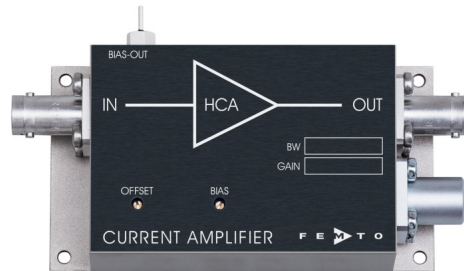


HCA-400M-5K-C

High-Speed Current Amplifier



Features	<ul style="list-style-type: none"> • Bandwidth DC ... 400 MHz • Rise / Fall Time 1 ns • Optimized for Low Pulse Distortion – Almost No Overshoot or Ringing will Occur • Transimpedance (Gain) 5×10^3 V/A 												
Applications	<ul style="list-style-type: none"> • Photodiode and Photomultiplier Amplifier • Spectroscopy • Ionisation Detectors • Ideal for Analyzing Digital Signals (No Baseline Shift at any Digital Code) • Preamplifier for A/D Converters, Digitizers etc. 												
Specifications	<table border="0"> <tr> <td>Test Conditions</td> <td>$V_s = \pm 15$ V, $T_a = 25^\circ\text{C}$</td> </tr> <tr> <td>Gain</td> <td> Transimpedance 5×10^3 V/A (@ 50 Ω load) Gain Accuracy $\pm 2\%$ </td> </tr> <tr> <td>Frequency Response</td> <td> Lower Cut-Off Frequency DC Upper Cut-Off Frequency (-3 dB) 400 MHz ($\pm 10\%$, @ Csource 2 to 4 pF) 350 MHz ($\pm 10\%$, @ Csource 5 to 10 pF) Max. Source Capacitance 10 pF (incl. cable, e.g. typical coax cable 1 pF/cm) Rise / Fall Time (10% - 90%) 1.0 ns (@ Csource 2 to 4 pF) 1.3 ns (@ Csource 5 to 10 pF) Gain Flatness ± 0.3 dB </td> </tr> <tr> <td>Input</td> <td> Equ. Input Noise Current 21 pA/$\sqrt{\text{Hz}}$ (@ 100 MHz) Equ. Input Noise Voltage 3.5 nV/$\sqrt{\text{Hz}}$ (@ 100 MHz) Equ. Integrated Noise 4 μA peak-peak (independent of Csource) Input Bias Current 2 μA typ. Input Bias Current Drift 0.07 $\mu\text{A} / ^\circ\text{C}$ Offset Current Compensation ± 200 μA, adjustable by offset trimpot Input Current Range ± 200 μA (for linear amplification) Input Offset Voltage < 2 mV DC Input Impedance 50 Ω (virtual) // 5 pF </td> </tr> <tr> <td>Output</td> <td> Output Voltage Range ± 1.0 V (@ 50 Ω load) for linear operation and low harmonic distortion Max. Output Voltage Range ± 1.5 V (@ 50 Ω load) Output Impedance 50 Ω (terminate with 50 Ω load for best performance) </td> </tr> <tr> <td>Bias Output</td> <td> Bias Output Voltage Range ± 12 V, adjustable by bias trimpot Bias Output Impedance 10 kΩ // 1 μF </td> </tr> </table>	Test Conditions	$V_s = \pm 15$ V, $T_a = 25^\circ\text{C}$	Gain	Transimpedance 5×10^3 V/A (@ 50 Ω load) Gain Accuracy $\pm 2\%$	Frequency Response	Lower Cut-Off Frequency DC Upper Cut-Off Frequency (-3 dB) 400 MHz ($\pm 10\%$, @ Csource 2 to 4 pF) 350 MHz ($\pm 10\%$, @ Csource 5 to 10 pF) Max. Source Capacitance 10 pF (incl. cable, e.g. typical coax cable 1 pF/cm) Rise / Fall Time (10% - 90%) 1.0 ns (@ Csource 2 to 4 pF) 1.3 ns (@ Csource 5 to 10 pF) Gain Flatness ± 0.3 dB	Input	Equ. Input Noise Current 21 pA/ $\sqrt{\text{Hz}}$ (@ 100 MHz) Equ. Input Noise Voltage 3.5 nV/ $\sqrt{\text{Hz}}$ (@ 100 MHz) Equ. Integrated Noise 4 μA peak-peak (independent of Csource) Input Bias Current 2 μA typ. Input Bias Current Drift 0.07 $\mu\text{A} / ^\circ\text{C}$ Offset Current Compensation ± 200 μA , adjustable by offset trimpot Input Current Range ± 200 μA (for linear amplification) Input Offset Voltage < 2 mV DC Input Impedance 50 Ω (virtual) // 5 pF	Output	Output Voltage Range ± 1.0 V (@ 50 Ω load) for linear operation and low harmonic distortion Max. Output Voltage Range ± 1.5 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 k Ω // 1 μF
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SOPHISTICATED TOOLS FOR SIGNAL RECOVERY

