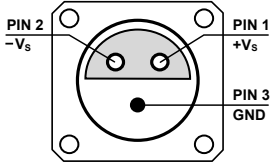


High Frequency Charge Amplifier



Features	• High gain of 10 V/pC • Wide operating range from 250 Hz to 15 MHz • Low input noise of 40×10^{-21} C/$\sqrt{\text{Hz}}$ and 700 pV/$\sqrt{\text{Hz}}$ • Optimized for sinusoidal signals from AC coupled charge sources
Applications	• Pyro- and piezoelectric detectors • Tuning fork quartz crystals • Length extension resonators • Atomic force microscopy (AFM)
Block Diagram	BS01-HQA_R01
Available Accessories	PS-15-25-L Power supply Input: 100 – 240 VAC Output: ± 15 VDC

High Frequency Charge Amplifier

Specifications	Test conditions	$V_S = \pm 15\text{ V}$, $T_A = 25\text{ }^\circ\text{C}$, output load impedance $1\text{ M}\Omega$, warm-up 20 minutes (min. 10 minutes recommended)
Gain	Charge gain Gain accuracy Equivalent current gain	10 V/pC (@ output load $\geq 100\text{ k}\Omega$) $\pm 3\%$ 1.6 V/ μA (@ 1 MHz sinusoidal input signal, output load $\geq 100\text{ k}\Omega$)
Frequency Response	Lower cut-off frequency (-3 dB) Upper cut-off frequency (-3 dB)	250 Hz 15 MHz typ. (with max. 100 pF source capacitance)
Input	Input impedance Effective AC input impedance Input charge noise Equivalent input current noise Input voltage noise Max. input charge	$1\text{ G}\Omega \parallel 10\text{ nF}$ $20\text{ }\Omega$ (@ 1 MHz) $40 \times 10^{-21}\text{ C}/\sqrt{\text{Hz}}$ (@ 1 MHz, open input) $90 \times 10^{-21}\text{ C}/\sqrt{\text{Hz}}$ (@ 1 MHz, 100 pF source capacitance) $250\text{ fA}/\sqrt{\text{Hz}}$ (@ 1 MHz, open input) $570\text{ fA}/\sqrt{\text{Hz}}$ (@ 1 MHz, 100 pF source capacitance) $700\text{ pV}/\sqrt{\text{Hz}}$ (@ 1 MHz) 1 pC_{PP}
Output	Output voltage range Output impedance Max. output current Output noise	10 V_{PP} (@ $\geq 100\text{ k}\Omega$ output load, for linear operation) 5 V_{PP} (@ $50\text{ }\Omega$ output load) $50\text{ }\Omega$ (for best performance terminate with $\geq 100\text{ k}\Omega$ load) 100 mA (short-circuit proof) 1.5 mV_{RMS} (10 mV_{PP}) typ. (@ open input) 4.6 mV_{RMS} (30 mV_{PP}) typ. (@ 100 pF source capacitance) (@ $\geq 1\text{ M}\Omega$ load, measuring bandwidth 200 MHz)
Power Supply	Supply voltage Supply current	$\pm 15\text{ V}$ ($\pm 14.5\text{ V} \dots \pm 16.5\text{ V}$) $\pm 35\text{ mA}$ (depends on operating conditions, recommended power supply capability min. $\pm 100\text{ mA}$)
Case	Weight	200 g (0.44 lbs) Material AlMg4.5Mn, nickel-plated
Temperature Range	Storage temperature Operating temperature	$-40\text{ }^\circ\text{C} \dots +85\text{ }^\circ\text{C}$ $0\text{ }^\circ\text{C} \dots +40\text{ }^\circ\text{C}$
Absolute Maximum Ratings	Input voltage Power supply voltage	20 V_{PP} $\pm 18\text{ V}$
Connectors	Input Output Power supply	BNC jack (female) BNC jack (female) LEMO® series 1S, 3-pin fixed socket (mating plug type: FFA.1S.303.CLAC52)
		 Pin 1: $+15\text{ V}$ Pin 2: -15 V Pin 3: GND
Scope of Delivery	HQA-15M-10T, LEMO® 3-pin connector, datasheet, transport package	
Ordering Information	HQA-15M-10T	High frequency charge amplifier

High Frequency Charge Amplifier

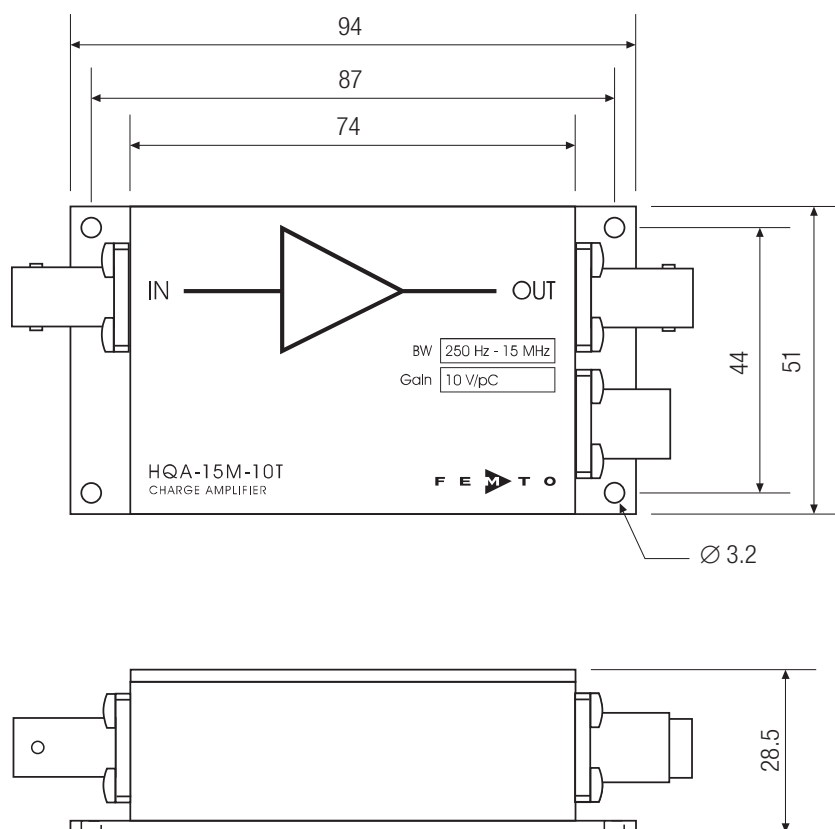
Operation

The amplifier is AC coupled for direct use with a charge sensor producing sinusoidal signals with no DC background. A source capacitance of less than 1 nF is recommended for proper operation. If the effective source capacitance (sensor plus cable capacitance) is small relative to the effective input impedance of the amplifier (10 nF) the amplifier acts as a virtual ground and most of the charge flows into the amplifier input.

At 1 MHz the amplifier input capacitance of 10 nF corresponds to a complex input impedance of 20Ω . An input resistor of 1 G Ω is incorporated to prevent buildup of static charge. The amplifier is not suited for sources producing an average DC background current as this would saturate the device.

Dimensions

HQA-15M-10T



DZ01-299001_R6

all dimensions are in mm unless otherwise noted

FEMTO Messtechnik GmbH
Klosterstr. 64
10179 Berlin · Germany
Phone: +49 30 280 4711-0
Fax: +49 30 280 4711-11
Email: info@femto.de
www.femto.de

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