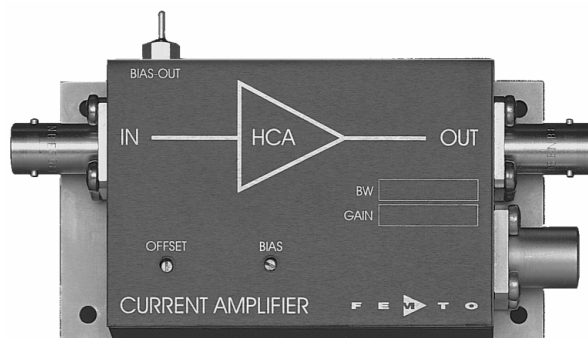
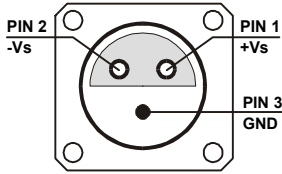


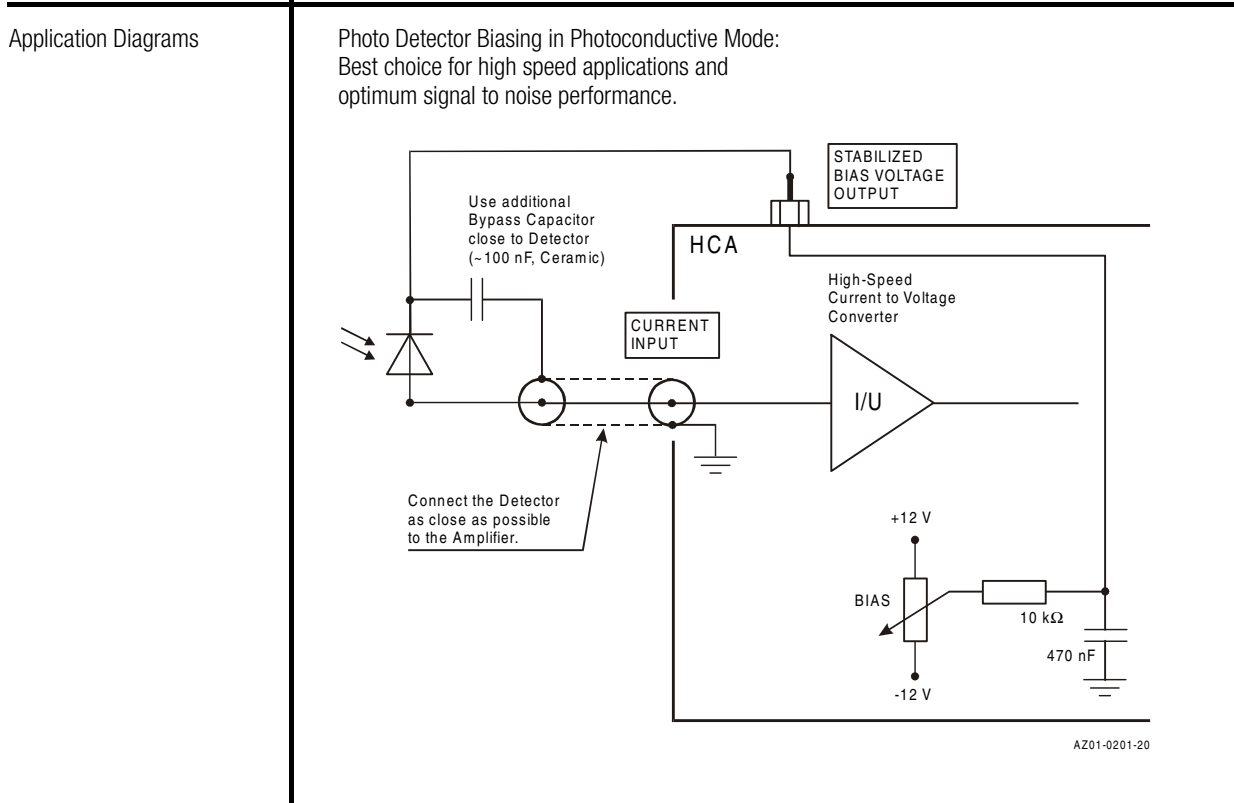
# High Speed Current Amplifier



<p>Features</p>	<ul style="list-style-type: none"> <li>• <b>Bandwidth DC ... 100 MHz</b></li> <li>• <b>Transimpedance (Gain) <math>5 \times 10^4</math> V/A</b></li> <li>• <b>Suitable for High Source Capacitance up to 20 pF</b></li> <li>• <b>Low Equivalent Input Noise Current of 3.8 pA/√Hz</b></li> </ul>																																																						
<p>Applications</p>	<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>																																																						
<p>Specifications</p>	<table border="0"> <tr> <td></td> <td><i>Test Conditions</i></td> <td><i>V<sub>s</sub> = ± 15 V, T<sub>a</sub> = 25°C</i></td> </tr> <tr> <td rowspan="2">Gain</td> <td>Transimpedance</td> <td><math>5 \times 10^4</math> V/A (@ 50 Ω load)</td> </tr> <tr> <td>Gain Accuracy</td> <td>± 2 %</td> </tr> <tr> <td rowspan="5">Frequency Response</td> <td>Lower Cut-Off Frequency</td> <td>DC</td> </tr> <tr> <td>Upper Cut-Off Frequency (- 3 dB)</td> <td>100 MHz (± 10 %, @ C<sub>source</sub> 2 to 10 pF)</td> </tr> <tr> <td></td> <td>80 MHz (± 10 %, @ C<sub>source</sub> 11 to 20 pF)</td> </tr> <tr> <td>Max. Source Capacitance</td> <td>20 pF (incl. cable, e.g. typical coax cable 1 pF/cm)</td> </tr> <tr> <td>Rise / Fall Time (10 % - 90 %)</td> <td>3.4 ns (@ C<sub>source</sub> 2 to 10 pF) 4.0 ns (@ C<sub>source</sub> 11 to 20 pF)</td> </tr> <tr> <td></td> <td>Gain Flatness</td> <td>± 0.3 dB</td> </tr> <tr> <td rowspan="10">Input</td> <td>Equ. Input Noise Current</td> <td>3.8 pA/√Hz (@ 10 MHz)</td> </tr> <tr> <td>Equ. Input Noise Voltage</td> <td>0.9 nV/√Hz (@ 10 MHz)</td> </tr> <tr> <td>Equ. Integrated Noise</td> <td>0.6 μA peak-peak</td> </tr> <tr> <td>Input Bias Current</td> <td>12 μA typ.