High Speed Current Amplifier

HCA-1M-1M-C

FEATURES

- Bandwidth and Frequency Response Independent of Detector Capacitance (up to 2 nF)
- Low Noise 3.5 pA/√Hz Equivalent Input Noise Current
- Bandwidth DC ... 1 MHz
- Transimpedance (Gain) 1 x 10^6 V/A
- Protection against ± 3.5 kV Transients
- Protection against ± 3.5 kV Transients

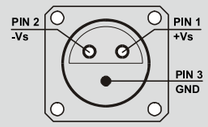
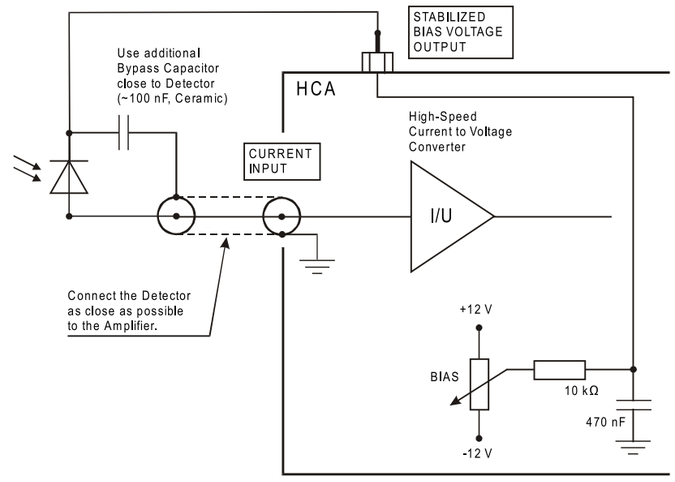
APPLICATIONS

- Photodiode and Photomultiplier Amplifier
- Spectroscopy
- Charge Amplifier
- Ionisation Detectors
- Preamplifier for Lock-Ins, A/D Converters, etc.

Specifications

	Test Conditions	Vs = ± 15 V, Ta = 25°C
Gain	Transimpedance	1 x 10^6 V/A (@ 50 Ω load)
	Gain Accuracy	± 1 %
Frequency Response	Lower Cut-Off Frequency	DC
	Upper Cut-Off Frequency (- 3 dB)	1 MHz
	Rise / Fall Time (10 % - 90 %)	350 ns
	Gain Flatness	± 0.3 dB
Input	Equ. Input Noise Current	3.5 pA/√Hz (@ 100 kHz)
	Equ. Input Noise Voltage	0.8 nV/√Hz (@ 100 kHz)
	Input Bias Current	18 µA typ.
	Input Bias Current Drift	0.8 nA / K
	Offset Current Compensation	± 6 µA adjustable by offset trimpot
	Input Current Range	± 1.5 µA (for linear amplification)
	Input Offset Voltage	3 mV
	DC Input Impedance	50 Ω (virtual) // 5 pF
Output	Output Voltage Range	± 1.5 V (@ 50 Ω load) for linear operation and low harmonic distortion
	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

Specifications (continued)

Power Supply	Supply Voltage	± 15 V
	Supply Current	± 50 mA typ. (depends on operating conditions, recommended power supply capability minimum ± 150 mA)
Case	Weight	210 g (0.5 lbs)
	Material	AlMg4.5Mn, nickel-plated
Temperature Range	Storage Temperature	-40 ... +100 °C
	Operating Temperature	0 ... +60 °C
Absolute Maximum Ratings	Input Voltage	± 5 V
	Input Voltage Transient	± 3.5 kV (pulsewidth 10 ns)
	Power Supply Voltage	± 22 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 Photoconductive Mode: Best choice for high speed applications and optimum signal to noise performance. 	

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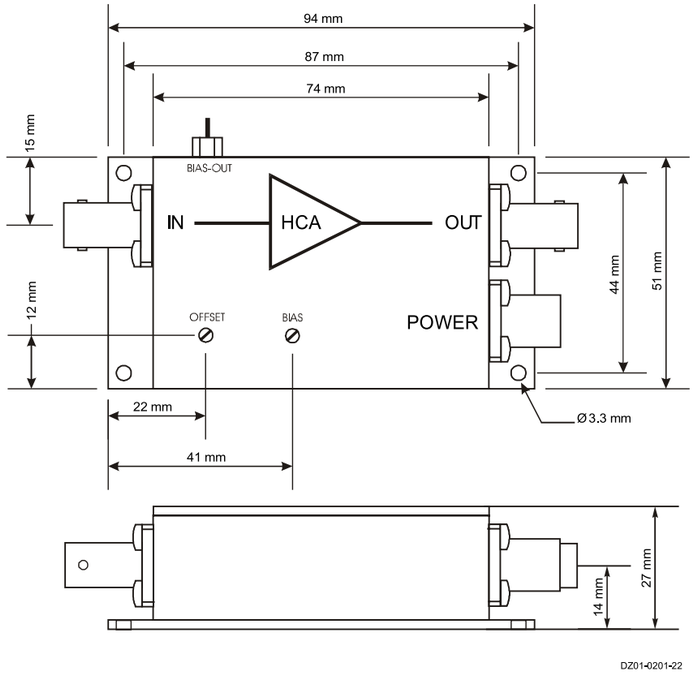


DZ01-0201-22

High Speed Current Amplifier

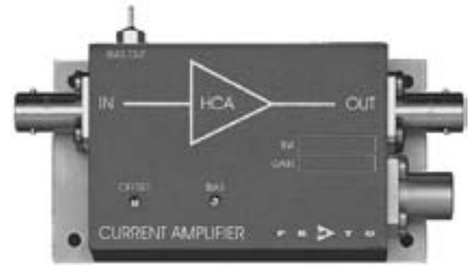
HCA-2M-1M

FEATURES

- Bandwidth and Frequency Response Independent of Detector Capacitance (up to 25 pF)
- Low Noise 340 fA/√Hz Equivalent Input Noise Current
- Bandwidth DC ... 2 MHz
- Transimpedance (Gain) 1 x 106 V/A
- Protection against ± 3.5 kV Transients

APPLICATIONS

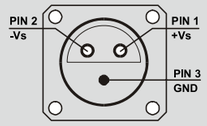
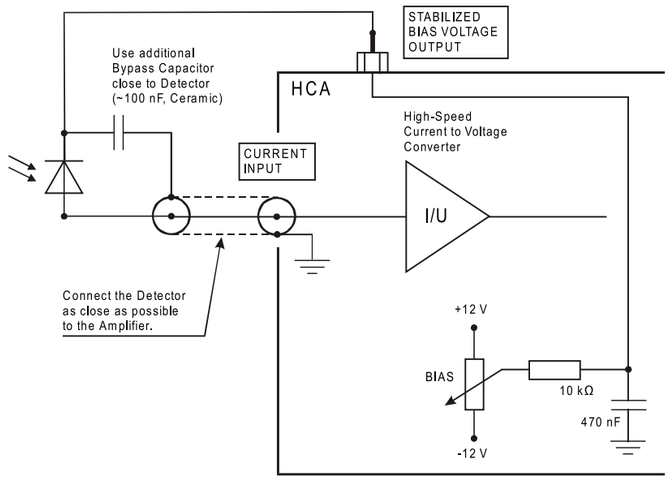
- Photodiode and Photomultiplier Amplifier
- Spectroscopy
- Charge Amplifier
- Ionisation Detectors
- Preamplifier for Lock-Ins, A/D Converters, etc.



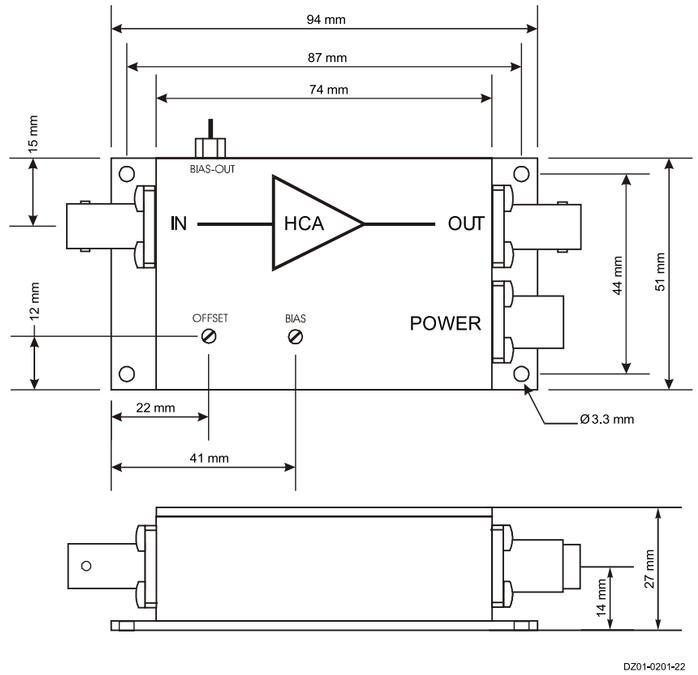
Specifications

	Test Conditions	Vs = ± 15 V, Ta = 25°C
Gain	Transimpedance	1 x 10^6 V/A (@ 50 Ω load)
	Gain Accuracy	± 1 %
Frequency Response	Lower Cut-Off Frequency	DC
	Upper Cut-Off Frequency (- 3 dB)	2 MHz
	Rise / Fall Time (10 % - 90 %)	180 ns
	Gain Flatness	± 0.3 dB
Input	Equ. Input Noise Current	340 pA/√Hz (@ 100 kHz)
	Equ. Input Noise Voltage	6 nV/√Hz (@ 100 kHz)
	Input Bias Current	5 µA typ.
	Input Bias Current Drift	Factor 1.7 / 10 K
	Offset Current Compensation	± 2.7 µA adjustable by offset trimpot
	Input Current Range	± 1.5 µA (for linear amplification)
	Input Offset Voltage	2 mV
	DC Input Impedance	50 Ω (virtual) // 5 pF
Output	Output Voltage Range	± 1.5 V (@ 50 Ω load) for linear operation and low harmonic distortion
	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

Specifications (continued)

Power Supply	Supply Voltage	± 15 V
	Supply Current	± 50 mA typ. (depends on operating conditions, recommended power supply capability minimum ± 150 mA)
Case	Weight	210 g (0.5 lbs)
	Material	AlMg4.5Mn, nickel-plated
Temperature Range	Storage Temperature	-40 ... +100 °C
	Operating Temperature	0 ... +60 °C
Absolute Maximum Ratings	Input Voltage	± 5 V
	Input Voltage Transient	± 3.5 kV (pulsewidth 10 ns)
	Power Supply Voltage	± 22 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 Photoconductive Mode: Best choice for high speed applications and optimum signal to noise performance.  AZ01-0201-20	

Dimensions



DZ01-0201-22

High Speed Current Amplifier

HCA-2M-1M-C

FEATURES

- Bandwidth and Frequency Response Independent of Detector Capacitance (up to 1 nF)
- Low Noise 3.5 pA/√Hz Equivalent Input Noise Current
- Bandwidth DC ... 2 MHz
- Transimpedance (Gain) 1 x 10^6 V/A
- Protection against ± 3.5 kV Transients

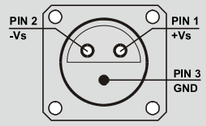
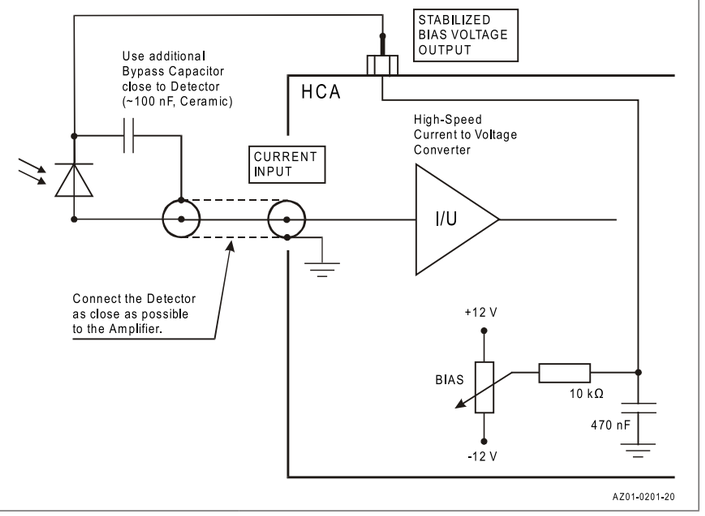
APPLICATIONS

- Photodiode and Photomultiplier Amplifier
- Spectroscopy
- Charge Amplifier
- Ionisation Detectors
- Preamplifier for Lock-Ins, A/D Converters, etc.

