



## P-CUBE High Sensitivity PIN Detector Modules

Our range of P-CUBE PIN detector modules offers an ideal solution for customers looking to experiment with low noise Silicon or InGaAs PIN detectors.

Integrated into a versatile, small-footprint package, these modules form a valuable addition to optical test benches for experiments in low-light conditions, as power monitors, communication systems, gas analysis detectors as well as fluorescence and spectroscopy detection.

With affordable modules optimised for detection from 200nm right through to 2150nm, there really is a module for every application and budget!



The P-CUBE is also available with an optional FC connector, providing a convenient method for connecting the modules to the sample with an optical fibre.

Webcode: **UK55-0250**

Dear colleagues

Whilst many are saying let's see how it goes with Brexit, so far the same level of demand remains for our photonic components. Furthermore, reading through the technical press, industry experts remain positive about the consequences over the following 2 years whilst the politicians unravel the UK from Europe. Clearly the UK receives much EU funding that is likely to stop but then the UK won't be paying into the EU. So indeed we will have to wait and see. Meanwhile, we should remain robust and positive about the future and continue with our excellence in photonics.

That is fitting since this issue brings many

## A-CUBE High Sensitivity APD Modules

For customers looking for a plug and play solution for high-sensitivity detection, LASER COMPONENTS' A-CUBE range is a perfect choice! Featuring a low-noise silicon or InGaAs APD with matched preamplifier and integrated high voltage supply, these modules come ready-made



with everything required to operate APDs easily and conveniently. Furthermore, the A-CUBE incorporates built-in temperature compensation circuitry allowing the APD to be operated with constant gain even when temperatures are more dynamic! The A-CUBE is available with a variety of active area sizes extending up to 3mm diameter for the most sensitive applications. By utilising both silicon and InGaAs detectors, high quantum efficiency is readily achieved right up to 1600nm. A 12V supply is all that's needed to operate, so get in touch today!

Webcode: **UK55-0350**

improvements and new products, whether this be convenient detectors (A- and P-cubes), greater versatility (ModBoxes), four9 coatings (IBS mirrors) or new pilot beams (CO<sub>2</sub> delivery), it always remains exciting to see a continual flow of innovation. Enjoy this summer's read, and we look forward to seeing you at one of our trade shows, see back page.

Chris Varney  
Managing Director

## New ModBox Models

iXBlue offers new models in the Photline Modbox series. The ModBox range is a family of reference sources for telecommunication, analogue (RFoF), and pulsed applications. They are user friendly turn-key instruments delivering state of the art performance. All ModBoxes are based on a high bandwidth LiNbO<sub>3</sub> modulator, with an automatic bias control circuit and laser source and high performance RF drive electronics tailored to the application. The ModBox family has been extended with the addition of new models.

The Photline ModBox-850nm-NRZ and ModBox-OBand-NRZ series is now available with the option of adjusting the extinction ratio for vertical eye closure (VER option). These transmitters produce very clean, high quality eye diagrams at speeds up to 50Gb/s.

A full stressed-eye option is now available on the ModBox-OBand-28Gb/s-NRZ-SE and ModBox-850nm-28Gb/s-NRZ-SE. These models allow variable magnitudes of stress to be applied in both horizontal (time) and vertical (optical power) eye axes (Stressed Eye).



The ModBox-VNA family has been extended to wavelengths, including 850nm, in the O and C Bands. When associated with a Vector Network Analyser, they make up a high performance and easy to use test equipment for the characterisation of photoreceivers or any high speed optoelectronic device.

Other ModBox reference transmitters are available at 850nm, in the O-band and C-Band and 1  $\mu$ m region for telecommunication, analogue (RFoF), and pulsed applications.

Webcode: **UK55-0960**



## Silicon Carbide UV Photodiodes

SiC offers an excellent alternative to blue enhanced Si PIN diodes since they are naturally 'blind' in the deep UV and visible, offering a good response between 200nm and 400nm. SiC is also significantly more resistant to damage when exposed to harsh UV radiation compared to Si photodiodes.