</td> </tr> <tr> <td>Input Bias Current Drift</td> <td>3 nA / °C</td> </tr> <tr> <td>Offset Current Compensation</td> <td>± 40 μA adjustable by offset trimpot</td> </tr> <tr> <td>Input Current Range</td> <td>± 30 μA (for linear amplification)</td> </tr> <tr> <td>Input Offset Voltage</td> <td>&lt; 1 mV</td> </tr> <tr> <td>DC Input Impedance</td> <td>56 Ω (virtual) // 5 pF</td> </tr> <tr> <td rowspan="3">Output</td> <td>Output Voltage Range</td> <td>± 1.5 V (@ 50 Ω load) for linear operation and low harmonic distortion</td> </tr> <tr> <td>Max. Output Voltage Range</td> <td>± 1.7 V (@ 50 Ω load)</td> </tr> <tr> <td>Output Impedance</td> <td>50 Ω (terminate with 50 Ω load for best performance)</td> </tr> <tr> <td rowspan="2">Bias Output</td> <td>Bias Output Voltage Range</td> <td>± 12 V, adjustable by bias trimpot</td> </tr> <tr> <td>Bias Output Impedance</td> <td>10 kΩ // 1 μF</td> </tr> </table>			<i>Test Conditions</i>	<i>V<sub>s</sub> = ± 15 V, T<sub>a</sub> = 25°C</i>	Gain	Transimpedance	$5 \times 10^4$ V/A (@ 50 Ω load)	Gain Accuracy	± 2 %	Frequency Response	Lower Cut-Off Frequency	DC	Upper Cut-Off Frequency (- 3 dB)	100 MHz (± 10 %, @ C <sub>source</sub> 2 to 10 pF)		80 MHz (± 10 %, @ C <sub>source</sub> 11 to 20 pF)	Max. Source Capacitance	20 pF (incl. cable, e.g. typical coax cable 1 pF/cm)	Rise / Fall Time (10 % - 90 %)	3.4 ns (@ C <sub>source</sub> 2 to 10 pF) 4.0 ns (@ C <sub>source</sub> 11 to 20 pF)		Gain Flatness	± 0.3 dB	Input	Equ. Input Noise Current	3.8 pA/√Hz (@ 10 MHz)	Equ. Input Noise Voltage	0.9 nV/√Hz (@ 10 MHz)	Equ. Integrated Noise	0.6 μA peak-peak	Input Bias Current	12 μA typ.	Input Bias Current Drift	3 nA / °C	Offset Current Compensation	± 40 μA adjustable by offset trimpot	Input Current Range	± 30 μA (for linear amplification)	Input Offset Voltage	< 1 mV	DC Input Impedance	56 Ω (virtual) // 5 pF	Output	Output Voltage Range	± 1.5 V (@ 50 Ω load) for linear operation and low harmonic distortion	Max. Output Voltage Range	± 1.7 V (@ 50 Ω load)	Output Impedance	50 Ω (terminate with 50 Ω load for best performance)	Bias Output	Bias Output Voltage Range	± 12 V, adjustable by bias trimpot	Bias Output Impedance	10 kΩ // 1 μF
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## High Speed Current Amplifier