Specifications

	Test Conditions	Vs = ± 15 V, Ta = 25°C
Gain	Transimpedance	1 x 10^6 V/A (@ 50 Ω load)
	Gain Accuracy	± 1 %
Frequency Response	Lower Cut-Off Frequency	DC
	Upper Cut-Off Frequency (- 3 dB)	2 MHz
	Rise / Fall Time (10 % - 90 %)	180 ns
	Gain Flatness	± 0.3 dB
Input	Equ. Input Noise Current	3.5 pA/√Hz (@ 100 kHz)
	Equ. Input Noise Voltage	0.8 nV/√Hz (@ 100 kHz)
	Input Bias Current	18 µA typ.
	Input Bias Current Drift	0.8 nA / K
	Offset Current Compensation	± 6 µA adjustable by offset trimpot
	Input Current Range	± 1.5 µA (for linear amplification)
	Input Offset Voltage	3 mV
	DC Input Impedance	50 Ω (virtual) // 5 pF
Output	Output Voltage Range	± 1.5 V (@ 50 Ω load) for linear operation and low harmonic distortion
	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

Specifications (continued)

Power Supply	Supply Voltage	± 15 V
	Supply Current	± 50 mA typ. (depends on operating conditions, recommended power supply capability minimum ± 150 mA)
Case	Weight	210 g (0.5 lbs)
	Material	AlMg4.5Mn, nickel-plated
Temperature Range	Storage Temperature	-40 ... +100 °C
	Operating Temperature	0 ... +60 °C
Absolute Maximum Ratings	Input Voltage	± 5 V
	Input Voltage Transient	± 3.5 kV (pulsewidth 10 ns)
	Power Supply Voltage	± 22 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 Photoconductive Mode: Best choice for high speed applications and optimum signal to noise performance. 	

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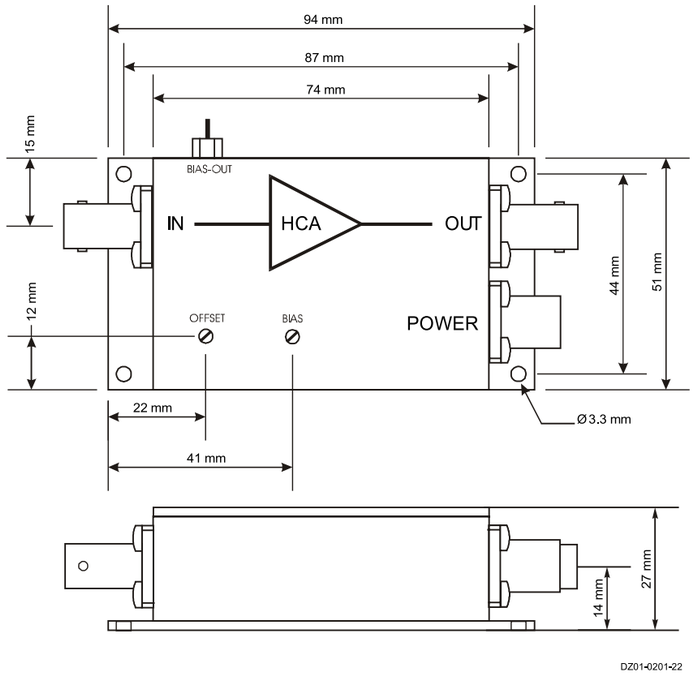


High Speed Current Amplifier

HCA-4M-500K

FEATURES

- Bandwidth and Frequency Response Independent of Detector Capacitance (up to 15 pF)
- Low Noise 490 fA/√Hz Equivalent Input Noise Current
- Bandwidth DC ... 4 MHz
- Transimpedance (Gain) 5 x 10^5 V/A
- Protection against ± 3.5 kV Transients

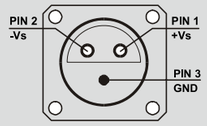
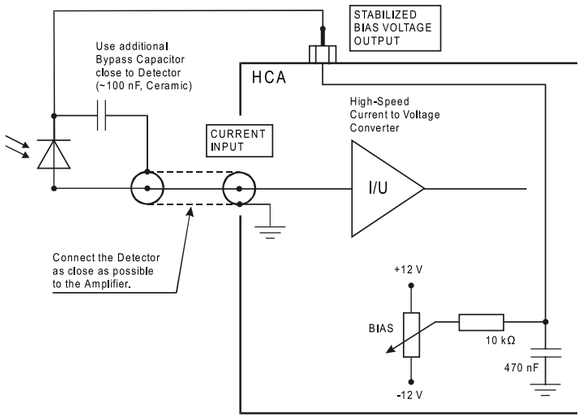
APPLICATIONS

- Photodiode and Photomultiplier Amplifier
- Spectroscopy
- Charge Amplifier
- Ionisation Detectors
- Preamplifier for Lock-Ins, A/D Converters, etc.

Specifications

	Test Conditions	Vs = ± 15 V, Ta = 25°C
Gain	Transimpedance	5 x 10^5 V/A (@ 50 Ω load)
	Gain Accuracy	± 1 %
Frequency Response	Lower Cut-Off Frequency	DC
	Upper Cut-Off Frequency (- 3 dB)	4 MHz
	Rise / Fall Time (10 % - 90 %)	90 ns
	Gain Flatness	± 0.3 dB
Input	Equ. Input Noise Current	490 fA/√Hz (@ 100 kHz)
	Equ. Input Noise Voltage	6 nV/√Hz (@ 100 kHz)
	Input Bias Current	5 µA typ.
	Input Bias Current Drift	Factor 1.7 / 10 K
	Offset Current Compensation	± 4 µA adjustable by offset trimpot
	Input Current Range	± 3 µA (for linear amplification)
	Input Offset Voltage	2 mV
	DC Input Impedance	50 Ω (virtual) // 5 pF
Output	Output Voltage Range	± 1.5 V (@ 50 Ω load) for linear operation and low harmonic distortion
	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

Specifications (continued)

Power Supply	Supply Voltage	± 15 V
	Supply Current	± 50 mA typ. (depends on operating conditions, recommended power supply capability minimum ± 150 mA)
Case	Weight	210 g (0.5 lbs)
	Material	AlMg4.5Mn, nickel-plated
Temperature Range	Storage Temperature	-40 ... +100 °C
	Operating Temperature	0 ... +60 °C
Absolute Maximum Ratings	Input Voltage	± 5 V
	Input Voltage Transient	± 3.5 kV (pulsewidth 10 ns)
	Power Supply Voltage	± 22 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 Photoconductive Mode: Best choice for high speed applications and optimum signal to noise performance. 	

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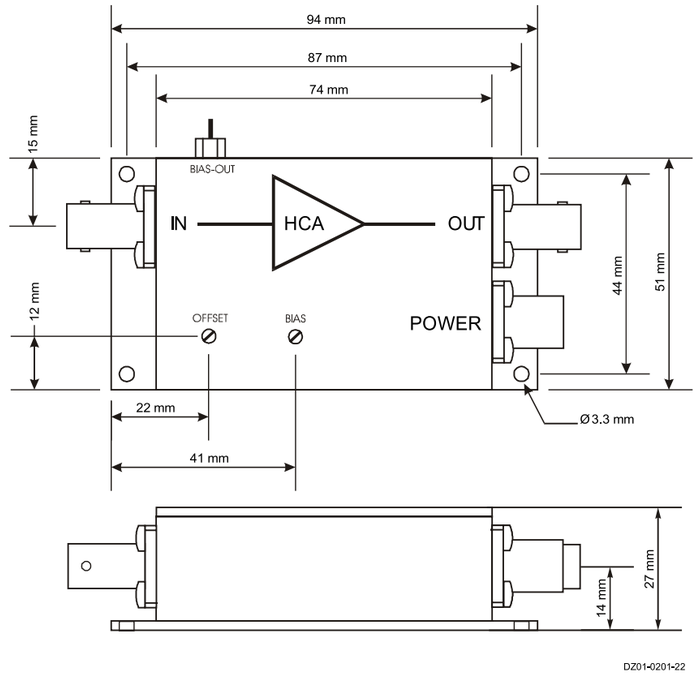


DZ01-0201-22

High Speed Current Amplifier

HCA-4M-500K-C

FEATURES

- Bandwidth and Frequency Response Independent of Detector Capacitance (up to 500 pF)
- Low Noise 3.5 pA/√Hz Equivalent Input Noise Current
- Bandwidth DC ... 4 MHz
- Transimpedance (Gain) 5 x 10^5 V/A
- Protection against ± 3.5 kV Transients

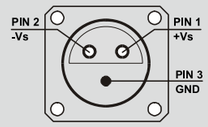
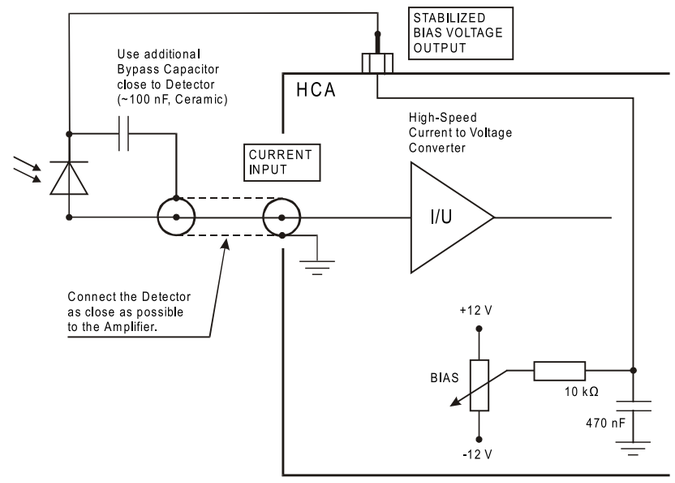
APPLICATIONS

- Photodiode and Photomultiplier Amplifier
- Spectroscopy
- Charge Amplifier
- Ionisation Detectors
- Preamplifier for Lock-Ins, A/D Converters, etc.

Specifications

	Test Conditions	Vs = ± 15 V, Ta = 25°C
Gain	Transimpedance	5 x 10^5 V/A (@ 50 Ω load)
	Gain Accuracy	± 1 %
Frequency Response	Lower Cut-Off Frequency	DC
	Upper Cut-Off Frequency (- 3 dB)	4 MHz
	Rise / Fall Time (10 % - 90 %)	90 ns
	Gain Flatness	± 0.3 dB
Input	Equ. Input Noise Current	3.5 pA/√Hz (@ 100 kHz)
	Equ. Input Noise Voltage	0.8 nV/√Hz (@ 100 kHz)
	Input Bias Current	18 µA typ.
	Input Bias Current Drift	0.8 nA / K
	Offset Current Compensation	± 6 µA adjustable by offset trimpot
	Input Current Range	± 3 µA (for linear amplification)
	Input Offset Voltage	3 mV
	DC Input Impedance	50 Ω (virtual) // 5 pF
Output	Output Voltage Range	± 1.5 V (@ 50 Ω load) for linear operation and low harmonic distortion
	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

Specifications (continued)

Power Supply	Supply Voltage	± 15 V
	Supply Current	± 50 mA typ. (depends on operating conditions, recommended power supply capability minimum ± 150 mA)
Case	Weight	210 g (0.5 lbs)
	Material	AlMg4.5Mn, nickel-plated
Temperature Range	Storage Temperature	-40 ... +100 °C
	Operating Temperature	0 ... +60 °C
Absolute Maximum Ratings	Input Voltage	± 5 V
	Input Voltage Transient	± 3.5 kV (pulsewidth 10 ns)
	Power Supply Voltage	± 22 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 Photoconductive Mode: Best choice for high speed applications and optimum signal to noise performance. 

