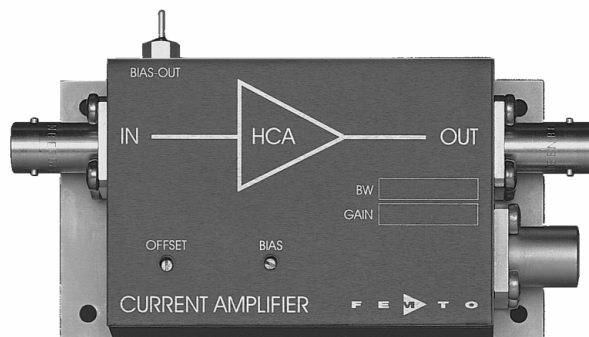




Datasheet

HCA-200M-20K-C

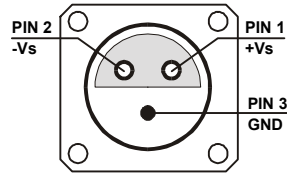
High Speed Current Amplifier



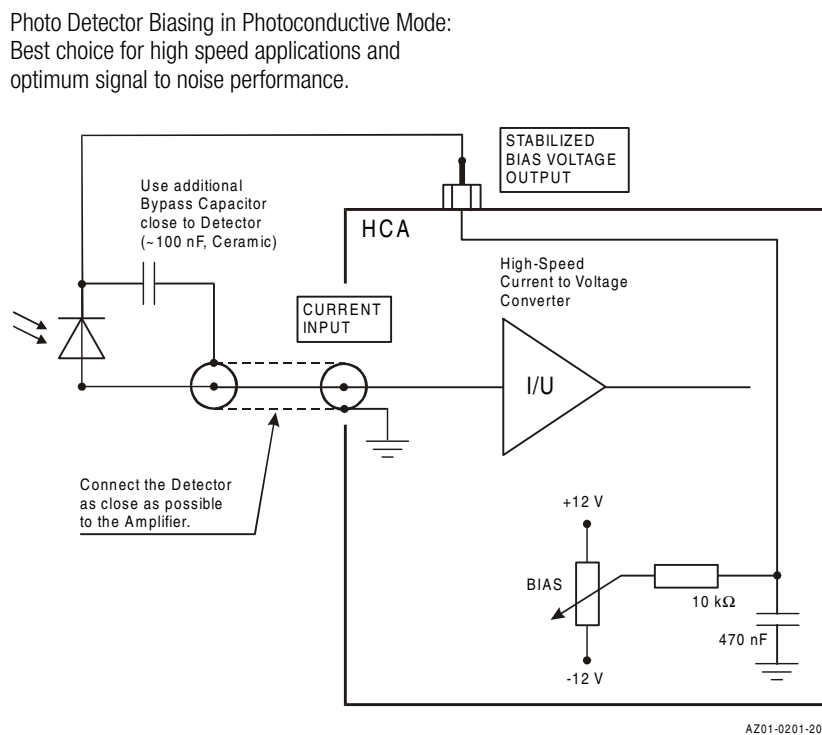
Features	<ul style="list-style-type: none"> • Bandwidth DC ... 200 MHz • Transimpedance (Gain) 2×10^4 V/A • Suitable for Source Capacitance up to 8 pF • Low Equivalent Input Noise Current of $4.9 \text{ pA}/\sqrt{\text{Hz}}$ 																																																											
Applications	<ul style="list-style-type: none"> • Photodiode and Photomultiplier Amplifier • Spectroscopy • Charge Amplifier • Ionisation Detectors • Preamplifier for Lock-Ins, A/D Converters, etc. 																																																											
Specifications	<table border="0"> <tr> <td></td> <td><i>Test Conditions</i></td> <td><i>$V_s = \pm 15 \text{ V}, T_a = 25^\circ\text{C}$</i></td> </tr> <tr> <td rowspan="2">Gain</td> <td>Transimpedance</td> <td>$2 \times 10^4 \text{ V/A}$ (@ 50 Ω load)</td> </tr> <tr> <td>Gain Accuracy</td> <td>$\pm 2 \%$</td> </tr> <tr> <td rowspan="5">Frequency Response</td> <td>Lower Cut-Off Frequency</td> <td>DC</td> </tr> <tr> <td rowspan="2">Upper Cut-Off Frequency (- 3 dB)</td> <td>200 MHz</td> <td>($\pm 10 \%$, @ Csource 2 to 4 pF)</td> </tr> <tr> <td>170 MHz</td> <td>($\pm 10 \%$, @ Csource 5 to 8 pF)</td> </tr> <tr> <td>Max. Source Capacitance</td> <td>8 pF</td> <td>(incl. cable, e.g. typical coax cable 1 pF/cm)</td> </tr> <tr> <td rowspan="2">Rise / Fall Time (10 % - 90 %)</td> <td>1.9 ns</td> <td>(@ Csource 2 to 4 pF)</td> </tr> <tr> <td>2.2 ns</td> <td>(@ Csource 5 to 8 pF)</td> </tr> <tr> <td></td> <td>Gain Flatness</td> <td>$\pm 0.3 \text{ dB}$</td> </tr> <tr> <td rowspan="10">Input</td> <td>Equ. Input Noise Current</td> <td>$4.9 \text{ pA}/\sqrt{\text{Hz}}$ (@ 10 MHz)</td> </tr> <tr> <td>Equ. Input Noise Voltage</td> <td>$0.9 \text{ nV}/\sqrt{\text{Hz}}$ (@ 10 MHz)</td> </tr> <tr> <td>Equ. Integrated Noise</td> <td>1.0 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 / $^\circ\text{C}$</td> </tr> <tr> <td>Offset Current Compensation</td> <td>$\pm 100 \mu\text{A}$ adjustable by offset trimpot</td> </tr> <tr> <td>Input Current Range</td> <td>$\pm 60 \mu\text{A}$ (for linear amplification)</td> </tr> <tr> <td>Input Offset Voltage</td> <td>< 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>$\pm 1.2 \text{ V}$ (@ 50 Ω load) for linear operation and low harmonic distortion</td> </tr> <tr> <td>Max. Output Voltage Range</td> <td>$\pm 1.7 \text{ V}$ (@ 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>$\pm 12 \text{ V}$, 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>$V_s = \pm 15 \text{ V}, T_a = 25^\circ\text{C}$</i>	Gain	Transimpedance	$2 \times 10^4 \text{ V/A}$ (@ 50 Ω load)	Gain Accuracy	$\pm 2 \%$	Frequency Response	Lower Cut-Off Frequency	DC	Upper Cut-Off Frequency (- 3 dB)	200 MHz	($\pm 10 \%$, @ Csource 2 to 4 pF)	170 MHz	($\pm 10 \%$, @ Csource 5 to 8 pF)	Max. Source Capacitance	8 pF	(incl. cable, e.g. typical coax cable 1 pF/cm)	Rise / Fall Time (10 % - 90 %)	1.9 ns	(@ Csource 2 to 4 pF)	2.2 ns	(@ Csource 5 to 8 pF)		Gain Flatness	$\pm 0.3 \text{ dB}$	Input	Equ. Input Noise Current	$4.9 \text{ pA}/\sqrt{\text{Hz}}$ (@ 10 MHz)	Equ. Input Noise Voltage	$0.9 \text{ nV}/\sqrt{\text{Hz}}$ (@ 10 MHz)	Equ. Integrated Noise	1.0 μA peak-peak	Input Bias Current	12 μA typ.	Input Bias Current Drift	3 nA / $^\circ\text{C}$	Offset Current Compensation	$\pm 100 \mu\text{A}$ adjustable by offset trimpot	Input Current Range	$\pm 60 \mu\text{A}$ (for linear amplification)	Input Offset Voltage	< 1 mV	DC Input Impedance	56 Ω (virtual) // 5 pF	Output	Output Voltage Range	$\pm 1.2 \text{ V}$ (@ 50 Ω load) for linear operation and low harmonic distortion	Max. Output Voltage Range	$\pm 1.7 \text{ V}$ (@ 50 Ω load)	Output Impedance	50 Ω (terminate with 50 Ω load for best performance)	Bias Output	Bias Output Voltage Range	$\pm 12 \text{ V}$, adjustable by bias trimpot	Bias Output Impedance	10 k Ω // 1 μF
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High Speed Current Amplifier

