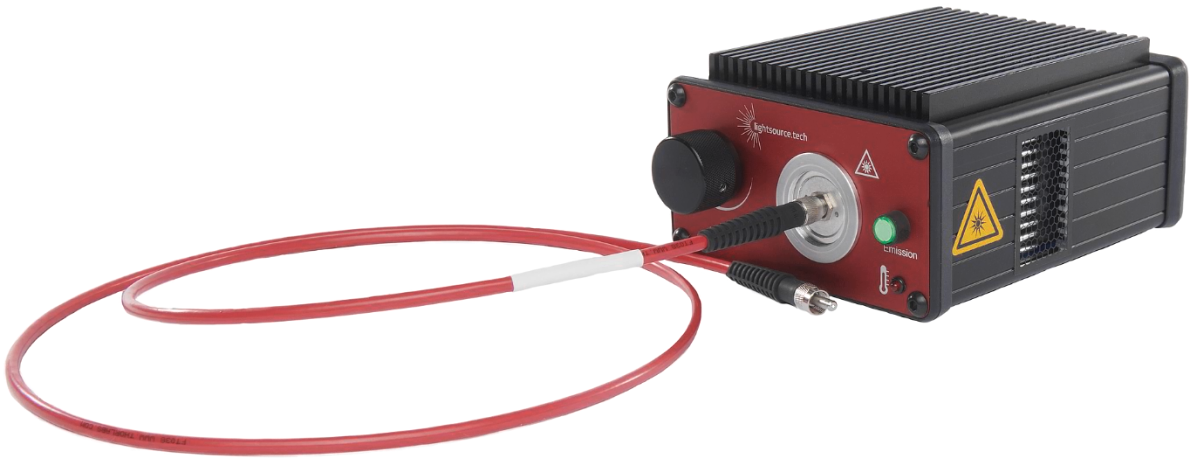
lightsource.tech®



LS-BB1

Broadband LED light source

VIS/NIR

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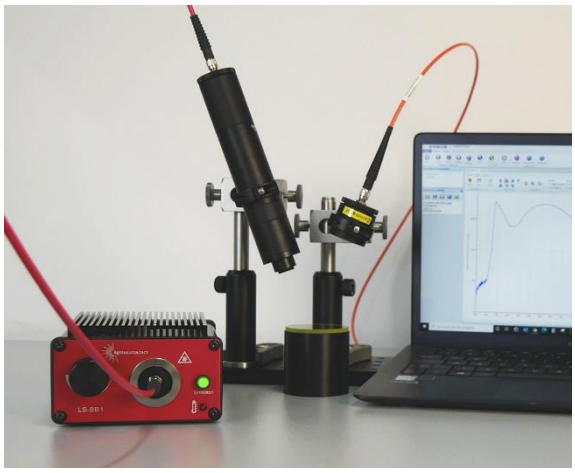
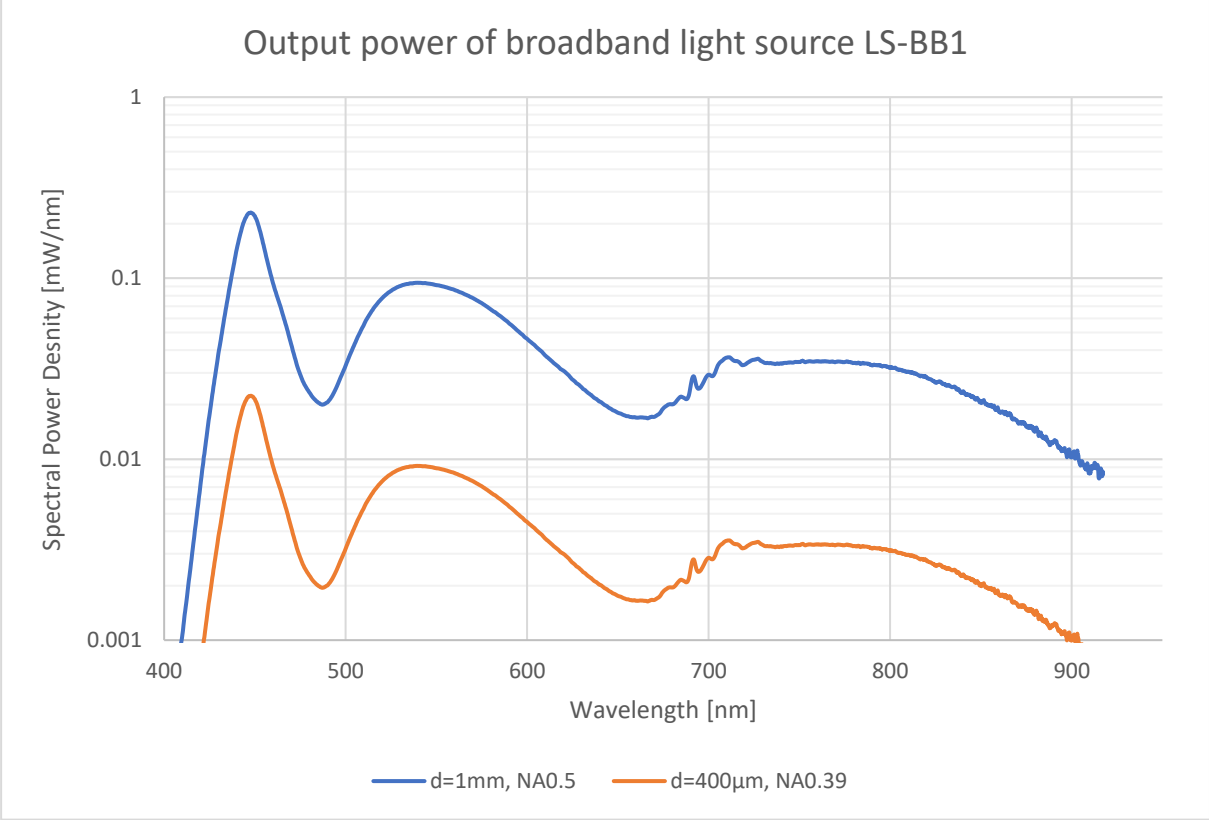


