

# BDL-440-SMC

## 440 nm Picosecond / CW Diode Laser with Single-Mode Fibre Coupler

60% coupling efficiency into single-mode fibre

TEM<sub>00</sub> mode

Wavelength 440 nm

Pulsed and CW operation

Pulse width down to 40 ps

Repetition rate 20-50-80 MHz

Low skew trigger output

Extremely low RF noise

Cooled laser diode

Fast on / off / multiplexing capability

Simple + 9 V to +12V wall-mounted power supply

Compact design - no external controller unit

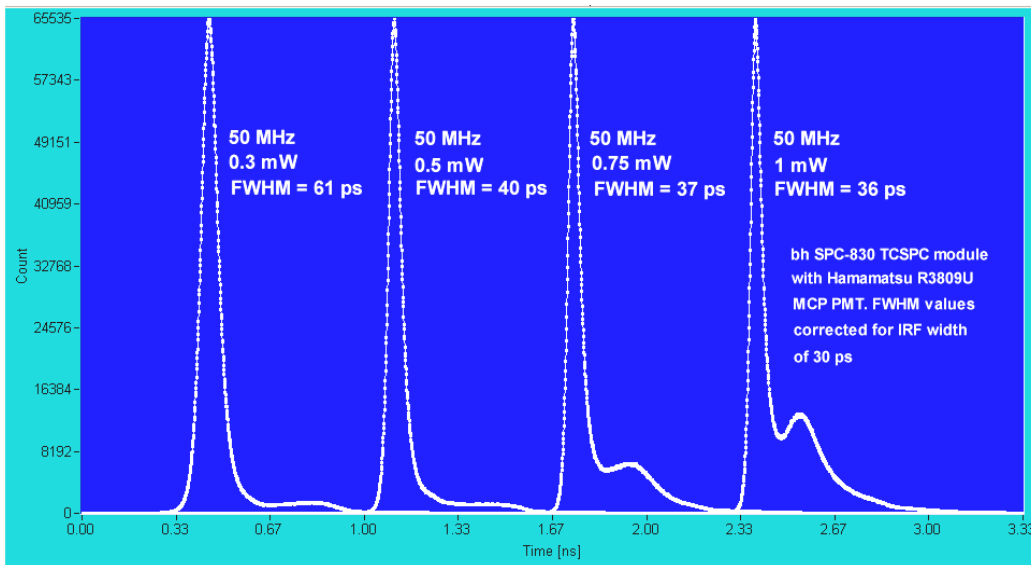
Compatible with all standard 1" footprint fibre couplers

Luminescence lifetime experiments

Laser scanning microscopy

Fluorescence correlation

Time-correlated single photon counting experiments



Designed and manufactured by



**Becker & Hickl GmbH**  
Nahmitzer Damm 30  
12277 Berlin, Berlin  
Tel. +49 / 30 / 787 56 32  
Fax. +49 / 30 / 787 57 34  
email: info@becker-hickl.com  
www.becker-hickl.com



**LASOS Lasertechnik GmbH**  
Carl-Zeiss-Promenade 10  
07745 Jena, Germany  
Tel. +49 3641 2944-0  
Fax +49 3641 2944-17  
info@lasos.com  
www.lasos.com



Sales Representatives



US Representative:  
**Boston Electronics Corp**  
tcspc@boselec.com  
www.boselec.com



UK Representative:  
**Photonic Solutions PLC**  
sales@psplc.com  
www.psplc.com

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## Optical

Repetition Rate	20-50-80 MHz, or CW operation
Wavelength	436 nm to 448 nm, typ. 440 nm
Pulse Width (FWHM, at 1 mW power, 50 MHz)	40 to 90 ps
Peak Power	40 to 250 mW <sup>1)</sup>
Average Power	20 MHz: 0.07 mW to 0.2 mW <sup>2)</sup>
(Average CW equivalent power, user adjustable)	50 MHz: 0.3 mW to 1 mW <sup>2)</sup>
	80 MHz: 0.4 mW to 1.2 mW <sup>2)</sup>
	CW mode: 1 mW to 20 mW <sup>2)</sup>
Beam diameter before coupler	0.7 mm, TEM <sub>00</sub> mode
Polarisation	horizontal
Coupling efficiency into single-mode fibre, typically	60%
Stability of Repetition Rate	± 100 ppm
Pulse-to Pulse Jitter	< 20 ps
Reaction time to 'Laser on' signal (pulsed mode)	1 µs
Reaction time to 'Laser on' signal (CW mode)	3 µs
Power and pulse shape stabilisation after switch-on	3 min <sup>5)</sup>
Fibre coupler	all 1" footprint couplers: Point Source, Schäfer&Kirchhoff, OZ Optics, Linus