Available in small TO-18 packages, a 0.1mm<sup>2</sup> active chip provide simple measurement of incident radiation. Optional integrated UV-A, UV-B and UV-C optical filters in TO-5 packages are available. Custom filters can also be installed. Isolated leads are available as well as low and high operating temperatures between -40°C and +125°C.

These SiC photodiodes are ideal for harsh environments, such as UV sterilisation, sun light and space applications, as well as being excellent companions for UV instruments and flame control.

Webcode: **UK55-0380**

## PSDs - Enhanced Customised Detection

Position Sensing Detectors (PSDs) are commonly used to detect incident or diffuse light in the wavelength range of 400-1100nm. In applications where there is a large amount of background light this can cause noise in the system which could affect the accuracy of your measurement.

To compensate for noise and increase positional accuracy we can incorporate either an Anti-Reflective (AR) coating or a filter onto the PSD window, or include both on the same PSD if required!

By incorporating these options into your PSD you will benefit from decreased noise and increased accuracy without adding anything in terms of size to your system, which can be very advantageous where space and weight is concerned. The window is pre-assembled to the PSD so no device assembly is required.

Many users have found having their PSDs built with an integrated filter or coating makes the devices even easier to include in their system as they no longer have to concern themselves with arranging filters and other optics in front of the detectors.

Webcode: **UK55-0230**

## IBS Mirror Coatings for Highly Demanding Applications

For applications which require the highest reflectivity and damage threshold, with the lowest thermal drift, LASER COMPONENTS offers ion beam sputtering (IBS) coatings. Unlike other coating methods, our IBS chamber allows independent control of process parameters such as energy input, layer growth rate and level of oxidation. This results in highly homogenous and ultra-dense layers which are free of moisture. Due to the absence of moisture, IBS coatings are virtually drift free and are not sensitive to temperature changes.

This process control also allows the growth of very complex layers meaning that the highest level of performance may be achieved, including; reflectivity values as high as

99.99%, and very broad bandwidths. The high energy ion beam used in this process eliminates the need for high temperatures



during coating, making IBS coating suitable for sensitive substrate materials. IBS coatings are available in the wavelength range of 260nm to 3000nm.

Webcode: **UK55-0010**

## Pulsed Fibre Laser at 532nm from Keopsys

PGFL series green fibre lasers from Keopsys are pulsed laser sources emitting at 532nm and delivering high peak power pulse in a very compact package.



The 532nm series is a green laser based on the combination of a powerful 1µm fibre laser and a compact, efficient frequency converter. The output beam is diffraction limited.

The laser system is delivered with an interface module that allows the laser to be driven

easily and keeps the frequency converter at a constant temperature. This source is ideal for underwater telemetry or range-finding applications.

Key features:

- energy per pulse up to 50µJ
- peak power up to 15kW
- average power up to 2W
- pulse repetition frequency 10kHz to 200kHz
- diffraction limited output beam
- low power consumption
- compact and rugged package

We offer the full range of Keopsys fibre lasers as well as pulsed and CW optical fibre amplifiers.

Webcode: **UK55-0190**

## 850nm VCSELs - the Perfect Solution

For applications requiring high speed and narrow linewidth laser sources, our range of 850nm VCSELs could be the perfect solution!

These VCSELs are available in ready to use fibre coupled packages with options including receptacle style housings such as ST, FC and SC as well as fibre pigtailed (single mode and multimode) co-axial assemblies.

VCSELs exhibit inherently narrow optical spectrums of 0.5nm FWHM and maximum rise and fall times of 0.3ns making them ideal for high speed modulation, ≥1GHz, as well as CW operation up to 1mW fibre coupled optical power.

All VCSELs are available with a range of fibre


types (specialised options are also available on request) and optional power monitor photodiodes for stabilising the optical power output through feedback control.



Webcode: **UK55-0830**



## The Key to Success: FiberKey P

 We would like to introduce our fibre coupler for CO<sub>2</sub> lasers, which transmits laser light and a pilot beam.