The LS-BB1 is a compact, fiber-coupled powerful **light source for spectroscopic applications**.

Technology: A special VIS / NIR phosphor converter converts the primary light of a high-performance LED at 450nm into a very broad, line-free spectrum up to the NIR range. This results in a point light source that is especially suitable for spectroscopy. The LS-BB1 efficiently couples this light into a multimode fiber with core diameters between 50 µm and 1 mm. This provides the user with a point light source that can be used flexibly with high luminance and very broadband spectral radiation.

Spectrum

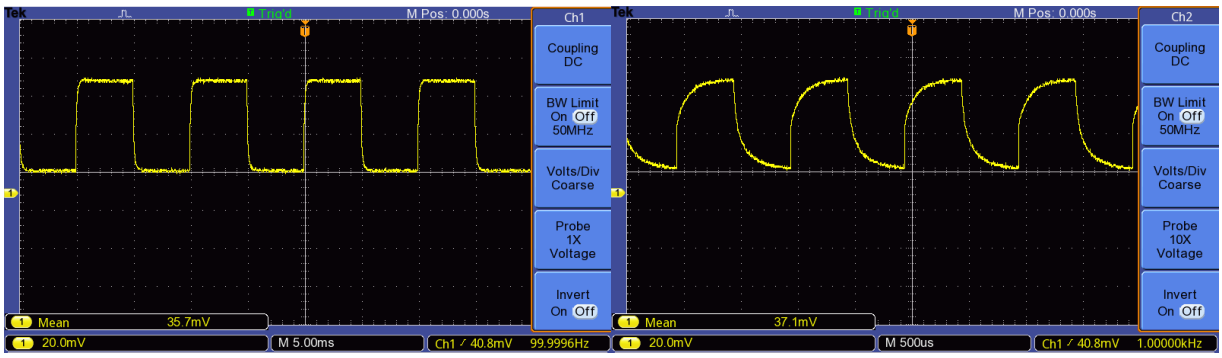


Specifications

<table>
<tr><td>Emitter</td><td>LED at 450nm with special VIS/NIR phosphor converter</td></tr>
<tr><td>Optical output</td><td>SMA optical fiber connection for multimode fibers with a core diameter of 50-1000µm (maximum fiber aperture NA=0.5)</td></tr>
<tr><td>Optical output power
(typical)</td><td>Core diameter of optical fiber 1mm NA 0.5: >20mW
400µm, NA 0.39: >2mW
Output power for other core diameters d or NA approx. $P_{out} \geq P_{tab} * NA^2/0.25 * d^2$ [mm]. Output adjustable via jogwheel or software 1-100%</td></tr>
<tr><td>Wavelength range</td><td>420-900 nm, see spectrum above</td></tr>
<tr><td>Manual operation</td><td>Software controlled configurable jogwheel (output, frequency, switch-on duration) depending on selected mode.</td></tr>
<tr><td>Operating modes</td><td><table>
<tr><td>Constant output</td><td>CW</td></tr>
<tr><td>Stroboscope</td><td>Frequency 0.12Hz – approx. 1kHz
Duty cycle 0–100%</td></tr>
<tr><td>Pulse trigger</td><td>Pulse width: approx. 500µs–4000ms
Delay: 4µs–4000ms
(Width + Delay <= 4000ms)</td></tr>
<tr><td>Direct mode</td><td>Analog/digital modulation to 2 kHz</td></tr>
</table>All modes allow output setting of 1–100%</td></tr>
<tr><td>Interface</td><td>Mini-USB type B connection, RS-232 via USB (COM interface, FTDI chipset, 115200 baud)</td></tr>
<tr><td>Software</td><td>LabVIEW™-based GUI or control with commands via RS-232, therefore able to be integrated into all programmable environments or direct terminal input.</td></tr>