F E M T O

DE-HCA-400M-5K-C_R4/JM/18MAR2019

HCA-400M-5K-C

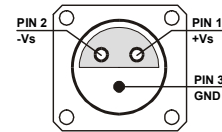
High-Speed Current Amplifier

Specifications (continued)

Power Supply	Supply Voltage Supply Current	± 15 V ± 60 mA typ. (depends on operating conditions, recommended power supply capability minimum ± 150 mA)
Case	Weight Material	210 g (0.5 lbs) AlMg4.5Mn, nickel-plated
Temperature Range	Storage Temperature Operating Temperature	$-40 \dots +100$ °C $0 \dots +60$ °C

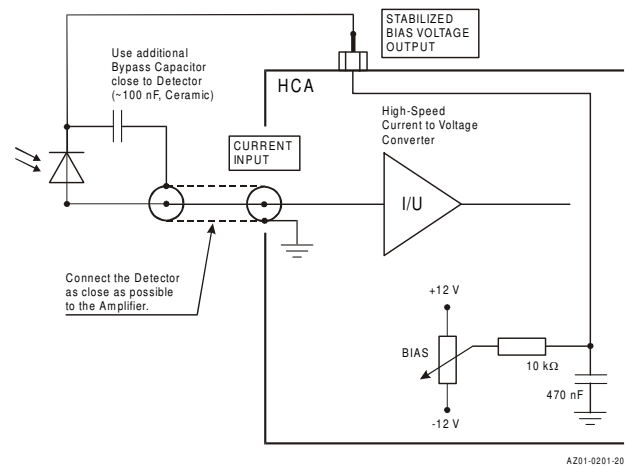
Absolute Maximum Ratings	Input Voltage Power Supply Voltage	± 5 V ± 22 V
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Connectors	Input Output Power Supply	BNC BNC LEMO series 1S, 3-pin fixed socket Pin 1: +15V Pin 2: -15V Pin 3: GND
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Application Diagrams

Photo Detector Biasing in Photoconductive Mode:
Best choice for high speed applications and optimum signal to noise performance.



SOPHISTICATED TOOLS FOR SIGNAL RECOVERY

F E M T O

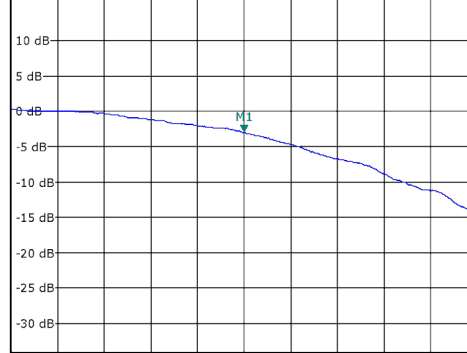
HCA-400M-5K-C

High-Speed Current Amplifier

Typical Performance
Characteristics

Frequency Response

Offs 16.0 dB RBW 3 MHz
Att 0 dB * VBW 10 kHz M1[1] -2.94 dB
Ref -4.0 dBm SWT 130ms 410.000000000 MHz

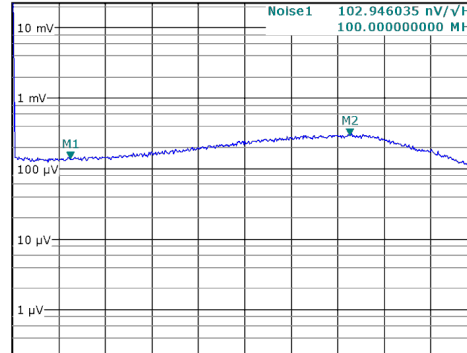


Start 20.0 MHz

Stop 800.0 MHz

Noise Spectrum

Att 0 dB RBW 3 MHz
Ref 22.4 nV * VBW 3 kHz Noise2 219.730591 nV/√Hz
SWT 180ms 580.000000000 MHz



Start 0.0 Hz

Stop 800.0 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 5×10^3 V/A, i.e.:

Marker	Frequency	Output Noise	Resulting Input Noise
1	100 MHz	103 nV/√Hz	21 pA/√Hz
2	580 MHz	220 nV/√Hz	44 pA/√Hz

