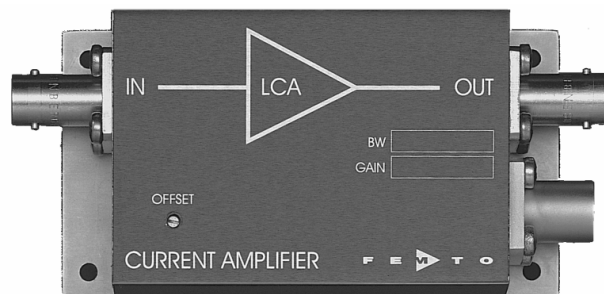




## Datasheet

## LCA-2K-2G

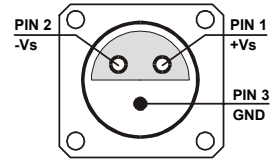
### Ultra-Low-Noise Current Amplifier



Features	<ul style="list-style-type: none"> <li>• <b>Bandwidth and Frequency Response Independent of Detector-Capacitance (up to 10 nF)</b></li> <li>• <b>Extremely Low Noise, 4.5 fA/<math>\sqrt{\text{Hz}}</math> Equivalent Input Noise Current</b></li> <li>• <b>Bandwidth DC ... 2 kHz</b></li> <li>• <b>Transimpedance (Gain) <math>2 \times 10^9</math> V/A</b></li> </ul>																																																				
Applications	<ul style="list-style-type: none"> <li>• <b>Photodiode- and Photomultiplier-Amplifier</b></li> <li>• <b>Spectroscopy</b></li> <li>• <b>Charge-Amplifier</b></li> <li>• <b>Ionisation Detectors</b></li> <li>• <b>Preamplifier for Lock-Ins, A/D-Converters, etc.</b></li> </ul>																																																				
Specifications	<p><i>Test Conditions</i> <span style="float: right;"><math>V_s = \pm 15</math> V, <math>T_a = 25^\circ\text{C}</math></span></p> <table border="0" style="width: 100%;"> <tr> <td style="width: 20%;">Gain</td> <td style="width: 50%;">Transimpedance Accuracy</td> <td style="width: 30%;">2 x 10<sup>9</sup> V/A (&gt;10 k<math>\Omega</math> Load) <math>\pm 1\%</math></td> </tr> <tr> <td rowspan="4">Frequency Response</td> <td>Lower Cut-Off Frequency</td> <td>DC</td> </tr> <tr> <td>Upper Cut-Off Frequency</td> <td>2 kHz (- 3 dB)</td> </tr> <tr> <td>Rise- / Fall-Time</td> <td>200 <math>\mu\text{s}</math> (10% - 90%)</td> </tr> <tr> <td>Gain Flatness</td> <td><math>\pm 0.1</math> dB</td> </tr> <tr> <td rowspan="8">Input</td> <td>Equ. Input Noise Current</td> <td>4.5 fA/<math>\sqrt{\text{Hz}}</math> (@ 300 Hz)</td> </tr> <tr> <td>Equ. Input Noise Voltage</td> <td>8 nV/<math>\sqrt{\text{Hz}}</math> (@ 300 Hz)</td> </tr> <tr> <td>Input Bias Current</td> <td>2 pA typ.</td> </tr> <tr> <td>Input Bias Current Drift</td> <td>Factor 2.3 / 10 K</td> </tr> <tr> <td>Offset Current Compensation</td> <td><math>\pm 1.5</math> nA, Adjustable by Offset-Trimpot</td> </tr> <tr> <td>Max. Input Current</td> <td><math>\pm 5</math> nA (Linear Amplification)</td> </tr> <tr> <td>Input Offset Voltage</td> <td>&lt; 1 mV</td> </tr> <tr> <td>DC Input Impedance</td> <td>50 <math>\Omega</math> (Virtual) // 5 pF</td> </tr> <tr> <td rowspan="3">Output</td> <td>Output Voltage</td> <td><math>\pm 10</math> V (&gt;10 k<math>\Omega</math> Load)</td> </tr> <tr> <td>Output Impedance</td> <td>50 <math>\Omega</math> (Terminate with &gt;10 k<math>\Omega</math> for best Performance)</td> </tr> <tr> <td>Max. Output Current</td> <td><math>\pm 10</math> mA (Linear Amplification)</td> </tr> <tr> <td rowspan="2">Power Supply</td> <td>Supply Voltage</td> <td><math>\pm 15</math> V</td> </tr> <tr> <td>Supply Current</td> <td><math>\pm 45</math> mA typ.</td> </tr> <tr> <td rowspan="2">Case</td> <td>Weight</td> <td>210 gr. (0.5 lbs)</td> </tr> <tr> <td>Material</td> <td>AlMg4.5Mn, nickel-plated</td> </tr> <tr> <td rowspan="2">Temperature Range</td> <td>Storage Temperature</td> <td>-40 ... +100 <math>^\circ\text{C}</math></td> </tr> <tr> <td>Operating Temperature</td> <td>0 ... +60 <math>^\circ\text{C}</math></td> </tr> </table>		Gain	Transimpedance Accuracy	2 x 10 <sup>9</sup> V/A (>10 k $\Omega$ Load) $\pm 1\%$	Frequency Response	Lower Cut-Off Frequency	DC	Upper Cut-Off Frequency	2 kHz (- 3 dB)	Rise- / Fall-Time	200 $\mu\text{s}$ (10% - 90%)	Gain Flatness	$\pm 0.1$ dB	Input	Equ. Input Noise Current	4.5 fA/ $\sqrt{\text{Hz}}$ (@ 300 Hz)	Equ. Input Noise Voltage	8 nV/ $\sqrt{\text{Hz}}$ (@ 300 Hz)	Input Bias Current	2 pA typ.	Input Bias Current Drift	Factor 2.3 / 10 K	Offset Current Compensation	$\pm 1.5$ nA, Adjustable by Offset-Trimpot	Max. Input Current	$\pm 5$ nA (Linear Amplification)	Input Offset Voltage	< 1 mV	DC Input Impedance	50 $\Omega$ (Virtual) // 5 pF	Output	Output Voltage	$\pm 10$ V (>10 k $\Omega$ Load)	Output Impedance	50 $\Omega$ (Terminate with >10 k $\Omega$ for best Performance)	Max. Output Current	$\pm 10$ mA (Linear Amplification)	Power Supply	Supply Voltage	$\pm 15$ V	Supply Current	$\pm 45$ mA typ.	Case	Weight	210 gr. (0.5 lbs)	Material	AlMg4.5Mn, nickel-plated	Temperature Range	Storage Temperature	-40 ... +100 $^\circ\text{C}$	Operating Temperature	0 ... +60 $^\circ\text{C}$
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# Ultra-Low-Noise Current Amplifier