Specifications (continued)	<p>Power Supply</p> <p>Supply Voltage                    <math>\pm 15\text{ V}</math>                  Supply Current                    <math>\pm 50\text{ mA typ.}</math>                  (depends on operating conditions, recommended power supply capability minimum <math>\pm 150\text{ mA}</math>)</p> <p>Case</p> <p>Weight                                210 g (0.5 lbs)                  Material                             AlMg4.5Mn, nickel-plated</p> <p>Temperature Range</p> <p>Storage Temperature            <math>-40 \dots +100\text{ }^\circ\text{C}</math>                  Operating Temperature        <math>0 \dots +60\text{ }^\circ\text{C}</math></p>
Absolute Maximum Ratings	<p>Input Voltage                      <math>\pm 5\text{ V}</math>                  Power Supply Voltage           <math>\pm 22\text{ V}</math></p>
Connectors	<p>Input                                BNC                  Output                              BNC                  Power Supply                    LEMO series 1S, 3-pin fixed socket                  Pin 1:    + 15V                  Pin 2:    - 15V                  Pin 3:    GND</p> 

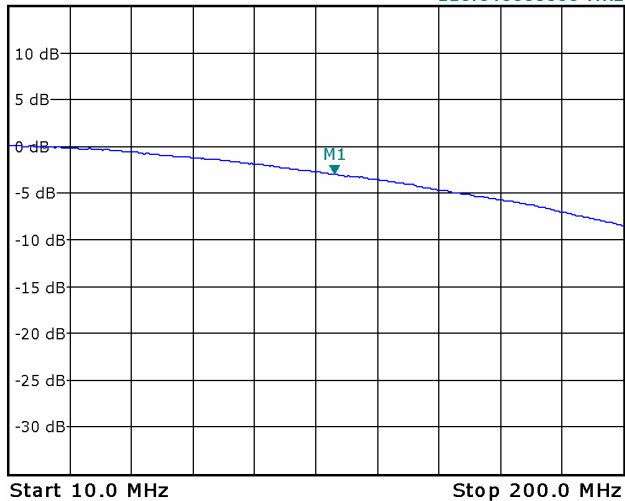


# High Speed Current Amplifier

Typical Performance Characteristics

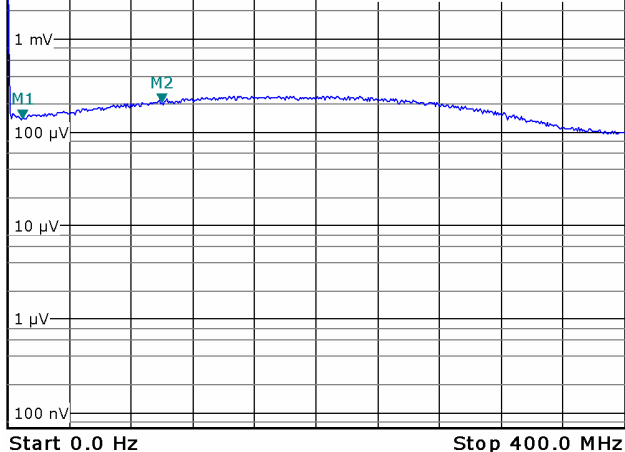
## Frequency Response

Offs 3.3 dB RBW 3 MHz  
 Att 0 dB \* VBW 1 kHz M1[1] -2.94 dB  
 Ref -26.7 dBm SWT 320ms 110.64000000 MHz



## Noise Spectrum

\* RBW 1 MHz  
 Att 0 dB \* VBW 1 kHz Noise1 189.508338 nV/√Hz  
 Ref 7.1 mV SWT 800ms Noise2 273.193149 nV/√Hz



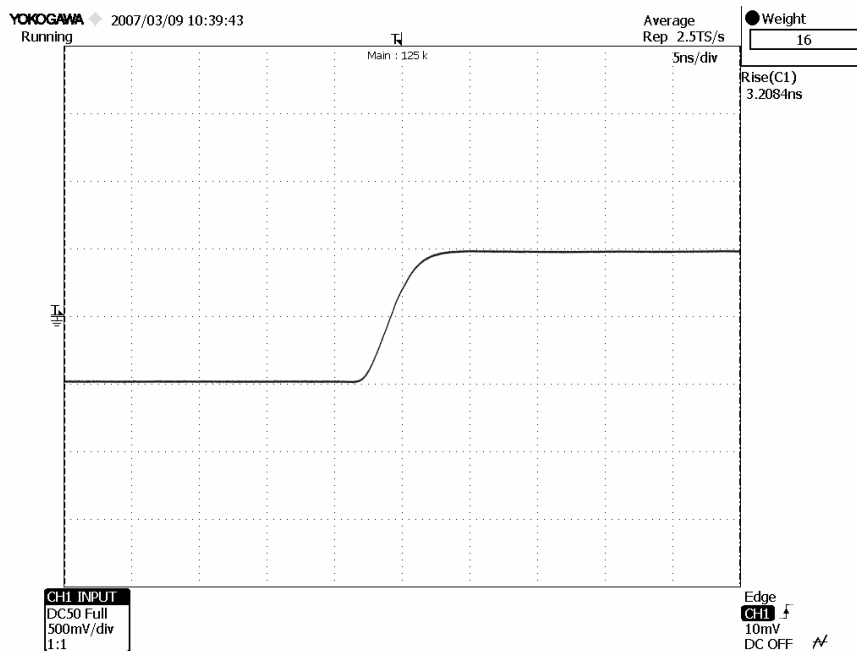
Note: Spectral noise data is measured at the amplifier output with open but shielded input. To determine the spectral input noise divide the measured output noise by the amplifier gain of  $5 \times 10^4$  V/A, i.e.:

Marker	Frequency	Output Noise	Resulting Input Noise
1	10 MHz	190 nV/√Hz	3.8 pA/√Hz
2	100 MHz	273 nV/√Hz	5.5 pA/√Hz