The invisible light of CO<sub>2</sub> lasers is often transmitted as a free-space beam with complex and expensive articulating optical arms used to guide the light to the required location. With the FiberKey P it is now possible for the first time to guide CO<sub>2</sub> laser light in hollow optical fibres to any point and simultaneously transmit the light of a pilot beam. Thanks to the pilot beam, the location of the processing beam can be easily adjusted for precise alignment.

Our CO<sub>2</sub> fibre coupler is optimised for the wavelength 10.6µm. A ZnSe lens gives a coupling at an efficiency of typically 80%. The FiberKey P is used in combination with a newly developed hollow-core fibre: the pilot beam is transmitted in the fibre cladding, and the invisible laser light is guided in the hollow core. The module is easily integrated with existing lasers using the flange mounting.

The transmission of CO<sub>2</sub> laser light in optical fibres can replace complex and expensive beam guides in many cases. This product

is currently available for an output power of up to 30W, and is therefore particularly well-suited for medical applications with




CO<sub>2</sub> lasers, for example to cut tissue when removing tumours or in dermatology. The pilot beam in the FiberKey P will accurately show the point of impact for the laser light, which makes it possible to work precisely.

Competitors who offer solid core optical fibre cables, that transmit light in the mid-IR range, can use a separate fibre for the pilot beam, but the hollow-core fibres have an advantage due to their low attenuation values.

Webcode: **UK55-0115**

## Gaussian Mirrors

 Gaussian mirrors, or variable reflecting mirrors, are characterised by a degree of reflection which slopes radially from the




centre of the optic in a Gaussian distribution. These mirrors are used in unstable resonators to produce high quality laser beams with low divergence at high pulse energies. In frequency-doubled systems they are used to

achieve a greater pump efficiency. Gaussian mirrors are extremely stable and suitable for high power applications. These optics are based on the principle of a Fabry Perot interferometer, with a position dependant mirror spacing. Dielectric coatings with a defined reflectivity value as a function of radius are generally monochromatic. The Gaussian profile is only valid for a single specified wavelength. Gaussian mirrors are manufactured with high precision usually to customer specifications, by LASER COMPONENTS, one of the few companies worldwide offering this type of mirror.

Webcode: **UK55-1010**

## Short Pulse Duration Seed Drivers

 We are proud to announce a new addition to the seed driver family - the BFPS-VRHSP-02 by PicoLAS!

Specially designed to drive laser diodes in seeding applications for fibre and solid state laser amplifiers, the BFPS-VRHSP-02 is the first seed driver available on the market which can deliver pulse durations as low as <500ps up to 10ns with extraordinary current potential of 2A. All driver settings




are controllable via an integrated digital interface with a particularly special feature being the integrated pulse width controller.

Webcode: **UK55-0550**

## Low Cost Laser Conversion

### Screens


 Our popular Visualize product line serves as a low cost alternative to beam profilers. Visualize can be an invaluable tool for alignment, location and visualisation of laser radiation outside of the visible spectrum, using a phosphor based scintillator screen to convert ultraviolet and infrared into visible light.

The range consists of three core products: VISualize, which produces a yellow/red emission when exposed to blue-NIR, perfect for viewing visible sources when using laser protective eyewear. VisualizeIR, which allows for safe visualisation of continuous wave or pulsed NIR, and UVISualize, which converts UV radiation to visible yellow light.

Each of these products is available in a handy 'credit-card' style format, with an active area of ~4.5cm<sup>2</sup>, currently priced at just £30 each.

Webcode: **UK55-0510**

## Inexpensive Containment Solutions for Lower Power Lasers

 Even lasers with comparatively low power levels require efficient protection. This, however, does not have to mean bulky and expensive laser safety barriers. For this purpose, we offer a new and cost efficient material, offering sufficient protection for power levels of up to 100W/cm<sup>2</sup> for 100s (test parameters: 1064nm, 2.82mm beam diameter).

The matte black SLC-100WB material is flexible and offers the same level of laser protection on both sides. Suited for all standard laser types from 190nm to 11,000nm and CE certified according to DIN EN12254.