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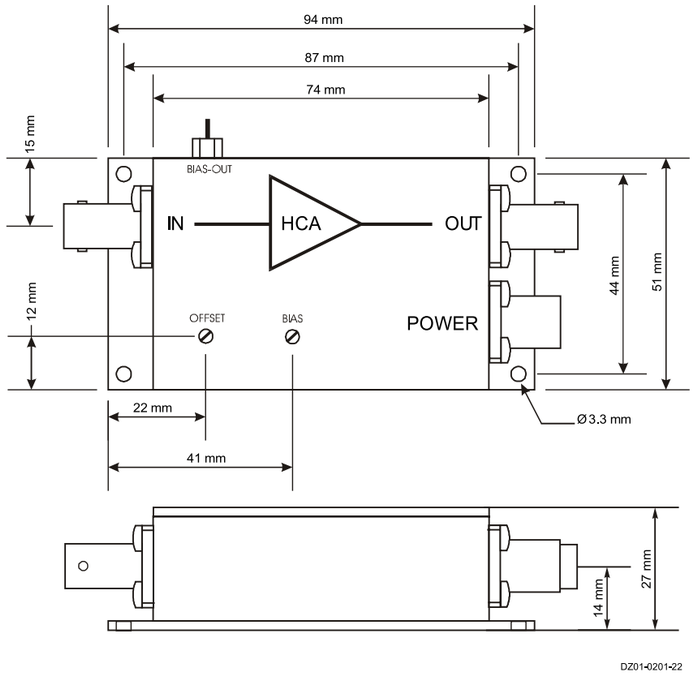


High Speed Current Amplifier

HCA-10M-100K

FEATURES

- Bandwidth and Frequency Response Independent of Detector Capacitance (up to 15 pF)
- Low Noise 1.1pA/√Hz Equivalent Input Noise Current
- Bandwidth DC ... 10 MHz
- Transimpedance (Gain) 1 x 10^5 V/A
- Protection against ± 3.5 kV Transients

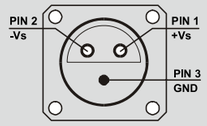
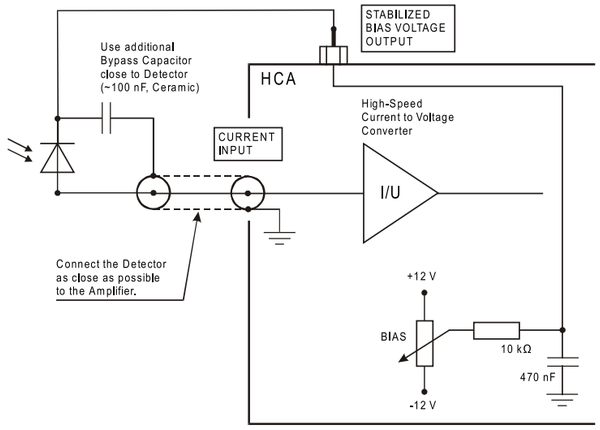
APPLICATIONS

- Photodiode and Photomultiplier Amplifier
- Spectroscopy
- Charge Amplifier
- Ionisation Detectors
- Preamplifier for Lock-Ins, A/D Converters, etc.

Specifications

	Test Conditions	Vs = ± 15 V, Ta = 25°C
Gain	Transimpedance	1 x 10^5 V/A (@ 50 Ω load)
	Gain Accuracy	± 1 %
Frequency Response	Lower Cut-Off Frequency	DC
	Upper Cut-Off Frequency (- 3 dB)	10 MHz
	Rise / Fall Time (10 % - 90 %)	35 ns
	Gain Flatness	± 0.3 dB
Input	Equ. Input Noise Current	1.1pA/√Hz (@ 100 kHz)
	Equ. Input Noise Voltage	6 nV/√Hz (@ 100 kHz)
	Input Bias Current	5 µA typ.
	Input Bias Current Drift	Factor 1.7 / 10 K
	Offset Current Compensation	± 20 µA adjustable by offset trimpot
	Input Current Range	± 15 µA (for linear amplification)
	Input Offset Voltage	2 mV
	DC Input Impedance	50 Ω (virtual) // 5 pF
Output	Output Voltage Range	± 1.5 V (@ 50 Ω load) for linear operation and low harmonic distortion
	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

Specifications (continued)

Power Supply	Supply Voltage	± 15 V
	Supply Current	± 50 mA typ. (depends on operating conditions, recommended power supply capability minimum ± 150 mA)
Case	Weight	210 g (0.5 lbs)
	Material	AlMg4.5Mn, nickel-plated
Temperature Range	Storage Temperature	-40 ... +100 °C
	Operating Temperature	0 ... +60 °C
Absolute Maximum Ratings	Input Voltage	± 5 V
	Input Voltage Transient	± 3.5 kV (pulsewidth 10 ns)
	Power Supply Voltage	± 22 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 Photoconductive Mode: Best choice for high speed applications and optimum signal to noise performance.  AZ01-0201-20	

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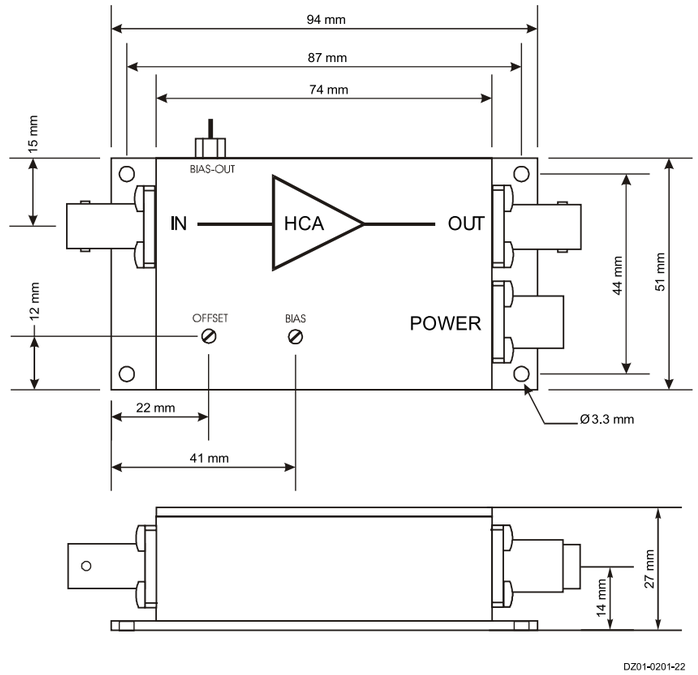


DZ01-0201-22

High Speed Current Amplifier

HCA-10M-100K-C

FEATURES

- Bandwidth and Frequency Response Independent of Detector Capacitance (up to 150 pF)
- Low Noise 3.5 pA/√Hz Equivalent Input Noise Current
- Bandwidth DC ... 10 MHz
- Transimpedance (Gain) 1 x 10^5 V/A
- Protection against ± 3.5 kV Transients

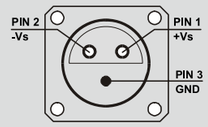
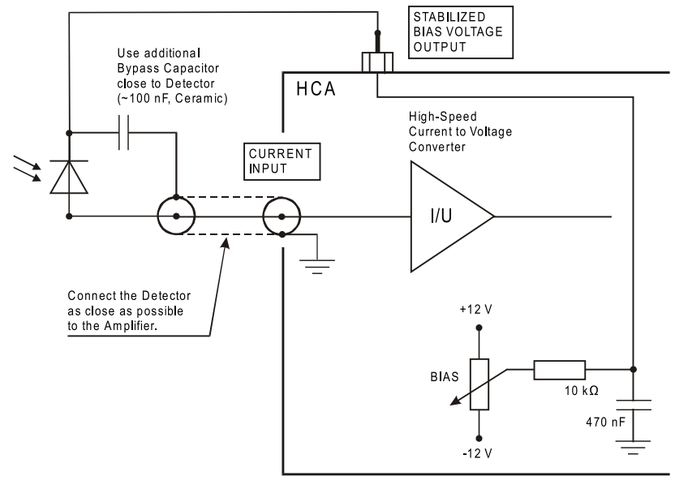
APPLICATIONS

- Photodiode and Photomultiplier Amplifier
- Spectroscopy
- Charge Amplifier
- Ionisation Detectors
- Preamplifier for Lock-Ins, A/D Converters, etc.

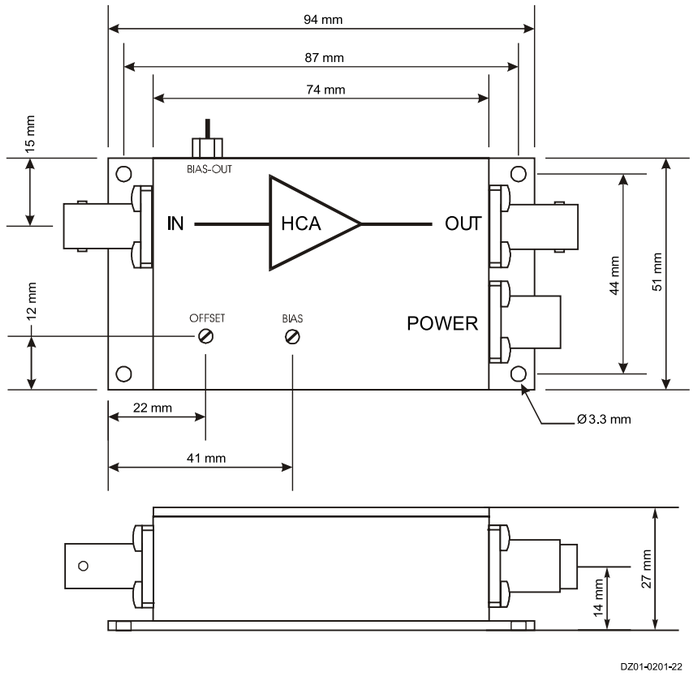
Specifications

	Test Conditions	Vs = ± 15 V, Ta = 25°C
Gain	Transimpedance	1 x 10^5 V/A (@ 50 Ω load)
	Gain Accuracy	± 1 %
Frequency Response	Lower Cut-Off Frequency	DC
	Upper Cut-Off Frequency (- 3 dB)	10 MHz
	Rise / Fall Time (10 % - 90 %)	35 ns
	Gain Flatness	± 0.3 dB
Input	Equ. Input Noise Current	3.5 pA/√Hz (@ 100 kHz)
	Equ. Input Noise Voltage	0.8 nV/√Hz (@ 100 kHz)
	Input Bias Current	18 µA typ.
	Input Bias Current Drift	0.8 nA / K
	Offset Current Compensation	± 20 µA adjustable by offset trimpot
	Input Current Range	± 15 µA (for linear amplification)
	Input Offset Voltage	3 mV
	DC Input Impedance	50 Ω (virtual) // 5 pF
Output	Output Voltage Range	± 1.5 V (@ 50 Ω load) for linear operation and low harmonic distortion
	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

Specifications (continued)

Power Supply	Supply Voltage	± 15 V
	Supply Current	± 50 mA typ. (depends on operating conditions, recommended power supply capability minimum ± 150 mA)
Case	Weight	210 g (0.5 lbs)
	Material	AlMg4.5Mn, nickel-plated
Temperature Range	Storage Temperature	-40 ... +100 °C
	Operating Temperature	0 ... +60 °C
Absolute Maximum Ratings	Input Voltage	± 5 V
	Input Voltage Transient	± 3.5 kV (pulsewidth 10 ns)
	Power Supply Voltage	± 22 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 Photoconductive Mode: Best choice for high speed applications and optimum signal to noise performance. 

Dimensions



High Speed Current Amplifier

HCA-20M-100K-C

FEATURES

- Bandwidth and Frequency Response Independent of Detector Capacitance (up to 50 pF)
- Low Noise 3.5 pA/√Hz Equivalent Input Noise Current
- Bandwidth DC ... 20 MHz
- Transimpedance (Gain) 1 x 10 V/A
- Protection against ± 3.5 kV Transients

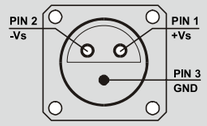
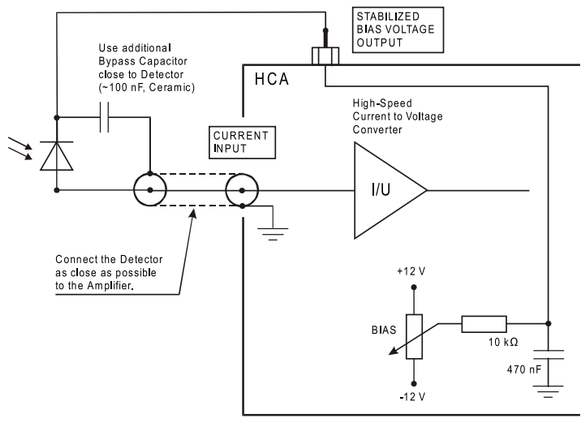
APPLICATIONS

- Photodiode and Photomultiplier Amplifier
- Spectroscopy
- Charge Amplifier
- Ionisation Detectors
- Preamplifier for Lock-Ins, A/D Converters, etc.

Specifications

Gain	Test Conditions	Vs = ± 15 V, Ta = 25°C
	Transimpedance	1 x 10^5 V/A (@ 50 Ω load)
	Gain Accuracy	± 1 %
Frequency Response	Lower Cut-Off Frequency	DC
	Upper Cut-Off Frequency (- 3 dB)	20 MHz
	Rise / Fall Time (10 % - 90 %)	18 ns
	Gain Flatness	± 0.3 dB
Input	Equ. Input Noise Current	3.5pA/√Hz (@ 100 kHz)
	Equ. Input Noise Voltage	0.8 nV/√Hz (@ 100 kHz)
	Input Bias Current	18 µA typ.
	Input Bias Current Drift	0.8 nA / K
	Offset Current Compensation	± 20 µA adjustable by offset trimpot
	Input Current Range	± 15 µA (for linear amplification)
	Input Offset Voltage	3 mV
	DC Input Impedance	50 Ω (virtual) // 5 pF
Output	Output Voltage Range	± 1.5 V (@ 50 Ω load) for linear operation and low harmonic distortion
	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

Specifications (continued)

Power Supply	Supply Voltage	± 15 V
	Supply Current	± 50 mA typ. (depends on operating conditions, recommended power supply capability minimum ± 150 mA)
Case	Weight	210 g (0.5 lbs)
	Material	AlMg4.5Mn, nickel-plated
Temperature Range	Storage Temperature	-40 ... +100 °C
	Operating Temperature	0 ... +60 °C
Absolute Maximum Ratings	Input Voltage	± 5 V
	Input Voltage Transient	± 3.5 kV (pulsewidth 10 ns)
	Power Supply Voltage	± 22 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 Photoconductive Mode: Best choice for high speed applications and optimum signal to noise performance. 	

