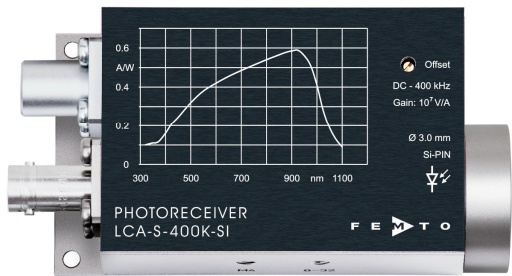






Low Noise 400 kHz Photoreceiver  
with Si-PIN Photodiode



Features	<ul style="list-style-type: none"> <li>• Large area Si-PIN photodiode, 3.0 mm active diameter</li> <li>• Bandwidth DC – 400 kHz</li> <li>• Amplifier transimpedance gain <math>1.0 \times 10^7</math> V/A</li> <li>• Max. conversion gain <math>5.9 \times 10^6</math> V/W @ 920 nm</li> <li>• Spectral range 320 – 1060 nm</li> <li>• Free-space input 1.035"-40 threaded, easily convertible to fiber optic input (FC and FSMA) with optionally available screw-on adapters</li> <li>• UNC 8-32 and M4 tapped holes for mounting on standard posts with metric and imperial thread</li> </ul>
Applications	<ul style="list-style-type: none"> <li>• Spectroscopy</li> <li>• General purpose opto-electronic measurements</li> <li>• Optical front-end for oscilloscopes, A/D converters and lock-in amplifiers</li> </ul>
Block Diagram	<p>The block diagram illustrates the internal circuitry. An 'OPTICAL INPUT' is shown as a box with two arrows pointing into a photodiode symbol. The photodiode is connected to a 'Bias' terminal. The output of the photodiode is connected to the inverting input of an 'I/V' (transimpedance) amplifier. The feedback path of the I/V amplifier is a resistor labeled 'Rf'. The output of the I/V amplifier is connected to a 'Buffer amplifier' block, which then leads to a 'VOLTAGE OUTPUT' box. An 'Offset nulling' block is connected to the non-inverting input of the I/V amplifier. The text 'BS01-LCA-S_R01' is located at the bottom right of the diagram area.</p>
Intended Use	<p>The LCA-S-400K-SI photoreceiver consists of an Si-PIN photodiode and a subsequent low-noise fixed gain transimpedance amplifier. It is designed for fast conversion of small optical signals into equivalent output voltages. Operation is mostly self-explanatory. If in doubt, consult this document or contact <a href="mailto:support@femto.de">support@femto.de</a>.</p> <p>For safe operation, please refer to the damage thresholds specified in the "Absolute Maximum Ratings", "Temperature Range" and "Power Supply" sections of this document.</p> <p>The operating environment must be free of smoke, dust, grease, oil, condensing moisture, and other contaminants that could affect the operation or performance.</p>