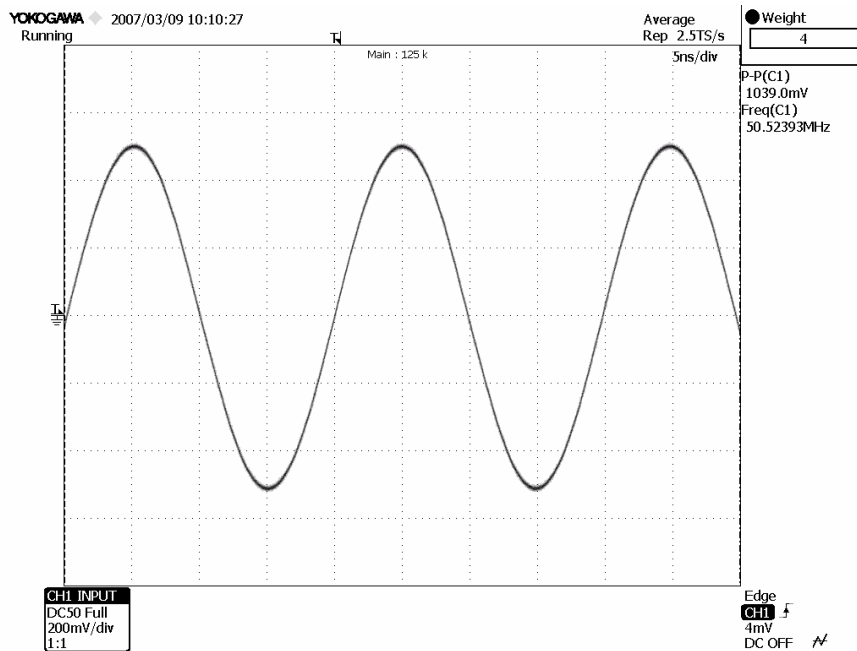
# High Speed Current Amplifier

Typical Performance Characteristics (continued)

Pulse Response to Square Wave Input Signal (with 16 times averaging)