## Trigger Output

Pulse Amplitude	+100 to +300 mV (peak) into 50 Ω
Pulse Width	1 ns
Output Impedance	50 Ω
Connector	SMA
Delay from Trigger to Optical Pulse	< 500 ps
Jitter between Trigger and Optical Pulse	< 10 ps

## Control Inputs

Frequency 20 MHz	TTL / CMOS high <sup>3)</sup>
Frequency 50 MHz	TTL / CMOS high <sup>3)</sup>
Frequency 80 MHz	TTL / CMOS high <sup>3)</sup>
CW operation	TTL / CMOS high <sup>3)</sup>
Laser ON / Off	TTL / CMOS low <sup>3)</sup>
External Power Control	analog input, 0 to + 10V

## Power Supply

Power Supply Voltage	+ 9 V to +12 V
Power Supply Current	300 mA to 1 A <sup>4)</sup>
Power Adapter	AC-DC power adapter, with key switch and control box in cable

## Mechanical Data

Dimensions	160 mm x 90 mm x 60 mm
Mounting Thread	two M6 holes

## Maximum Values

Power Supply Voltage	0 V to +15 V
Voltage at Digital Control Inputs	-2 V to +7 V
Voltage at Ext. Bias Input	-12 V to + 12 V
Ambient Temperature	0 °C to 40 °C <sup>5)</sup>

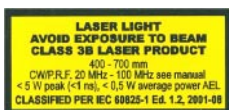
1) Typical values, sample tested. Depends on pulse width and selected power.

2) Recommended power adjust range. Lower power gives broader pulses, higher power gives ringing in pulse shape. Power levels above the given range can be selected, but may impair the lifetime of the laser diode.

3) All inputs have 10 kΩ pull-up resistors. Open input is equivalent to logic 'high'.

4) Dependent on ambient temperature. Cooling current changes due to temperature regulation of laser diode

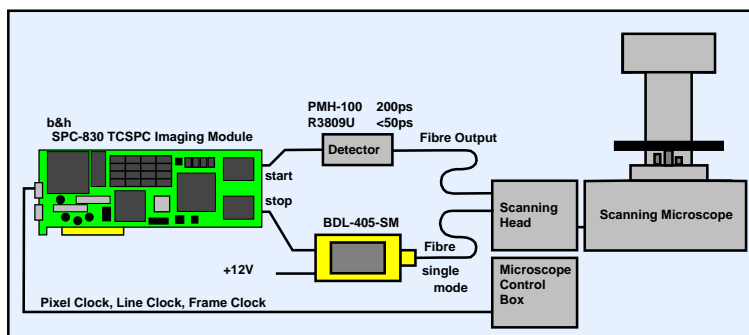
5) Operation below 13 °C may result in extended warm-up time.



**Caution: Class 3B laser product. Avoid direct eye exposure. Light emitted by the device may be harmful to the human eye. Please obey laser safety rules when operating the devices. Complies with US federal laser product performance standards.**

## Application: TCSPC lifetime imaging with laser scanning microscopes

The BDL-405-SM laser excites the sample with 50 MHz, 75 ps pulses. The microscope scans the sample in y-x direction, and the SPC-830 TCSPC imaging module records the photon distribution versus time and the coordinates of the scanning area. The setup detects single and double exponential lifetimes down to a few 10ps. Typical applications are ion concentration, ph, or oxygen saturation measurements by fluorescence quenching, FRET experiments and distinguishing of autofluorescence components. Please see [www.becker-hickl.com](http://www.becker-hickl.com) for detailed information.



Becker & Hickl GmbH  
 Nahmitzer Damm 30  
 12277 Berlin  
 Tel. +49 / 30 / 787 56 32  
 Fax. +49 / 30 / 787 57 34  
<http://www.becker-hickl.com>  
 email: [info@becker-hickl.com](mailto:info@becker-hickl.com)

