



# Product Catalogue

 **LASERS**

 **IMAGING & MICROSCOPY**

 **SPECTROSCOPY**

 **OPTOMECHANICS & OPTICS**

 **DIAGNOSTICS**

 **ACCESSORIES**

[www.photonicsolutions.co.uk](http://www.photonicsolutions.co.uk)

Celebrating 20 Years in Photonics

# Welcome to Photonic Solutions' Product Catalogue

This year is particularly exciting for us as we are celebrating 20 years as the leading supplier of photonics and associated technologies to the UK scientific and industrial market. From the early days of our formation in 1999, our mission was always to provide the highest quality photonic products backed up by the highest quality service and support. We continue to strive for total customer satisfaction, representing only well-established manufacturers with a quality-driven product line and a reputation of providing the highest quality photonics products to both research and industry.

Currently we are the exclusive distributor for over 40 leading manufacturers of scientific and industrial laser systems, research grade spectroscopy solutions, optical instruments, cutting edge microscopy and imaging systems, together with optics, laser diagnostics and detectors for the photonics sector.

To help you navigate through our Product Catalogue we have divided our product portfolio into 6 main product lines: Lasers, Imaging & Microscopy, Spectroscopy, Optomechanics & Optics, Diagnostics and Accessories. The sections are colour coded to ease navigation.

## What's NEW at Photonic Solutions?

We have added some fantastic new companies and products to our portfolio in the past year. New companies include Alluxa, i2S, Jireh Scientific Imaging, Lexel Laser, MOGLabs, New Scale Technologies, Sciencetech, Sound and Bright, and 3DOptix.

**Alluxa** - manufacturer of high-performance optical filters and thin-film coatings.

**i2S** – manufactures the TZcam - a high definition, real-time Terahertz camera with the highest sensitivity on the market.

**Jireh Scientific Imaging** – manufacturer of Zion - professional performance spectroscopy camera.

**Lexel Laser** - range of continuous wave gas lasers.

**MOGLabs** – offers a range of products which are tailored to the needs of the atom optics laboratory.

**New Scale Technologies** - M3 micro-stages and actuators which are all-in-one “smart modules” with built-in controllers that are easy to integrate into handheld and portable instruments.

**Sciencetech** - optical spectroscopic instruments, continuous and flash solar simulators, and photovoltaic testing equipment, and custom solutions from light sources to spectroscopy system.

**Sound and Bright** - offer a range of cutting-edge laser-based ultrasound systems for Non-Destructive Testing applications.

**3DOptix** - offers innovative mounting platform - the Breadbox™ which can extend the entire optical table into the vertical dimension creating a truly three-dimensional precise grid with discrete locations for the optical elements.

Finally, we have recently launched our redesigned and revamped webshop, [www.photonicshop.co.uk](http://www.photonicshop.co.uk), which now offers an increased portfolio of products to purchase on-line. Keeping your photonic research running has never been easier!

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**QUANTEL LASER** has merged with Keopsys and formed LUMIBIRD. LUMIBIRD is one of the world's leading specialists in solid-state lasers and laser diodes.

Quantel laser range from Lumibird offers a wide variety of products that meet the special requirements of industrial (manufacturing, LiDAR sensors), military and scientific (laboratories and universities) applications including: Pulsed solid-state lasers (Nd:YAG, Nd:YLF and Nd:Glass); Fiber lasers for marking and engraving, atom cooling and trapping; Tunable dye lasers and High power laser diodes.

## MERION

To meet the laser market's diverse needs with reliable, high-performance and competitive solutions, LUMIBIRD's product ranges are transitioning to an industrial platform model. Merion is the first platform model for diode-pumped solid-state lasers. This modular and versatile new laser platform will enable use in almost any application,

from environmental LiDARs to medical equipment and industrial instrumentation. The platform model also enable Quantel to produce a highly diverse range of lasers with different power levels (100 mJ to 1J), different frequencies (from a few dozen to 500 Hz) and variable wavelengths.

NEW

### Merion MW

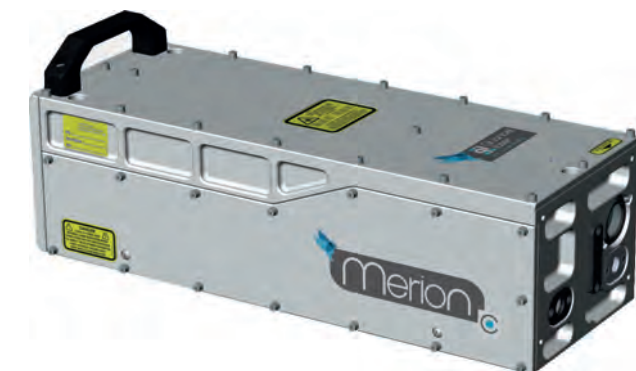
- Lightweight and compact design
- Repetition rates up to 200 Hz
- Quick and easy access to 1064, 532, 355 & 266 nm
- Plug & play harmonics with automatic phase-matching
- Quick-connect cables and cooling lines
- Single longitudinal mode option available
- No installation required
- Diode warranty : 2 billion shots



NEW

### Merion C

- Compact and portable
- Sealed laser head
- Industrial design, built to last
- Superior beam profile up to 400 Hz
- Easy to integrate
- Plug and operate remotely
- Interchangeable laser head



MODEL		MERION MW 7-100	MERION MW 7-200	MERION MW 9-100	MERION C-S4	MERION C-G4
Repetition rate (Hz)		100	200	100	up to 400Hz	up to 400Hz
Energy (mJ)	1064nm	300	200	650	100	100
	532nm	160	95	360	50	50
	355nm	90	60	200	30	30
Pulse duration (ns)	1064nm		5-9		<10	

NEW

### VIRON 50mJ

The VIRON is a DPSS Q-switched Nd:YAG laser specifically designed for high efficiency in a robust and compact package as required by instrumentation manufacturers.

- Air cooled, compact DPSS laser
- Laser head and control electronics integrated into one single housing
- Operation only requires an external 24VDC supply
- Sealed for operation in various environments
- Easy to integrate

MODEL	VRN20-30-G	VRN20-50-G
Repetition rate (Hz)	20	20
Energy per pulse (mJ) @ 1064 nm	30	50
Energy per pulse (mJ) @ 532 nm	15	25
Pulse width (ns)		<8



VIRON



**OXXIUS** is a design and manufacturing company founded in 2002, to bring disruptive innovations to the market of visible lasers. They develop advanced, CW laser modules targeting numerous applications in bio-photonics, metrology, spectroscopy, and other analytic and instrumentation applications for both research and industrial customers.

Oxxius develop innovative, patented, diode pumped solid state architectures as well as offering a broad range of diode laser modules, covering the wavelength range from UV to near IR.

## LASER SERIES

Oxxius has a unique range of extremely stable and reliable DPSS lasers (LCX) along with stabilised laser diode modules (LBX).

The key to the superior Oxxius performance is their patented alignment free monolithic resonator (AMR) enabling the highest spectral quality on the market, with high stability and robustness over

time. Due to the highly efficient design of the resonator, Oxxius is able to provide much higher powers than their competitors from the same compact industry-standard-sized package – a huge advantage! By packaging the laser controller in the same housing as the laser, Oxxius offer a true one-box solution – another significant advantage over competitive systems.

### Low noise LCX DPSS lasers and LBX laser diode modules

The low noise version of the LCX DPSS series and LBX laser diode modules are ideal for biophotonics and industrial applications. All lasers in the range feature superior beam quality, excellent stability and fast modulation capabilities. Contained within a compact, industry standard sized package, these lasers are the ideal addition to the laboratory or for integration into OEM instruments.

- Low noise (<0.2%)
- LCX 50-500mW, LBX Up to 350mW
- Linewidth LCX<0.1nm; Linewidth LBX <1.5nm
- Excellent power stability: LXC (+/-1%) LBX (+/-0.5%)
- SM, PM and MM fiber coupling options
- M<sup>2</sup><1.1 LCX and <1.25-1.4 LBX
- OEM version has controller integrated into laser head
- 375nm, 405nm, 445nm, 450nm, 473nm, 488nm, 505nm, 515nm, 520nm, 532nm, 553nm, 561nm, 633nm, 638nm, 639nm, 642nm, 647nm, 660nm, 730nm, 785nm, 980nm

### Single Longitudinal Model Laser: LCX-S DPSS lasers and LBX-S laser diode modules

They operate at 532, 553, 561, 633, 640, 785, 830 and 1064nm.

- SLM
- 40-500mW
- Low noise <0.2%
- Long coherence length >100m for LCX and >1m for LBX
- Linewidth <1MHz for LCX and <100MHz for LBX
- Excellent power stability (+/-1%)
- SM, PM and MM fiber coupling options
- M<sup>2</sup> <1.1

### LBX HPE

High Power Multi Transverse Mode laser diode module offering excellent performance and reliability in a compact laser head.

- 375, 405, 450, 473, 532, 638 and 785nm versions available
- Up to 1000mW (selected wavelengths)
- Power stability (+/-1%)

## OXXIUS LASER COMBINERS

The L6Cc, L4Cc and L2C are compact laser combiner systems which integrate the Oxxius LCX and LBX laser modules. With free space output or fiber delivery, these laser banks are ideally suited to applications in bio imaging where combinations of wavelengths

Available configurations:

- L6Cc – up to 6 wavelengths
- L4Cc – up to 4 wavelengths
- L2C – up to 2 wavelengths

### Features

- Large choice of wavelengths 375nm–1064nm
- Free space or fiber coupled
- Modular optical design
- Fast AOM modulation
- Direct modulation of each laser with independent control
- USB & RS232 controller interface
- Multiple outputs available
- Flexible design customised to specific requirements

may be required for multi-wavelength interrogation, eg confocal microscopy, super resolution imaging, optogenetics, flow cytometry, SPIM, FRAP, TIRF, etc.





**OPOTEK** specialises in OPO tunable laser products that range from stand-alone OPO modules to complete scientific instruments. They offer innovative products that provide flexibility, excellent performance and high reliability whilst being easy to use and maintain.

### Opolette™ 355

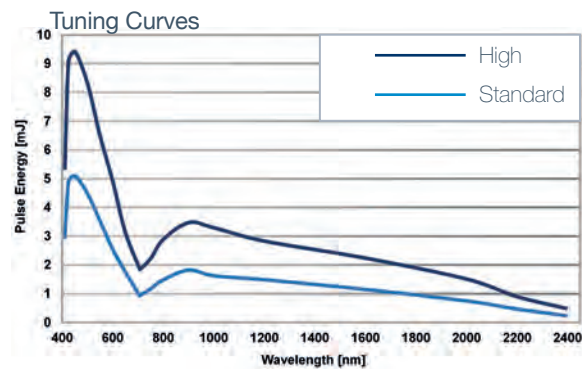
The Opolette™ 355 tunable laser system utilises patented OPO technology to generate wavelengths over a broad range in the UV VIS and IR. Designed for portability the entire laser head (including the Nd:YAG pump laser) fits into an 18 x 30cm footprint! It ships completely sealed to protect optical components from contamination.

Requiring no installation the system includes verification hardware to check alignment after shipping or relocation. All tunable beams exit the system from the same location resulting in only one beam path to the end user application. Wavelength tuning is hands-free under PC control.

Wavelength tuning	410-2400nm 210-2400nm (+UV option)
Peak OPO Energy (mJ)	5.1 (9.4mJ HE option)
Peak OPO efficiency	>30%
Pulse length	4-7ns
Rep rate	20Hz
Beam diameter	3mm (4mm HE option)
Access to residual 355 (mJ)	8-12mJ (15-20mJ HE option)



Opolette™



### Radiant™

The RADIANT™ tunable laser series utilises optical parametric oscillator technology to generate wavelengths over a broad range in the UV, VIS and IR. Integration of system components into one compact unit increases ruggedness, minimises misalignment and allows the user to reposition the system.

Included verification hardware enables the user to confirm that beam paths are preserved after shipment or relocation. Hermetically sealed modules protect sensitive optical materials from the environment. All tunable beams exit the system from the same port resulting in one beam path to the end-user's application. Wavelength tuning is hands-free and PC controlled.

- All-in-one housing design integrates pump laser, OPO, harmonics, beam steering optics and control electronics.
- Option to extend the tuning range with the addition of the UV (210-410nm) or EUV (192-410nm) tuning and One-Port-One Path™ modules that maintain one optical path for all tunable beams.



Radiant™ 355

### Phocus™ Mobile

Based on the Ring-Cavity™ optical parametric oscillator (OPO) technology, the Phocus™ Mobile represents the ideal light source for photoacoustic imaging applications that require high pulse energies and NIR wavelengths for deep penetration of biological tissue. High damage thresholds combined with minimal maintenance and turn-key operation reduce system down-time and allow ease of operation. The system provides a light-sealed, transportable cart designed for deployment into pre-clinical environments. A customizable, safety-interlocked fiber bundle delivers light from the system to the instrumentation and prevents system operation without fiber attachment. Motorised harmonics and fiber bundle delivery provide a completely, hands-free tunable laser system.

- Tunable laser system into that is light-sealed, transportable cart designed for deployment into pre-clinical environments.
- Unique, Ring-Cavity™ OPO design increases the OPO damage threshold while maintaining high efficiency in order to deliver short, nanosecond pulses.



Phocus™ Mobile

**A.P.E** Located in Berlin, A.P.E GmbH is a world leading supplier of picosecond and femtosecond OPOs, ultra-short laser pulse diagnostics and tunable wavelength conversion devices. Since 1992 A.P.E has been passionately supporting customers to get the best out of their ultrafast lasers, applications and processes.

A.P.E's portfolio includes OPOs, systems for harmonic generation (HarmoniXX series), autocorrelators for pulse width measurements, spectrometers and other equipment for measuring and characterising fs and ps laser pulses.



## OPTICAL PARAMETRIC OSCILLATORS

### Levante fs/ps OPOs

The newly designed Levante series of femtosecond and picosecond OPOs now feature full automation with software-controlled tuning, so handling and integration have never been easier.

Both the Levante Emerald (pumped in the green) and Levante IR (pumped in the infrared) are extremely versatile, synchronously-pumped OPOs offering dual-colour outputs with broad tunability and are available in both fs and ps configurations.

In combination with wavelength converters from the HarmoniXX series, almost every wavelength from 190nm up to 15µm can be generated via SHG, THG, FHG, and DFG.

A range of fully qualified and recommended ps/fs pump lasers are also available from A.P.E and Light Conversion, allowing us to offer complete system solutions for every OPO. A.P.E also have impressive OPO solutions for existing Ti:Sapphire pump lasers and single-box solutions for s-SNOM and AFM-IR applications.

*In our search for a robust, fully automated tunable light source optimal for coherent Raman microscopy, the A.P.E PicoEmerald S clearly stood out. It has proven to be reliable with its ease of use and system integration capabilities essential for supporting access to a wide range of users in our facility.*

Dr Alastair Wark, Technology and Innovation Centre, University of Strathclyde.



### PicoEmerald for CARS & SRS

The PicoEmerald is a fully automated, one box light source for coherent Raman spectroscopy (e.g. CARS and SRS) and multiphoton microscopy, covering the entire Raman fingerprint region (720-9000cm<sup>-1</sup>). The system delivers 2ps pulses with 10cm<sup>-1</sup> spectral width, providing the shortest possible pulses for the highest signal levels, while maintaining the optimum spectral resolution.