## Low Noise 400 kHz Photoreceiver with Si-PIN Photodiode

Available Version	<p>LCA-S-400K-SI-FST</p>  <p>1.035"-40 threaded flange with internally threaded coupler ring (outer diameter 30 mm) for free space applications, compatible with many optical standard accessories</p> <p>Optionally available: Fiber adapters PRA-FC, PRA-FCA and PRA-FSMA, with the relative large 3.0 mm dia. photodiode installed in the LCA-S-400K-SI input coupling is not critical, however, standard SM 9/125 fibers (PC or APC) with low numerical aperture (NA) are recommended for ensuring near 100% coupling efficiency</p>												
Related Model	<p>LCA-S-400K-IN-FST</p> <p>InGaAs-PIN, Ø 0.5 mm, 900 - 1700 nm free space input, 1.035"-40 threaded flange</p>												
Available Accessories	<div> <p>PRA-FC PRA-FCA PRA-FSMA</p>  <p>Fiber-adapter with external 1.035"-40 thread (suitable for FST models only)</p> </div> <div> <p>PRA-PAP</p>  <p>Alternative mounting option: post adapter plate, easy to mount on FEMTO photoreceiver series OE, FWPR, PWPR, HCA-S and LCA-S</p> </div> <div> <p>PS-15-25-L</p>  <p>Power Supply input: 100 – 240 VAC output: ±15 VDC</p> </div>												
Specifications	<table> <tr> <td>Test conditions</td><td><math>V_s = \pm 15 \text{ V}</math>, <math>T_A = 25 \text{ }^\circ\text{C}</math>, output load impedance <math>1 \text{ M}\Omega</math>, warm-up 20 minutes (min. 10 minutes recommended)</td></tr> <tr> <td>Gain</td><td> <p>Transimpedance gain <math>1.0 \times 10^7 \text{ V/A}</math> (@ output load <math>\geq 100 \text{ k}\Omega</math>)</p> <p>Gain accuracy <math>\pm 1 \%</math> (electrical)</p> <p>Conversion gain <math>5.9 \times 10^6 \text{ V/W typ.}</math> (@ 920 nm, output load <math>\geq 100 \text{ k}\Omega</math>)</p> </td></tr> <tr> <td>Frequency Response</td><td> <p>Lower cut-off frequency DC</p> <p>Upper cut-off frequency (–3 dB) 400 kHz</p> <p>Gain flatness <math>\pm 0.5 \text{ dB}</math></p> </td></tr> <tr> <td>Time Response</td><td>Rise/fall time (10 % – 90 %) 900 ns</td></tr> <tr> <td>Input</td><td> <p>Noise equivalent power (NEP) <math>120 \text{ fW}/\sqrt{\text{Hz}}</math> (@ 920 nm, 10 kHz)</p> <p>Optical saturation power <math>1.6 \text{ }\mu\text{W}</math> (for linear amplification, @ 920 nm)</p> <p>Input offset compensation range <math>\pm 300 \text{ nA}</math>, adjustable by offset potentiometer</p> </td></tr> <tr> <td>Detector</td><td> <p>Detector Si-PIN photodiode</p> <p>Active area <math>\varnothing 3.0 \text{ mm}</math></p> <p>Spectral range 320 – 1060 nm</p> <p>Max. sensitivity <math>0.59 \text{ A/W typ.}</math> (@ 920 nm)</p> </td></tr> </table>	Test conditions	$V_s = \pm 15 \text{ V}$ , $T_A = 25 \text{ }^\circ\text{C}$ , output load impedance $1 \text{ M}\Omega$ , warm-up 20 minutes (min. 10 minutes recommended)	Gain	<p>Transimpedance gain <math>1.0 \times 10^7 \text{ V/A}</math> (@ output load <math>\geq 100 \text{ k}\Omega</math>)</p> <p>Gain accuracy <math>\pm 1 \%</math> (electrical)</p> <p>Conversion gain <math>5.9 \times 10^6 \text{ V/W typ.}</math> (@ 920 nm, output load <math>\geq 100 \text{ k}\Omega</math>)</p>	Frequency Response	<p>Lower cut-off frequency DC</p> <p>Upper cut-off frequency (–3 dB) 400 kHz</p> <p>Gain flatness <math>\pm 0.5 \text{ dB}</math></p>	Time Response	Rise/fall time (10 % – 90 %) 900 ns	Input	<p>Noise equivalent power (NEP) <math>120 \text{ fW}/\sqrt{\text{Hz}}</math> (@ 920 nm, 10 kHz)</p> <p>Optical saturation power <math>1.6 \text{ }\mu\text{W}</math> (for linear amplification, @ 920 nm)</p> <p>Input offset compensation range <math>\pm 300 \text{ nA}</math>, adjustable by offset potentiometer</p>	Detector	<p>Detector Si-PIN photodiode</p> <p>Active area <math>\varnothing 3.0 \text{ mm}</math></p> <p>Spectral range 320 – 1060 nm</p> <p>Max. sensitivity <math>0.59 \text{ A/W typ.}</math> (@ 920 nm)</p>
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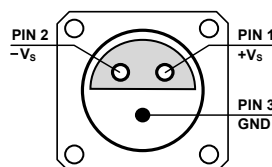
## Low Noise 400 kHz Photoreceiver with Si-PIN Photodiode

### Specifications (continued)

Output	Output voltage range Output impedance Max. output current Output noise	–3 V ... +10 V (@ $\geq 100\text{ k}\Omega$ output load) 50 $\Omega$ (terminate with $\geq 100\text{ k}\Omega$ load) 30 mA (short-circuit proof) 1.6 mV RMS (10 mV peak-peak) typ. (@ $\geq 100\text{ k}\Omega$ load, no signal on detector, measurement bandwidth 1 MHz)
Input Flange	Material	1.4305 stainless steel, nickel-plated
Coupler Ring	Material	1.4305 stainless steel, glass bead blasted
Power Supply	Supply voltage Supply current	$\pm 15\text{ V}$ ( $\pm 14.5\text{ V}$ ... $\pm 16.5\text{ V}$ ) $\pm 40\text{ mA}$ (depends on operating conditions, recommended power supply capability min. $\pm 150\text{ mA}$ )
Case	Weight Material	212 g (0.47 lbs) LCA-S-400K-SI-FST incl. coupler ring AlMg4.5Mn, nickel-plated
Temperature Range	Storage temperature Operating temperature	–30 °C ... +85 °C 0 °C ... +60 °C