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



Application Diagrams

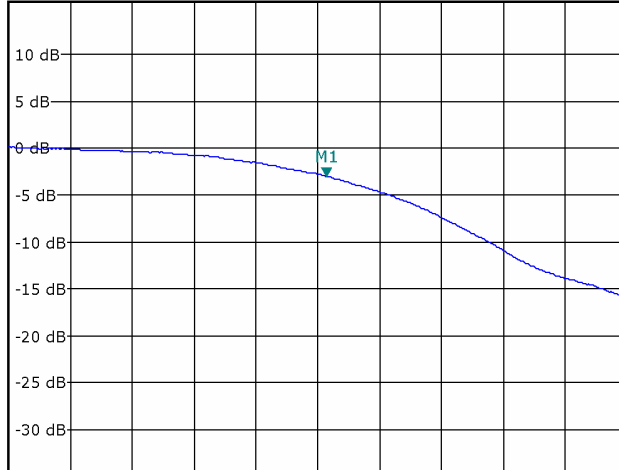


High Speed Current Amplifier

Typical Performance Characteristics

Frequency Response

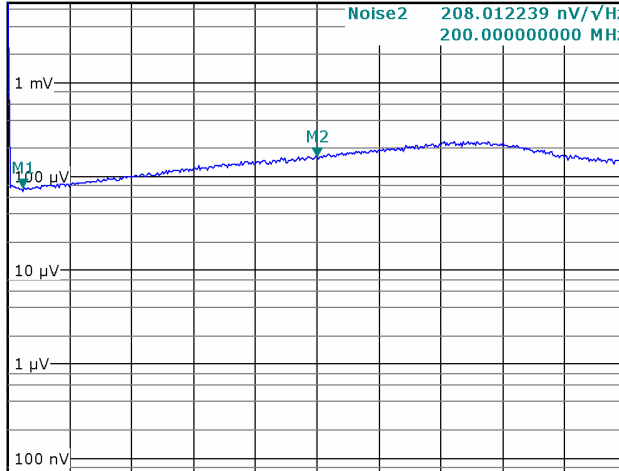
Offs 5.1 dB RBW 3 MHz
 Att 0 dB * VBW 1 kHz M1[1] -3.00 dB
 Ref -23.4 dBm SWT 660ms 210.48000000 MHz



Start 10.0 MHz Stop 400.0 MHz

Noise Spectrum

* RBW 1 MHz
 Att 0 dB * VBW 1 kHz Noise1 96.560999 nV/√Hz
 Ref 7.1 mV SWT 800ms 10.00000000 MHz
 Noise2 208.012239 nV/√Hz
 200.00000000 MHz



Start 0.0 Hz Stop 400.0 MHz

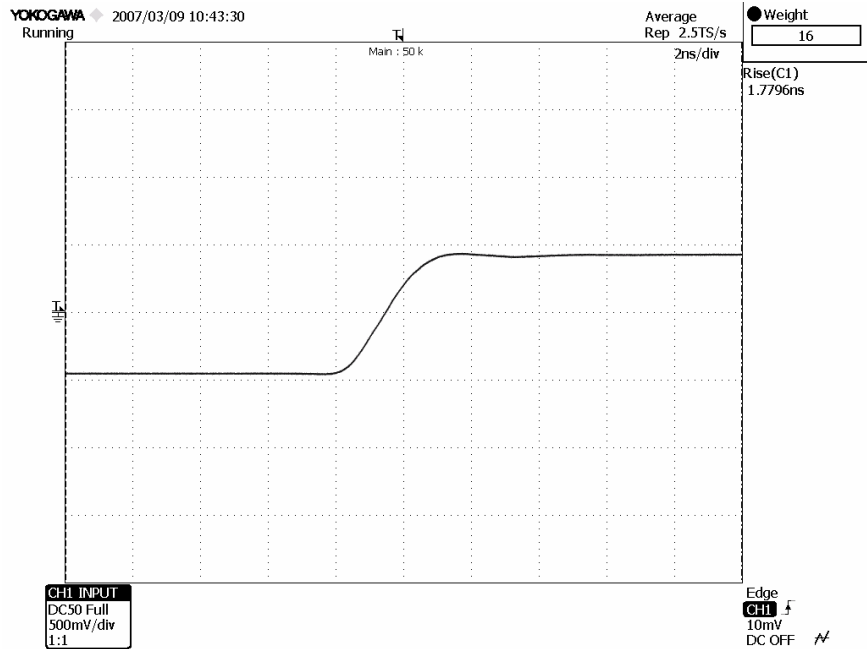
Note: Spectral noise data is measured at the amplifier output with open but shielded input. To determine the spectral input noise divide the measured output noise by the amplifier gain of 2×10^4 V/A, i.e.:

Marker	Frequency	Output Noise	Resulting Input Noise
1	10 MHz	97 nV/√Hz	4.9 pA/√Hz
2	200 MHz	208 nV/√Hz	10.4 pA/√Hz

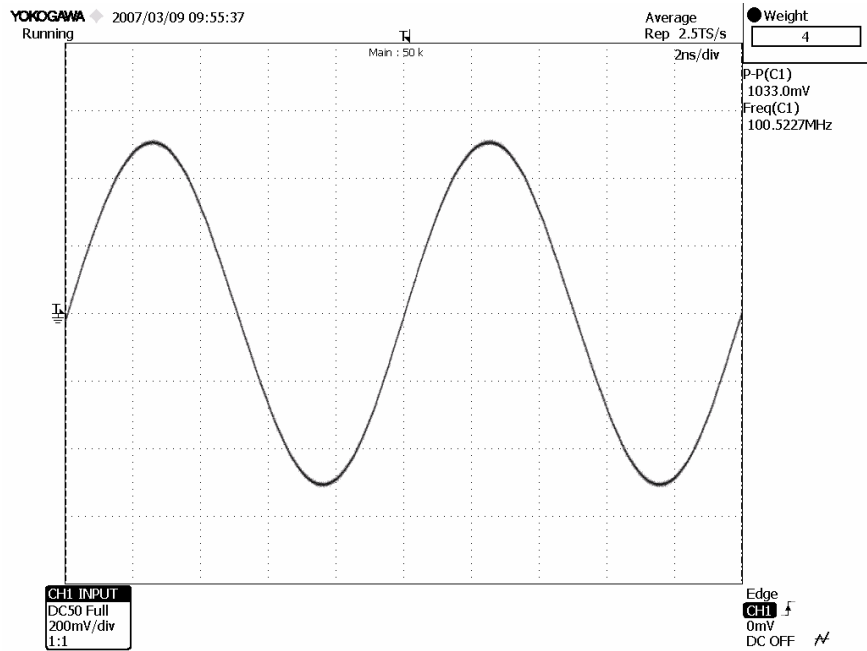
High Speed Current Amplifier

Typical Performance Characteristics (continued)