The PicoEmerald supplies three temporally and spatially overlapping picosecond pulse trains (Pump, Signal, Idler), making it a perfect source for multicolour experiments such as CARS:

- Fundamental (IR) at 1031nm
- Signal beam tunable from 720-990nm
- Idler beam tunable from 1150-2030nm
- Optional modulation of the IR beam for video-rate SRS

## FREQUENCY CONVERTERS

### HarmoniXX

The HarmoniXX product line is a series of frequency converters for ultrafast lasers. Built as a modular system, it is ideal for Ti:Sapphire as well as many other wavelength ranges, covering second, third and fourth harmonic generation.

The focus is on user friendliness and a compact design. By featuring a quick exchange of optics, the HarmoniXX devices can be used for a wide range of pulse widths from fs to several ps as well as a DFG configuration for mid-infrared generation.



HarmoniXX

## PULSE MANAGEMENT

### PulseSelect

The PulseSelect is an acousto-optical single pulse selector developed for the special demands of femtosecond laser technology. Pulse distortion is minimised by a low dispersive design and the use of reflective optics. The use of an acousto-optical selection element allows for high repetition rates and high contrast ratio. Pulse repetition rate can be reduced by using an adjustable internal frequency divider or by external triggering. Low division ratios down to  $f_{REF}/2$  are possible.

A.P.E also offers a choice of cavity dumper solutions for those with Ti:Sapphire, ion, dye and other laser types.

## PULSE DIAGNOSTICS

### PulseCheck Autocorrelators

The pulse width is a critical factor for the adjustment and optimisation of ultrafast laser systems and the characterisation of experiments. A.P.E PulseCheck autocorrelators can accurately measure pulses from <10fs to 500ps for almost any wavelength range from 200nm to 12µm.

### Carpe Microscope Autocorrelator

Unique solution for the direct measurement of pulses at the sample plane of commercial & home-built microscopes (700-2000nm).

### Spiders

A family of Spider products for single shot, fully phase-resolved ultrafast pulse characterisation. Available for pulses down to 5fs and in the visible and NIR spectral ranges up to ~1100nm.

### WaveScan

A selection of precise laser spectrum analysers for measurement of wavelengths from 200nm to 6.3µm, and with resolutions down to 0.05nm.



**LIGHT CONVERSION** is the world leading manufacturer of continuously tunable ultrafast light sources, with both their TOPAS and ORPHEUS series of optical parametric amplifiers (OPAs) and frequency mixers, as well as their impressive femtosecond PHAROS and CARBIDE laser systems. Since their establishment in 1994 as a spin off from the University of Vilnius Laser Research Centre, Light Conversion has installed more than 2000 OPAs and more than 1000 PHAROS laser systems worldwide.

Light Conversion has recently expanded its family of high power, ultrafast DPSS lasers – PHAROS – along with its own OPA – ORPHEUS – based on the successful TOPAS design. Due to its rugged, turn key design, PHAROS is equally at home in the ultrafast

laser lab or in an industrial micromachining environment where, of particular interest to users, is the tunable pulse performance from 190fs to 10ps, and variable rep rate from single shot to 1MHz.

*The PHAROS laser is a rugged and flexible system which has been an excellent addition to our facility. It is easy to use, reliable and combines good beam quality with femtosecond pulses, all of which allow for great machining results in all materials.*

Dr Nadeem Rizvi, Laser Micromachining Ltd.



**PHAROS**

PHAROS is an impressively robust and truly flexible femtosecond laser system, aimed at both industrial and scientific users. With more than 1000 units sold worldwide, PHAROS is established as the true market leader in key applications such as material processing and laser micromachining. Coupled with the ORPHEUS, a dedicated OPA, it becomes a powerful scientific tool for research areas such as ultrafast spectroscopy.

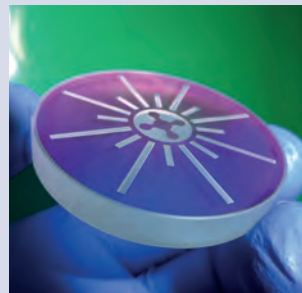


Image courtesy of Laser Micromachining Ltd

- Tunable pulse duration 190fs – 10ps
- Up to 2.0mJ pulse energy
- Up to 20W average power
- Single shot – 1MHz tunable repetition rate
- Includes pulse picker for pulse-on-demand applications
- Harmonic generators (2H, 3H, 4H, 5H) stand alone or integrated

PHAROS MODEL	PHAROS-10W	PHAROS-15W	PHAROS-20W	PHAROS SP	PHAROS SP-1.5	PHAROS 2mJ
Max Average Power	10W	15W	20W	6W		
Pulse Duration (Assuming Gaussian Pulse Shape)	<290fs			<190fs		<300fs
Pulse Duration Range	290fs - 10ps			190fs-10ps		300fs-10ps
Max. Pulse Energy	>0.2mJ/>0.4mJ			>1.0mJ	>1.5mJ	>2.0mJ
Repetition Rate	single pulse to 1MHz					
Centre Wavelength	1028nm ± 5nm					
Output Pulse Stability	<0.5% rms over 24 hours					
Beam Quality	TEM <sub>00</sub> ; M <sup>2</sup> <1.2	TEM <sub>00</sub> ; M <sup>2</sup> <1.3				
Polarisation	Linear, Horizontal					

**CARBIDE**

CARBIDE is a close relative to PHAROS, offering maximum flexibility in pulse duration, repetition rate, pulse energy and average power. The industrialised CARBIDE design boasts a fully integrated laser head and power supply, combined in a single ultra-compact unit. Air-cooled and water-cooled versions are available with up to 40W average power (higher powers coming soon).

- Carbide-40W
- 290fs-10ps tunable pulsewidth
- >400µJ pulse energy
- Single shot - 2MHz tunable repetition rate
- 1028nm ± 5nm wavelength
- <0.5% rms stability
- Automated harmonics generators 515, 343, 257nm
- Includes pulse picker for pulse on demand applications



**FLINT**

**Ytterbium Oscillator**

- Up to 20W
- <100fs pulsewidth (<40fs Flint SP)
- 76MHz rep rate
- 1035 ± 10nm
- Kerr lens modelocking
- Carrier Envelope Phase (CEP) stabilisation option



**Carbide-40W-400µJ – Up to 2MHz – Higher powers and energies coming soon!**

**ORPHEUS OPAs**

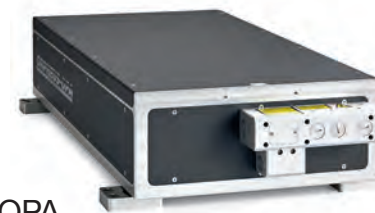
ORPHEUS is a collinear OPA pumped by PHAROS or CARBIDE lasers. It generates tunable femtosecond pulsed output and with optional wavelength tuning range extensions can cover from 210nm to beyond 16µm.



**ORPHEUS-OPA**

**All-in-one OPA**

- Completely hands-free and single-housing design
- Exceptional long-term stability
- Integrated detectors for output monitoring and remote diagnostics
- Most versatile all-in-one solution
- Single pulse – 2 MHz repetition rate
- Thermally shielded and stabilized housing



**ORPHEUS**

**Classic, HP, HE OPA**

- 190 – 16000nm tunable wavelength
- Single pulse – 2 MHz repetition rate
- Up to 40W pump power
- Up to 2mJ pump energy
- Computer controlled

**ORPHEUS-F**

**Best selling OPA**

- Combines the best features of OPA and NOPA
- Pulse duration compressible down to <40fs
- Variable output bandwidth
- Full computer control via USB port and dedicated software



**ORPHEUS-ONE**

**Collinear mid infrared OPA**

- 1350 – 1600nm tunable wavelength
- Twice the mid IR output compared to Orpheus
- Rep rates up to 2MHz
- Various bandwidth configurations

**ORPHEUS twins**

**Two independently tunable OPAs**

- 210 – 16000nm
- Single pulse to 2MHz
- Both OPAs share the same WLC source as seed for amplification, giving the ultimate in coherence
- Two integrated mini spectrometers
- Single monolithic housing

**ORPHEUS-N**

**Non-collinear OPA**

- Pulse duration down to <15fs
- High rep rates up to 2MHz
- Integrated prism compressor
- Adjustable bandwidth and pulse duration
- Computer controlled wavelength tuning
- Compact and flexible design

**ORPHEUS-PS**

**Narrow bandwidth OPA**

- Continuously tunable picosecond pulses from 315 – 5000nm
- Near bandwidth limited output, <15cm<sup>-1</sup> spectral width
- Rep rate up to 100kHz

PRODUCTS	PUMP ENERGY, POWER	TUNING RANGE	EXTENDED TUNING RANGE	OUTPUT PULSE DURATION
ORPHEUS	8 – 400 µJ, <8 W	630 – 2600 nm	210 - 16000 nm	0.7 – 1.0 times pump pulse duration
	8 – 1000 µJ, <40 W (HP)		190-16000nm	
	1000 – 2000 µJ, <10 W (HE)		210 – 630 nm	
ORPHEUS-ONE	12 – 400 µJ, <8 W	1350 – 4500 nm	720 – 970 nm	0.7 – 1.0 times pump pulse duration
	12 – 1000 µJ, <40 W (ONE-HP)		4500 – 16000 nm	
	1000 – 2000 µJ, <10 W (ONE-HE)		720 - 970 nm	
ORPHEUS-F	8 – 500 µJ, <40 W	650 – 900 nm,	325 – 450 nm	40 – 100 fs, user adjustable
		1200 – 2500 nm		
ORPHEUS-N-2H	10 – 200 µJ, <8 W	650 – 900 nm	325 – 450 nm	10 – 40 fs
ORPHEUS-N-3H	12 – 200 µJ, <8 W	520 – 900 nm	260 – 450 nm	15 – 45 fs
ORPHEUS-TWINS	8 – 2000 µJ, <40 W	630 – 4500 nm (depends on configuration)	210 – 16000 nm	Depends on configuration, down to < 40 fs
ORPHEUS-PS	SHBC output required: 515 nm: 120 µJ – 1 mJ, 1 – 3 ps, < 20 cm <sup>-1</sup> ; 1030 nm: uncompressed residual	640 – 1010 nm,	320 – 5000 nm	1 – 4 ps
		1050 – 2600 nm		



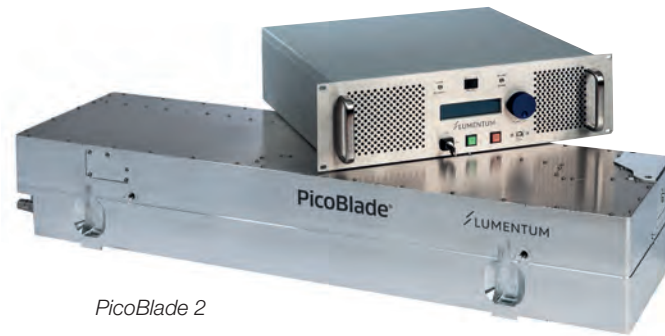
LUMENTUM is a global laser manufacturer specialising in HeNe, Argon ion, CW and pulsed DPSS lasers, laser diodes, kW ultrafast industrial lasers, fiber lasers and industrial diode lasers.

### ULTRAFAST INDUSTRIAL LASERS

Lumentum ultrafast industrial lasers serve OEM system integrators with high-volume applications. Features include:

- Plug-n-play, easily integrating into diverse industrial systems
- Hermetically sealed housings with less movement and adjustment
- Sustainable in harsh industrial environments for 24/7 operation

Lumentum ultrafast industrial lasers are ideal for a wide variety of applications, from micromachining to metrology. The lasers use passive, self-starting, proprietary semiconductor saturable absorber mirror (SESAM) technology to generate picosecond seed pulses without any external control.



PicoBlade 2



Output Power	Up to 50W
Rep Rate	Single shot to 8MHz
Pulse Energy	Up to 200µJ
Pulse Width	10ps
Peak Power	20MW
Wavelength	1064nm (532 and 355nm options)
M <sup>2</sup> (TEM <sub>00</sub> )	<1.3

#### PicoBlade 2

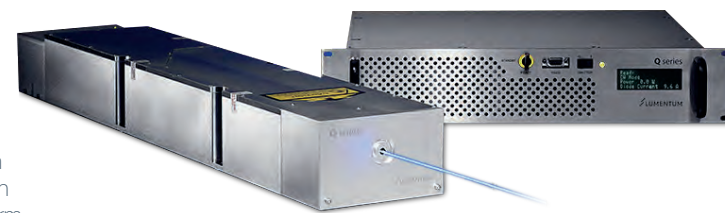
Designed for maximum processing speed, the PicoBlade provides a versatile tool to process virtually any material with the highest precision and reliability. Most other picosecond lasers emit pulses at fixed energy levels that are too high for most applications and are only adjustable by reducing the average power. This results in poor production throughput, even for high power laser systems. In contrast PicoBlade allows adjustment of the pulse energy to the value required by your specific application at full average power and therefore maximum process speed!

### SOLID STATE LASERS

#### Q-Series - up to 40W at 355nm

High Power Q-switched Diode Pumped Laser 355 or 532nm.

Q-series lasers set the performance standard for high precision micromachining with UV lasers. This is due to the inherent design benefits of intracavity UV generation, unique to the Q-series which results in unsurpassed pulse to pulse energy stability and long term output power stability. Coupled with exceptionally stable beam position and profile, the Q-series is ideal for processes requiring the most accurate feature placement. The Q-series achieves the tightest possible process tolerances for precision micromachining and



other materials processing applications. Further benefits of Q-series intracavity harmonic design results in the highest reliability and up time of any industrial UV laser due to the low fluence in the harmonic crystals and no cavity optics exposed to UV.

MODEL	Q-201*	Q-301	Q-302	Q-303	Q-304	Q-305	Q-306	Q-331	Q-332	Q-333
Wavelength	532nm	355nm								
Average Power (W) at Rep Rate (kHz)	12/14.5/15 5/10/15	10/8/6 10/20/30	8/6.8/5 30/50/70	>6.5/4.5/2.9 70/100/130	>11/9.5/6.3 40/60/90	22/14.4/10.4 40/80/120	40/20/12 40/20/120	5/4/3 10/20/30	4/3.4/2.5 30/50/70	3.6/2.5/1.6 70/100/130
Pulse Width (ns)	18/29/40	34/52/69	78/107/135	135/180/225	95/130/180	80/135/190	70/120/160	34/52/69	78/107/135	132/168/204
Spatial Mode	TEM <sub>00</sub>									
Frequency Range (kHz)	1-250kHz (internally triggered) 0-250kHz (externally triggered)									

\*Q-202 532nm laser also available - see website for more details.



Lumentum HeNe lasers and tubes

### HeNe LASERS

For the past 15 years Photonic Solutions has been European stockist for the Lumentum range of HeNe lasers, supplying our own customers and also the European distributors of Lumentum lasers. We carry a wide range of lasers and power supplies in stock for next day delivery.

#### 1100 series of HeNe lasers

Industry standard cylindrical housing with power outputs up to 22.5mW, linear or randomly polarised. Choice of power supply module for 12VDC, 115/230VAC inputs or CDRH approved "laboratory" type with key switch and emission indicator.