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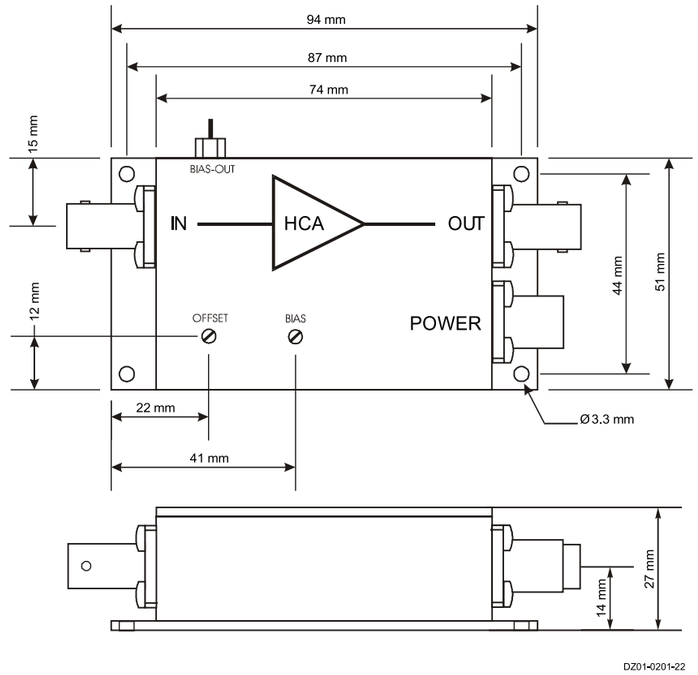

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High Speed Current Amplifier

HCA-40M-100K-C

FEATURES

- Bandwidth and Frequency Response Independent of Detector Capacitance (up to 150 pF)
- Low Noise 3.5 pA/√Hz Equivalent Input Noise Current
- Bandwidth DC ... 10 MHz
- Transimpedance (Gain) 1 x 10^5 V/A
- Protection against ± 3.5 kV Transients

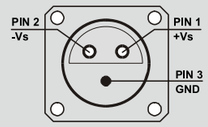
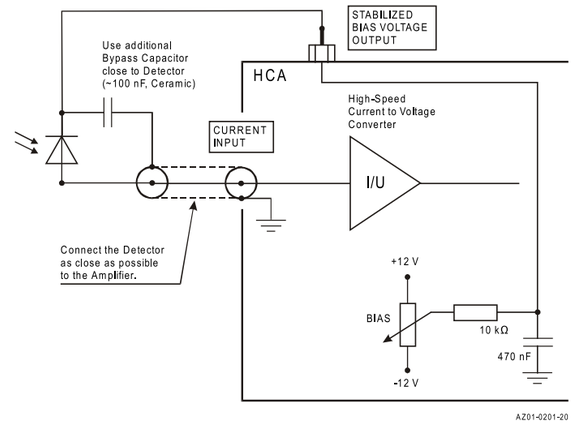
APPLICATIONS

- Photodiode and Photomultiplier Amplifier
- Spectroscopy
- Charge Amplifier
- Ionisation Detectors
- Preamplifier for Lock-Ins, A/D Converters, etc.

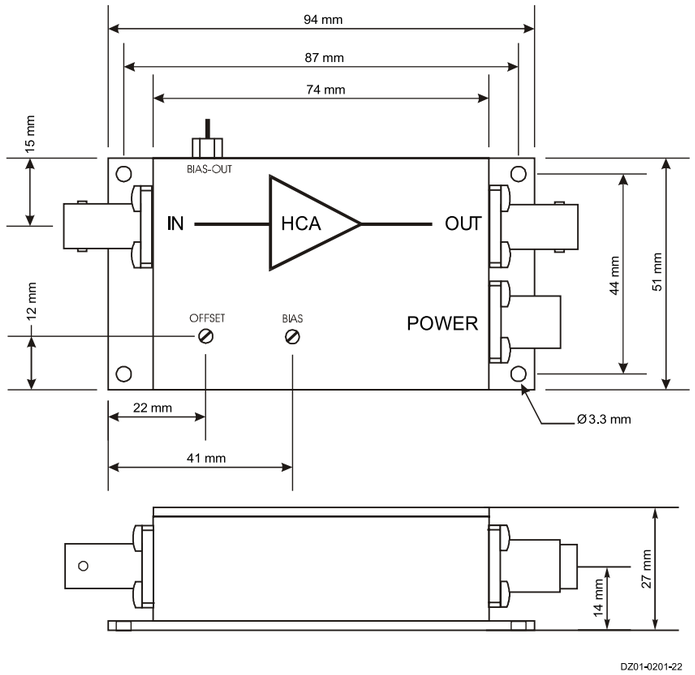
Specifications

	Test Conditions	Vs = ± 15 V, Ta = 25°C
Gain	Transimpedance	1 x 10^5 V/A (@ 50 Ω load)
	Gain Accuracy	± 1 %
Frequency Response	Lower Cut-Off Frequency	DC
	Upper Cut-Off Frequency (- 3 dB)	40 MHz
	Rise / Fall Time (10 % - 90 %)	10 ns
	Gain Flatness	± 0.3 dB
Input	Equ. Input Noise Current	3.7 pA/√Hz (@ 100 kHz)
	Equ. Input Noise Voltage	0.8 nV/√Hz (@ 100 kHz)
	Input Bias Current	18 µA typ.
	Input Bias Current Drift	0.8 nA / K
	Offset Current Compensation	± 20 µA adjustable by offset trimpot
	Input Current Range	± 15 µA (for linear amplification)
	Input Offset Voltage	3 mV
	DC Input Impedance	50 Ω (virtual) // 5 pF
Output	Output Voltage Range	± 1.5 V (@ 50 Ω load) for linear operation and low harmonic distortion
	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

Specifications (continued)

Power Supply	Supply Voltage	± 15 V
	Supply Current	± 50 mA typ. (depends on operating conditions, recommended power supply capability minimum ± 150 mA)
Case	Weight	210 g (0.5 lbs)
	Material	AlMg4.5Mn, nickel-plated
Temperature Range	Storage Temperature	-40 ... +100 °C
	Operating Temperature	0 ... +60 °C
Absolute Maximum Ratings	Input Voltage	± 5 V
	Input Voltage Transient	± 3.5 kV (pulsewidth 10 ns)
	Power Supply Voltage	± 22 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 Photoconductive Mode: Best choice for high speed applications and optimum signal to noise performance. 

Dimensions



High Speed Current Amplifier

HCA-100M-50K-C

FEATURES

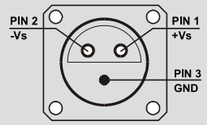
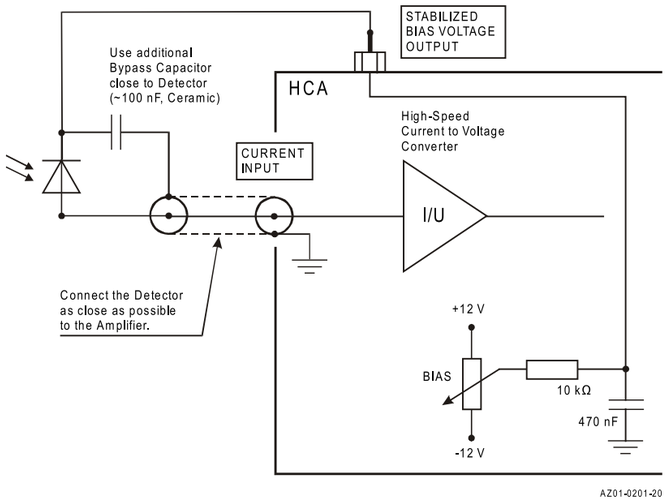
- Bandwidth DC ... 100 MHz
- Transimpedance (Gain) 5 x 10^4 V/A
- Suitable for High Source Capacitance up to 20 pF
- Low Equivalent Input Noise Current of 3.8 pA/√Hz
- Protection against ± 3.5 kV Transients

APPLICATIONS

- Photodiode and Photomultiplier Amplifier
- Spectroscopy
- Charge Amplifier
- Ionisation Detectors
- Preamplifier for Lock-Ins, A/D Converters, etc.

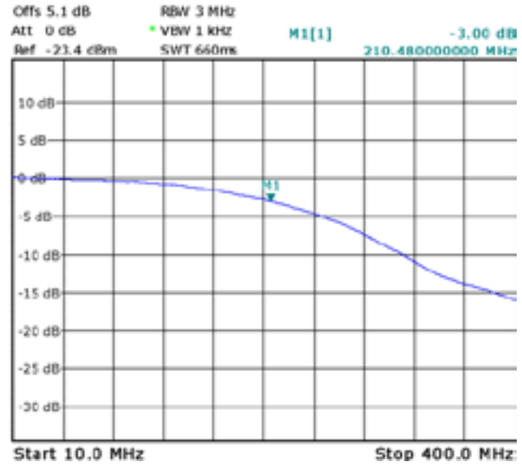
Specifications	Test Conditions	Vs = ± 15 V, Ta = 25°C
Gain	Transimpedance	5 x 10^4 V/A (@ 50 Ω load)
	Gain Accuracy	± 2 %
Frequency Response	Lower Cut-Off Frequency	DC
	Upper Cut-Off Frequency (- 3 dB)	100 MHz (± 10 %, @ Csource 2 to 10 pF) 80 MHz (± 10 %, @ Csource 11 to 20 pF)
	Max. Source Capacitance	20 pF (incl. cable, e.g. typical coax cable 1 pF/cm)
	Rise / Fall Time (10 % - 90 %)	3.4 ns (@ Csource 2 to 10 pF) 4.0 ns (@ Csource 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 kHz)
	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	50 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

Specifications (continued)

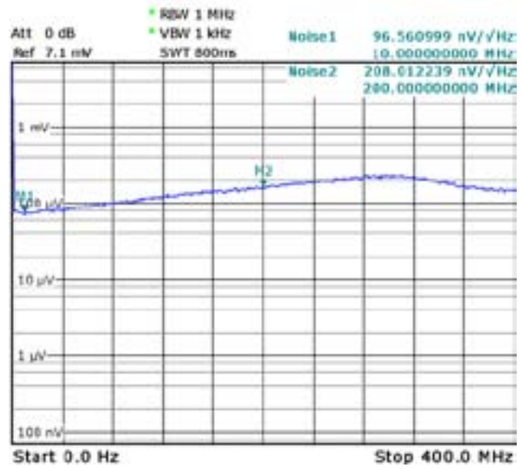
Power Supply	Supply Voltage	± 15 V
	Supply Current	± 50 mA typ. (depends on operating conditions, recommended power supply capability minimum ± 150 mA)
Case	Weight	210 g (0.5 lbs)
	Material	AlMg4.5Mn, nickel-plated
Temperature Range	Storage Temperature	-40 ... +100 °C
	Operating Temperature	0 ... +60 °C
Absolute Maximum Ratings	Input Voltage	± 5 V
	Power Supply Voltage	± 22 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 Photoconductive Mode: Best choice for high speed applications and optimum signal to noise performance. 	