Absolute Maximum Ratings	Optical input power (CW) Power supply voltage	10 mW $\pm 20\text{ V}$
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Connectors	Input Output Power supply	1.035"-40 threaded flange for free space applications and for use with various types of optical standard accessories BNC jack (female) LEMO® series 1S, 3-pin fixed socket (mating plug type: FFA.1S.303.CLAC52)
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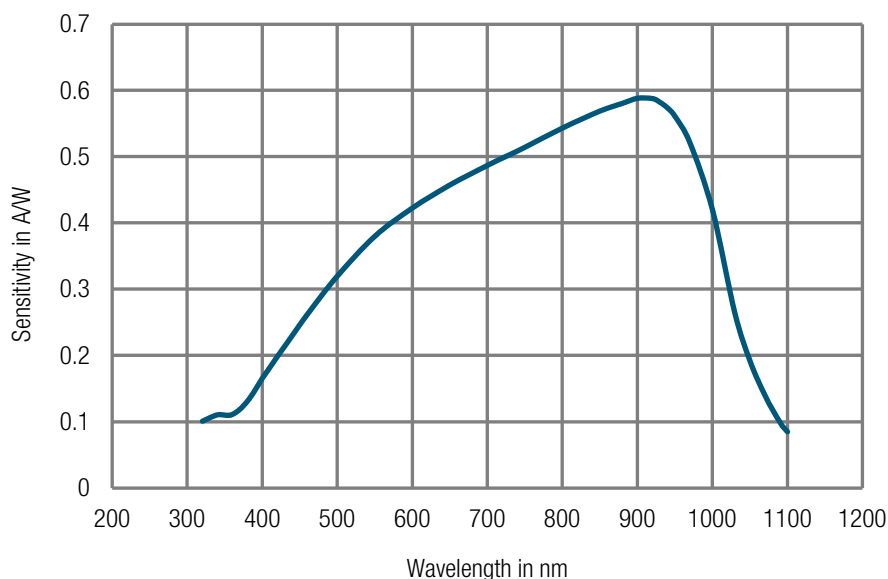
Pin 1: +15 V  
Pin 2: –15 V  
Pin 3: GND

Scope of Delivery	LCA-S-400K-SI, internally threaded coupler ring, LEMO® 3-pin connector, datasheet, transport package
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Ordering Information	LCA-S-400K-SI-FST 1.035"-40 threaded flange for free space applications and for use with various types of optical standard accessories
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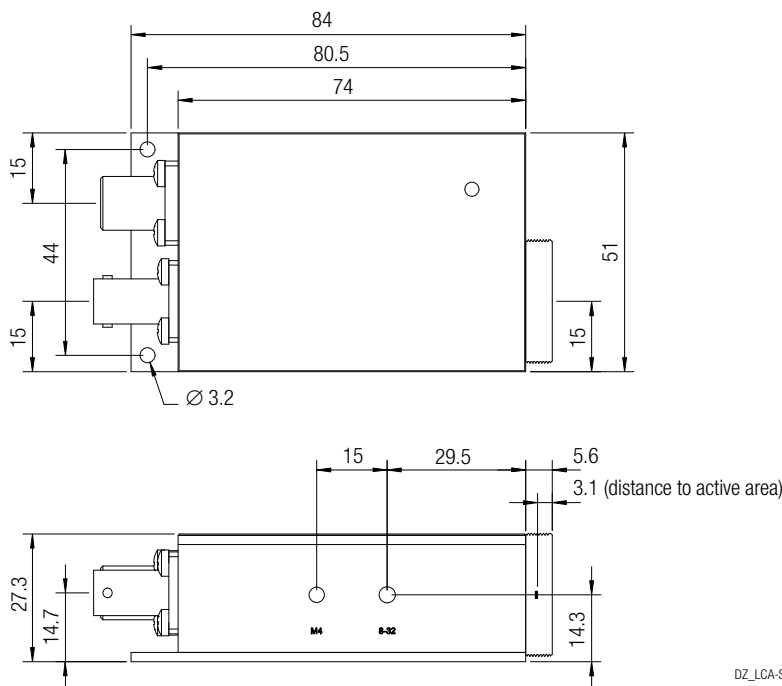
## Low Noise 400 kHz Photoreceiver with Si-PIN Photodiode

Spectral Responsivity



Dimensions

LCA-S-400K-SI-FST (1.035"-40 threaded free space input)



FEMTO Messtechnik GmbH  
Klosterstr. 64  
10179 Berlin · Germany  
Phone: +49 30 280 4711-0  
Fax: +49 30 280 4711-11  
Email: [info@femto.de](mailto:info@femto.de)  
[www.femto.de](http://www.femto.de)

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