MODEL	1101/P	1103/P	1107/P	1108/P	1122/P	1125/P	1137/P	1135/P	1144/P	1145/P
Min. Output Power (mW)	1.5	2.0	0.8	0.5	2.0	5.0	7.0	10.0	15.0	22.5/21.0
Wavelength (nm)	632.8									
Mode Purity (TEM <sub>00</sub> )	>95%									
Beam Diameter (mm)	0.63	0.63	0.48	0.48	0.63	0.81	0.81	0.68	0.7	0.7
Beam Divergence (mrad)	1.3	1.3	1.7	1.8	1.3	1.0	1.0	1.2	1.15	1.15
Polarisation Ratio	N.A./500:1									
Mode Spacing (MHz)	730	730	1090	1090	730	435	435	320	257	257
Overall Length (mm)	241	241	178	178	272	401	401	486	635	635
Diameter (mm)	31.6	31.6	31.6	31.6	44.2	44.2	44.2	44.2	44.2	44.2
POWER SUPPLIES										
12VDC OEM Power Supply	101T-1700	101T-1700	101T-1250	101T-1250	101T-1800	101T-2300	101T-2300	n/a	n/a	n/a
115/230VAC OEM Power Supply	314T-1700	314T-1700	314T-1250	314T-1250	314T-1800	314T-2300	314T-2300	380T-3100	380T-3800	380T-3800
Lab Type Power Supply	1201-2	1201-2	1205-2	1205-2	1206-2	1202-2	1202-2	1216-2	1218-2	1218-2

### Novette Series

Self contained HeNe laser includes built in power supply and mains adapter.



Novette - self contained HeNe laser

MODEL	1508	1508P	1507	1507P
Power (mW)	0.5	0.5	0.8	0.8
Wavelength (nm)	632.8			
Beam Diameter (mm)	0.48			
Beam Divergence (mrad)	1.7			
Polarisation	N/A	500:1	N/A	500:1
Longitudinal Mode Spacing (MHz)	1090			
CDRH Class	II	II	3R	3R

### ARGON LASERS

Lumentum are the recognised leaders in the supply of air cooled argon ion lasers for OEM applications such as flow cytometry, DNA sequencing, graphic arts and semiconductor inspection. Most popular models eg 2213-75SL and 2214-30SL are usually held in stock in Edinburgh for immediate delivery.

MODEL	2211-XXSL	2211-4VL	2214-XXSL	2214-4VL	2214-XXGL	2213-75SL	2213-XXVL	2218-0XXSLS	2218-010GLS
Output Power (mW)	20/30	4	10/20/30	4	15/20	75	15/25	10/20/30	10
Wavelength (nm)	488	458	488	458	515	488	458	488	515
Package	Rectangular				Cylindrical				



Argon laser head and psu

# Sirah

**SIRAH** offers the broadest range of tunable dye lasers on the market. A truly modular design allows systems to be configured to match a variety of Nd:YAG or excimer pump lasers and the wide choice of gratings available allows users to select the optimum combination of linewidth and tuning range to match their requirements.

Three main platforms are offered each of which can be fitted with any resonator.

### Cobra

Sirah's basic dye laser is a single stage design with oscillator only or oscillator and pre-amplifier in a single dye cuvette. Up to 150mJ pump (grating) or 230mJ (prism).

### Cobra-Stretch

2 stage design and can therefore accommodate one extra amplifier stage or a FCU (frequency conversion unit) inside the main cabinet. New more compact design, touch panel remote control. Up to 650mJ pump.

### Precision Scan

3 stage system with 2 main amplifier stages and an FCU inside the main cabinet. Up to 1.4J pump.

Also available:

### Credo

Dye laser optimised for pumping with high repetition rate DPSS lasers at 355 or 532nm. Up to 250kHz!

### Pulsed Dye Amplifier

5 amplification stages and phase conjugate mirror for SLM pulses.

### Sync-Pumped Dye Laser

Tunable output with ps pulsewidths at MHz rep rates.

### Frequency Conversion Units & Near IR OPA unit

Extend the tunable range of Sirah dye lasers, SHG, THG, SFM, etc 190nm – 11microns.

### Near IR OPA unit

Tuning range 1.5 - 5.4microns.



Sirah Precision Scan Dye Laser



**CUTTING EDGE OPTRONICS** laser resonator and laser amplifier modules are the engine that drives not only their own DPSS laser systems, but also many external (well-known) customers who fabricate their own DPSS laser systems.

With a variety of gain media, rod diameter, rod length and diode bar count options, these gain modules have served as a work horse for many important applications.

- Operates : CW or QCW
- Material : Nd:YAG or Nd:YLF
- Rod diameter : 2-25mm
- Pump length : 63-188mm



### PIV SYSTEM

The Patara – HP PIV dual oscillator DPSS laser system is purpose built for Particle Image Velocimetry applications. The independently controllable laser oscillators can be configured with Nd:YAG for high average power, or Nd:YLF for high pulse energy applications.

The Nd:YAG configuration produces output powers of >200W per oscillator at 532nm with a 10kHz rep rate. The Nd:YLF configuration produces pulse energies of >50mJ per oscillator at 527nm with a 1kHz rep rate. Both configurations provide the excellent beam quality and shot to shot stability required to produce high quality repeatable light sheets for optimum illumination.

The two laser oscillators and beam combination optics share a common housing for excellent mechanical stability, ease of set up and use. Each oscillator can be triggered independently (internal or external) providing end users with maximum adjustability of laser pulse timing.

	DPSS ND:YLF	DPSS ND:YAG
Power	50W (30W, 20W)	200W (100W)
Pulse energy	50mJ (30mJ, 40mJ)	20mJ (10mJ)
Wavelength	527nm	532nm
Rep rate	1kHz	10kHz
Pulse width	<150ns	<120ns



NEW

**LEXEL LASER** manufacture a wide range of multi-line and single line tunable and single frequency CW lasers ranging from the Deep UV to the Visible. Based on Argon and Krypton gas laser technology these lasers are used in numerous applications ranging from Spectroscopy, Holography, Optical Fiber Bragg Grating (FBG) and Nano Technology.

### LEXEL QUANTUM 9 SHG CW Deep UV Laser & Tunable Visible Argon Laser

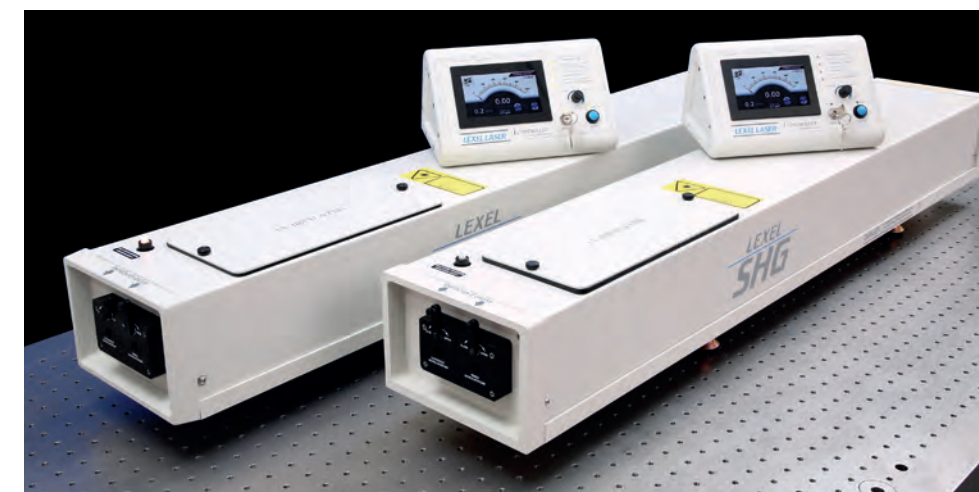
Our standard LEXEL™ QUANTUM 9 SHG Argon Laser provides true continuous-wave deep ultraviolet from 229nm to 264nm with outputs up to 200mW, plus tunable visible wavelengths from 457nm to 528nm.

LEXEL 95-SHG BEAM PARAMETERS		
	514 nm wavelength	257 nm wavelength
Mode	TEM <sub>00</sub>	TEM <sub>00</sub>
Beam diameter*	< 1.5 mm	0.6 x 0.7 mm
Beam divergence	< 0.6 mrad	< 0.6 mrad
Beam polarisation	Horizontal	Vertical
Power stability** (light control)	(+/- 0.2%)	(+/- 1%)

\*Beam diameter measured at the front of output coupler  
\*\*After 15 mins warm-up

LEXEL 85-SHG WAVELENGTH AND POWER			
Visible Wavelength*	Output power, mW	SHG wavelength**	Output power, mW
568.2 nm	225	284 nm	10
528.7 nm	420	264 nm	10
514.5 nm	2400	257 nm	200
501.7 nm	480	250 nm	10
496.5 nm	750	248 nm	30
488.0 nm	1800	244 nm	100
476.5 nm	720	238 nm	10
457.9 nm	420	229 nm	10

\*Single line operation. Some wavelengths require special optics  
\*\*One SHG wavelength per BBO crystal



### LEXEL PRISM Ion Lasers

Our standard LEXEL™ PRISM Argon laser provides multiline output from 457nm to 528nm with output from 1W to 7W, plus tunable singleline wavelengths from 454nm to 528nm. With optional wavelength output in the mid-UV 351nm and 363nm or infrared at 1090nm.

MODEL OF KRYPTON LASER	85-K	95-K	95L-K
Wavelength	Power (mW)		
799.3nm		30	45
752.5nm	25	100	200
676.4nm	50	150	300
647.1nm	100	500	1000
568.2nm			225
530.9nm			275
520.8nm			125
482.5nm			50
476.2nm			75

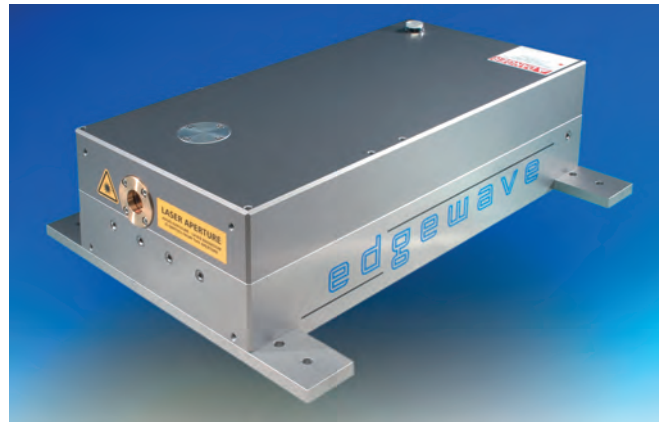
MODEL OF ARGON LASER	85	95	95L				
Wavelength	Power (mW)						
1090nm	35	60	100	150			
528.7nm	130	200	250	350		375	420
514.5nm	400	800	1200	1700	1700	2100	2400
501.7nm	45	100	200	300	300	450	480
496.5nm	100	300	400	600	600	700	750
488.0nm	350	700	1000	1300	1300	1600	1800
476.5nm	100	300	400	600	600	650	720
472.7nm	20	60	140	100	100	200	240
465.8nm	10	30	70	70	70	150	180
457.9nm	45	150	200	300	300	350	420
454.5nm			5	10		120	140
351-363.8nm					100		100
351.1nm					50		50





**EDGEWAVE** is an innovative German manufacturer of short pulse DPSS lasers based on a unique slab (INNOSLAB) design. Ultra short pulse lasers are diode pumped, mode-locked oscillators and amplifiers.

	SHORT PULSE LASERS	ULTRA SHORT PULSE LASERS	
	BX, GX, IS SERIES	PX SERIES	FX SERIES
M <sup>2</sup> Beam Quality	<2	<1.5	
Energy/Pulse	Up to 120mJ	1000µJ	100µJ
Pulse Width	Down to 1ns	10ps	600fs
Peak Power	Up to 10MW	100MW	160MW
Rep Rate	Up to 150kHz	50MHz	
Average Power	Up to 800W	400W	200W
Available Wavelengths	1064, 532, 355, 266nm		



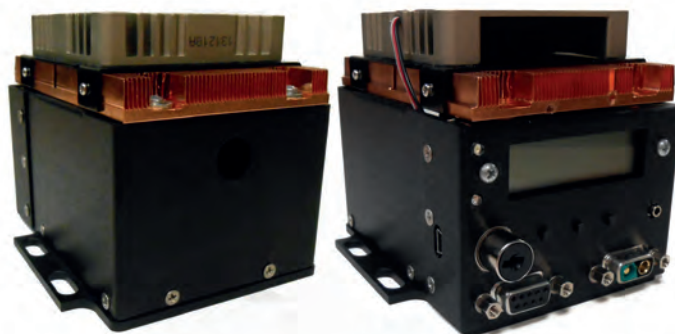
BX series INNOSLAB Laser



**POWER TECHNOLOGY INC** designs and manufactures laser diode products for OEM analytical, biomedical, semiconductor inspection, defence, security, machine vision and many other applications. Wavelengths from 375nm to 1650nm, temperature stabilised modules, beam circularisation, cw, pulsed and modulated outputs.

### Grande – High Power Laser Diode

The Grande laser provides up to 20W of optical power for demanding applications that require high output powers. Controlled by an internal microprocessor, the design features an LCD display which provides users with safety status as well as real time information on power current settings and internal temperature. Drive current and bias settings are user controllable with 12 bits of resolution (4096 steps). The Grande features passive cooling for the circuitry and laser. Input to the module is typically 5VDC, whilst the blue and green lasers require 8VDC.



Grande

### Diagnostic accessories - IR Viewers

Power Technology offer a range of infrared viewers for alignment, thermal imaging and observation.

Five different models of IR viewers are available with different resolution and field of view, depending on your requirements. Models available IRVH, IRVM, IRVE, IRV1 and IRV2.

Extensive range of options are available, including OEM integration, adaption to a microscope and camera integration

- Range of different resolutions available
- Different fields of view available

### iQ series laser heads

The iQ series of lasers heads and modules from PTI are OEM products designed specifically to address the needs of high-end OEM applications requiring superior optical quality, together with precise control over crucial operating parameters to ensure excellent thermal, wavelength and output power stability. These laser heads and modules offer excellent optical and mechanical stability. The iQ series is available at wavelengths from 375 to 1550nm.

- Visible specifications
  - 450nm-3W
  - 515nm-0.9W
  - 635nm-0.65W
- IR Specifications
  - 808nm-5 & 10W
  - 915nm-5 & 10W
  - 980nm-5 & 10W
- CW and modulated outputs available



iQ series laser diode module



IR viewers



**TEEM PHOTONICS**, based in Grenoble France, is the world leader in passively Q-switched microlasers for industrial use, with a broad product offering covering wavelengths from 213nm to 1535nm.

### SINGLE LONGITUDINAL MODE (SLM) LASERS

Teem Photonics offers a complete range of Single Longitudinal Mode (SLM) lasers from 1535nm down to 266nm. These products display the same high quality and long operational life as the other lasers of the range.

#### Microchip family

Various models at 1535, 1064, 532, 355 and 266nm in sealed or unsealed packages. Ultrashort pulses, high peak power, air cooled, excellent beam quality.

#### Powerchip family

Amplified microchip lasers, the powerchip have even higher peak power, excellent beam quality, 10's of µJ and 100's ps pulsewidth. Rep rate 10Hz to 1kHz. Wavelengths now 1064, 532, 355, 266 and 213nm.