Typical Performance Characteristics

Frequency Response



Noise Spectrum

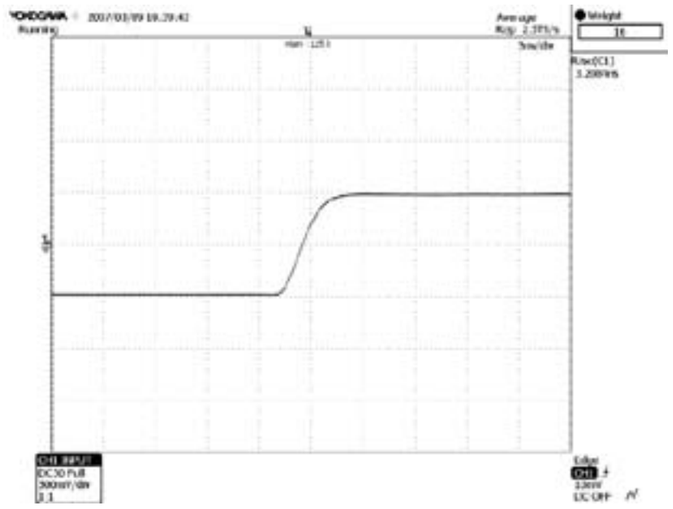


Note: Spectral noise data is measured at the amplifier output with open but shielded input.
To determine the spectral input noise divide the measured output noise by the amplifier gain of 5 x 10^4 V/A, i.e.:

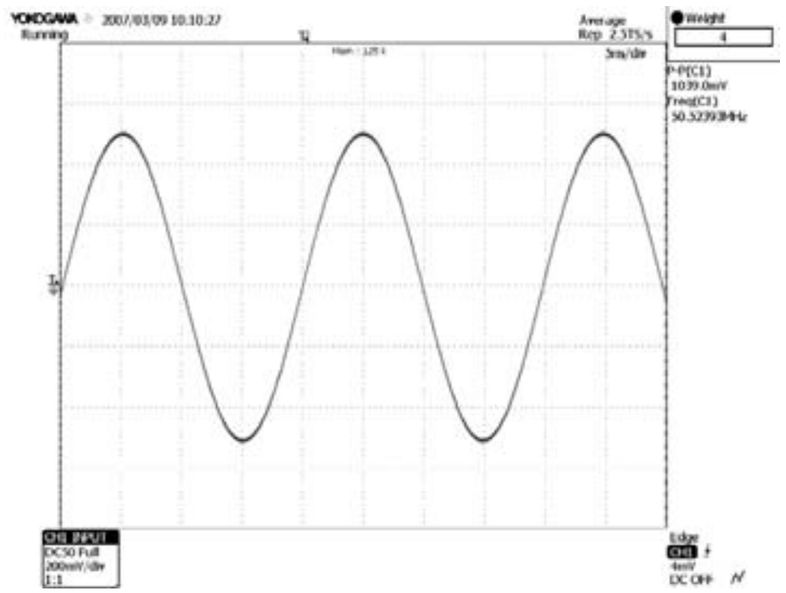
Marker	Frequency	Output Noise	Resulting Input Noise
1	10 MHz	190 nV/√Hz	3.8 pA√Hz
2	100 MHz	273 nV/√Hz	5.5 pA√Hz

Typical Performance Characteristics (continued)

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

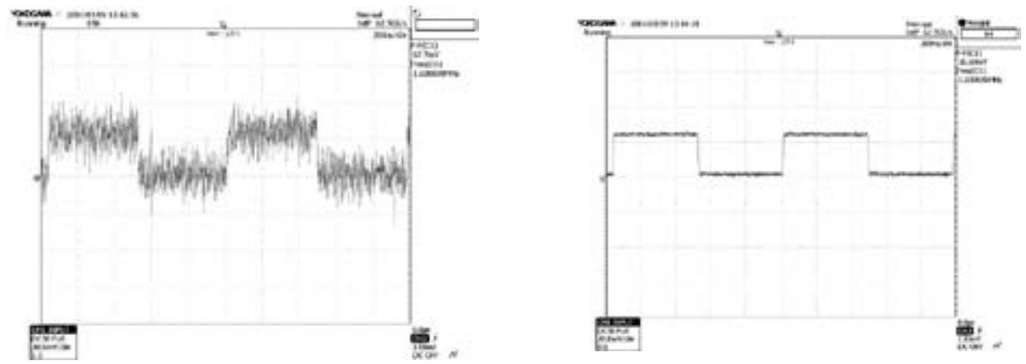


Large Signal Response output signal for 50 MHz, 20 µA peak-peak input signal
(with 4 times averaging)

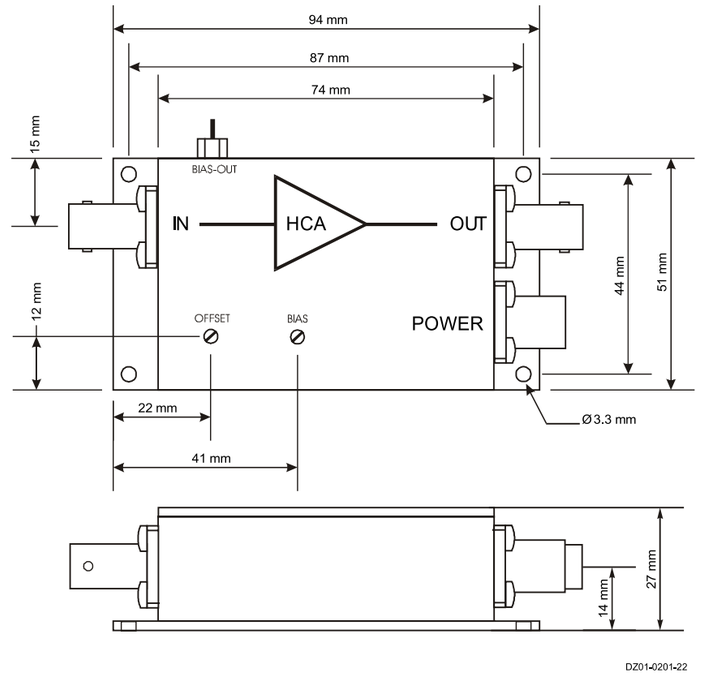


Typical Performance Characteristics (continued)

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



Dimensions



TSC
www.toptical.com.tw 02-2346-1510 toptical@ms17.hinet.net

High Speed Current Amplifier

HCA-200M-20K-C

FEATURES

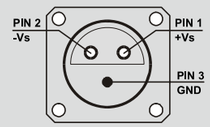
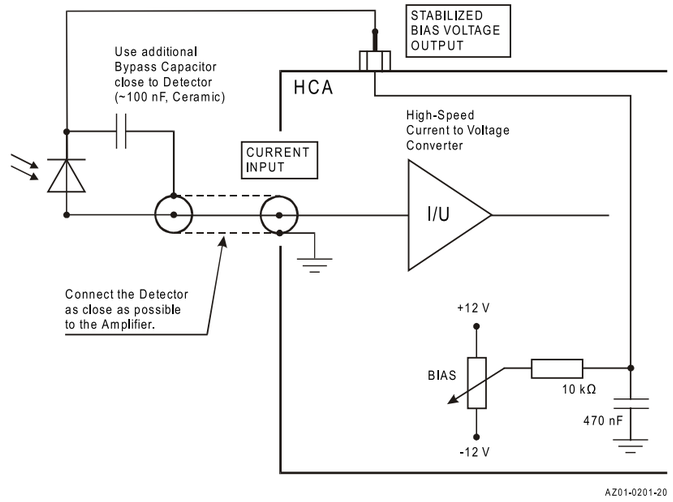
- Bandwidth DC ... 200 MHz
- Transimpedance (Gain) 2 x 10^4 V/A
- Suitable for Source Capacitance up to 8 pF
- Low Equivalent Input Noise Current of 4.9 pA/√Hz

APPLICATIONS

- Photodiode and Photomultiplier Amplifier
- Spectroscopy
- Charge Amplifier
- Ionisation Detectors
- Preamplifier for Lock-Ins, A/D Converters, etc.

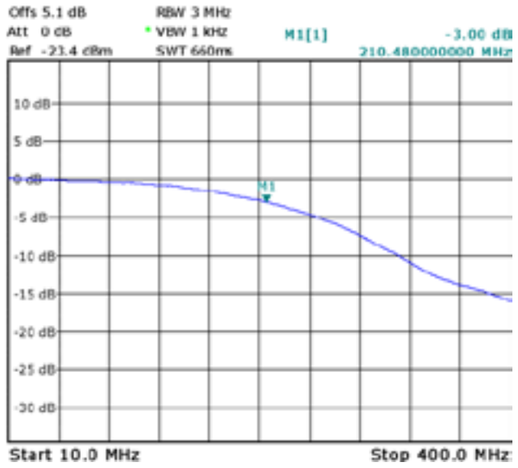
Specifications	Test Conditions	Vs = ± 15 V, Ta = 25°C
Gain	Transimpedance	2 x 10^4 V/A (@ 50 Ω load)
	Gain Accuracy	± 2 %
Frequency Response	Lower Cut-Off Frequency	DC
	Upper Cut-Off Frequency (- 3 dB)	200 MHz (± 10 %, @ Csource 2 to 4 pF) 170 MHz (± 10 %, @ Csource 5 to 8 pF)
	Max. Source Capacitance	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	± 0.3 dB
Input	Equ. Input Noise Current	4.9 pA/√Hz (@ 10 MHz)
	Equ. Input Noise Voltage	0.9 nV/√Hz (@ 10 MHz)
	Equ. Integrated Noise	1.0 µA peak-peak
	Input Bias Current	12 µA typ.
	Input Bias Current Drift	3 nA / °C
	Offset Current Compensation	± 100 µA adjustable by offset trimpot
	Input Current Range	± 60 µA (for linear amplification)
	Input Offset Voltage	< 1 mV
	DC Input Impedance	50 Ω (virtual) // 5 pF
Output	Output Voltage Range	± 1.2 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

Specifications (continued)

Power Supply	Supply Voltage	± 15 V
	Supply Current	± 50 mA typ. (depends on operating conditions, recommended power supply capability minimum ± 150 mA)
Case	Weight	210 g (0.5 lbs)
	Material	AlMg4.5Mn, nickel-plated
Temperature Range	Storage Temperature	-40 ... +100 °C
	Operating Temperature	0 ... +60 °C
Absolute Maximum Ratings	Input Voltage	± 5 V
	Power Supply Voltage	± 22 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 Photoconductive Mode: Best choice for high speed applications and optimum signal to noise performance. 

Typical Performance Characteristics

Frequency Response



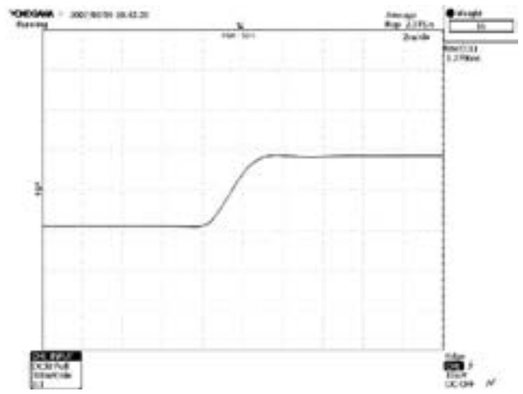
Noise Spectrum

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 x 10^4 V/A, i.e.:

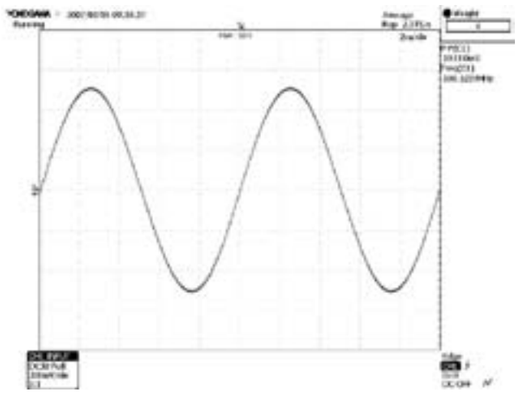
Marker	Frequency	Output Noise	Resulting Input Noise
1	10 MHz	97 nV/√Hz	4.9 pA√Hz
2	200 MHz	208 nV/√Hz	10.4 pA√Hz

Typical Performance Characteristics (continued)

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

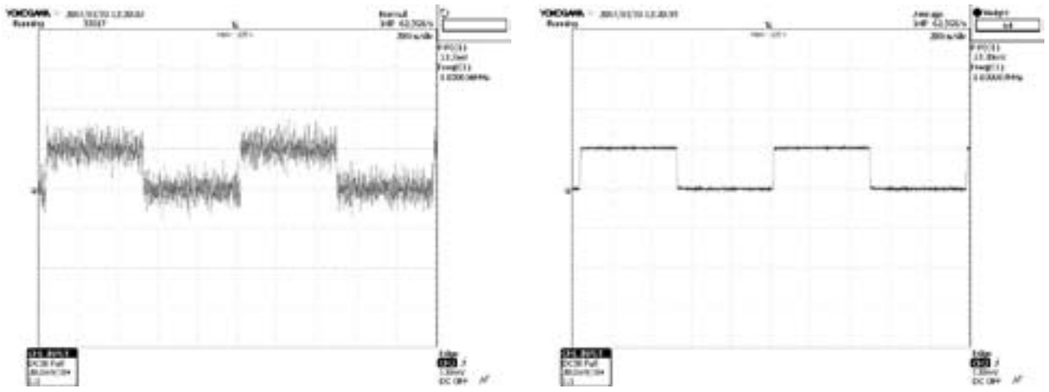


Large Signal Response output signal for 50 MHz,
20 µA peak-peak input signal
(with 4 times averaging)

