



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  $\pm 4.5$  V range on  $50\ \Omega$  termination ( $\pm 10$  V on  $1\ k\Omega$ ). 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)

### Gain Drift

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

### Noise FWHM keV (Si) <sup>(1)</sup>

Detector capacitance

0 pF	330 pF
< 2.8	< 6.812

### Rise Time <sup>(2)</sup>

Detector capacitance

0 pF	330 pF
< 5.4 ns	< 60 ns

### Output Linear Range

$\pm 10$  V  $1\ k\Omega$  termination

$\pm 4.5$  V  $50\ \Omega$  termination

### Gain Uniformity

$< \pm 5\%$  (RMS)

### Open Loop Gain

$> 1\ 10^6$

### $E^2\text{CPR}$ Maximum energy-squared count-rate product

$E^2\text{CPR}$   $1.57\ 10^6\ \text{MeV}^2/\text{s}$

### Decay Time

$22\ \mu\text{s}$

### Detector Bias Voltage

$\pm 750$  V max

### Packaging

Alloy Box

### Dimensions (WxHxD connector excluded):

100 x 50 x 124 mm<sup>3</sup>

(1) Measured with a CAEN N968 Spectroscopy Amplifier and N957 Peak Sensing ADC shaping time: 3  $\mu\text{s}$ .

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

### Noise

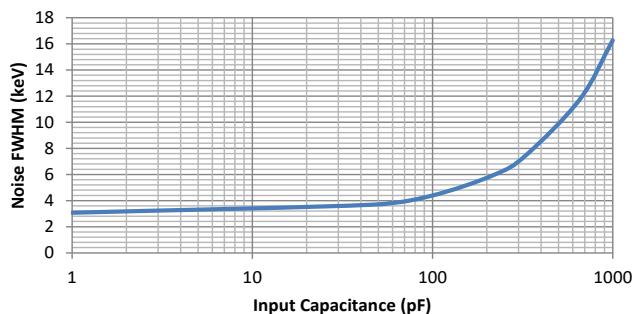


Fig. 2: Maximum Noise vs input Capacitance

### Rise Time

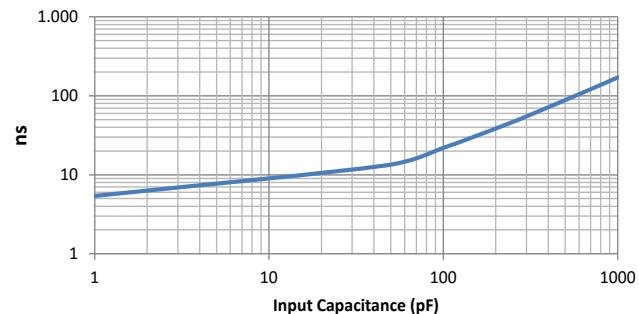


Fig. 1 : Typical Rise Time vs input Capacitance (test input rise time = 1.6 ns, amplitude: 200 mV, 50  $\Omega$  termination)

## 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 MΩ resistance in series (other on request);

#### SHV connector

## TEST

Positive or negative input for the energy calibration via  $C_{test} = 1 \text{ pF}$ ;

#### SMA connector

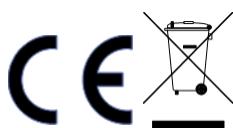
A1422E: Amphenol RF 901-9889-RFX

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



## 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.

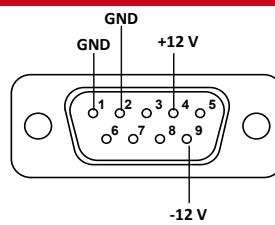


Fig. 3: Power Supply Connector pin out

## 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

## Power Requirements

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

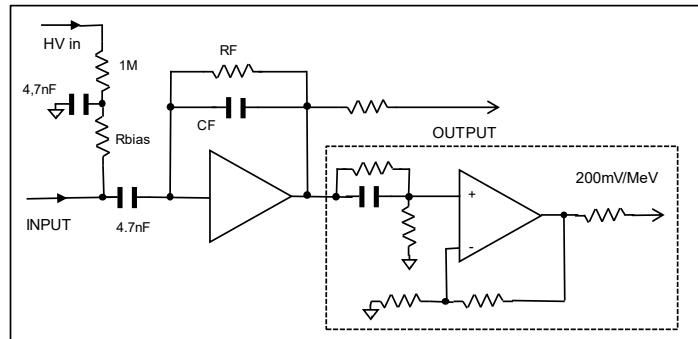


Fig. 4: A1422E/F diagram

## Ordering Option

### Ordering code

WA1422E200F3

WA1422F200F3

### Description

A1422E - 2 Ch. Charge Preamplifier, 200mV/MeV gain, Cdet<400pF

A1422F - 4 Ch. Charge Preamplifier, 200mV/MeV gain, Cdet<400pF

## 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

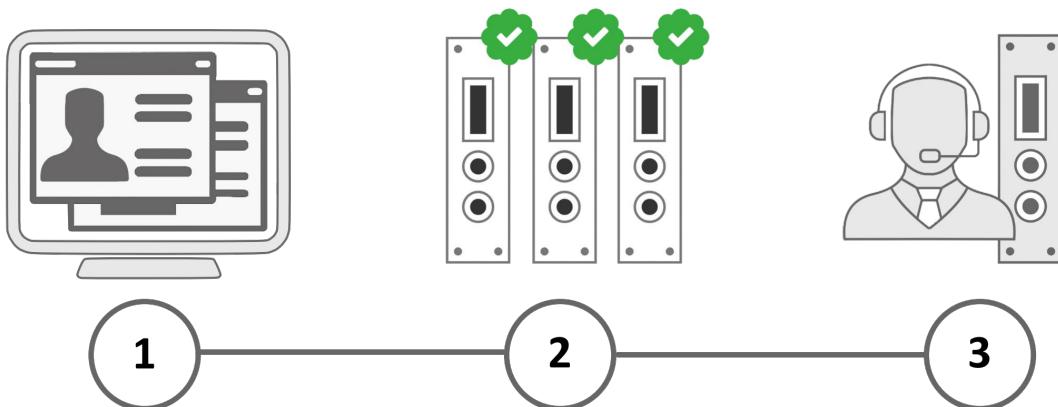
## Cleaning

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.



create a MyCAEN+ account

register your devices

get support and more!



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**CAEN S.p.A.**  
Via Vetraia 11  
55049 - Viareggio  
Italy  
Phone +39 0584 388 398  
Fax +39 0584 388 959  
[info@caen.it](mailto:info@caen.it)  
[www.caen.it](http://www.caen.it)



**CAEN GmbH**  
Eckehardweg 10  
42653 - Solingen  
Germany  
Phone +49 212 254 40 77  
Fax +49 212 254 40 79  
[info@caen-de.com](mailto:info@caen-de.com)  
[www.caen-de.com](http://www.caen-de.com)

**CAEN Technologies, Inc.**  
1 Edgewater Street - Suite 101  
Staten Island, NY 10305  
USA  
Phone: +1 (718) 981-0401  
Fax: +1 (718) 556-9185  
[info@caentechnologies.com](mailto:info@caentechnologies.com)  
[www.caentechnologies.com](http://www.caentechnologies.com)

**CAENspa INDIA Private Limited**  
B205, BLDG42, B Wing,  
Azad Nagar Sangam CHS,  
Mhada Layout, Azad Nagar, Andheri (W)  
Mumbai, Mumbai City,  
Maharashtra, India, 400053  
[info@caen-india.in](mailto:info@caen-india.in)  
[www.caen-india.in](http://www.caen-india.in)