Absolute Maximum Ratings	Input Voltage	$\pm 7\text{ V}$
	Power Supply Voltage	$\pm 22\text{ V}$
Connectors	Input	BNC
	Output	BNC
	Power Supply	LEMO Series 1S, 3-pin Fixed Socket
		Pin 1: +15V Pin 2: -15V Pin 3: GND



**Application Diagrams**

Photo Detector Biasing in Photovoltaic Mode:  
Use for Low Speed Applications and Minimum Dark Current.

The diagram shows a photo detector connected to the 'CURRENT INPUT' of the LCA. The detector's anode is connected to ground, and its cathode is connected to the LCA's current input. The LCA is labeled 'Ultra-Low-Noise Current to Voltage Converter' and contains an 'I/U' block. The LCA is powered by +Vs and -Vs.

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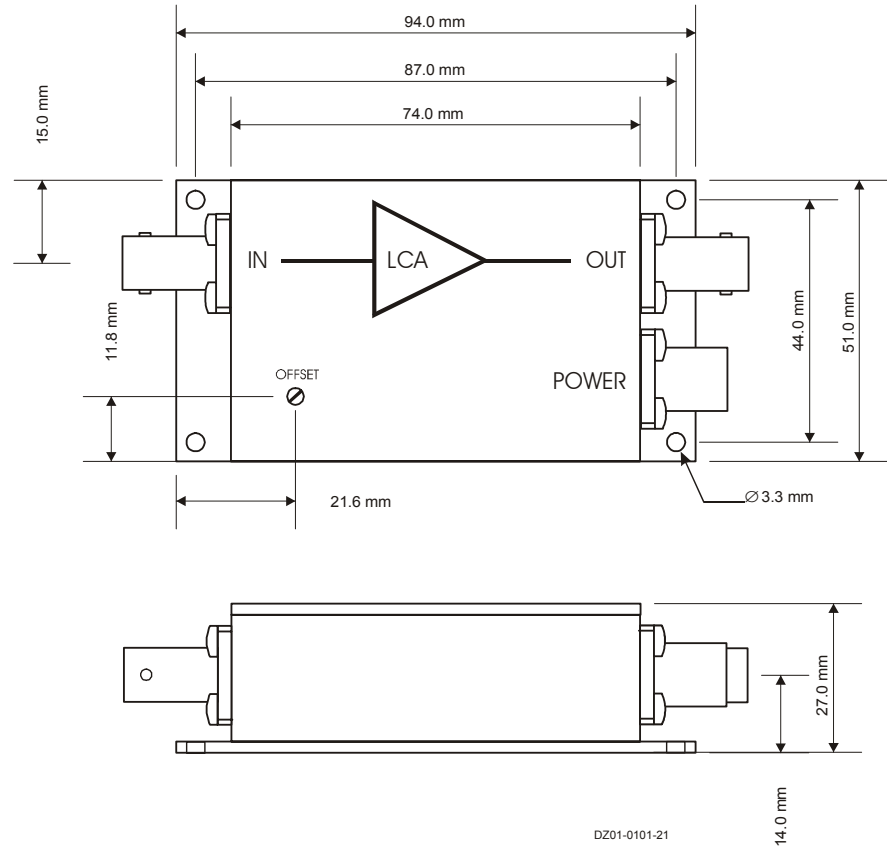
Photo Detector Biasing in Photoconductive Mode:  
Use for Fast Applications and if More Dark Current is Tolerable.  
Bias Voltage Decreases Detector Capacitance.

The diagram shows a photo detector connected to the 'CURRENT INPUT' of the LCA. The detector's anode is connected to a '+ BIAS VOLTAGE' source through a bypass capacitor. The detector's cathode is connected to ground. The LCA is labeled 'Ultra-Low-Noise Current to Voltage Converter' and contains an 'I/U' block. The LCA is powered by +Vs and -Vs. A note indicates: 'Use additional Bypass Capacitor close to the Detector (~100 nF, Ceramic)'. The LCA is labeled 'LCA'.

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# Ultra-Low-Noise Current Amplifier

Dimensions



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