#### PicoFlash

High rep rate (130kHz) fiber amplified laser at 1064, 532 and 355nm.

#### PicoSpark

Multi Watt laser at 1064 or 532nm in Master Oscillator Fiber amplifier (MOFA) architecture. 100's of µJ, 10's of kHz. Average power >5W at 1064 and >3W in green.

SLM laser models				
Wavelength (nm)	Laser model S/N	Pulse duration (ps)	Linewidth (MHz)	Linewidth (pm)
1535	MNE-06E-100	3500	126	1,0
1064	SNP-70F-1x0	700	629	2,4
1064	STP-07E-1x0	700	629	2,4
1064	STP-10E-BLI	10 000	44	0,2
1064	HNP-70F-100	550	800	3,0
1064	ANP-70F-100	600	733	2,8
532	STG-03E-1x0	500	880	0,8
532	HNG-70F-100	500	880	0,8
532	ANG-70F-100	500	880	0,8
355	SNV-20F-10x	600	733	0,3
355	STV-01E-1xx	400	1 100	0,5
355	STV-02E-1xx	600	733	0,3
266	SNU-20F-10x	600	733	0,2
266	STU-01E-1xx	400	1 100	0,3



Microchip laser



PicoFlash laser



Powerchip laser



PicoSpark laser

**KIMMON** started manufacturing HeCd lasers back in 1971. Since then they have installed over 44000 units making them not only the oldest but also the largest manufacturer of HeCds. Their reputation for reliability and quality is unmatched in the laser industry and this is backed up by the finest warranty offered by any company. If a laser fails in warranty, Kimmon replace it and restart the warranty clock. If there is a subsequent failure within this restarted warranty period, it will again be replaced and warranty restarted. Needless to say, this can only be offered due to the extreme reliability and the confidence Kimmon have in the quality of their lasers.



### HeCd Lasers

HeCd lasers are available at 442nm, 325nm and dual wavelength versions 442/325nm.

#### Powers available

- Up to 100mW at 325nm
- Up to 180mW at 442nm
- Up to 40/150mW at 325/442nm (dual wavelength)



Kimmon HeCd lasers

### KKFL Fiber Laser

New laser technology from Kimmon - the KKFL20 is the first of a new series of high performance fiber lasers

- Polarisation ratio - >200:1
- Rated Power - >20W CW
- Cooling - Air cooled



KKFL Fiber Laser



**MOGLABS** MOG Laboratories Pty Ltd is an offshoot of an experimental atom optics laboratory at the University of Melbourne, Australia. They develop diode lasers along with electronics for research. They supply products of outstanding performance, superb features, high-quality design, excellent ergonomics and moderate cost.

MOGLabs portfolio includes tunable cateye and Littrow diode laser, lasers electronics, optical amplifiers and wavemeters.

NEW



CEL: Tunable Cateye Laser

**CEL: Tunable Cateye Laser**

The MOGLabs cateye diode laser offers a new twist in external cavity diode lasers. A cateye reflector and ultranarrow filter replace the alignment-sensitive diffraction grating of conventional Littrow and Litman-Metcalf designs. The CEL is robust, stable, and acoustically inert. You can literally hit it with a hammer and it will stay locked, and it is inherently self-aligning so you can tune tens of nanometres without having to realign. In combination with MOGLabs electronics, the linewidth can be well below 100 kHz.

- 520nm- 1612nm at powers up to 200mW extra-cavity
- Acoustically inert and passively stable
- Narrow linewidth, Typically <100kHz,
- 10MHz bandwidth, AC or DC coupled
- Low frequency-noise
- Self-aligning

**ARF/XRF AGILE RF SYNTHESIZER**

The MOGLabs ARF/XRF agile RF synthesizer provides two channels of agile RF frequency synthesis with high-power output drivers. Each channel spans a frequency range of 20 to 400 MHz with output power up to +36dBm (4 W).



ARF/XRF Agile RF Synthesizer

**LASER ELECTRONICS**

**Diode laser controller DLC202/DLC252/ DLC502**

Provides everything needed to drive tunable external cavity diode laser (ECDL) and lock it to an atomic or other frequency reference.

Every model includes low-noise photodetector, ultra-low noise diode current source, temperature controller, scan generator, two high-voltage piezo drivers, demodulator (lock-in amplifier), servo feedback loop filter circuits, ergonomic controls, and more.

**Tapered amplifier controller LDD605**

Tapered amplifier controller LDD605 - The LDD605 laser diode driver is a combination current and temperature controller with sophisticated front-panel menu operation and plain text computer command interface via ethernet and USB. A high-precision low-noise current source drives a wide range of diodes at up to 6 amps. The precision temperature controller, with flexible computer-defined PID response, provides 60 W capacity for a wide range of TEC devices. The LDD605 is designed for use with our MOA series of tapered amplifiers and high-power diodes for lasers and fibre amplifiers.



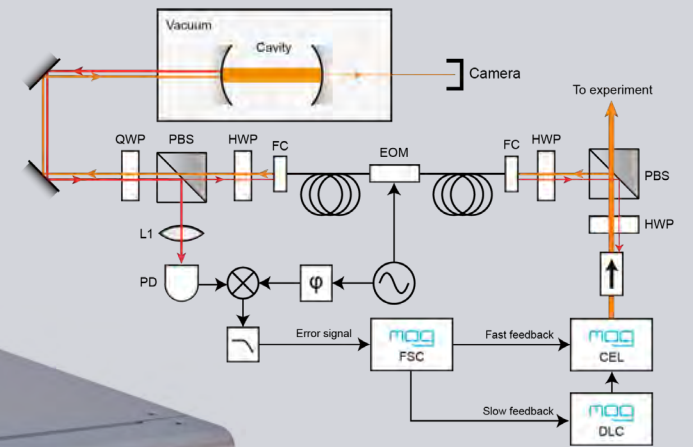
LDL: Littrow External Cavity Diode Lasers



APPLICATION NOTE

**POUND-DREVER-HALL LOCKING**

Simplified apparatus diagram for the Pound-Drever-Hall locking with the MOGLabs Fast Servo Controller FSC, the Cateye Laser (CEL) and its controller DLC. Some laser light is picked off by a polarising beamsplitter (PBS) and fiber-coupled (FC) into an EOM. The beam is out-coupled and passes through a polarising beamsplitter (PBS) into the vacuum chamber containing the high-finesse cavity. The weak transmission is observed with a camera. The intensity of the reflected beam (red) is measured on the photodiode (PD) and mixed with a phase-shifted copy of the rf driving the EOM. The result is low-pass filtered to produce an error signal which is processed by a fast servo system (FSC) and fed back to the laser (CEL) and its controller (DLC).



**GAM**, based in Orlando Florida, manufactures highly reliable excimer lasers for the scientific and OEM markets.



**EX-5**

The EX-5 air-cooled mini excimer laser brings total metal/ceramic design and corona preionisation to a minimal cost, ultra-compact package. With its new type III SUPERCHAMBER the EX-5 offers exceptionally long dynamic and static gas lifetimes with no requirement for external vacuum systems – it requires only a small bottle of premix gas to run for hundreds of millions of pulses. Now available with repetition rates up to 250, 500 and 1000Hz!

GAM EX-5 Excimer laser



**LTB BERLIN** is an innovative developer and manufacturer of short pulse Nitrogen lasers and high resolution echelle spectrometers.



**MNL range of Nitrogen lasers –**

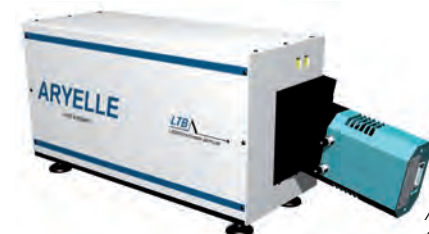
337nm, up to 300Hz, 3ns pulsewidth, 2 year warranty



MNL-300 Nitrogen Laser

**Aryelle range of spectrometers –**

extremely compact, high resolution echelle based spectrometer, 157–1100nm wavelength range



Aryelle high resolution echelle based spectrometer



**NKT PHOTONICS** - Photonic Solutions represent NKT Photonics for their Koheras ultra narrow linewidth, single frequency fiber lasers.

NKT Photonics' Koheras fiber lasers are ultra-low noise fiber lasers with longitudinal single mode and single frequency operation. These lasers are based on a DFB design ensuring robust and reliable operation with an unprecedented low phase and intensity noise level together with mode-hop free, inherent single frequency output. Available within a wide range of wavelengths in the 1µm and 1.5µm range, one of the key advantages of NKT's DFB fiber laser technology is the freedom to choose the operating wavelength with an accuracy of up to 2 decimal places. Due to the excellent beam quality, frequency conversion can efficiently bring many important applications in atomic physics within reach.

### Koheras BASIK/BASIK MIKRO low noise, single frequency fiber laser module

Ultra compact module for OEM integration

- Compact OEM footprints: BASIK 22.5 x 91 x 220mm, BASIK MIKRO 20 x 70 x 150mm
- Up to 40mW at 1.5µm, 10mW at 1µm
- PM output, PER >23dB
- integrated fast wavelength modulation up to 8GHz
- Widest thermal tuning on the market 1000pm



Koheras BASIK

	Standard Wavelength	Wavelength ranges	OEM module	Rack mount	Output power
Koheras BASIK OEM laser module	1550.12 nm, 1064.00 nm	1535-1580 nm / 1030-1120 nm	✓		10-40 mW
Koheras BASIK MIKRO compact single line OEM laser module	1550.12 nm	1535-1580 nm	✓		10-40 mW
Koheras ADJUSTIK single line lasers	1550.12 nm, 1064.00 nm	1535-1580 nm / 1030-1120 nm		✓	10-40 mW
Koheras ADJUSTIK HP single line lasers	1550.12 nm, 1064.00 nm	1545-1565 nm / 1060-1075 nm		✓	0.2 - 2W
Koheras Boostik line card amplifier module	1550.12 nm	1545-1565nm	✓		
Koheras ACOUSTIK		1535-1580 nm / 1030-1120 nm		✓	10-40 mW
Koheras BOOSTIK high power lasers	1550.12 nm, 1064.00 nm	1550-1570 nm / 1050-1090 nm		✓	2-15 W
Koheras Harmonik high power, frequency doubled laser system	775-780 nm	775-780nm, 1550-1560nm		✓	7W



Koheras BOOSTIK linecard amplifier



Koheras ADJUSTIK

### Koheras BOOSTIK linecard amplifier

Extends the output power of the Koheras BASIK seed laser while preserving the ultra-low noise and narrow linewidth operation.

- Powers up to 15W, 1064.00nm and 1550.12nm standard wavelengths
- Custom modules from 1050nm – 1090nm and 1550nm – 1570nm
- <0.1kHz Linewidth (lorentzian)
- Fully compatible with the BASIK E15 and C15 seed laser models
- Compact OEM footprint - 92 x 45 x 220mm
- <0.1kHz Linewidth (lorentzian)
- AcoustiK multi-channel system or stand-alone

### Koheras ADJUSTIK HP single line lasers

Benchtop system now available with powers up to 2W at 1.5µm

- 2W at 1545-1565nm, 200mW at 1060 – 1070nm
- Based on Koheras BASIK module
- Integrated fast wavelength modulation up to 8GHz
- Thermal tuning up to 1000nm

### Koheras BOOSTIK HP High Power, low noise, single-frequency lasers

Koheras BOOSTIK HP High Power, low noise, single-frequency lasers High power, single frequency 19" rack benchtop lasers with up to 15W output power

- 1064nm and 1550.12nm standard wavelengths
- Up to 15W output power at 1µm or 1.5µm
- Custom modules from 1550nm-1570nm and 1050nm-1090nm
- <0.1kHz Linewidth (lorentzian)
- Integrated fast wavelength modulation up to 8GHz, 20kHz bandwidth
- Thermal tuning up to 1000pm

NEW

### Koheras HARMONIK

Up to 7 W at 780 nm with unique combination of low noise, narrow linewidth, and excellent beam quality.

The HARMONIK system is a high-power, frequency-doubled laser system consisting of NKT Photonics popular low-noise Koheras BOOSTIK HP fiber laser platform in combination with their new frequency converter module, HARMONIK. The HARMONIK has dual output, delivering up to 7W of SHG light in combination with up to 7W of residual 1560nm light. Choose from two HARMONIK systems, the C7 or the E7. The C7 has an exceptionally low relative intensity noise: A RIN level of -140 dBc/Hz at 10 MHz. The E7 has a narrow linewidth and very low phase noise: A line-width of <0.2 kHz and phase noise of -87 dB(rad/√Hz/m) at 10 Hz.

- Supported wavelengths 775 – 780nm
- Dual output, up to 7W at 780nm and 7W at 1560nm
- <0.2kHz linewidth
- Ultra-low frequency and intensity noise
- Excellent beam quality, M<sup>2</sup> <1.1
- Free space or single mode fiber delivery on both outputs



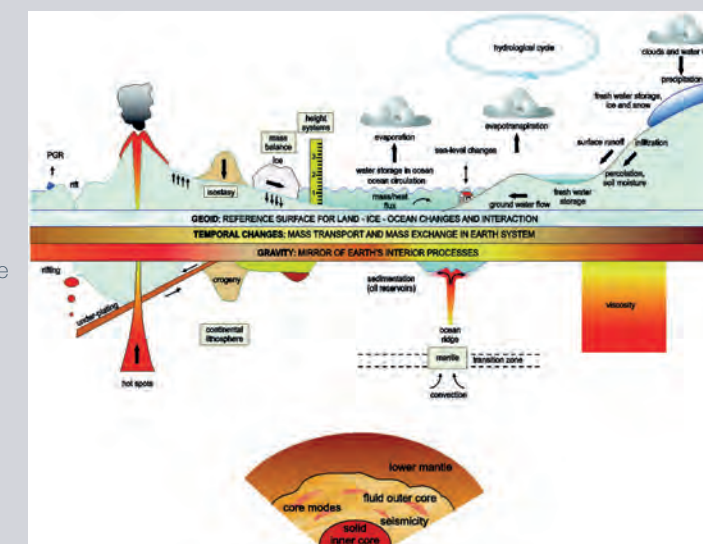
Koheras HARMONIK

## APPLICATION NOTE

### Koheras HARMONIK increasing sensitivity detection of gravitational acceleration

Atom interferometry is typically related to the measurement of gravitational acceleration. It is one of the most sensitive methods used for gravity measurement for fundamental science and real-world geophysical effects. Single frequency lasers are used for atom interferometry, trapping and cooling of Rubidium or Potassium.

Atom interferometry is analogous to light interferometry, so instead of using light we use atom waves and instead of beam splitters and mirrors we use a laser to do the splitting and combining of the atom waves. One of the limiting factors of atom interferometry is the atom shot noise. To overcome this, the user needs more atoms, which form into an atom cloud, this leads to easier detection of the atom waves phase shift. The phase shift or phase difference is used to determine gravitational acceleration (g). The more atoms you can split from the atom cloud the better you can detect the g. Researchers look for higher power at 780nm with low noise and narrow linewidth as it allows them to trap more atoms to increase the phase difference and achieve higher sensitivity for g. I will introduce the use of a newly developed, high power laser offering up to 7W at 780nm, simultaneously with up to 7W at 1560nm that will enable users to integrate atomic cooling, trapping and atom interferometer with just one laser. The high power at 780nm, in combination with low noise and narrow linewidth, is allowing higher sensitivity detection for g.





