



The **A1422E/F** is a charge sensitive preamplifier with 2/4 input channels. The sensitivity is 200 mV/MeV.

It is suited for silicon detectors with wide surface and high capacitance, used for nuclear and subnuclear physics experiments, where very low noise, fast response and high counting rates are required. The modules accept both positive and negative input charge pulses and provide an energy output of ± 4.5 V range on 50 Ω termination (± 10 V on 1k Ω). Moreover, a test input accepts positive and negative signals for calibration purposes.

The A1422E/F is implemented into alloy boxes and feature **SHV** connectors for HV/IN, **SMA** connectors for DET/IN, TEST IN and E OUT and **D-type** 9 pin male connector for the power supply.

- Alloy box
- Fast, low noise inverting preamplifier
- Positive or negative input signals
- Gain 200 mV/MeV (si)
- 2 or 4 input channels
- Up to 750 V (positive or negative) detector bias voltage
- Low noise input stage composed JFETs diode protected

Specification

Charge Sensitivity

200 mV/MeV (Si)

Noise FWHM keV (Si) ⁽¹⁾

Detector capacitance	0 pF	330 pF
	< 2.8	< 6.812

Rise Time ⁽²⁾

Detector capacitance	0 pF	330 pF
	< 5.4 ns	< 60 ns

Output Linear Range

± 10 V 1 k Ω termination

± 4.5 V 50 Ω termination

Integral non Linearity

$< \pm 0.05\%$ ($0 \div \pm 10$ V 1 k Ω termination)

Temperature Instability

$< \pm 100$ ppm/ $^{\circ}\text{C}$ (0 to 50 $^{\circ}\text{C}$)

Gain Drift

$< \pm 0.5\%$ (0 to 50 $^{\circ}\text{C}$)

Gain Uniformity

$< \pm 5\%$ (RMS)

Open Loop Gain $> 10^6$

E²CPR Maximum energy-squared count-rate product

E²CPR $1.57 \cdot 10^6$ MeV²/s

Decay Time 22 μs

Detector Bias Voltage

± 750 V max

Packaging

Alloy Box

Dimensions (WxHxD connector excluded):

100 x 50 x 124 mm³

(1) Measured with a CAEN N968 Spectroscopy Amplifier and N957 Peak Sensing ADC shaping time: 3 μs .

(2) Test input rise time: 1.6 ns, amplitude: 200 mV 50 Ω termination

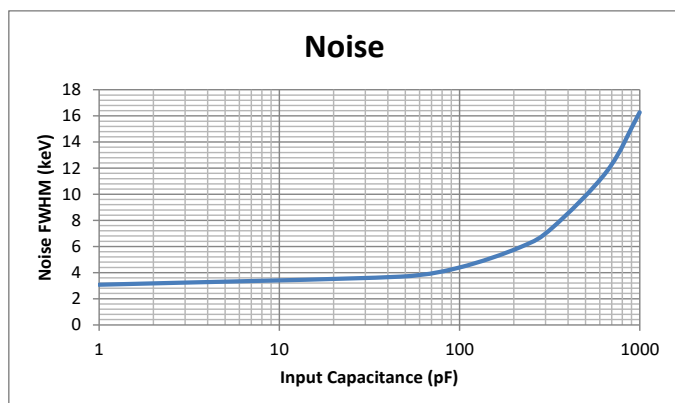


Fig. 2: Maximum Noise vs input Capacitance

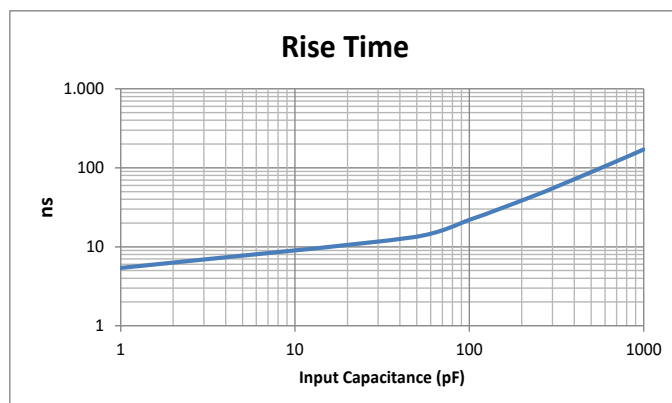


Fig. 1 : Typical Rise Time vs input Capacitance (test input rise time = 1.6 ns, amplitude: 200 mV, 50 Ω termination)

Inputs

IN

Accepts positive and negative input charge pulses from semiconductor detectors and supplies the HV bias to the detector itself;

SMA connector

A1422E: Amphenol RF 901-9889-RFX

A1422F: Adam Tech RF2-49B-T-00-50-G-HDW

HV

Up to 1000 V (positive or negative) for the detector bias. 100 M Ω resistance in series (other on request);

SHV connector.

TEST

Positive or negative input for the energy calibration via Ctest = 1 pF;

SMA connector

A1422E: Amphenol RF 901-9889-RFX

A1422F: Würth Elektronik 60312242114510

Power

Input Power through a **D-type 9 pin** male connector.

The power supply can be provided by CAEN Spectroscopy Amplifier N968 (via a D-type female connector on the rear-panel) or DT5423 Desktop Linear Power Supply

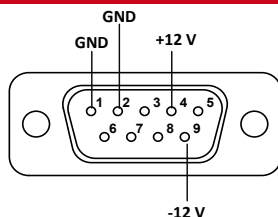


Fig. 3: Power Supply Connector pin out

Power Requirements

	+12 V	-12 V
A1422E (2ch)	60 mA	20 mA
A1422F (4ch)	120 mA	40 mA

Outputs

OUT

± 10 V max. (open circuit), 50 Ω back termination. The output voltage is proportional to the amount of input charge.

