

**Low-Noise Charge Amplifier
 Fixed-Gain Micro-Module**

Features

- Compact: 66 x 29 x 11 mm (including header)
- Frequency Response independent of Detector Capacitance (up to 100 pF)
- Low Noise

Applications

- AFM Microscopy

The A159-002-02 is a state-of-the-art low-noise charge preamplifier board for piezoelectric tuning forks as nc-AFM pickup. It offers high gain and low noise on an ultra-compact board. The A159-002-02 is designed for a sinusoidal signal around 30 kHz. An on-board attenuator of 40 dB for the excitation voltage is provided.

Due to its small footprint this board can be mounted very close to the detector. Means to compensate for a cable capacitance of up to 10 pF are included too.

Characteristics	
Gain ±5%	10^{13} V/C
Bandwidth ±10%	500 Hz – 15 MHz (Detector Capacitance ≤ 100 pF)
Input Charge Noise Density (with open input)	40 x 10^{-21} C/√Hz @ 1 MHz
	150 x 10^{-21} C/√Hz @ 30 kHz
Effective Input Impedance	500 MΩ // 7 nF
Input Voltage Noise (typ.)	1 nV/√Hz @ 100kHz
Max. Input Charge (for linear amplification)	2 pC peak-peak
Max. recommended Source Capacitance	1 nF (for linear amplification)
Non-Linearity	< 1%
Output Voltage Range	20 V peak-peak (>10 kΩ Load)
Output Impedance	50 Ω
Max. Output Current	± 20 mA

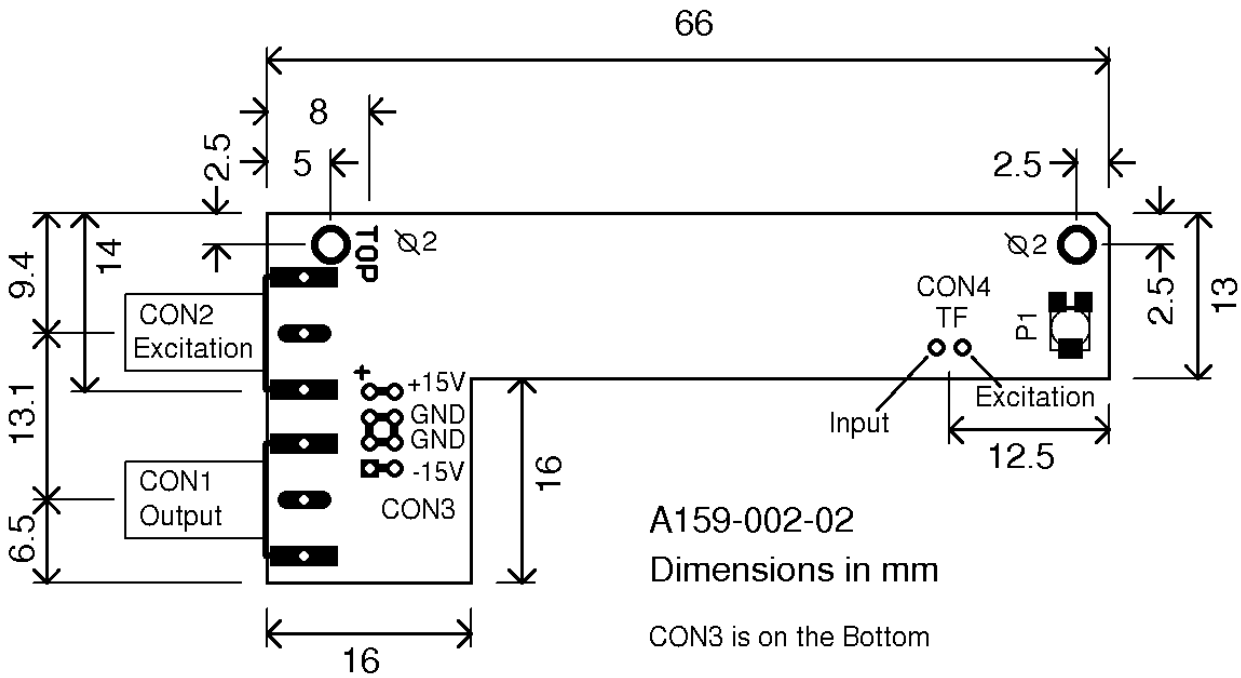
Characteristics	
Attenuation of Excitation Voltage	40 ±0.2 dB (100 : 1)
Input Impedance of Attenuator	5 kΩ
Output Impedance of Attenuator	100 Ω
Bandwidth of Attenuator	DC – 1.5 MHz
Max. Input Voltage for Attenuator	20 V peak-peak
Compensation Range for Detector Parallel Capacitance	0 - 10 pF, trimmable with P1
Power Supply Voltage	± 15 V
Power Supply Current	± 30 mA typ. (no signal)
Shield	Not provided, board must be shielded externally
Weight	13 g
Storage Temperature	-20 .. +80 °C
Operating Temperature	10 .. 50 °C

All characteristics are for ±15 V power supply and 25 °C ambient temperature.

Absolute Maximum Ratings	
Excitation Voltage	30 V peak-peak
Power Supply Voltage	± 20 V

Connections	
Input for Excitation Voltage	SMA Connector CON2
Output of Charge-Amplifier	SMA Connector CON1
Input of Charge-Amplifier	Solder Pad CON4
Output of attenuated Excitation Voltage	Solder Pad CON4
Power Supply	8 Pin 2-row Header CON3 (2 mm Pitch): Pin 1, 2 = -15V Negative Supply Pin 3, 4, 5, 6 = Ground Pin 7, 8 = +15V Positive Supply

Dimensions



CON1 and CON2 are SMA, CON3 is a 2mm Header at the bottom, CON4 are Solder Pads. P1 is the Parallel Capacitance Compensation Trimmer.