<tr><td>Signal In</td><td>TTL level for trigger or digital modulation, analog input (0-5V, biased) for analog modulation (via SMA connection)</td></tr>
<tr><td>Signal Out</td><td>Selectable output signals (via SMA connection); Signal reference (TTL), Laser driver input (0-5V), Current monitor (500mV/A), Signal In looped through</td></tr>
<tr><td>Option output</td><td>4 via firmware adaptable inputs/outputs for external sensors, interlocks, etc. (DIO/analog/I2C, +5V, GND)</td></tr>
<tr><td>Thermal management</td><td>2 miniature high-performance fans, low-noise, air inlet on top, air outlet on both sides and underneath. Temperature sensor (readable using software), overheating protection, LED signal. Environmental temperature 5-30 °C. (Other temperature ranges possible on request.) If using multiple LS-BB1 devices alongside / on top of each other, ensure unimpeded air circulation.</td></tr>
<tr><td>Power supply</td><td>Plug-in power supply 12V DC, 2.5A (included with delivery), connection: coaxial power connector 5.5x2.1, power input approx. 5W max.</td></tr>
<tr><td>Dimensions</td><td>130mm (L) x 106mm (W) x 56mm (H) without user controls and connections</td></tr>
</table>

Pulse and stroboscope operation

The light of the LS-BB1 can be switched on and off quickly, but the afterglow of the VIS / NIR phosphor converter results in lower frequencies compared to our other light sources. Switching frequencies of up to 1 kHz with full modulation are easily possible, as for example for synchronization with spectrometers. An external trigger input with an adjustable delay is available for this. The minimum delay is approx. 4 µs, jitter is less than 1 µs. Thanks to the built-in microprocessor, the LS-BB1 can also be operated as a free-running stroboscope with an adjustable frequency and duty cycle.

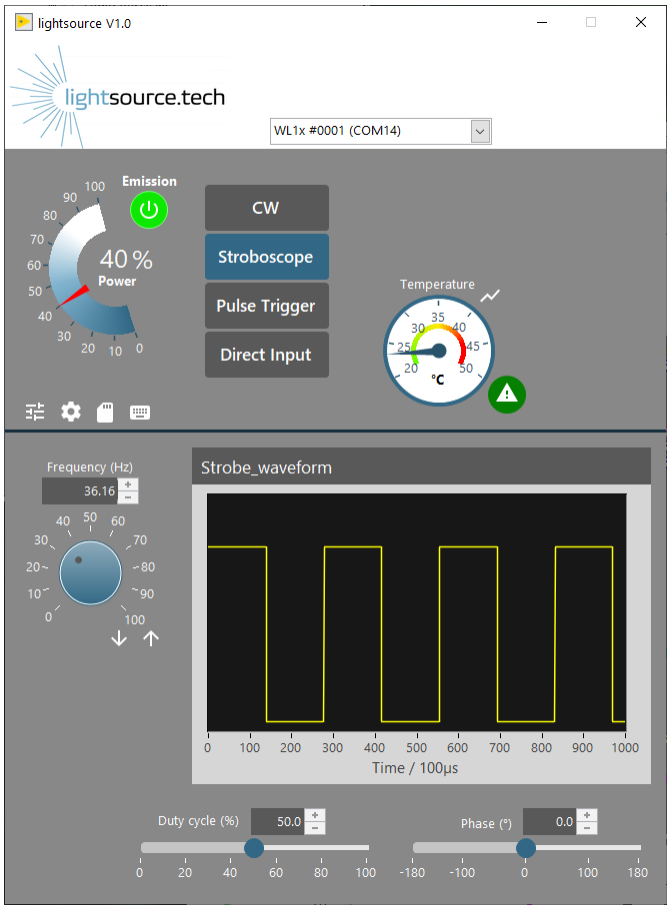


Optical pulse shape at 100% output power in stroboscopic operation with 100Hz (left) or 1kHz (right), measured with Thorlabs PDA36A2 Si Amplified Photodetector