SMA connector

A1422E: Amphenol RF 901-9889-RFX

A1422F: Würth Elektronik 60312242114510

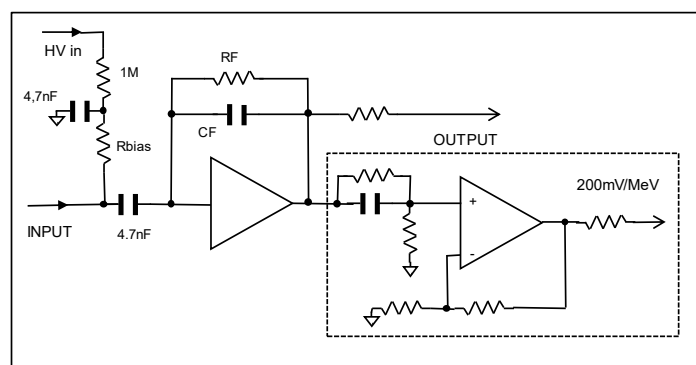


Fig. 4: A1422E/F diagram

Ordering Option

Ordering code	Description
WA1422E200F3	A1422E - 2 Ch. Charge Preamplifier, 200mV/MeV gain, Cdet<400pF
WA1422F200F3	A1422F - 4 Ch. Charge Preamplifier, 200mV/MeV gain, Cdet<400pF



Safety Warning and Operation Requirements

⚠️ WARNING

During normal operation, a potentially hazardous high voltage bias is applied to a detector via the preamplifier.

Only qualified personnel should carry out installation, operation and maintenance procedures of this unit.

Furthermore, the preamplifier bias circuit has a very long time constant and therefore this circuitry can remain at high voltage for a very long time.

If the user does not exercise adequate caution, this voltage can cause personal injury due to electrical shock.

Please observe the following precautions:

- Completely discharge the detector bias circuit by switching off the bias supply before connecting a cable, to the Input/ Detector connector.

- If you are using a variable power supply, bring the voltage value to zero and wait for at least 30-60 seconds. The bias circuitry will discharge itself through the output of the bias supply.

⚠️ WARNING

Do not connect the **IN** to exposed circuitry. Connect the preamplifier to a Detector/ Power Supply properly grounded to safety earth.

⚠️ WARNING

Opening the instrument cover can expose dangerous voltages. Disconnect the instrument from all voltage sources before opening.

Operation

Anyway care must be taken in the use of A1422E/F with high voltage detectors.

Please remember to:

- Turn down gradually bias voltage prior to connect or disconnect preamp input
- Avoid fast changes in bias voltage
- Avoid Detector breakdown or discharge

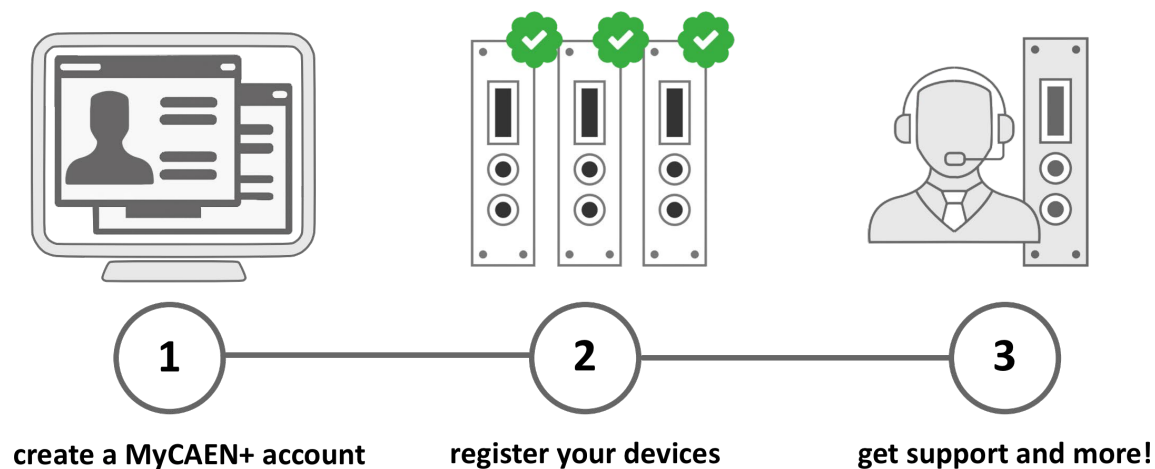
Cleaning

If required the equipment may be cleaned with isopropyl alcohol or deionized water and air dried. Clean the exterior of the product only. Do not apply cleaner directly to the items or allow liquids to enter or spill on the product.

Register your device

Register your device to your **MyCAEN+** account and get access to our customer services, such as notification for new firmware or software upgrade, tracking service procedures or open a ticket for assistance. **MyCAEN+** accounts have a dedicated support service for their registered products. A set of basic information can be shared with the operator, speeding up the troubleshooting process and improving the efficiency of the support interactions.

MyCAEN+ dashboard is designed to offer you a direct access to all our after sales services. Registration is totally free, to create an account go to <https://www.caen.it/become-mycaenplus-user> and fill the registration form with your data.





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