Photonic Solutions now offer the two-photon laser scanning microscope range from the innovative and highly respected Hungarian specialists Femtonics.

**FEMTONICS** is one of the most dynamically expanding manufacturers of two-photon laser scanning microscopes. They make unique, custom designed 2D systems and as a pioneer, they have introduced real time 3D imaging technology to the market. With their highly modular design, each Femtonics microscope can be configured to readily meet exactly the researchers own needs, and address a wide variety of biological applications.

## MICROSCOPES

### Femto3D AcoustoOptic Product line

Femtonics specialty is represented by the acousto-optic scanner-based technology of the Femto3D Atlas and Femto3D OMEGA microscope which take the ability to scan the three-dimensional sample with astonishing speed. The novel features of these microscopes are the electrically tunable acousto-optic (AO) deflectors, which do not contain scanning mirrors or any other slowly moving mechanical components, so the positioning of the focal spot is fast, flexible, stable and independent of the travelling distance. This positioning freedom results an extremely high scanning speed, up to 30 kHz at any 3D location under the objective in a cubic millimeter volume.

### Femto3D OMEGA Stand-alone Acousto-Optic Scanning Microscope

Femto3D Omega is Femtonics stand-alone, complete acousto-optic scanner-based microscope. This microscope is capable of scanning neuronal, dendritic, and other neuropil activities about one million faster compared to classical scanning methods with preserved two-photon resolution. Both in vivo and in vitro As a stand-alone system, this microscope contains all parts which are needed for imaging including, not only the AODs, but the light path with optics, control electronics and a work station, and Femtonics measurement control and analysis software.

- The fastest 3D scanning methods
- 108 $\mu\text{m}^3$  scanning volume
- 2000 simultaneous measurement locations
- 30 kHz scanning speed at any point in 3D
- High-speed raster scanning: 40 fps at 510x510,
- Raster scanning up to 3000 fps at reduced FOV
- In vivo 3D motion correction by specialized scanning patterns

NEW

### Femto3D ATLAS 3D imaging extension

The Femto3D Atlas is a 3D imaging extension for any existing upright microscope. It can be coupled to any host microscope to enable high-speed 3D in vivo imaging. It contains not only the AODs but the requiring light path with optics, control electronics and a work station, and it involves the full optical engineering, and our measurement control and analysis software. The ATLAS coupled with a host microscope, provides all the high performance 3D scanning capabilities for in vivo imaging as the Femto3D OMEGA but with some improvements in the functionality as follows:

- Broadband and automatic tuning of the laser with dispersion compensation from 750 – 1050nm
- 3D scan head can rapidly switch between imaging and photostimulation for simultaneous 3D imaging and 3D photostimulation
- In interleaving mode for simultaneous 3D imaging at two wavelengths
- Integrated ultra-fast scanning mode - allows frame and volume scanning with over the speed of resonant scanning)



**i2S** are renowned experts in the field of industrial vision, offering innovative techniques in image capture and processing for integrated and enhanced vision applications.

TZcam - High definition, real-time Terahertz camera from i2S with the highest sensitivity on the market. The TZcam is based on antenna-coupled microbolometer technology with 16x12mm detector area offering 50 $\mu\text{m}$  resolution over the 320x240 pixel array.

This highly versatile camera is essential for many applications including research, non-destructive testing, agronomics and biomedicine. The i2S non-contact THz penetrating imaging system can detect manufacturing defects or imperfections inside parts during production, in real-time, by seeing through the materials.



be visionary

NEW

## APPLICATION NOTE

### THREE-PHOTON MICROSCOPY

Multiphoton microscopy is a ubiquitous tool in deep-tissue and live fluorescence imaging, and achieves sub-cellular resolution at penetration depths of up to several hundred microns.

Until recently, this process has been confined to two-photon (2P) excitation of the chosen fluorophore using near-infrared wavelengths (e.g. 700-1100nm). Now, there is a growing interest in three-photon (3P) excitation, which greatly improves image contrast at increased depths. The preferred excitation wavelengths of 1300nm and 1700nm offer improved scattering/absorption properties, and coincide with the optimal 3P excitation of known fluorescent tags such as GFP, RFP and calcium indicators.

When moving to 3P excitation, where the absorption cross-section is much weaker, the established femtosecond laser sources used in 2P microscopy (~100fs, 80MHz, ~2-3nJ) are no longer appropriate. For 3P imaging, the ideal laser system offers tunable wavelengths across the 1.3 $\mu\text{m}$  and 1.7 $\mu\text{m}$  range, with sub-70fs pulses with microjoule pulse energies at up to ~2MHz rep rate.

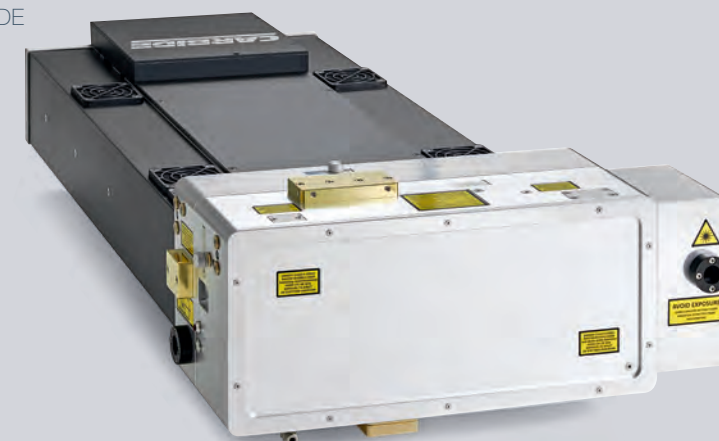
A great example is the combination of an amplified ytterbium pump laser (e.g. Light Conversion CARBIDE or PHAROS) pumping a short-pulse optical parametric amplifier, OPA (e.g. Light Conversion ORPHEUS-F). While such a solution is already fully automated and 'hands-free', Light Conversion are now offering a fully integrated one-box solution, tunable Industrial OPA (i-OPA) for 3P microscopy, thereby reducing complexity and keeping the overall system size to a minimum.



### I-OPA Industrial – grade Optical Parametric Amplifier

I-OPA series of optical parametric amplifiers marks a new era for simplicity in the world of tunable wavelength femtosecond light sources. It is designed to be coupled with PHAROS and CARBIDE series femtosecond lasers and be used with spectroscopy or microscopy applications that demand high stability. The I-OPA-F model is primarily designed to be used as a light source in multiphoton microscopy devices.

- Automatically tunable or fixed wavelength options
- Robust, integrated mechanical design
- Simple, user friendly design
- Up to 2MHz repetition rate, down to single shot operation
- Up to 40W pump power
- Integrated beamsplitter for pump beam access



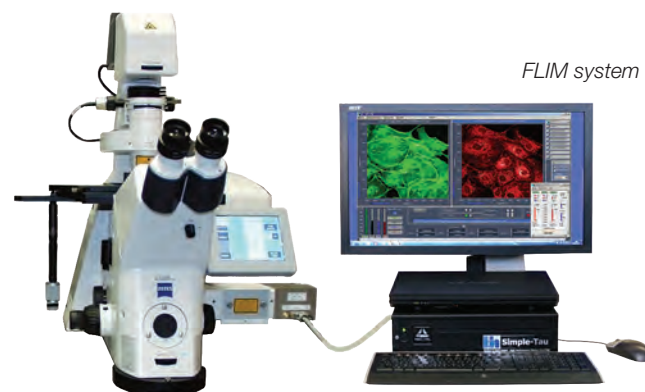


**BECKER AND HICKL** offer a wide range of high-grade FLIM systems for laser scanning microscopes. Using bh's proprietary multidimensional time correlated single photon counting technique, their FLIM and TCSPC systems are characterised by ultra-high photon efficiency and ultra-high timing resolution.

### FLIM SYSTEMS FOR LASER SCANNING MICROSCOPES

Becker & Hickl offer FLIM upgrades for one photon and multiphoton microscopes, for confocal or non-descanned detection. FLIM upgrades consist of all the hardware and software required to acquire FLIM data using multi-dimensional TCSPC technique. FLIM upgrades are available for Nikon A1/C1/C2, LSM 710/780/880, Olympus FV1000 and Leica SP2/SP5/SP8

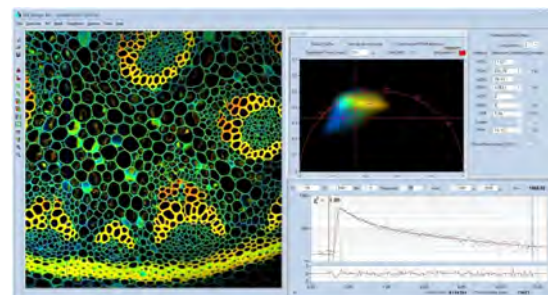
- Single detector systems / Dual detector system
- Multispectral FLIM systems
- High-efficiency GaAsP hybrid detectors (HPM-100)
- Simultaneous detection in all wavelength channels
- Parallel TCSPC for dual detector systems
- Time-tag and histogram modes, FCS recording, on-line correlation and fit
- Simultaneous FLIM/PLIM



FLIM system

### SPCImage NG – new generation of bh's FLIM Analysis Software

SPCImage NG is a new generation of bh's TCSPC-FLIM data analysis software. It combines time-domain and frequency-domain analysis, uses a maximum-likelihood algorithm to calculate the parameters of the decay functions in the individual pixels, and accelerates the analysis procedure by GPU processing. SPCImage NG provides decay models with one, two, or three exponential components, incomplete-decay models, and shifted-component models. Another important feature is advanced IRF modelling,



SPCImage NG TCSPC-FLIM data analysis software

- Electrical IRF width of less than 7 ps (FWHM)
- Time channel width down to 820 fs
- Optical time resolution with an HPM-100-06 hybrid detector shorter than 25 ps (FWHM)
- Virtually free of pile-up effects, drastically reduced counting loss.
- Data can be recorded with up to 1024 or even 4096
- 1024 x 1024 or 2048 x 2048 pixels
- System is equally suitable for fast FLIM and precision FLIM applications.

NEW

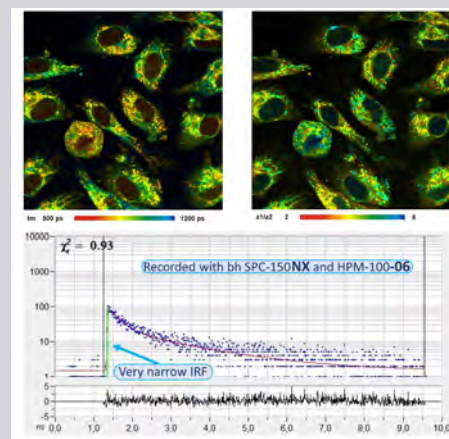
### FASTAC FLIM – FAST FLIM

As there is a drive towards faster and faster acquisition of FLIM, bh have developed their FASTAC fast-acquisition FLIM system. FASTAC FLIM comprises a single detector, four parallel TCSPC channels, and a device that distributes the photon pulses into the four recording channels. FLIM data can be recorded at acquisition times down to the fastest frame times of the commonly used galvanometer scanners. Fast recording does not compromise the time resolution.

## APPLICATION NOTE

### Metabolic imaging with unprecedented accuracy

NADH FLIM is based on the separation of the fluorescence-decay components of the free and the protein-bound form of NAD(P)H. The amplitudes and the decay times of the components are used to derive information on the metabolic state of the cells or the tissue. The separation of the decay components and the accuracy of the amplitudes and lifetimes improve substantially by using the ultra-fast HPM-100-06 or HPM-100-07 hybrid detectors. The IRF in combination with the SPC-150N and the SPC-150NX TCSPC modules is less than 20ps.



**Becker & Hickl** are the technology leaders in Photon Counting. Their proprietary multi-dimensional time-correlated single-photon counting principle, first introduced in 1993, made TCSPC more than 100 times faster than the existing devices. The bh TCSPC products are complemented by picosecond diode lasers, detector modules, multi-spectral detector assemblies, and experiment control modules.

### TCSPC CARDS

All bh TCSPC modules use a multi-dimensional TCSPC process as well as a high speed high resolution TAC/ADC principle. The SPC modules can be used for classic fluorescence decay applications as well as for fluorescence lifetime imaging (FLIM), multi-wavelength FLIM, simultaneous fluorescence- and phosphorescence lifetime

imaging (FLIM/PLIM), fast time-series FLIM, fluorescence correlation spectroscopy (FCS), single-molecule experiments, anti-bunching experiments and many other multi-dimensional photon recording tasks such as sequences of photon distributions, or multi-dimensional time-tag data.

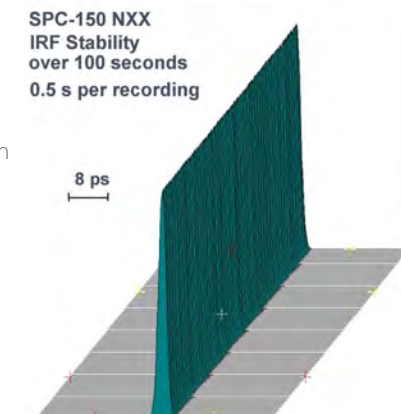
Choose from	SPC-130-EMN	SPC-150N	SPC-150NX	SPC-150NXX	SPC-160 SPC-160PCIe	DPC-230
	Low-Cost High Speed	All-Rounder	Ultra-High Resolution	Extreme Resolution	FLIM Intensity Counter	16 Channel Photon Counter
FLIM / FCS	No / Yes	Yes / Yes	Yes / Yes	Yes / Yes	Yes / Yes	Yes <sup>(4)</sup> / Yes
Number of Detectors per Module	Up to 16 <sup>(1)</sup>					Up to 16 <sup>(4)</sup>
Number of Parallel Modules	Up to 4 <sup>(2)</sup> or 32 <sup>(3)</sup>					Up to 4 <sup>(2)</sup> or 32 <sup>(3)</sup>
Multi-Module Packages	SPC-132-EMN SPC-133-EMN SPC-134-EMN	SPC-152N SPC-153N SPC-154N	SPC-152NX SPC-153NX SPC-154NX	SPC-152NXX SPC-153NXX SPC-154NXX	SPC-162 SPC-163 SPC-164	On Request
Min. Bin Width	813 fs	813 fs	407 fs	203 fs	813 fs	165 ps
Electronical Time Resolution (RMS)	2.5 ps	2.5 ps	1.6 ps	1.1 ps	2.5 ps	
FIFO (Time Tagging) Mode?	Yes	Yes + FIFO Image	Yes + FIFO Image	Yes + FIFO Image	Yes + FIFO Image	Yes + FIFO Image

NEW

### SPC-150NXX Ultra-high resolution TCSPC module <1.1ps timing jitter

bh's new SPC-150NXX TCSPC module targets high-resolution applications with ultra-fast detectors. With a single-nanowire superconducting NbN detector the module has achieved an overall system IRF of 4.4 ps FWHM, please see application note. In addition to the short IRF the SPC-150NXX has an extraordinarily high IRF stability. For a series of IRFs recorded over 100 seconds, the variance in the IRF centroid is < 0.4 ps.