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



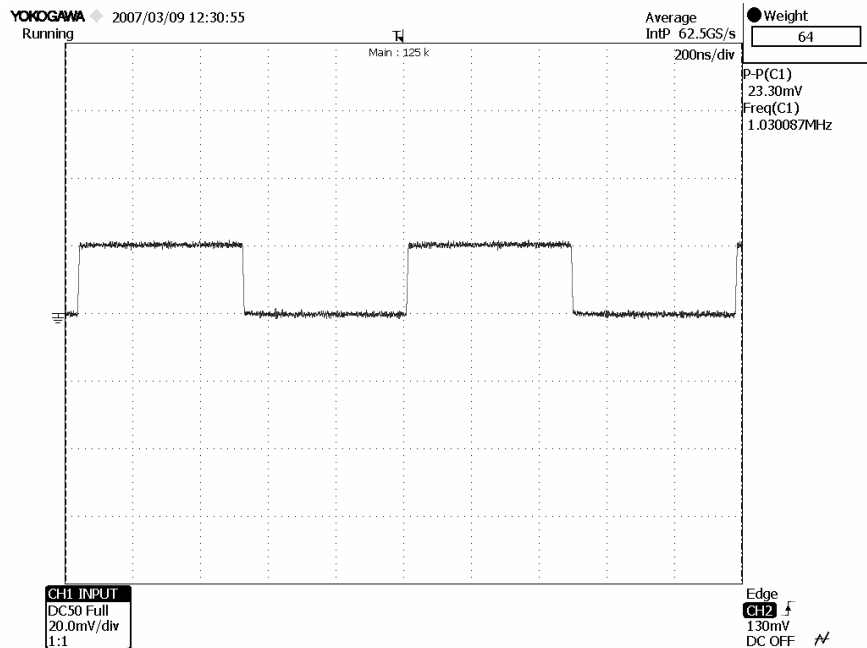
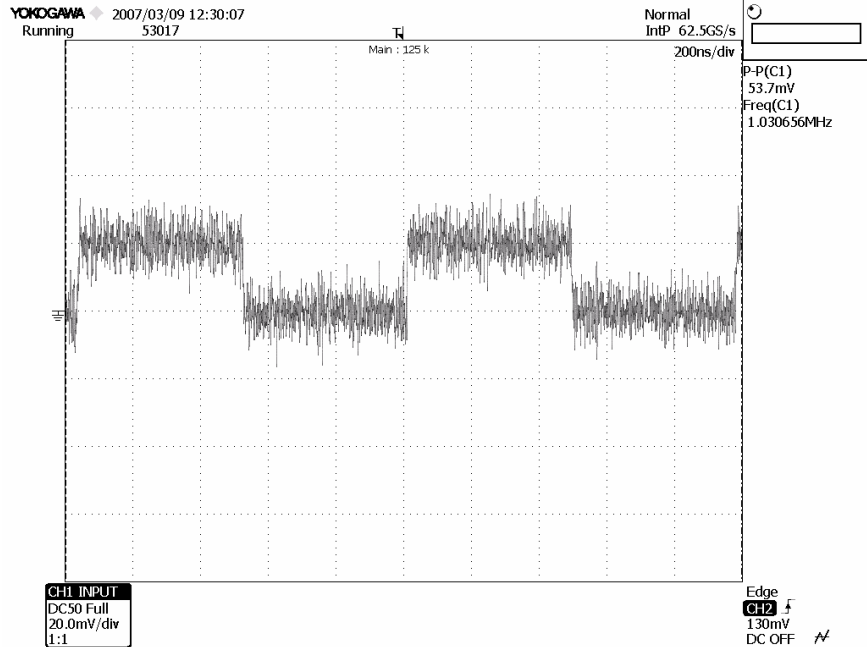
Large Signal Response output signal for 100 MHz, 50 μ A peak-peak input signal (with 4 times averaging)



High Speed Current Amplifier

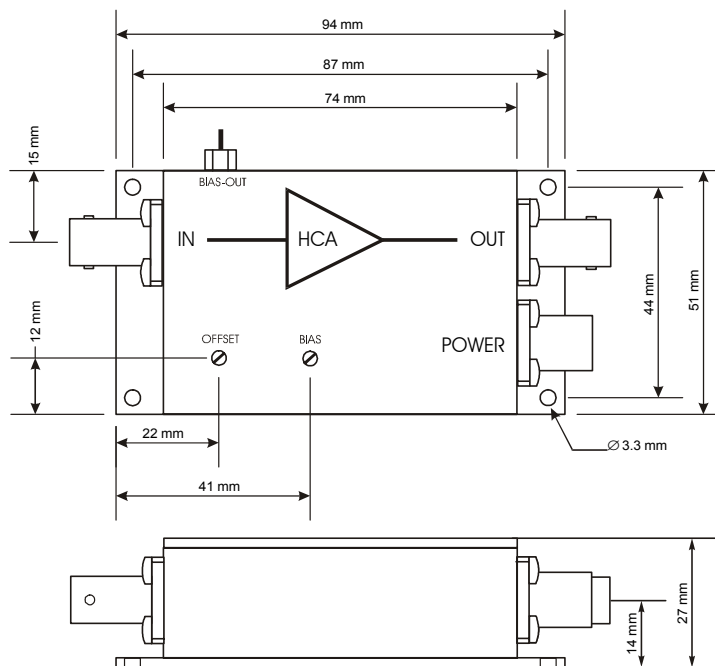
Typical Performance Characteristics (continued)

Small Signal Response
output signal for 1 MHz, 1 μ A 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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