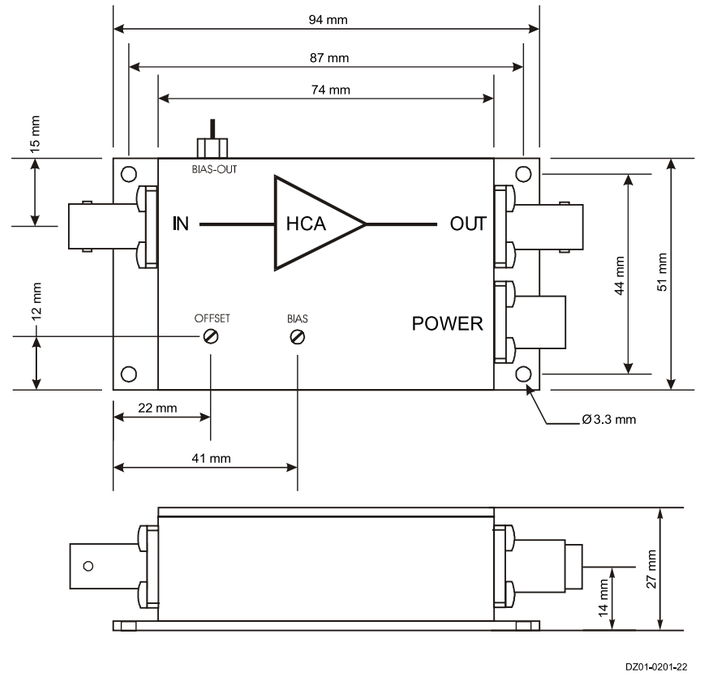


Typical Performance Characteristics (continued)

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



Dimensions



High Speed Current Amplifier

HCA-400M-5K-C

FEATURES

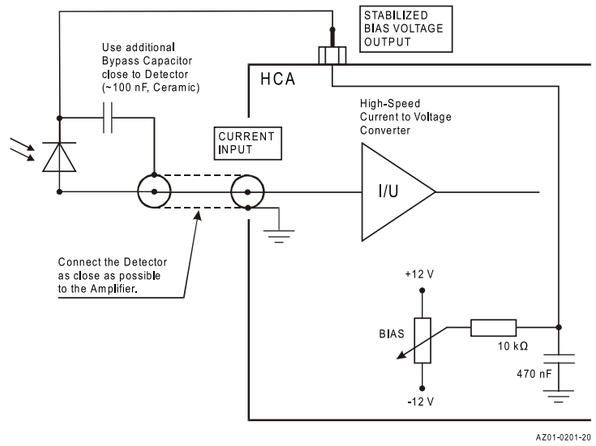
- Bandwidth DC … 400 MHz
- Rise / Fall Time 1 ns
- Optimized for Low Pulse Distortion – Almost No Overshoot or Ringing will Occur
- Transimpedance (Gain) 5 x 10^3 V/A

APPLICATIONS

- Photodiode and Photomultiplier Amplifier
- Spectroscopy
- Charge Amplifier
- Ionisation Detectors
- Preamplifier for Lock-Ins, A/D Converters, etc.

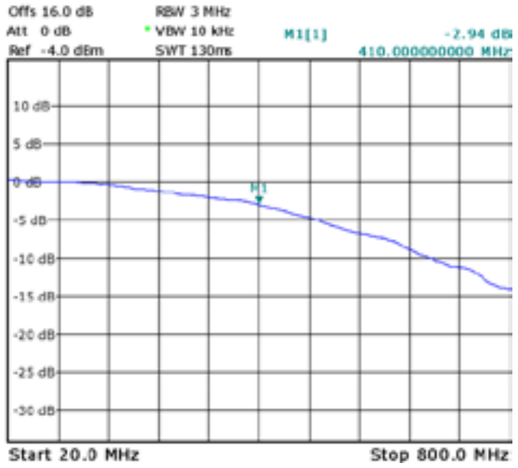
Specifications	Test Conditions	Vs = ± 15 V, Ta = 25°C
Gain	Transimpedance	5 x 10^3 V/A (@ 50 Ω load)
	Gain Accuracy	± 2 %
Frequency Response	Lower Cut-Off Frequency	DC
	Upper Cut-Off Frequency (- 3 dB)	400 MHz (± 10 %, @ Csource 2 to 4 pF) 350 MHz (± 10 %, @ Csource 5 to 10 pF)
	Max. Source Capacitance	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/√Hz (@ 100 MHz)
	Equ. Input Noise Voltage	3.5 nV/√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 µA / °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 kΩ // 1 µF

Specifications (continued)

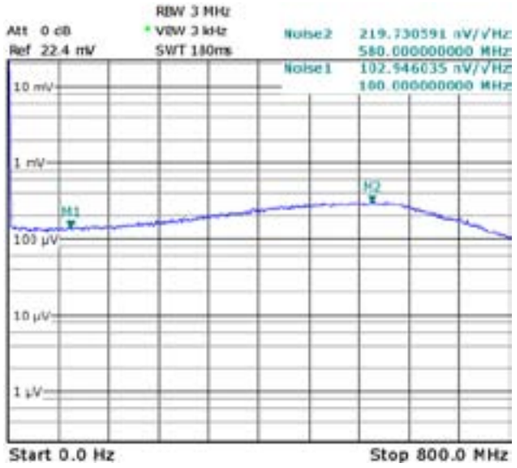
Power Supply	Supply Voltage	± 15 V
	Supply Current	± 60 mA typ. (depends on operating conditions, recommended power supply capability minimum ± 150 mA)
Case	Weight	210 g (0.5 lbs)
	Material	AlMg4.5Mn, nickel-plated
Temperature Range	Storage Temperature	-40 ... +100 °C
	Operating Temperature	0 ... +60 °C
Absolute Maximum Ratings	Input Voltage	± 5 V
	Power Supply Voltage	± 22 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 Photoconductive Mode: Best choice for high speed applications and optimum signal to noise performance. 

Typical Performance Characteristics

Frequency Response



Noise Spectrum

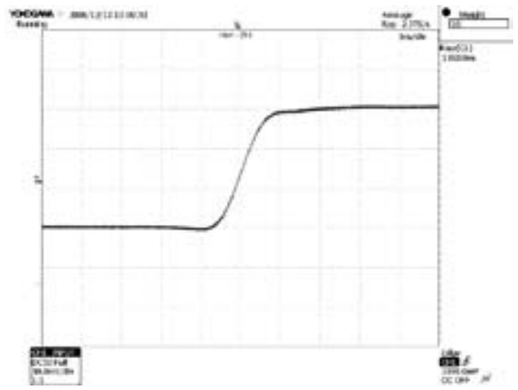


Note: Spectral noise data is measured at the amplifier output with open but shielded input.
To determine the spectral input noise divide the measured output noise by the amplifier gain of 2 x 10^4 V/A, i.e.:

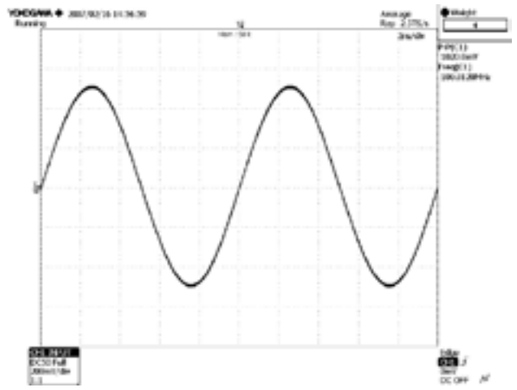
Marker	Frequency	Output Noise	Resulting Input Noise
1	100 MHz	103 nV/√Hz	21 pA√Hz
2	580 MHz	220 nV/√Hz	44 pA√Hz

Typical Performance Characteristics (continued)

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

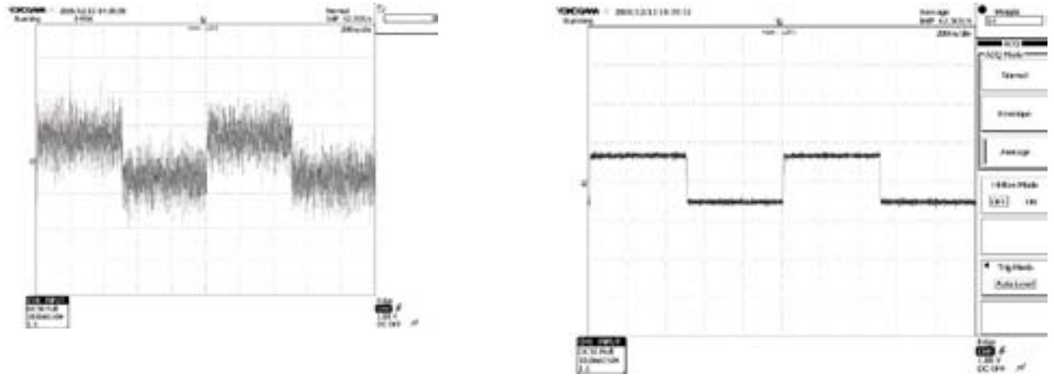


Large Signal Response output signal for 100 MHz,
200 µA peak-peak input signal
(with 4 times averaging)

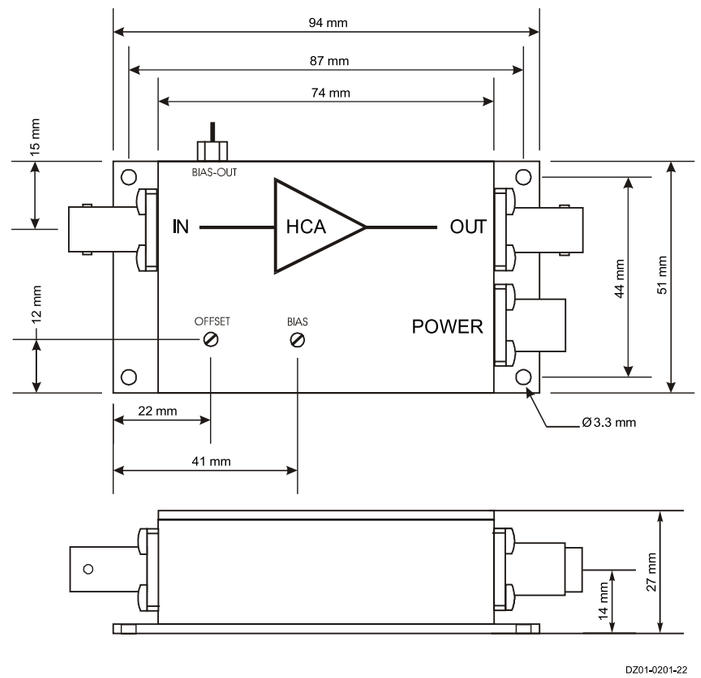


Typical Performance Characteristics (continued)

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



Dimensions



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Variable Gain
Low Noise Current Amplifier

DLPCA-200

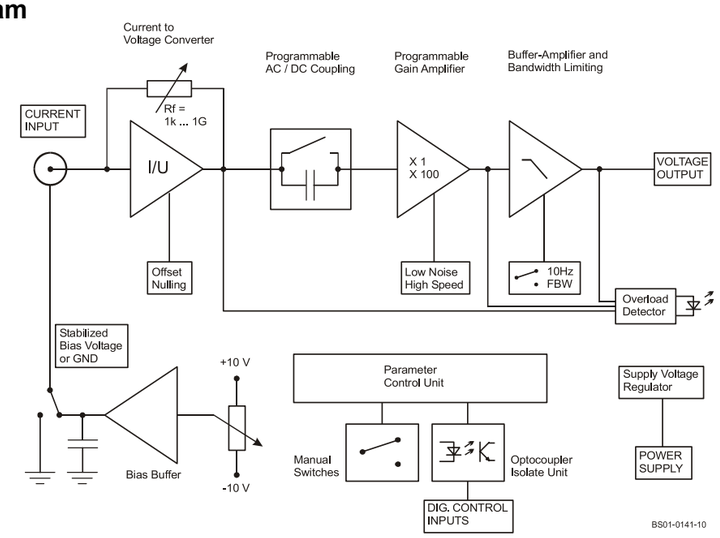
FEATURES

- Transimpedance (Gain) Switchable from 1 x 103 to 1 x 1011 V/A
- Bandwidth DC / 1 Hz ... 500 kHz
- Bandwidth Switchable to DC ... 10 Hz for Low Noise DC Measurements
- Bandwidth Independent of Detector Capacitance (up to 1 nF)
- Adjustable Bias Voltage
- Protection Against ± 3 kV Transients
- Local and Remote Contro

APPLICATIONS

- Photodiode and Photomultiplier Amplifier
- Scanning Tunneling Microscopy (STM)
- Spectroscopy
- Beam Monitoring for Particle Accelerators / Synchrotrons
- Ionisation Detectors
- Preamplifier for Lock-Ins, A/D-Converters, etc.