- Time Channel Width Down to 203 fs
- Electrical Time Resolution 1.1 ps RMS (< 3 ps FWHM)
- 10 MHz Saturated Count Rate
- FLIM, PLIM, FLITS, FCS, Mosaic FLIM
- Improved Resolution for Ultra-Fast Detectors e.g. for Superconducting NbN Detectors
- Parallel Operation of Up to 4 Modules
- Available as Multi-Module Package e.g. SPC-152NXX, SPC-153NXX and SPC-154NXX



NEW

### Picosecond Diode Lasers

bh delivers a number of picosecond diode lasers with wavelengths from the NUV to the NIR. All lasers feature simple +12V power supply, high repetition rate, short pulse width, and an extremely low electrical noise level. The complete driver electronics is integrated in the laser module. All bh diode laser modules are directly compatible with the bh TCSPC modules.

### Picosecond Diode Laser Hub – Unit of up to 4 laser lines

- Up to 4 Diode Lasers from BDS Family
- Flexible Wavelength Configurations
- Wavelength Range from 405 nm to 640 nm (Other on Request)
- Free Beam or Fiber Output
- Fast ON / OFF / Multiplexing Capability
- 450 x 300 x 80 mm<sup>3</sup>



Diode Laser Hub

	BDL-SMN Series	BDS-SM Series	BDS-SMY Series	BDS-MM
Wavelength / nm	375, 405, 445, 473, 488, 515, 640, 685, 785, Other on Request	375, 405, 445, 473, 488, 515, 640, 685, 785, 1064, Other on Request	532, 561, 594	405, 445, 525, 640, 685, 785, 915, Other on Request
Pulse Width Range (FWHM)/ps	40 – 90 (Medium Power)	30 – 90 (Medium Power)	40 – 80 (Medium Power)	65 – 120 (Medium Power)
Number of Parallel Modules	200 – 300 (Max. Power)	60 – 300 (Max. Power)		120 – 300 (Max Power)
Repetition Rates / MHz	20, 50, 80 and CW	20, 50, 80 and CW	20 or 50	20 and 50
Peak Power / mW	100 to 1000	100 to 1000	100 to 250	1000 to 5000
Trigger by synchronisation input	Yes	Yes	Yes	Yes
Beam Quality	BM	BM	SM	MM
Beam Profile Correction Optics	Yes	No	No	No



NEW

## MONOCHROMATORS AND SPECTROGRAPHS

Sciencetech offer an extensive range of monochromators and spectrographs, ranging from ultra-compact, single grating scanning monochromators (9030 series) based on a Seya-Namioka optical layout, to long (1.5m) focal length monochromators which can achieve a resolution of 0.004nm in single pass mode.

For applications requiring better signal to noise, reduced stray light and better resolution than the standard models, then double additive models are available. For applications requiring a tunable bandpass or notch filter light source, then double subtractive models are available. Standard options include:

- Single or double monochromators
- Multiple input and output port options
- Resolution from 1 nm to 0.001 nm
- Wavelengths from 200 nm to 5 mm
- Single or multichannel detectors
- Imaging options
- Drivers for system-design platforms



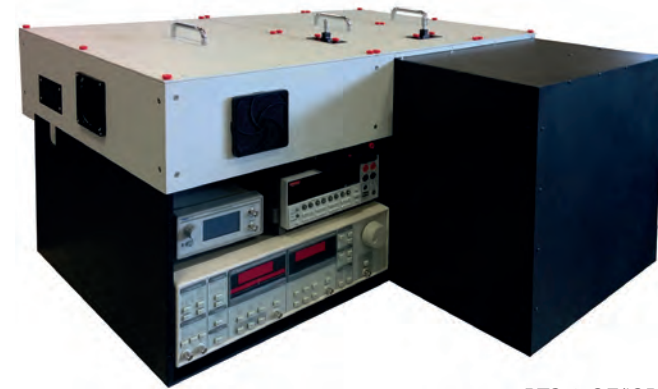
9055 series monochromator

## PHOTOVOLTAIC TESTING EQUIPMENT

### Quantum Efficiency/IPCE Measurement Systems

Sciencetech's PTS range of Quantum Efficiency Systems empower researchers to measure Current Voltage characteristics (IV), Internal Quantum Efficiency (IQE) and External Quantum Efficiency (EQE), for any photovoltaic device. These systems are uniquely configured for Terrestrial PV testing, Extraterrestrial PV testing and Concentrated photovoltaic (CPV). A variety of accessory modules are available to provide positive sample positioning, temperature control, and electrical probing capabilities.

- Complete, turn-key PV efficiency measurement solution
- Includes IV Testing, Spectral Response, Quantum Efficiency System/ IPCE System
- Configurations including Constant Photocurrent (CPM) with single or dual beam (DBM), Photothermal Deflection (PTD) and Steady State Photoconductivity (SSP)
- Compliant to IEC 60904-1, ASTM E1036 and ASTM E 1021-15 standard and test methods Table



PTS-2-QE/IPCE



TLS-55-X300

## TUNABLE LIGHT SOURCES

Sciencetech offers a series of highly modular computer-controlled tunable light sources configured around a Xe or QTH lamp in combination with a motorised monochromator. There are four base models of the TLS tunable light source, but all components of the system, including the light source and monochromator can be changed to suit the desired wavelength range and power levels necessary for your application.

The four models all come with a touch screen power supply, 6 position filter wheel, control software and are all mounted to a metal breadboard. They contain either a 9072S (1/8m) or 9055 (1/4m) monochromator with a choice of two light sources: 300W Xe arc lamp and 250W QTH lamp..

- TLS-55-X300: 300W Xe lamp, 1/4m motorised mono
- TLS-72-X300: 300W Xe lamp, 1/8m motorised mono
- TLS-55-Q250: 250W QTH lamp, 1/4m motorised mono
- TLS-72-Q250: 250W QTH lamp, 1/8m motorised mono

## SOLAR SIMULATORS

Sciencetech's Solar Simulators produce light that closely matches the characteristics of sunlight such as the spectral match, spatial non-uniformity and temporal stability of the simulated output beam. This allows Sciencetech to achieve Class AAA certification even on large target areas up to 45 x 45cm (unmatched by any other manufacturer) or in extra-terrestrial solar spectrum such as AM0. Depending on your application requirements, Sciencetech provide a variety of Solar Simulators with an area of illumination and powers that works for you. All models offer standards compliance to the most current standards from the ASTM, IEC, and JIS.

NEW

### Small Area Solar Simulators

SciSun series is a new generation of solar simulators, design with small footprint in mind, they are easy to use, economically priced and technically superior.

- Up to 2 Suns (AM 1.5G)
- Class A uniformity over 50x50mm square area
- Plug and play' operation

### Ultra High Efficiency (UHE) Solar Simulators

The UHE systems are capable of far more efficiency and power unit than previously possible. All this without sacrificing temporal stability, spatial uniformity, or spectral matching.

- Industry leading efficiency
- Class AAA
- Radiance angle of +/- 1.5° half angle
- Target size up to 300 x 300mm
- Turn-key operation

### Highly Collimated

This solar simulator series is based on a Fresnel lens to collimate the light beam from the arc lamp source to infinity, which results in highly collimated illumination of the target spot.

- Highly collimated beam of 0.5° half angle
- Illumination target area 10cm-45cm

### Large Area Solar Simulators

LASI single unit offers 0.5 x 0.5m illumination area and operate with a Xe arc lamp with a solar colour temperature of 6,000K. Combine multiple LASI units to illuminate up to 3 x 3m target.

### LED Solar Simulators

Class AAA LED based solar simulator incorporating an 18 colour LED array. Each LED can be independently adjusted for intensity

- Target Area: 156mm x 156mm,
- AM1.5G spectral match from 400nm-1100nm
- Output irradiance at the target 1000W/m<sup>2</sup> (1 sun)



UHL-NL-250



### Custom made Solar Simulators

Sciencetech can meet your unique research demands with unique research equipment! With almost 35 years experience in tailored solutions for multiple research applications, with vacuum and clean room compatibility. We can tailor Solar Simulators to illuminate large areas, cover full or modified solar spectrums in accordance with ASTM, IEC standards or to give sun like collimation angles.

- Collimation half angle as small as 0.35° with AAA classifications
- Full automation and temperature monitoring
- Large area IR solar simulator, 1.5mx1.5m, 700-1100nm
- Self minting vacuum (down to 10 torr)

We have experience in Solar PV research, consumer electronics, automotive, aerospace, solar thermal, outdoor material degradation and weathering testing. Please contact us today to discuss your specialised requirements.



UV Solar Simulator for Air-pollution studies

## ARC LAMP SOURCES

### Continuous Arc Lamp Sources

Research and Industrial Grade Xenon Arc Lamps

- 230-2500nm
- 75-1600W, 3kW-7kW sources
- Focused or collimated beam
- Elliptical or parabolic reflector
- Adjustable power supply with touch screen interface

### Quartz Tungsten Halogen Lamps

- Broad band smooth emission: 350 to 4000nm
- 50-100W sources
- Long lifetime and relatively inexpensive

### Deuterium Lamps

- Shortest UV available wavelength: 115 to 400 nm
- Smooth continuous UV spectrum (above 170nm) with almost no visible to infrared light
- Up to 30W
- Dual Deuterium / QTH



**Jireh Scientific Imaging** is the commercial arm of Jireh Technologies which, for the past 20 years, has been delivering excellence in quality and performance in the field of Analytical Instrumentation.

Within Jireh Scientific Imaging is the expertise and market knowledge that has developed an innovative camera designed and engineered not only for low noise quantitative spectroscopy applications, but also with the end-user's and OEM applications' budget in mind.

## SPECTROSCOPY CAMERA

### Zion high grade scientific CCD

The Zion is a spectroscopy camera that will fit your needs and your budget! The Zion was designed and engineered for low noise quantitative spectroscopy applications. Featuring a 1024 array with 6.7mm CCD height and 26mm spectral coverage, the Zion is ideal for multi-stripe spectroscopy and maximum light collection area.

Industry standard 1024x256 pixel spectroscopy array

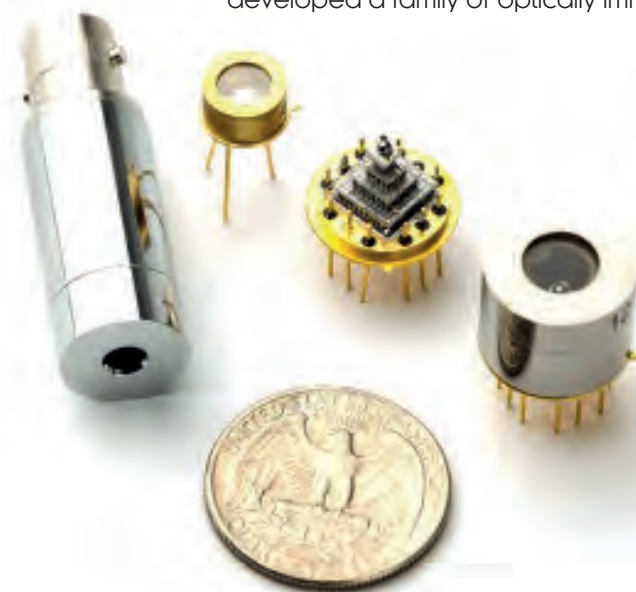
- Air Cooled or Liquid Cooled
- USB 2.0 & Ethernet Interfaces for easy installation
- Fully Integrated small package design
- Software Engineered to integrate with most popular Spectrometer
- Industry Standard Spectroscopy Mount
- Software Development Kit (SDK) Ease of control integration into complex setups: Matlab, Labview, Visual Basic or C/C



Zion CCD camera



The **VIGO** (Poland) product line features infrared detectors designed for operation in the 2-12micron spectral ranges offering high performance and down to sub nanosecond response times. Also available are several CO<sub>2</sub> laser detectors with peak sensitivity at 10.6µm. Both photovoltaic and photoconductive detectors are available as uncooled and thermoelectrically cooled (2, 3 and 4 stage TE cooled versions are available) devices. For low radiation measurements VIGO has developed a family of optically immersed detectors.



## HARPIA-TA

Newly re-designed pump-probe spectrometer for measuring femtosecond transient absorption spectra and kinetics.

The popular HARPIA spectrometer has been completely redesigned and re-engineered to meet the needs and standards of today's scientific researchers. This improved version offers a sleek and compact design contained in a single monolithic aluminium housing, ensuring excellent optical stability and minimal optical path for the interacting beams. The overall dimensions are greatly reduced by a factor of roughly 4X, meaning HARPIA also takes up much less optical table space!

When used with PHAROS/ORPHEUS, HARPIA can work at high repetition rates up to 1MHz. High repetition rate excitation allows the measurement of Transient Absorption dynamics while exciting the sample with extremely low energies – avoiding exciton annihilation effects in energy transferring systems or nonlinear carrier recombination in semiconductor/nanoparticle samples.

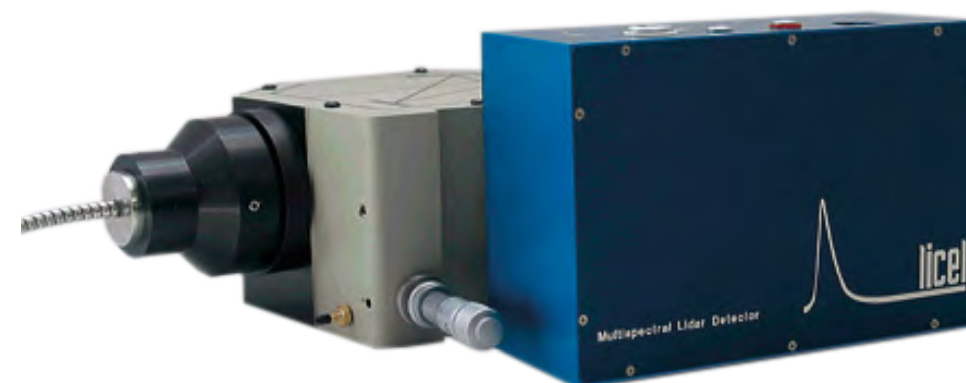
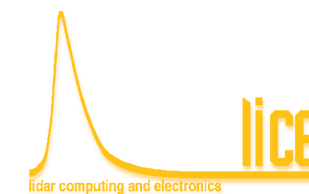
- 350-1100nm probe wavelength range
- Beam monitoring and self calibration
- Simple integration of any user preferred spectrograph
- Transient absorption and z-scan experiments on the same device
- Sample space for cryostat or flow cell.



HARPIA-TA

**LICEL** – specialist company based in Berlin manufacturing products designed and optimised for LIDAR technology.

- Transient Recorder Module
- Multi-spectral LIDAR detector
- Photomultiplier modules
- Si-Avalanche photodiode modules



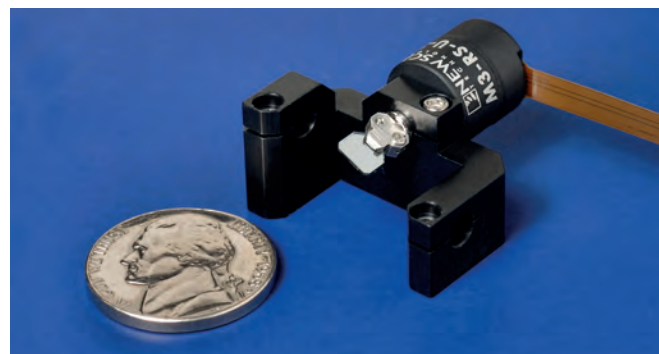
Licel multispectral LIDAR detector



# New Scale Technologies

**New Scale Technologies** M3 micro-stages and actuators are all-in-one "smart modules" with built-in controllers: easy to integrate into handheld and portable instruments. They enable smaller, smarter imaging systems, scientific instruments, medical devices, aerospace and defense systems and more.

