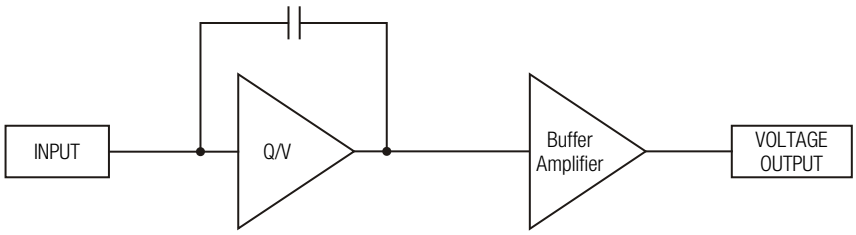
High Frequency Charge Amplifier

Features	• **High gain of 10 V/pC** • **Wide operating range from 250 Hz to 15 MHz** • **Low input noise of 40 × 10^{-21} C/√Hz and 700 pV/√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

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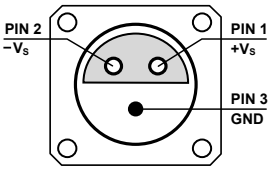
Specifications	Test conditions	$V_S = \pm 15$ V, $T_A = 25$ °C, output load impedance 1 MΩ, warm-up 20 minutes (min. 10 minutes recommended)
Gain	Charge gain	10 V/pC (@ output load ≥ 100 kΩ)
	Gain accuracy	±3 %
	Equivalent current gain	1.6 V/µA (@ 1 MHz sinusoidal input signal, output load ≥ 100 kΩ)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



Pin 1: +15 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

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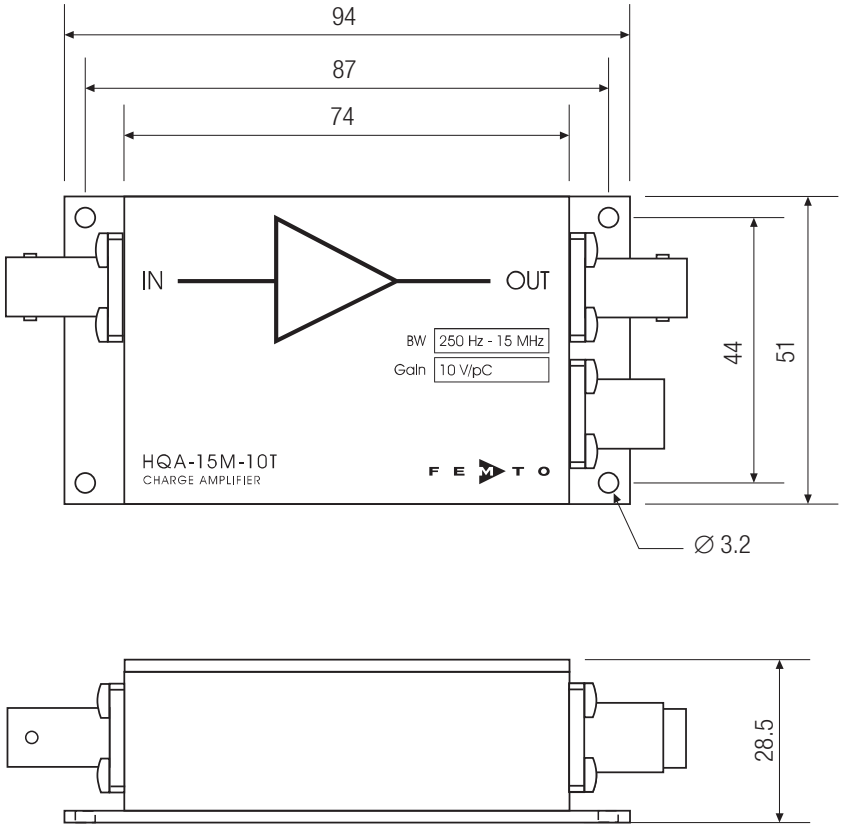
Operation	The amplifier is AC coupled for direct use with a charge sensor producing sinusoidal signals with no DC background. A source capacitance of less than 1 nF is recommended for proper operation. If the effective source capacitance (sensor plus cable capacitance) is small relative to the effective 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 20 Ω. An input resistor of 1 GΩ 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

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