Block Diagram



Specifications	Test Conditions	Vs = ± 15 V, Ta = 25°C
Gain	Transimpedance	1 x 10^3 ... 1 x 10^{11} V/A
	Gain Accuracy	± 1 %
	Gain Drift	see table below
Frequency Response	Lower Cut-Off Frequency	DC
	Upper Cut-Off Frequency	up to 500 kHz (see table below), switchable to 10 Hz
	Gain Flatness	± 0.1 dB
Input	Equ. Input Noise Current	see table below
	Equ. Input Noise Voltage	4 nV/√Hz (@ 1 kHz)
	Input Offset Current Drift	see table below
	Input Bias Current	1 pA typ. (max. 3 pA)
	Max. Input Current	see table below (value for linear amplification)
	Input Offset Compensation	adjustable by offset trimpot and external control voltage; max. range see table below

Performance depending on Gain Setting							
Gain Setting (Low Noise) (V/A)	10^3	10^4	10^5	10^6	10^7	10^8	10^9
Upper Cut-Off Frequency (- 3 dB)	500 kHz	500 kHz	400 k	200 kHz	50 kHz	7 kHz	1.1 kHz
Rise / Fall Time (10% - 90%)	700 ns	700 ns	900 ns	1.8 µs	7 µs	50 µs	300 µs
Input Noise Current Density (/√Hz)	20 pA	2.3 pA	450 fA	130 fA	43 fA	13 fA	4.3 fA
measured at	10 kHz	10 kHz	10 kHz	1 kHz	1 kHz	100 Hz	100 Hz
Integr. Input Noise Current (rms)*	21 nA	2.4 nA	500 pA	130 pA	41 pA	5.8 pA	0.8 pA
Offset Current Drift (/°C)	30 nA	3 nA	0.3 nA	30 pA	3 pA	0.3 pA	0.1 pA
Gain Drift (/°C)	0.008%	0.008%	0.008%	0.01%	0.01%	0.01%	0.02%
Max. Input Current (±)	10 mA	1 mA	0.1 mA	10 µA	1 µA	0.1 µA	10 nA
Input Offset Compensat. (±)	100 µA	10 µA	1 µA	0.1 µA	10 nA	1 nA	0.1 nA
DC Input Impedance (// 5 pF)	50 Ω	50 Ω	50 Ω	60 Ω	150 Ω	1 kΩ	10 kΩ

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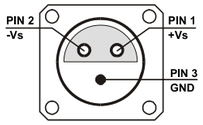
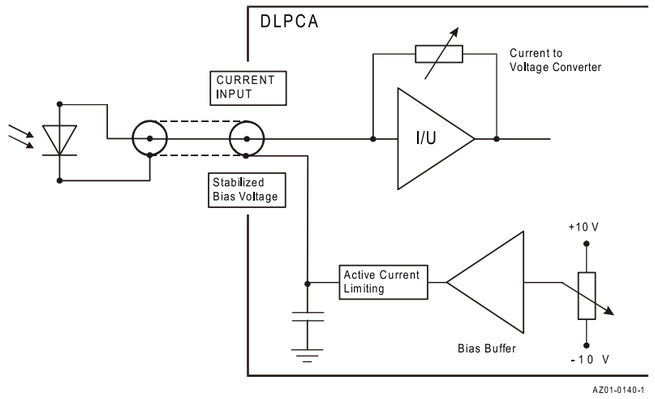
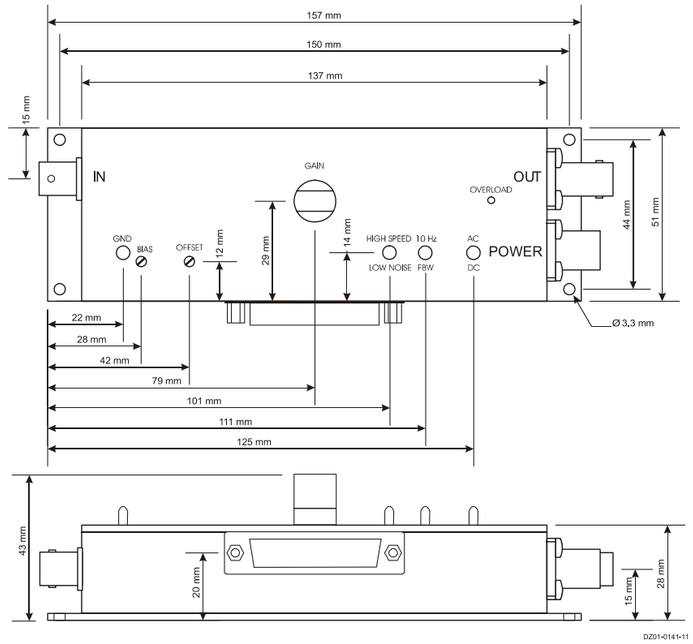
Performance depending							
on Gain SettingGain Setting (High Speed) (V/A)	10^5	10^6	10^7	10^8	10^9	10^{10}	10^{11}
Upper Cut-Off Frequency (- 3 dB)	500 kHz	500 kHz	400 kHz	200 kHz	50 kHz	7 kHz	1.1 kHz
Rise / Fall Time (10% - 90%)	700 ns	700 ns	900 ns	1.8 µs	7 µs	50 µs	300 µs
Input Noise Current Density (/√Hz)	13 pA	1.8 pA	440 fA	130 fA	43 fA	13 fA	4.3 fA
measured at	10 kHz	10 kHz	10 kHz	1 kHz	1 kHz	100 Hz	100 Hz
Integr. Input Noise Current (rms)*	12 nA	1.8 nA	450 pA	120 pA	37 pA	5.3 pA	0.8 pA
Offset Current Drift (/°C)	30 nA	3 nA	0.3 nA	30 pA	3 pA	0.3 pA	0.1 pA
Gain Drift (/°C)	0.008%	0.008%	0.008%	0.01%	0.01%	0.01%	0.02%
Max. Input Current (±)	100 µA	10 µA	1 µA	0.1 µA	10 nA	1 nA	0.1 nA
Input Offset Compensat. (±)	100 µA	10 µA	1 µA	0.1 µA	10 nA	1 nA	0.1 nA
DC Input Impedance (// 5 pF)	50 Ω	50 Ω	50 Ω	60 Ω	150 Ω	1 kΩ	10 kΩ

* The integrated input noise is measured with an open but shielded amplifier input in the full bandwidth („FBW“) setting. The input referred peak-peak noise can be calculated from the rms noise as follows: $I_{peak\text{-}peak} = I_{rms} \times 6$
The output noise is given by: $U_{peak\text{-}peak} = I_{peak\text{-}peak} \times Gain$

Output	Output Voltage	± 10 V (@ ≥ 1 MΩ load)
	Output Impedance	50 Ω (terminate with ≥ 1 MΩ load for best performance)
	Max. Output Current	± 30 mA
Detector Bias	Bias Voltage Range	± 10 V, max. 22 mA (bias voltage connected to shield of BNC input socket, adjustable by trimpot, switchable to GND)
Indicator LED	Function	overload
Digital Control	Control Input Voltage Range	LOW bit: - 0.8 ...+ 1.2 V, HIGH bit: 2.3 ... + 12 V
	Control Input Current	0 mA @ 0 V, 1.5 mA @ + 5 V, 4.5 mA @ + 12 V
	Overload Output	non active: 0 V, max. -1 mA, active: 5.1 V, max. 7 mA
Ext. Offset Control	Control Voltage Range	± 10 V
	Offset Control Input Impedance	20 kΩ
Power Supply	Supply Voltage	± 15 V
	Supply Current	+ 120 / - 80 mA typ. (depends on operating conditions, recommended power supply capability min. ± 200 mA)
	Stabilized Power Supply Output	± 12 V, max. ± 150 mA, + 5V, max. 50 mA
Case	Weight	320 g (0.74 lb.)
	Material	AlMg4.5Mn, nickel-plated
Temperature Range	Storage Temperature	-40 ... +100 °C
	Operating Temperature	0 ... +60 °C
Absolute Maximum Ratings	Signal Input Voltage	-16 V / + 12 V
	Transient Input Voltage	± 3 kV (out of 200 pF source)
	Control Input Voltage	- 5 V / + 16 V
	Power Supply Voltage	± 22 V
Connectors	Input	BNC, isolated
	Output	BNC
	Detector Bias Output	shield of input BNC
	Power Supply	LEMO series 1S, 3-pin fixed socket Pin 1: + 15V Pin 2: - 15V Pin 3: GND 
	Control Port	Sub-D 25-pin, female, qual. class 2 Pin 1: + 12 V (stabilized power supply output) Pin 2: - 12 V (stabilized power supply output) Pin 3: AGND (analog ground) Pin 4: + 5 V (stabilized power supply output) Pin 5: digital output: overload Pin 6: signal output (connected to BNC) Pin 7: NC Pin 8: input offset control voltage Pin 9: DGND (ground for digital control pins 10 - 14) Pin 10: digital control input: gain, LSB Pin 11: digital control input: gain Pin 12: digital control input: gain, MSB Pin 13: digital control input: AC/DC Pin 14: digital control input: high speed / low noise Pin 15 - 25: NC

<table>
<tr><td rowspan="15">Remote Control Operation</td><td>General</td><td colspan="5">Remote control input bits are opto-isolated and connected by logical OR function to local switch settings. For remote control set the corresponding local switches to “Remote”, "AC" and "H” (High Speed) and select the wanted setting via a bit code at the corresponding digital inputs. Mixed operation, e.g. local gain setting and remote controlled AC/DC setting, is also possible.
Switch settings “FBW / 10 Hz” and “Bias / GND” are not remote controllable.</td></tr>
<tr><td rowspan="11">Gain Setting</td><td>Low Noise</td><td>High Speed</td><td></td><td></td><td></td></tr>
<tr><td>Pin 14=HIGH
Pin Gain (V/A)</td><td>14=LOW
Gain (V/A)</td><td>Pin 12
MSB</td><td>Pin 11</td><td>Pin 10
LSB</td></tr>
<tr><td>10^3</td><td>10^5</td><td>LOW</td><td>LOW</td><td>LOW</td></tr>
<tr><td>10^4</td><td>10^6</td><td>LOW</td><td>LOW</td><td>HIGH</td></tr>
<tr><td>10^5</td><td>10^7</td><td>LOW</td><td>HIGH</td><td>LOW</td></tr>
<tr><td>10^6</td><td>10^8</td><td>LOW</td><td>HIGH</td><td>HIGH</td></tr>
<tr><td>10^7</td><td>10^9</td><td>HIGH</td><td>LOW</td><td>LOW</td></tr>
<tr><td>10^8</td><td>10^{10}</td><td>HIGH</td><td>LOW</td><td>HIGH</td></tr>
<tr><td>10^9</td><td>10^{11}</td><td>HIGH</td><td>HIGH</td><td>LOW</td></tr>
<tr><td rowspan="3">AC/DC Setting</td><td colspan="5">Coupling Pin 13</td></tr>
<tr><td colspan="5">AC LOW</td></tr>
<tr><td colspan="5">DC HIGH</td></tr>
<tr><td>Application Diagram</td><td colspan="6">Photo Detector Biasing
 
</td></tr>
</table>

Dimensions



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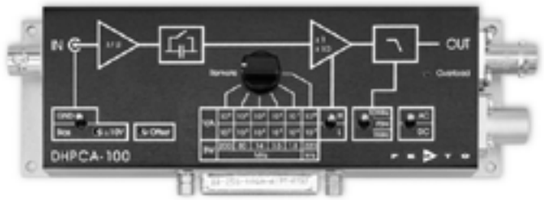
Variable-Gain High Speed Current Amplifier

DHPCA-100



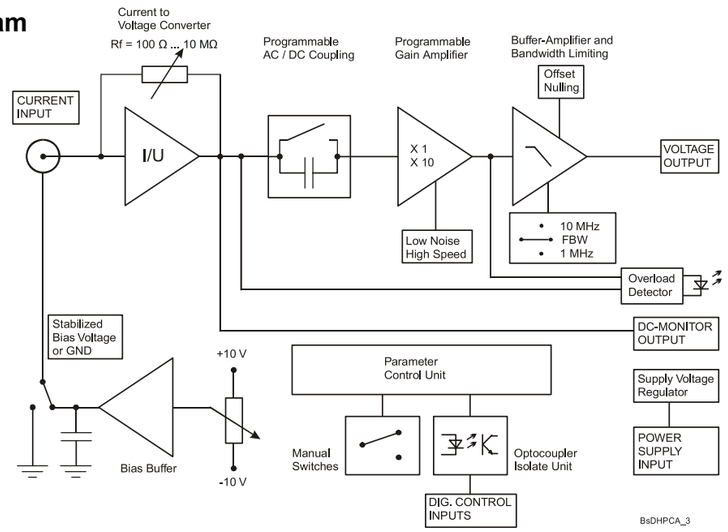
FEATURES

- Transimpedance (Gain) Switchable from 1 x 10^2 to 1 x 10^8 V/A
- Bandwidth from DC up to 200 MHz
- Upper Cut-Off Frequency Switchable to 1 MHz, 10 MHz or Full Bandwidth
- Switchable AC/DC Coupling
- Adjustable Bias Voltage for Use with External Photodetectors
- Local and Remote Control of All Main Functions

APPLICATIONS

- Photodiode and Photomultiplier Amplifier
- Scanning Tunneling Microscopy (STM)
- Spectroscopy
- Preamplifier for Lock-Ins, A/D-Converters, etc.