NEW



M3-RS rotary stage

## MOTORISED MICROPOSITIONERS

The M3 family of micro-positioners from New Scale Technologies bring disruptive features to your product development and experimental work in a truly miniature package. The success of these modules is down to the fully embedded driver electronics which results in a compact, plug-and-play positioning stage.

- Smallest complete piezo-electric motor stages
- Fully embedded motor control
- Fast and Easy integration
- Faster more efficient product development

MODEL	M3-RS	M3-LS-1.8	M3-LS-3.4	M3-L	M3-FS	M3-F
Function	Rotary stage	Linear Stage	Linear Stage	Linear Actuator	Lens focusing	Lens Focusing
Travel	360°	6mm	15mm	6mm	1.5mm	1.5mm
Resolution (closed-loop)	0.025°/440µrad	500nm	500nm	500nm	500nm	500nm
Max load	3g	20g	200g	20N	5g	5g
Speed	1100deg/s	5mm/s	>4mm/s	5mm/s	5mm/s	5mm/s



M3-FS lens focusing stage

# 3DOptix

**3DOptix** revolutionises the optomechanical industry with their innovative mounting platform - the BreadBox™ and free-to-use optical system design software. This new platform extends the entire optical table in the vertical dimension creating a truly three-dimensional precise grid with discrete locations for the optical elements.

NEW



## OPTOMECHANICS

The BreadBox™ mounting platform together with the 3DOptix compatible optical mounts creates a Virtual Cage system above your entire optical table with the same accuracy as any traditional cage system, yet with much higher agility and flexibility. 3DOptix BreadBox™ is ideal for rapid optical prototyping or any complex optical application.

All 3DOptix mounts are synchronised with each other once mounted on the same optical table or to the same three-dimensional structure. This means that complex optical systems are easy to build in a three-dimensional, space saving structure.

The 3DOptix BreadBox™ platform is designed to accommodate optical elements of standard sizes and is compatible with any other commercial optical or optomechanical components. All optical elements are centred exactly above the fixation locations for easy design and placement of optical components.

**HC PHOTONICS**, founded by a team of Stanford graduates, is the pioneer of periodic poling technology and the technology leader today. HCP specialises in commercial volume production of periodically-poled nonlinear crystals (PPXX, PPLN, PPMgO:LN, PPMgO:LT) and the fiber pigtailed mixers for various laser applications from UV to Mid-IR (355nm-5µm).

# HCP

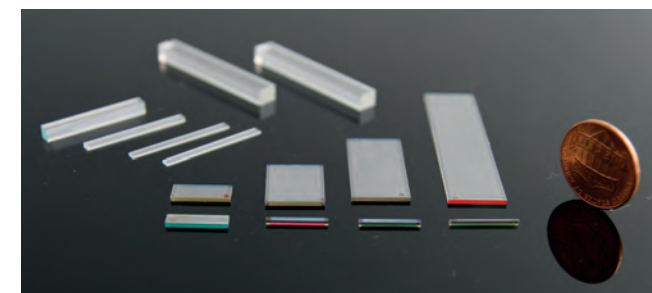
HC PHOTONICS CORP.

Combining this world-leading PP technology with extensive manufacturing experience, HCP continues to position itself as your trusted and committed partner, working closely with you to bring your ideas to fruition.

## PPXX (PPMgO:LN, PPMgO:LT) chips

Various nonlinear frequency conversion schemes are available, including:

- Second harmonic generation (SHG)
- Sum frequency generation (SFG)
- Difference frequency generation (DFG)
- Spontaneous parametric down-conversion (SPDC)
- OPO/OPA



PPLN crystals

## PPXX Mixers and Cavity Mixers

Plug-and-play PPXX (PPLN, PPLT) waveguide mixers for various wavelength conversion applications. Devices can be designed to operate in continuous wave (CW) or quasi-CW configurations in wavelength ranges from the UV to mid IR.

- Intercavity CW OPO –ICOPO
- Please replace um with µm in first bullet first and second line



Waveguide mixers

## PPLN Enhanced Cavity Mixers

HCP offer a range of PPLN mixer configurations containing an optical cavity for enhanced conversion efficiency.

Supplied with an integrated pump laser (where required), these devices offer customers an enormous range of nonlinear optical schemes in a compact, alignment-free package.

- Available configurations: External Pump OPO (EP-OPO), Intracavity OPO (IC-OPO), Intra-cavity SFG (IC-SFG), Intra-cavity DFG (IC-DFG)
- Output wavelength from UV/Visible to NIR/MIR
- Mixing configuration: IC-OPO, IC-SFG, IC-SHG, IC-DFG, EP-OPO etc.
- Available with integrated electronics
- Convenient, compact, robust and versatile

## Intracavity CW OPO – ICOPO

The ICOPO is a compact turn-key optical parametric oscillator with integrated Intracavity pump laser.

- Wavelength bands ranging from 1.4-1.9 µm (Signal) and 2.4-4.4 µm (Idler)
- Fixed and tunable wavelength variants
- Broadband (few nm) or narrowband (SLM) output.
- Free space or fiber-coupled output in an ultra-compact package

**ZOLIX**, established in 1999, is a leading manufacturer of fine mechanics, optical tables and motorised micro-positioning stages.

# Zolix

Their product portfolio includes an extensive range of optomechanics which are designed to cater for all the requirements of a modern day optics laboratory: motorised and manual stages, optical tables and breadboards, high stability optical mounts, filter mounts, lens mounts, polariser mounts, posts, holders, clamps, rails, carriers and other associated accessories.

In addition, Zolix has built a strong reputation of partnering with OEM customers, delivering solutions from sub-assemblies to full systems including design, testing and manufacturing. Give us a call to see if we can help with your opto-mechanical requirements.





Alluxa is an ISO 9001 certified ITAR registered manufacturer of high performance optical filters and thin film coatings with their advanced SIRRUS™ Plasma Deposition process.

NEW

## ULTRA SERIES OPTICAL FILTERS AND WINDOWS

### ULTRA and ULTRA Narrow series bandpass filters

Alluxa is the world leader in ultra-narrowband filters. Our ultra-narrow bandpass filters remain unchallenged in terms of achieving greater than 90% transmission along with sub-nanometer bandwidths, wide-range out-of-band blocking, and steep edges.

### Notch Filters

The deep blocking, tight wavelength control, steep edges, and wide-range transmission of ULTRA Series thin-film notch filters all allow for precision blocking of lasers or other light sources, without sacrificing the quality of target signals.

### Dichroic Filters and Beamsplitters

The steep edges, maximum transmission, and maximum reflection of ULTRA Series thin-film dichroic filters all translate into minimal loss of light intensity and optimal instrument performance. Each ULTRA Series dichroic filter, polychroic filter, dichroic beamsplitter, or beam combiner is resistant to laser damage and can be designed to work at any angle.

### Custom Coatings

Alluxa's engineering team will work with you to design custom optical filters and thin-film coatings for your OEM system.

### Dielectric Mirrors

Alluxa's ULTRA Series of high-reflectivity dielectric mirrors provide close to 100% reflection over a broad or precise range of wavelengths. Each hard coated, thin-film dielectric mirror is resistant to laser damage and all will boost instrument performance by preserving light source intensity.



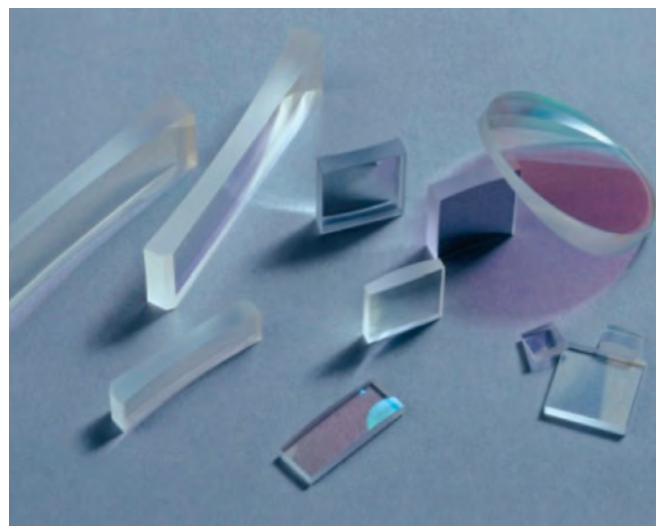
CASIX designs, grows, manufactures and supplies high quality crystals and precision optical products, lenses, coatings and precision glass solutions for optical communications, instrumentation, surveying, scientific and medical markets.

### Laser Optics

- Laser Grade prisms
- Output Couplers
- Laser mirrors
- Waveplates
- Polarisers
- Singlet Lenses
- Achromatic Lenses
- Cylindrical Lenses
- Laser Beam Expanders
- Windows
- Beamsplitters

### Crystal Products

- Laser Crystals – Nd:YVO<sub>4</sub>, Nd:YAG, Nd:GdVO<sub>4</sub>, Cr:YAG
- Non linear optical crystals – KTP, LBO, BBO, LiNbO<sub>3</sub>
- Birefringent Crystals – YVO<sub>4</sub>, α-BBO, Calcite
- Infra Red Crystals – Si, Ge.
- Waveguide Crystals – PP-MgSLT
- Diode pumped laser microchips – Nd:YVO<sub>4</sub>/KTP



Cylindrical lenses

NEW

SOUND AND BRIGHT are experts in the field of optics and non-destructive testing, specialising in laser based ultrasound devices. These innovative systems are hand assembled and are the only multi-channel random quadrature system (Quartet) on the market, with industry leading sensitivity and noise reduction made possible by many years of cutting-edge research and development.



The Quartet

### The Quartet - Multi Purpose Receiver

This multi-purpose laser receiver is suited for a wide range of acoustic and ultrasonic applications, offering high sensitivity, low to no maintenance, can be fitted with a variety of laser wavelengths, and is capable of rapid scans and measurements.



The Tempo 1D

### The Tempo 1D - Ultra-high frequency receiver

Capable of detecting surface displacements resulting from the propagation of UHF ultrasounds up to the GHz, for characterisation of micro and nano components.



The Tempo 2D

### The Tempo 2D - Multi-component receiver

The Tempo 2D simultaneously measures two components of the surface displacement, for the efficient detection of shear waves.

GENTEC, celebrating over 40 years of excellence in innovation and providing quality solutions for laser power and energy measurement applications.

## POWER METER AND ENERGY DETECTORS

Heads to suit any laser application offering high damage threshold and fast response times – nanoWatts to multi kiloWatts and nanoJoules to Joules.

### Gentec Maestro

Touchscreen laser power and energy monitor, reads ALL Gentec detector types: thermopile, photo and pyroelectric.

- Large touchscreen colour LCD display
- 5.6inch diagonal
- 640 x 480 resolution
- 18 bit colour
- Multiple languages
- Intuitive user interface



Gentec Maestro



**SIGNAL RECOVERY** is part of AMETEK Advanced Measurement Technology, and designs, manufactures and sells lock-in amplifiers, signal averagers, amplifiers, light choppers, signal multiplexers, and specialised counters. They have been leaders in this technology since the lock-in amplifier was invented back in the 60's by one of their constituent companies. This long history gives Signal Recovery a unique insight into the areas of research into which these products are used and the ability to really understand and help customers solve the most difficult measurement problems.

Signal Recovery may be a name you are not familiar with. For many years they traded under the EG&G and Brookdeal Electronics company names, with a brief period as part of PerkinElmer Instruments. These changes of ownership have led to their products carrying several different brand names, but since 2001 have consistently used the SIGNAL RECOVERY name.

The good news is that these first class products are now available from us and we are delighted to have them in our portfolio. Application areas include optical measurements, scanned probe microscopy, audio studies, AC impedance studies, Atomic Force Microscopy (AFM).

### 7230 Lock-in amplifier

The model 7230 is a new concept in general purpose DSP lock-in amplifiers. It offers the same excellent Signal Recovery performance but at a lower price. This has been achieved by replacing traditional control buttons and display with easy to use control panels that can be operated from any computer via your favourite browser.

- 1mHz to 120kHz (250kHz option)
- Voltage and current input modes
- 10µs to 100ks output time constants
- Built-in web pages for control from any computer on the same network
- Dual reference, dual harmonic and virtual reference modes
- Ethernet, USB & RS232 computer interface
- Free Labview driver



Model 7230 DSP Lock-in amplifier

### 9210 Multichannel Lock-in amplifier

The model 9210 is a compact multichannel lock-in amplifier which uses the latest FPGA technology to deliver an instrument which can make complex AC and DC measurements on up to 10 different analog signals. In addition it can generate excitation signals to drive the experiment as well as measure the current derived by these signals. It is therefore ideally suited to making direct impedance measurements on samples such as semiconductors or in material analysis as well as for use in optical, calorimetric AC susceptibility and many other experiments.

The unit is operated via a Gigabit Ethernet or USB interface from a free Windows compatible software package, or via a Labview 2016 driver. Both packages allow full instrument set-up and display of measured results in a wide range of digital and graphical outputs.

This powerful, slimline console based instrument is a cost effective alternative to purchasing multiple instruments!



Model 9210 Multichannel Lock-in amplifier



**QUANTUM COMPOSERS** is a leading manufacturer of Digital Delay Pulse Generators to meet the needs of any application. 9520 and 9530 series – up to 8 independent channels offering 250ps resolution, 50ps jitter.



Emerald pulse generator

### SAPPHIRE AND EMERALD PULSE GENERATORS

The Emerald 9250 is the newest addition to our line of Digital Delay Pulse Generators. This unit will come standard with a 280ppb TCXO oscillator, giving you performance you demand.

- 5ps timing resolution
- 15ps rms jitter
- 6 memory slots
- 2 year warranty
- Up to 4 channel outputs
- USB standard communication, Bluetooth optional.
- Up to 20MHz external trigger rate



**ELECTRO-OPTICS TECHNOLOGY Inc** provides innovative, high quality, enabling laser components that represent the best value in terms of performance, reliability, and delivery. EOT manufactures Faraday rotators and isolators to protect laser diodes, fiber lasers, and solid-state lasers from back reflections while providing high transmission and excellent beam quality. EOT also stocks a complete line of photodetectors for time domain and frequency response measurements.