Software

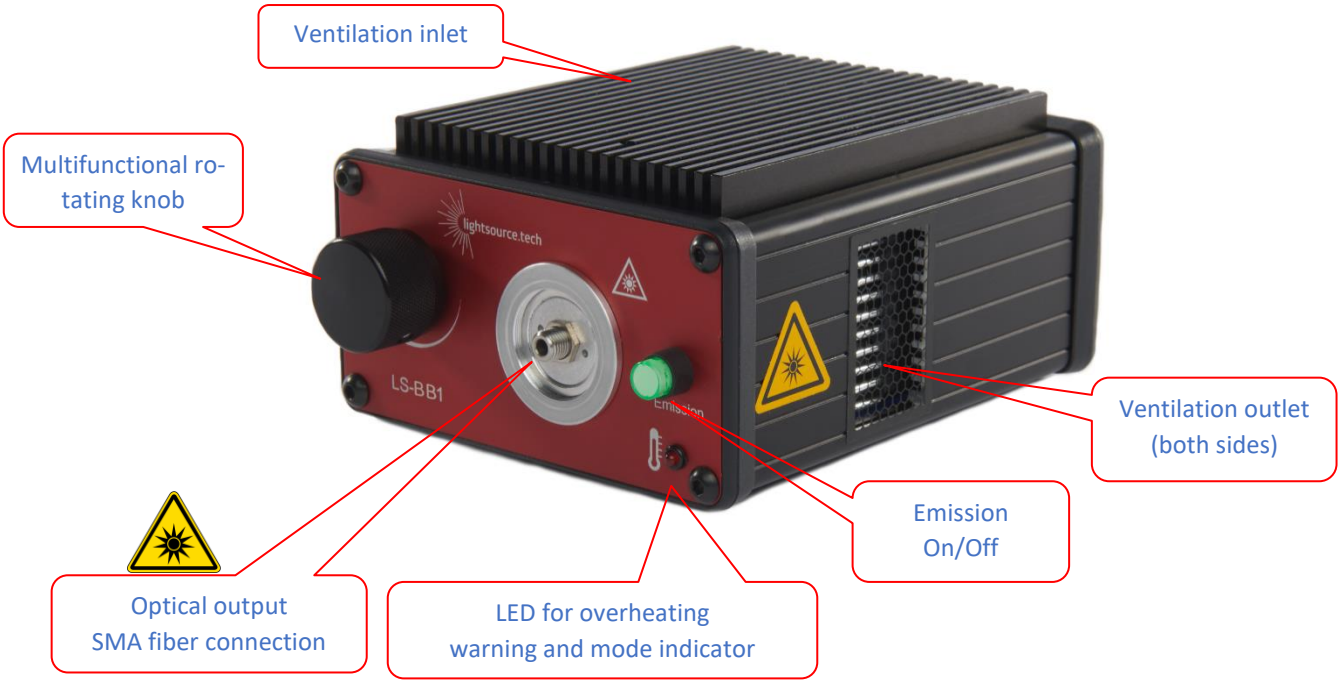
Brightness and (depending on the operating mode) other parameters can be conveniently controlled using a rotary knob. The light source can also be completely controlled via a serial RS232 interface (via USB). This can be done either directly using simple commands from any programming environment or using the convenient GUI provided.

A VI library is available on request for integration into LabVIEW® programs.