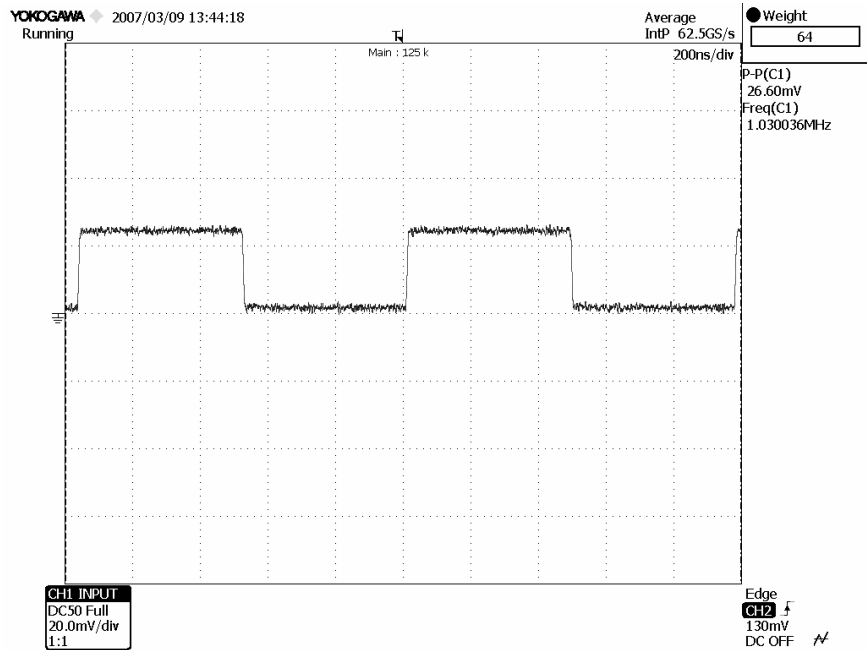
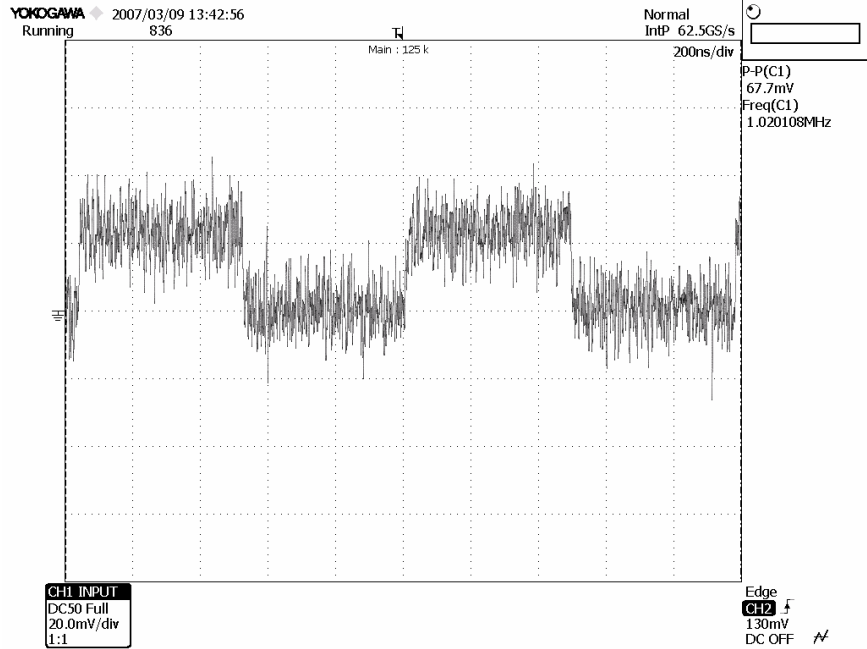
Large Signal Response output signal for 50 MHz, 20  $\mu$ A peak-peak input signal (with 4 times averaging)



# High Speed Current Amplifier

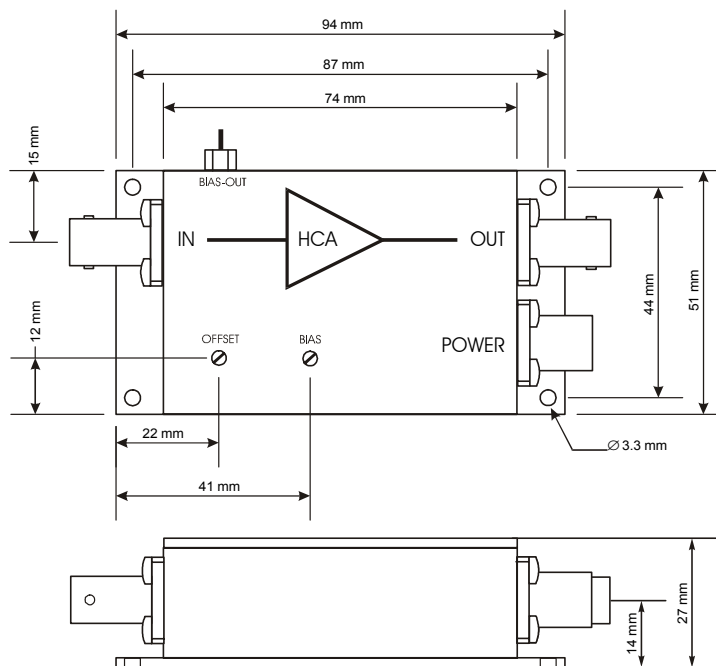
Typical Performance Characteristics (continued)

Small Signal Response  
output signal for 1 MHz, 500 nA peak-peak square wave input signal  
(without (top) and with 64 times averaging (bottom))



# High Speed Current Amplifier

Dimensions



DZ01-0201-22

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