EOT high speed detectors

### DETECTORS

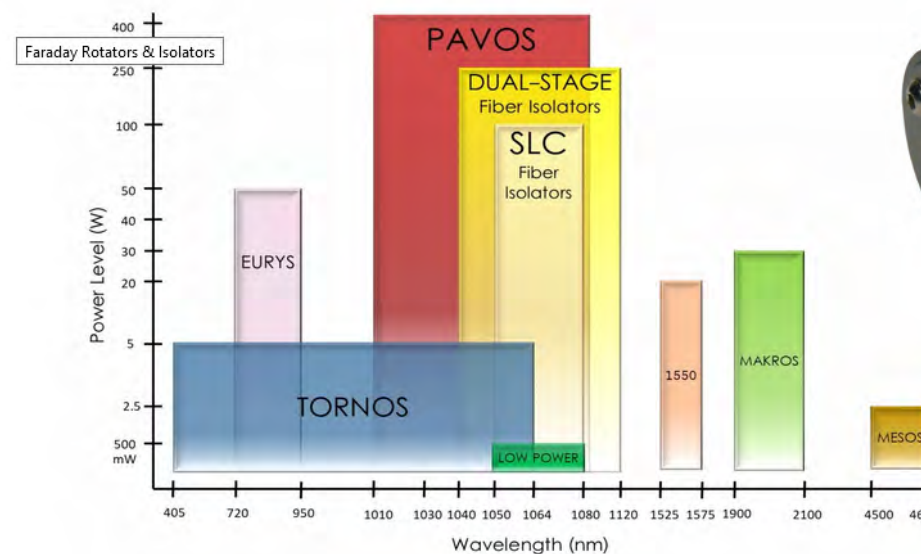
MODEL NO	DESCRIPTION	TYPE	WAVELENGTH (NM)	NOTES
ET-2000	<2GHz Biased Silicon	Biased Silicon PIN	300-1100	The most popular PIN photodiode, 4 models available, ET-2030, 2040, 2060, 2070
ET-3000	<2GHz Biased InGaAs	Biased InGaAs PIN	900-1700	4 models available with risetimes from 175ps to 6ns. ET-3000,3010
ET-2030A	<2GHz Amplified	Amplified Si	300-1100	Amplified sub nanosecond response detectors
ET-3000A	<2GHz Amplified	Amplified InGaAs	900-1700	Amplified sub nanosecond response detectors
ET-3500/F	>12.5GHz Biased InGaAs	InGaAs	1000-1650	Ultra fast <25ps PIN photodiode. Also available model ET-3500A/F
ET-4000/F	>12.5GHz Biased GaAs	GaAs	400-900	Ultra fast <30ps PIN photodiode. Also available model ET-3500A/F
ET-2030TTL	TTL/Analogue	PIN Silicon	300-1100	Photodiode offering TTL or analogue output
ET-3000TTL	TTL/Analogue	PIN InGaAs	900-1700	Photodiode offering TTL or analogue output
ET-5000/F	>12.5GHz	PIN InGaAs	900-2100	High speed, rise time 28ps. Also available model ET-3500A/F
ET-3600/F	>22GHz InGaAs	InGaAs	1000-1650	<16ps rise time/fall time

### FARADAY ROTATORS AND OPTICAL ISOLATORS

EOT's Faraday rotators rotate the plane of polarised light 45 deg in the forward direction and an additional 45 deg of non-reciprocal rotation in the reverse direction, whilst maintaining the light's linear polarisation.

A wide range of devices is offered, including a choice of input aperture dimensions, power handling capabilities, bandwidths and wavelength ranges from 405nm to 4.6microns.

When placed between crossed polarisers, a Faraday Rotator becomes an optical isolator. An optical isolator provides high transmission in the forward direction and strongly attenuates any light travelling in the reverse direction effectively protecting laser oscillators from the deleterious effects of back reflections, a critical consideration in most laser processing applications.



# LASNiX



**LASNIX**, based in Germany, manufacture unique, substrate-free infrared components such as laser attenuators and polarisers. Step attenuators are precision instruments to reduce laser beam power whilst leaving the mode structure and all other beam parameters unchanged.

Lasnix attenuators are based on a free-standing metal grid and are designed for simple alignment and ease of use.

## PRODUCTS

Step attenuators for IR lasers 0.7-1200µm spectral region. Various step sizes up to 10dB per step allow transmittance from 100% to a minimum of 0.001%.

Polarisers and variable attenuators – precision thin film elements to perfectly polarise a CO2 laser beam. Power handling up to 30W CW.



We supply the **NoIR** range of EN207:2010 certified laser safety eyewear for medical, scientific, aviation, military and industrial applications.

They are all lightweight, comfortable and are therefore easy to wear – an important consideration for many users who may spend long hours wearing them.

The eyewear features non reflective polycarbonate filters which attenuate by absorbing the laser radiation.



A wide range is held in stock in Edinburgh for immediate delivery. They can be purchased securely via our web shop at [www.photonicshop.co.uk](http://www.photonicshop.co.uk).

All safety eyewear is fully approved with CE certification.



**ID QUANTIQUE** offer a range of single photon counting modules with best in class timing resolution for the visible and infrared regions of the optical spectrum.

### ID120 VIS Highest Quantum Efficiency

- Silicon Avalanche Photodiode
- 350-1000nm
- Free-Running
- 80% Quantum Efficiency
- 200Hz Dark Count Rate
- 500µm Active Area
- Integrated Counter

### ID230 NIR Best Dark Count Rate

- InGaAs/InP APD
- 900-1700nm
- Free-Running
- Best Dark Count Rate (<50Hz)
- 25% Quantum Efficiency
- 100ps Timing Resolution
- Adjustable Temperature
- Single mode or multimode fiber connection

### Other Visible Photon Counters

- ID100 Best Dark Count Rate - 350-900nm, Free-Running, 40ps Timing Resolution
- ID110 100MHz photon detector - 350-900nm, Free-Running and gated, 200ps Timing Resolution

### Other Infrared Photon Counters

- ID210 100MHz Gated detector- 900-1700nm, Gated and Free-Running, 30% QE
- ID220 Free-Running SPAD – 900-1700nm, Free-Running, 250ps Timing Resolution



ID120



ID230



*Emerald pulse generator*

### ID900 Time Controller

IDQ's Time Controller is an all-in-one device that performs timing, delay and pattern generation all with 20ps precision. The ID900 performs the functions of a number of devices: time-to-digital converter, coincidence counter, delay generator, pattern generator, counter and discriminator. Its core consists of 4 high-speed (<20 ps precision, 100Mcps rate) inputs and 4 high-speed outputs, interconnected by reconfigurable logic. An advanced synchronization circuit allows for up to 16 devices to be "daisy-chained" for a total of 64 fast input and output channels.

- 1GHz counters
- Fast data transfer (100Mcps)
- Up to 64 channels
- 4 inputs and outputs interconnected through reconfigurable logic
- Intuitive graphical user interface
- Programming languages: LabView, Python, Matlab, C/C++
- High precision discriminator

CATALOGUE NUMBER	LASER DYES with (Alternative name)	Prices £ per g
363-400	alpha-NPO--(E.4000)	46.00
410	BBO--(E.4100)	£185.00
359-410	BBQ--(E.3800)	£71.00
420-424	Bis-MSB--(E.4210)	£26.00
361-380	BPBD-365-(Butyl--PBD)	£31.00
435-450	Coumarin-440-(Coumarin-120)	£90.00
445-460	Coumarin-445--(E.4450)	£99.00
444-460	Coumarin-450-(Coumarin-2)	£32.00
454-460	Coumarin-456-(Coumarin-4)	£24.00
454-475	Coumarin-460-(Coumarin-1,-Coumarin-47)	£20.00
453	Coumarin-461-(Coumarin-311)	£80.00
478	Coumarin-478-(Coumarin-106)	£117.00
470-491	Coumarin-480-(Coumarin-102)	£85.00
481-516	Coumarin-481-(Coumarin-152A)	£61.00
479-529	Coumarin-485-(Coumarin-152)	£66.00
484-496	Coumarin-490-(Coumarin-151)	£91.00
476-540	Coumarin-498--(E.4980)	£124.00
470-522	Coumarin-500--(E.5000)	£95.00
474-504	Coumarin-503-(Coumarin-307)	£74.00
499-520	Coumarin-504-(Coumarin-314)	£115.00
510-530	Coumarin-510--(E.5100)	£112.00
501-519	Coumarin-519-(Coumarin-343)--(E.5190)	£127.00
520-530	Coumarin-522B--(E.5221)	£112.00
514-522	Coumarin-523-(Coumarin-337)--(E.5230)	£105.00
515-545	Coumarin-525--(E.5250)	£117.00
525-535	Coumarin-535-(Coumarin-7)--(E.5350)	£75.00
528-560	Coumarin-540-(Coumarin-6-s)	£66.00
500-562	Coumarin-540A-(Coumarin-153)	£47.00
547-555	Coumarin-545--(E.5451)	£105.00
315-695	Cresyl-Violet-670-Perchlorate-(Kresylviolett)	£99.00
--	Cryptocyanine--(E.707)	£97.00
--	DASPI--(E.4620)	£141.00
--	DCI'-(DCI-2)--(E.5950)	£198.00
606-670	DCM--(E.6490)	£107.00
--	DCM-II--(E.6491)	£58.00
--	DCM-Special--(E.6493)	£106.00
--	DDBCI--(E.6180)	£264.00
--	DDI-(DDCI)--(E.8100)	£424.00
--	DI--(E.5235)	£124.00
538-560	Disodium-Fluorescein-(Uranin)	£25.00
--	DMETCI--(E.5240)	£231.00
360-363	DMQ--(E.22050)	£141.00
332-336	DMT--(E.3320)	£115.00
--	DNTTCI--(E.8850)	£320.00
--	DOCI--(E.5410)	£242.00
732-823	DOTC-Iodide--(E.8250)	£106.00
732-854	DOTC-Perchlorate--(E.8251)	£111.00
405-409	DPS--(E.4060)	£65.00
--	DQOCI--(E.5920)	£330.00
--	DQTCI--(E.6220)	£330.00
--	DQTCI'--(E.6240)	£209.00
--	DQTrCI--(E.9010)	£193.00
--	DTCI--(E.6250)	£160.00
--	DTDCI--(E.7310)	£61.00
--	DTP--(E.8500)	£194.00
828-889	DTTC-Iodide--(E.8630)	£54.00
350-351	Exalite-351--(E.3510)	£177.00
373-382	Exalite-376--(E.3760)	£161.00
377	Exalite-377E--(E.3770)	£177.00
379-391	Exalite-384--(E.3840)	£177.00
387-399	Exalite-389--(E.3890)	£177.00
389-392	Exalite-392A--(E.3921)	£177.00
390-393	Exalite-392E--(E.3920)	£177.00
398-409	Exalite-398--(E.3980)	£177.00
397-406	Exalite-400E--(E.3970)	£177.00
404-405	Exalite-404--(E.4040)	£161.00
391-411	Exalite-411--(E.4110)	£161.00
416	Exalite-416--(E.4160)	£177.00
398-419	Exalite-417--(E.4170)	£177.00
406-430	Exalite-428--(E.4280)	£161.00
546-558	Fluorescein-548-(Fluorescein-27)	£42.00
552-574	Fluorol-555-(Fluorol-7GA)	£37.00
-	HDITCP--(E.8330)	156.00

CATALOGUE NUMBER	LASER DYES with (Alternative name)	Prices £ per g
-	HICI--(E.5670)	£182.00
-	HIDCI-(HDIC)--(E.7410)	£97.00
675-839	HIDCI-(HIDC)--(E.7410)	£97.00
802-873	HITC-Iodide-(Hexacyanin-3)	£59.00
802-875	HITC-Perchlorate--(E.8421)	£54.00
863-940	IR-125--(E.9030)	£92.00
865-964	IR-140--(E.9500)	£141.00
960-976	IR-143--(E.9200)	£495.00
850-880	IR-144--(E.8690)	£231.00
584-642	Kiton-Red-620-(Sulforhodamin-B)	£25.00
389-404	LD-390-(Quinolon-390)	£118.00
402-426	LD-423--(E.4230)	£82.00
412-431	LD-425--(E.4250)	£82.00
462-474	LD-466-(Coumarin-466)	£88.00
472-486	LD-473--(E.4730)	£88.00
489-502	LD-489--(E.4889)	£214.00
479-500	LD-490-(Coumarin-6H)	£124.00
663-700	LD-688--(E.6880)	£177.00
660-696	LD-690--(E.6910)	£87.00
690-800	LD-700-(Rhodamine-700)	£153.00
782-818	LD-800-(Rhodamine-800)--(E.8000)	£125.00
690-726	LDS-698-(Pyridine-1)	£94.00
713-747	LDS-722-(Pyridine-2)	£94.00
716-730	LDS-730-(Styryl-6)--(E.7300)	£115.00
718-753	LDS-750-(Styryl-7)	£115.00
743-780	LDS-751-(Styryl-8)--(E.7510)	£137.00
759-757	LDS-759--(E.7590)	£762.00
757-793	LDS-765--(E.7650)	£666.00
785-795	LDS-798--(E.7980)	£367.00
812-880	LDS-821-(Styryl-9)--(E.8210)	£139.00
861-946	LDS-867--(E.8670)	£1,109.00
925-975	LDS-925-(Styryl-13)--(E.9250)	£1,386.00
--	NCI-(Neocyanine)--(E.7730)	£115.00
670-750	Nile-Blue-690-Perchlorate	£72.00
668-710	Oxazine-720-Perchlorate-(Oxazine-170)--(E.7210)	£101.00
675-760	Oxazine-725-Perchlorate-(Oxazine-1)	£58.00
700-811	Oxazine-750-Perchlorate--(E.7500)	£106.00
392-400	PBBO--(E.4001)	£38.00
355-367	PBD--(E.3660)	£28.00
--	Phenoxazone-660-(Phenoxazone-9)	£108.00
--	PICI--(E.5200)	£124.00
--	Pinacyanol--(E.5940)	£75.00
381-421	POPOP--(E.4190)	£29.00
365-381	PPO--(E.3720)	£25.00
338-343	p-Terphenyl-(PTP)--(E.3400)	£28.00
526-550	Pyromethene-546--(E.5460)	£183.00
546-561	Pyromethene-556--(E.5560)	£183.00
540-580	Pyromethene-567--(E.5675)	£183.00
552-580	Pyromethene-580--(E.5805)	£166.00
571-597	Pyromethene-597--(E.5970)	£166.00
575-605	Pyromethene-605--(E.6050)	£183.00
612-631	Pyromethene-650--(E.6505)	£183.00
--	Q-Switch-1	£110.00
1180-1530	Q-Switch-5-(E.10900)	£58.00
387-390	QUI--(E.22200)	£141.00
595-630	Rhodamine-3B-Perchlorate	£101.00
540-570	Rhodamine-560-(Rhodamine-110)	£92.00
540-570	Rhodamine-560-Perchlorate	£113.00
551-590	Rhodamine-575--(E.5750)	£58.00
550-610	Rhodamine-590-Chloride-(Rhodamine-6G)	£25.00
550-610	Rhodamine-590-Perchlorate	£28.00
550-610	Rhodamine-590-Tetrafluoroborate	£28.00
579-637	Rhodamine-610-Chloride-(Rhodamine-B)	£20.00
579-637	Rhodamine-610-Perchlorate	£27.00
602-671	Rhodamine-640-Perchlorate-(Rhodamine-101)	£74.00
424-449	Stilbene-420-(Stilbene-3)	£32.00
609-671	Sulforhodamine-640-(101)	£73.00
350-356	TMQ--(E.3500)	£115.00

Exciton Laser Dyes Pricelist.

Next day courier delivery £20. Prices exclude VAT.

Available to purchase on-line from [www.photonicshop.co.uk](http://www.photonicshop.co.uk)



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**t** 0131 664 8122

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