Block Diagram



Specifications	Test Conditions	Vs = ± 15 V, Ta = 25°C
Gain	Transimpedance	1 x 10^2 ... 1 x 10^8 V/A
	Gain Accuracy	± 1 %
	Gain Drift	see table below
Frequency Response	Lower Cut-Off Frequency	DC / 100 Hz, switchable
	Upper Cut-Off Frequency	Dependent on gain setting up to 200 MHz (see table), switchable to 10 MHz or 1 MHz
	Gain Flatness	± 0.1 dB
Input	Equ. Input Noise Current	see table below
	Equ. Input Noise Voltage	typ. 2.8 nV/√Hz
	Input Bias Current	typ. 20 pA
	Input Offset Compensation	Adjustable by offset-trimpot and external control voltage, min. ± 100 mV

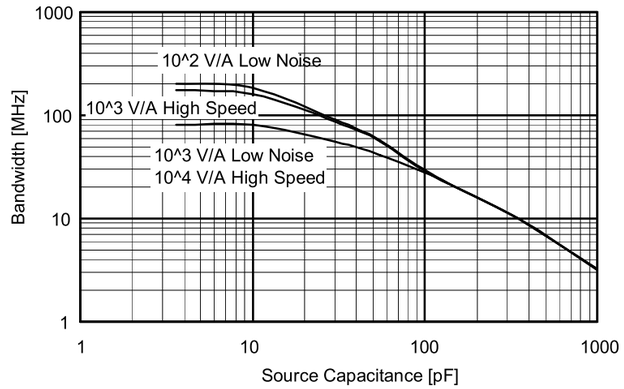
Performance depending on Gain Setting

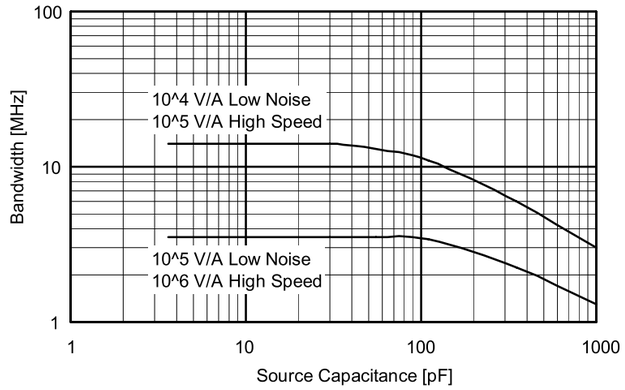
Gain Setting (Low Noise) (V/A)	10^2	10^3	10^4	10^5	10^6	10^7
Upper Cut-Off Frequency (-3 dB)	200 MHz	80 MHz	14 MHz	3.5 MHz	1.8 MHz	220 kHz
Rise / Fall Time (10% - 90%)	1.8 ns	4.4 ns	25 ns	0.1 µs	0.2 µs	1.6 µs
Equ. Input Noise Current (/√Hz)	200 pA	16 pA	2.1 pA	500 fA	170 fA	60 fA
measured at	1 MHz	1 MHz	1 MHz	10 kHz	10 kHz	10 kHz
Max. Input Current (±)	10 mA	1 mA	0.1 mA	10 µA	1 µA	0.1 µA
Gain setting (High Speed) (V/A)	10^3	10^4	10^5	10^6	10^7	10^8
Upper Cut-Off Frequency (- 3 dB)	175 MHz	80 MHz	14 MHz	3.5 MHz	1.8 MHz	220 kHz
Rise / Fall Time (10% - 90%)	2.0 ns	4.4 ns	25 ns	0.1 µs	0.2 µs	1.6 µs
Equ. Input Noise Current (/√Hz)	140 pA	6.0 pA	1.5 pA	450 fA	150 fA	55 fA
measured at	1 MHz	1 MHz	1 MHz	10 kHz	10 kHz	10 kHz
Max. Input Current (±)	1 mA	0.1 mA	10 µA	1 µA	0.1 µA	10 nA

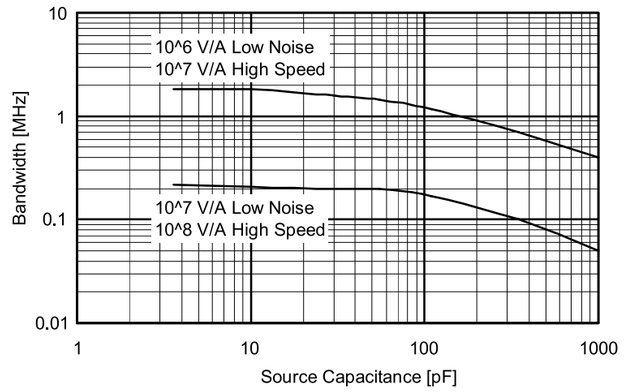
Upper cut-off frequencies and equivalent input noise currents given in this table are typical values only which will depend on the source capacitance. Keep the source capacitance as low as possible by using short cables at the input to achieve best possible bandwidth and noise performance. For the dependence of the upper cut-off frequencies on the source capacitance please see the diagrams on the next page.

Specifications (continued)

Dependence of Upper Cut-Off Frequency on Source Capacitance

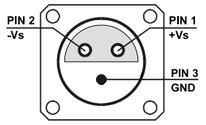






Specifications (continued)

Output	Output Voltage	± 1 V (@ 50 Ω Load), for linear amplification	
	Output Impedance	50 Ω	
	Slew Rate	1,000 V/µs	
DC Monitor Output	Monitor Output Gain	Mode	Monitor Gain
		Low Noise	Gain Setting Divided by -1
		High Speed	Gain Setting Divided by -10
	Monitor Output Polarity	Inverting	
	Monitor Output Voltage Range	± 1 V (@ >10 kΩ Load)	
	Monitor Output Bandwidth	DC ... 1 kHz	
	Monitor Output Impedance	1 kΩ	
Detector Bias	Bias Voltage Range	± 10 V, max. 22 mA, connected to shield of BNC input connector, switchable to GND	
	Warning	A bias current of 20 mA may destroy sensitive detectors. Please pay attention to the correct polarity and careful adjustment of the bias voltage to protect your detector. Put the bias switch to GND (ground) if you don't want to use the internal bias voltage. The positive and the negative supply voltage of the amplifier must be switched "on" and "off" simultaneously in order to avoid overvoltage at the bias output.	
Indicator LED	Function	Overload	
Digital Control	Control Input Voltage Range	Low: - 0.8 ...+ 1.2 V, High: 2.3 ... + 12 V	
	Control Input Current	0 mA @ 0V, 1.5 mA @ + 5 V, 4.5 mA @ + 12 V	
	Overload Output	Non Active: 0 V , max. -1 mA, Active: 5.1 V, max. 7 mA	
Ext. Offset Control	Control Voltage Range	± 10 V	
	Offset Control Input Impedance	15 kΩ	
Power Supply	Supply Voltage	± 15 V	
	Supply Current	typ. + 110 / - 90 mA	
	Stabilized Power Supply Output	± 12 V, max. 150 mA, + 5V, max. 50 mA	
Case	Weight	320 gr. (0.74 lbs)	
	Material	AlMg4.5Mn, nickel-plated	
Temperature Range	Storage Temperature	-40 ... +100 °C	
	Operating Temperature	0 ... +60 °C	
Absolute Maximum Ratings	Signal Input Voltage	± 5 V	
	Control Input Voltage	- 5 V / + 16 V	
	Power Supply Voltage	± 20 V	
	Transient Input Voltage	± 1.5 kV (out of a 1 nF Source)	

Connectors	Input	BNC, isolated
	Output	BNC
	Power Supply	LEMO Series 1S, 3-pin fixed Socket Pin 1: + 15V Pin 2: - 15V Pin 3: GND 
	Control Port	Sub-D 25-pin, female, Qual. Class 2 Pin 1: +12V (Stabilized Power Supply Output) Pin 2: -12V (Stabilized Power Supply Output) Pin 3: AGND (Analog Ground) Pin 4: +5V (Stabilized Power Supply Output) Pin 5: Digital Output: Overload Pin 6: DC Monitor Pin 7: BIAS Monitor Pin 8: Offset Control Voltage Pin 9: DGND (Ground for Digital Control Pins) Pin 10: Digital Control Input: Gain, LSB Pin 11: Digital Control Input: Gain Pin 12: Digital Control Input: Gain, MSB Pin 13: Digital Control Input: AC/DC Pin 14: Digital Control Input: High Speed / Low Noise Pin 15: Upper BW Limit 10 MHz PIN 16: Upper BW Limit 1 MHz PIN 17-25 NC

Remote Control Operation

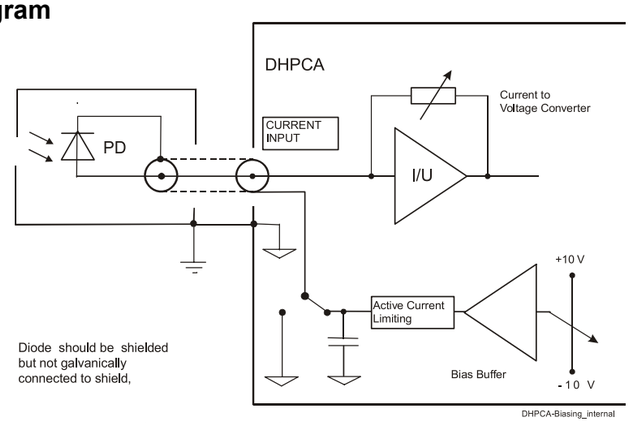
General	Remote Control Input Pins are optically isolated. Corresponding control bits are connected by logical OR function to local switch setting allowing for mixed mode operation. For pure remote control set the corresponding local switch to “Remote”, "AC" , "L” (Low Noise), "FBW" and select the desired setting via a bit-code at the corresponding digital inputs. Mixed operation, i.e. local gain setting and remote controlled AC/DC setting, is also possible. Switch setting “Bias / GND” is not remote controllable.				
Gain Setting	Low Noise Gain (V/A) Pin 14= Low	High Speed Gain (V/A) Pin 14= High	Pin 10 LSB	Pin 11	Pin 12 MSB
	10^2	10^3	Low	Low	Low
	10^3	10^4	High	Low	Low
	10^4	10^5	Low	High	Low
	10^5	10^6	High	High	Low
	10^6	10^7	Low	Low	High
	10^7	10^8	High	Low	High

AC/DC Setting	Coupling Pin	13
	AC	High
	DC	Low

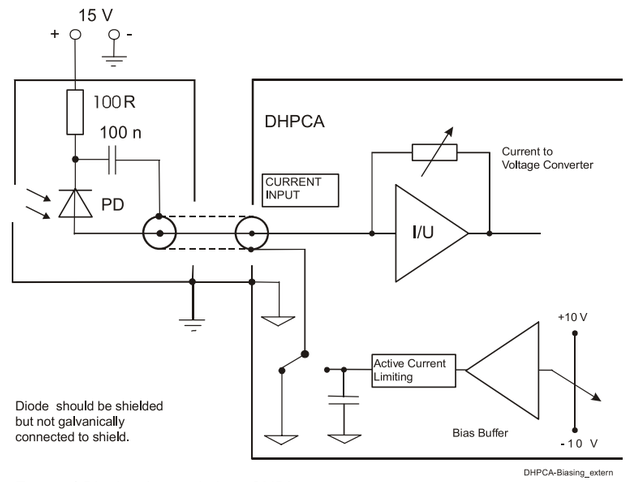
Low Pass Filter Setting	Upper Bandwidth Limit	Pin 15	Pin 16
	Full Bandwidth	Low	Low
	10 MHz	High	Low
	1 MHz	Low	High

High Speed / Low Noise Setting	Mode	Pin 14
	Low Noise	Low
	High Speed	High

Application Diagram



Internal Biasing (set switch to BIAS)



External Biasing (set switch to GND)

Dimensions