As with all laser containment products offered by us, this material is offered in completely custom sizing and multiple formats including wall or ceiling mounted curtains, window shades and free standing barriers. All mounting hardware is included, providing you with a complete laser containment solution, tailored to your setting.

Webcode: **UK55-0540**



## Narrow-Banded Laser Sources for Fibre-Optic Sensor Applications

We are pleased to offer laser sources manufactured by Redfern Integrated Optics (RIO). These high-performance single-frequency external cavity lasers (ECLs)



are based on RIO's PLANEX™ proprietary planar technology. PLANEX™ lasers consist of an amplification chip and a planar waveguide structure (PLC) with an integrated Bragg grating. The combination of these elements results in a laser with a large laser cavity that has significant advantages:

- optical output power of up to 20mW
- very low relative intensity noise (RIN)
- ultra-low phase noise and very small line width
- very low wavelength sensitivity regarding bias current and temperature
- the low-noise, powerful, ultra-narrow band PLANEX™ lasers are particularly

well suited for applications that place high demands on absolute precision, lifetime (even under harsh environmental conditions in the field during application), or a high attainable resolution

They are ideal light sources for applications including:

- acoustic and seismic sensing
- LIDAR and remote sensing systems
- distributed fibre-optic temperature or strain sensing systems
- high-resolution spectroscopy
- wavelength locking and optical phase locked loops
- microwave photonic links
- coherent communications

The pin assignment and form factor conform to the industrial standard and make simple application in existing systems possible as a drop-in exchange or upgrade to improve performance.

The lasers are also available as laser source modules with a serial interface, as a bench-top laser source, or in other configurations.

Webcode: **UK55-1830**

## Low Cost Red Laser Modules

The LC-LMD Low Cost Laser Module Diode series is very popular for manual alignment applications and machine integrators using thousands of low cost, simple to use, laser modules. This success is accredited to the LC-LMDs' low cost, form factor, and ease of installation.

Compared to standard laser diodes which require focusing optics and drive circuits to be additionally purchased, integrated, and aligned, the LC-LMDs already contain all of this! Installing the LC-LMDs into a product or system is simple with the only requirement being 3VDC across the pins on the rear of the laser.

To promote the LC-LMD laser module series the LC-LMD-635-03-03-A are for a limited time available for the low price of £7.50 each, providing a great value price for users who are keen to test a cheap and reliable laser in their system!

Webcode: **UK55-0740**

## Quad PbSe Detectors

An attractive multi-gas sensor can now be designed around our new quad PbSe detector, especially suited for low signals and reduced cross-talk, when before single point detectors with rotating filter wheels would be needed.

Each chip within the quad has its own optical filter, selected from a large range of 17 standard filters. Custom types or free-issued filters by customers are possible.

Greater sensitivity for longer wavelengths is achieved with cooled versions, using an optional integrated thermoelectric cooler.

Four simultaneous signals are possible in now a smaller space and with faster reaction time, all within a TO-8 or TO-39 housing.

Webcode: **UK55-1740**

Webcode: **UK55-0311**

## FLEXPOINT® Microprocessor Controlled Laser Modules

We are pleased to introduce the MVmicro DIG series; a standard MVmicro Machine Vision laser with an integrated microprocessor which offers various communication and reporting options. Along with all of the standard homogenous optics with 20% line uniformity, modulation, and wide operating temperatures, the MVmicro DIG can be programmed to switch its modulation and dimming between active high and active low settings, read out operating parameters to a computer terminal, and report environmental conditions and lifetime within the laser module. Having access to these parameters can provide a significant advantage when

standardising the uniform line lasers used across a range of products with different power and modulation requirements. This



also provides the ability to monitor the life time and highest temperature the laser has been used in for evaluation and product failure prevention.

### See us at

Photon16, September 06-07, 2016, University of Leeds, **Booth 5**

The Future Photonics Hub Industry Day, September 13, 2016, University of Southampton, **Booth S14**

SPiE Security + Defence, September 27-28, 2016, Edinburgh International Conference Centre, **Booth 405**

Photonex 2016, October 12-13, 2016, Ricoh Arena, Coventry, **Booth D15**



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