SOPHISTICATED TOOLS FOR SIGNAL RECOVERY

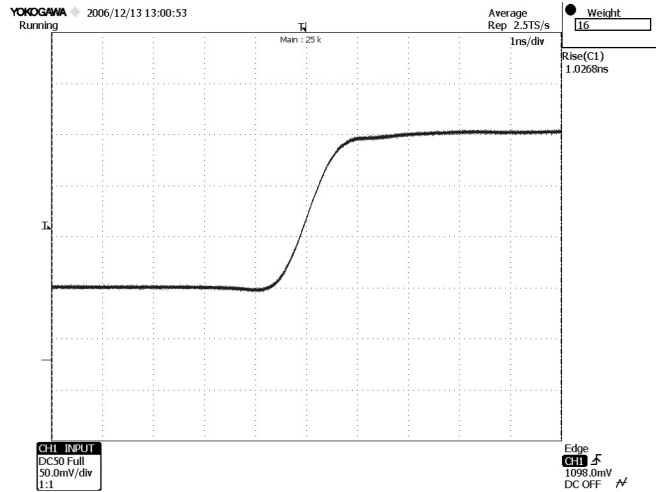
F E M T O

HCA-400M-5K-C

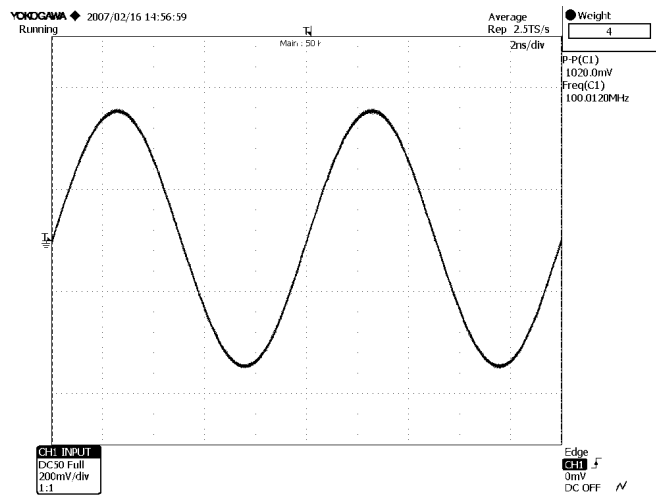
High-Speed Current Amplifier

Typical Performance
Characteristics
(continued)

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



Large Signal Response
output signal for 100 MHz, 200 μ A peak-peak input signal
(with 4 times averaging)



SOPHISTICATED TOOLS FOR SIGNAL RECOVERY

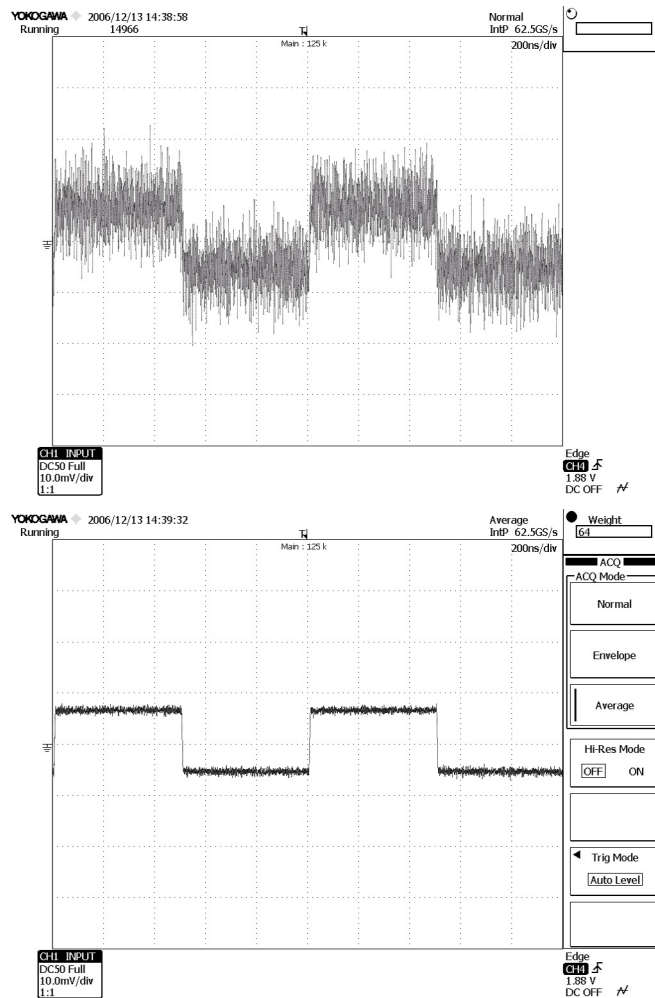
F E M T O

HCA-400M-5K-C

High-Speed Current Amplifier

Typical Performance
Characteristics
(continued)

Small Signal Response
output signal for 1 MHz, 2.4 μ A peak-peak square wave input signal
(without (top) and with 64 times averaging (bottom))



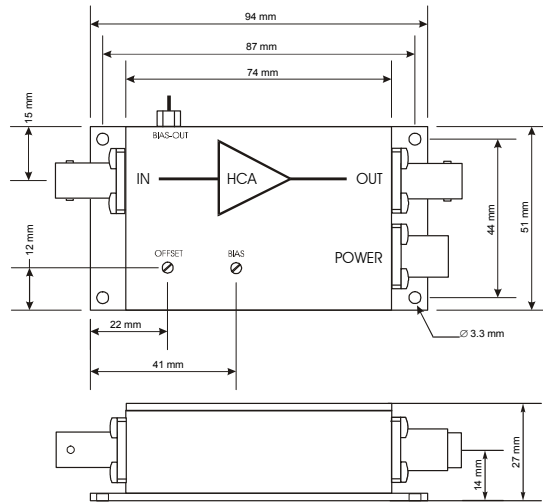
SOPHISTICATED TOOLS FOR SIGNAL RECOVERY

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HCA-400M-5K-C

High-Speed Current Amplifier

Dimensions



D201-0201-22

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SOPHISTICATED TOOLS FOR SIGNAL RECOVERY

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