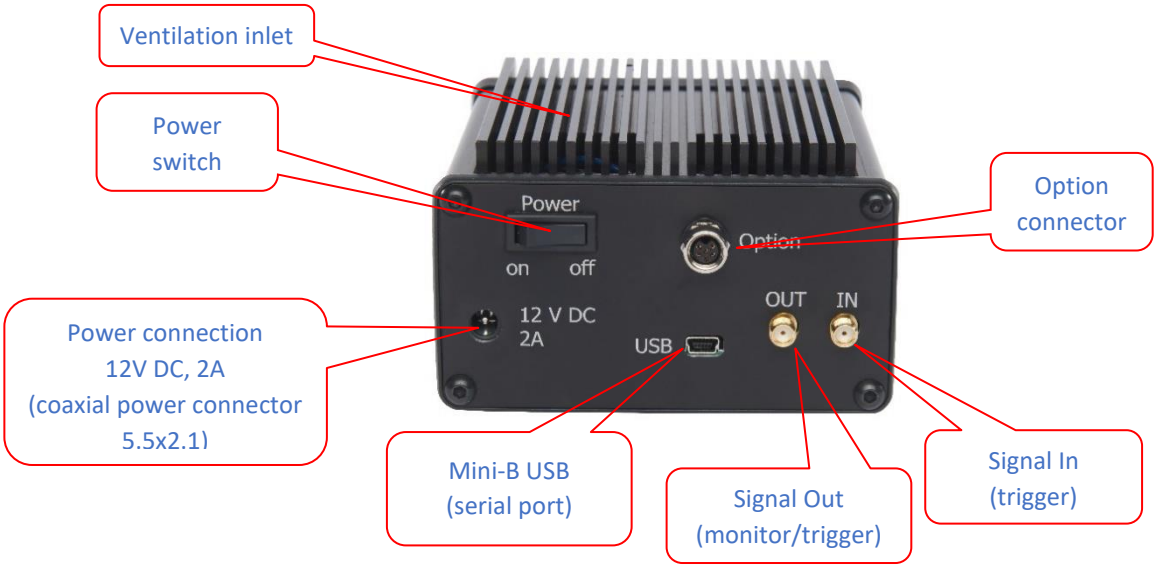


Operating program of the LS-BB1

Front with controls:



Back with connections:



Scope of delivery

- Light source LS-BB1
- Plug-in power supply
- Operating instructions
- USB cable (A to Mini-B, 2m)
- Software (as download)

An optical fiber is not included in the delivery scope. Suitable optical fibers for your application with various core diameters, numerical apertures and of various materials are available from us or other suppliers. We recommend using quartz optical fibers.

The LS series of light sources has been tested according to the following guidelines:
2014/35/EU Low Voltage Directive, LVD
2014/30/EU EMC directive, EMC test standard DIN-EN 61326-1 2018-09 [VDE 08433-20-1]
Electrical measuring, control, regulating and laboratory equipment – General EMC requirements

Test certificate available on request.

Any other plug-in power supply with suitable connection (coaxial power connector 5.5x2.1) and output may be used in place of the plug-in power supply provided.

Safety Instructions – Please read before use –

The light source LS-BB1 is an ultra-bright point light source. Emitted light output and luminance can reach very high, potentially dangerous levels!

The LS-BB1 is **not a toy** and may only be used by technically trained personnel. If the LS-BB1 or the underlying optics module is built into devices or instruments, or is connected to such devices or instruments via an optical fiber, appropriate protective measures must be taken to ensure the safe operation of the entire system. If the LS-BB1 is operated as a stand-alone device, please ensure that emission is switched off when the device is not being supervised.

Risk of eye damage: avoid direct observation of:

- the outlet opening if no fiber is inserted, or

- the glowing fiber end, or

- narrow, collimated beams or focal points.

Use protective glasses to reduce light intensity to a safe and comfortable level. Please check whether the protective glasses you use – e.g. laser safety glasses – are suitable for the emission range of the LS-BB1. In particular, we recommend the use of safety glasses that suppress the primary LED at 450 nm. Suitable protective glasses are also available from lightsource.tech.

Many applications require the beam to be collimated or focused. Depending on the optical technology used, dangerous luminance levels can arise even far from the source.

Particularly when coupling into optical microscopes or similar visual observation devices, light may be focused in areas that result in direct exposure to the user (eyes, hands, etc.). It is imperative that optical systems of this kind are professionally designed to avoid dangerous exposure.

Neurologically photo-sensitive persons should note: The LS-BB1 provides pulsed or stroboscopic modes. Avoid visual observation of intense, low-frequency flickering illumination conditions.

Risk of burns arises in the range of focused or narrow, collimated beams.

Fire risk: Do not place flammable substances in focus.

For users of the Try Out Box: Please note the general safety instructions above and the special information on the individual experiments! Use the safety glasses enclosed!

If you feel unsure about whether safety measures are sufficient, speak to the Laser Safety Officer or contact us on lightsource.tech.

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