Five Little Helpers Ready for Immediate Application

## Now also Available with Pulsed Laser Diodes

**WEB** US35  
-950

They are available for avalanche photodiodes, InGaAs PIN photodiodes, PbSe detectors, pyroelectric detectors, and now also for pulsed laser diodes: the CUBE series for immediate application and easy integration in an optical bench.

The L-CUBE houses powerful pulsed laser diodes. Choose between the following wavelengths: 850 nm (up to 10 W), 905 nm (up to 200 W), and 1550 nm (up to 40 W).

Both the power and the pulse length between 30 ns and 150 ns can be flexibly adjusted, either via rotary potentiometers directly at the housing or digitally on the computer via an RS232 port. This provides great leeway in picking the device parameters and also makes it possible to vary certain parameters during operation.

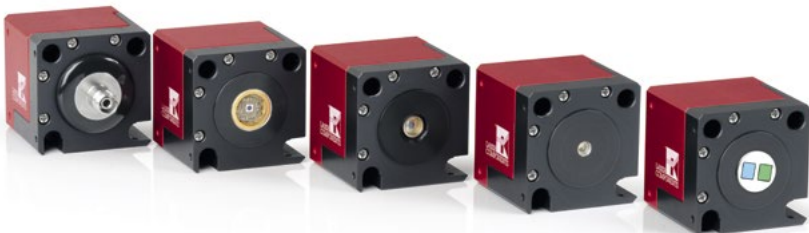
Another advantage of the L-CUBE is the costs that are saved during the development and testing phase: with a single pulsed laser module, a wide range of

pulse duration and pulse power combinations can be achieved.

Initial operation. Because all of the components are housed in a small, shielded metal housing (approximately 40 mm x 40 mm x 40 mm), operation only requires a trigger signal and a standard 12 VDC voltage supply. This makes the handling of pulsed laser diodes child's play.

OEM versions and custom modules of all CUBE models are available upon request. ■

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# Lumics "LuOcean™ Mini 4"

## The Creation of the Next Generation

WEB US35 -091

The Mini 4 is the latest addition to Lumics' LuOcean™ series of high-power, fiber-coupled diode laser modules.

This newest edition now offers power levels up to 70 W and wavelengths ranging from 793 – 1470 nm. Also, for the first time, the 1940 nm ultra-compact design, offering power up to 7W ex fiber at this wavelength, is available world wide.

There are many other new features:

- selectable electro-optical configuration (low current/high voltage or high current/low voltage)
- variety of pilot lasers
- option for up to 3 independently controllable wavelengths in one module.



The LuOcean™ Mini 4 is a perfect fit for applications in the medical and life science markets, sensing, pumping, and soft material welding and processing. Lumics' proprietary OEM driver board, specifically optimized for the LuOcean™ Mini Series, truly simplifies design, production and system integration by eliminating the need for a bulky stand-alone laser driver.

With their leading-edge technology, compact footprints and competitive pricing, these new offerings from Lumics pave the way for customers to design with ease and innovation. ■

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# 10 Years PicoLAS

WEB US35 -071

PicoLAS has specialized in the development and production of drivers for diode lasers for over 10 years. The drivers range from ultra-short pulse drivers and high speed seed drivers capable of pulses less than 1 ns to high power CW and QCW drivers with output current up to 300 A. Development efforts at PicoLAS have continued and recently several new products have been added. The range of seed drivers has been expanded and now includes a driver with an integrated pulse generator. New high performance OEM drivers with AC input have also been added. The new LDP-CWAC series are compact, have

excellent efficiency and are CE approved. Customized OEM solutions can also be offered to perfectly match your requirements. ■

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# Unbelievable!

## Small Low Cost Laser Modules

WEB US35 -050

We offer small, low cost, green and blue laser modules for use in a variety of applications. Operating at 450 nm or 520 nm, at either 1 mW or 5 mW output power, these dot laser modules are suitable for a wide range of commercial or industrial applications. The small 5 millimeter diameter of the laser housing makes these products attractive for applications where limited space is a concern. Contact our sales staff at Laser Components USA for more details. ■

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# Succession Plan at Laser Components Canada

## Production Facility for Pulsed Laser Diodes with new CEO Jeff Britton

The story of LASER COMPONENTS Canada began more than a decade ago: It was a time when it was difficult to obtain start-up capital from banks in connection with optoelectronics after so many people lost their money with a big bang in the telecommunications industry.

LASER COMPONENTS GmbH invested in and reached an agreement with Paul Rainbow to found a company to develop and manufacture pulsed laser diodes. LASER COMPONENTS provided the capital and an internationally operating sales network; Paul Rainbow provided the knowhow, decades of personal

experience, and the most important factor: a team that works well together! Now, 13 years and several million laser diodes later, Mr. Rainbow will be passing the reigns as the general manager of a successful and economically sound company to Jeff Britton, who was a member of the original founding team and was responsible for production from the very beginning.

We would like to take this opportunity to thank Paul Rainbow for his excellent work and his entrepreneurial spirit, which he has proven time and time again. He can be very proud of what he has

accomplished. Simultaneously, we wish Jeff Britton all the best in his new position and the same magical touch with which his predecessor was blessed. He will always have the support of LC GmbH and the rest of the LC group.

Paul Rainbow will be with the company for the coming years as chairman of the board and will take care of special development projects. We look forward to working with him in this capacity in the future. ■

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### CEOs of the Laser Components Group

from left to right: Christian Merry (LC SAS, France), Chris Varney (LC UK, UK), Dragan Grubisic (LC DG, USA), Gary Hayes (LC USA, USA), Günther Paul (Founder, Germany), Alan Doctor (LC PG, USA), Mikael Winters (LC Nordic, Sweden), Patrick Paul (LC GmbH, Germany), Jeff Britton (LC Canada, Canada)



# Lead Selenide Detectors in a TO-46 Housing

## The Miniaturization of Infrared Detectors is Small and Fine.

**WEB** US35  
-231

Effective immediately, we offer a PbSe detector in a 4.7 mm TO-46 housing. Up to now, the smallest available size was an 8.3 mm housing. This new component has a 1 mm detector

and is available under the designation PB45S10104S. Prototypes are already available in stock for delivery. ■

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# Avalanche Photodiodes in an SMD Housing

## Silicon APDs for the Wavelength Range Between 400 nm and 1100 nm with the Smallest Dimensions

**WEB** US35  
-952

Matching our high-end/low-cost pulsed laser diodes at 905 nm, we also offer Si avalanche photodiodes in a compact SMD housing. The dimensions are just 3.1 mm x 1.8 mm x 1 mm. You receive an emitter and a detector with an excellent price/performance ratio from one source. These devices are made for such applications as range finding, speed measurement, laser radar guns, and security scanners, as well

as for use in test and measurement systems in industry and medicine. The SAH series has an epitaxial structure and is produced on 6" wafers. The new APD features a high sensitivity between 400 nm and 1000 nm and short rise times from 250 ps to 300 ps. Designs with a diameter of 230 μm and 500 μm are available for delivery. Another advantage includes a low operating voltage, which contributes to saving energy in portable systems (e.g., laser range finders). ■

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