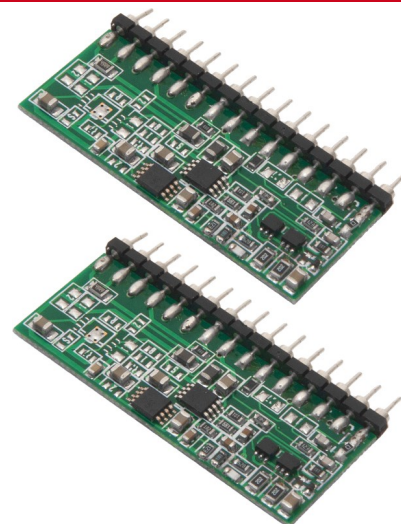


The **A1422H** series are charge sensitive preamplifiers implemented on a single in-line package. Various sensitivity values are available and various detectors capacitances are supported:

- **F2 type:** up to 200 pF
⇒ sensitivity: **5, 45, 90, 400, 450 mV/MeV (Si)**
- **F3 type:** up to 1000 pF
⇒ sensitivity: **5, 45, 90 mV/MeV (Si)**

All of them can be used in 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 1 k Ω). Moreover, a test input accepts positive and negative signals for calibration purposes.

CAEN offers charge sensitive preamplifiers (Mod. **A1422**) based on A1422H modules and packaged in a 1/4/8 channels boxes. **A1422** are implemented into alloy boxes and feature SHV connectors for the Input/Detector and HV Bias signals, LEMO connectors for the test input and Output/Energy and a cable with a D-type 9 pin male connector for the power supply.



- **Single in-line package**
- **(39 mm x 20 mm x 3 mm)**
- **Fast, low noise inverting preamplifier**
- **Positive or negative input signals**
- **Four available sensitivities:**
 - 5 mV/MeV (Si)
 - 45 mV/MeV (Si)
 - 90 mV/MeV (Si)
 - 400 mV/MeV (Si)
 - 450 mV/MeV (Si)
- **Up to 1000 pF detector capacitance supported**
- **Up to 800 V (positive or negative) detector bias voltage**
- **Low noise input JFETs diode protected**

Specification

Charge Sensitivity

5 mV/MeV (Si)
45 mV/MeV (Si)
90 mV/MeV (Si)
400 mV/MeV (Si) (only F2)
450 mV/MeV (Si) (only F2)

Recommended Range of Input Capacitance

F2: up to 200 pF
F3: up to 1000 pF

Noise FWHM keV (Si) ⁽¹⁾

Model	Detector capacitance	
	0 pF	200 pF
F2 - 5 mV/MeV	< 4.7	< 7.6
F2 - 45 mV/MeV	< 2.2	< 4.3
F2 - 90 mV/MeV	< 2.2	< 4.2
F2 - 400, 450 mV/MeV	< 2.2	< 4.1
Model	390 pF 1000 pF	
F3 - 5 mV/MeV	< 10.5	< 21.5
F3 - 45 mV/MeV	< 5.8	< 13.2
F3 - 90 mV/MeV	< 5.5	< 13.2

Rise Time ⁽²⁾

Model	Detector capacitance	
	0 pF	200 pF
F2 - 5 mV/MeV	< 5 ns	< 15 ns
F2 - 45 mV/MeV	< 5 ns	< 15 ns
F2 - 90 mV/MeV	< 10 ns	< 25 ns
F2 - 400, 450 mV/MeV	< 70 ns	< 110 ns
Model	390 pF 1000 pF	
F3 - 5 mV/MeV	< 20 ns	< 40 ns
F3 - 45 mV/MeV	< 25 ns	< 50 ns
F3 - 90 mV/MeV	< 45 ns	< 100 ns

Power requirements

5, 45, 90 mV/MeV

+12 V ⇒ F2: 12 mA F3: 20 mA
- 12 V ⇒ F2: 4 mA F3: 4 mA

400, 450 mV/MeV

+12 V ⇒ F2: 16 mA
- 12 V ⇒ F2: 8 mA

Output Linear Range

± 10 V 1 k Ω termination
 ± 4.5 V 50 Ω termination

Integral non Linearity

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

Temperature Instability

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

Open Loop Gain

5 mV/MeV (F2 / F3) > $1 \cdot 10^5$
45, 90 mV/MeV (F2 / F3) > $1 \cdot 10^6$
400, 450 mV/MeV (F2) > $1 \cdot 10^6$

E²CRP Maximum energy-squared count-rate product

Sensitivity	E ² CRP
5 mV/MeV (Si)	$1.57 \cdot 10^{10}$ MeV ² /s
45 mV/MeV (Si)	$1.57 \cdot 10^8$ MeV ² /s
90 mV/MeV (Si)	$7.86 \cdot 10^7$ MeV ² /s
400, 450 mV/MeV (Si)	$7.00 \cdot 10^6$ MeV ² /s

Decay Time

5 mV/MeV (Si) 100 μ s
45 mV/MeV (Si) 100 μ s
90 mV/MeV (Si) 50 μ s
400, 450 mV/MeV (Si) 27 μ s

Detector Bias Voltage

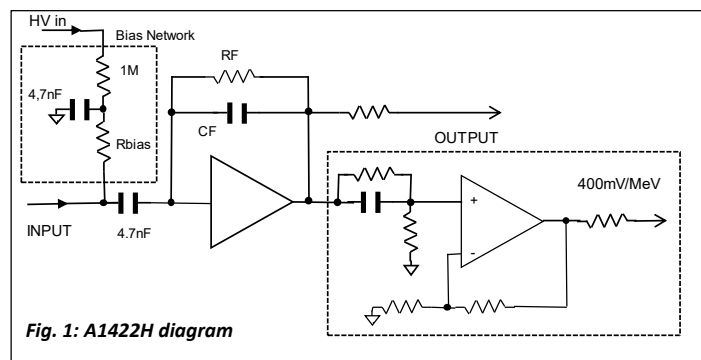
± 800 V max

Packaging

Single in-line package
39 mm x 20 mm x 3 mm (pins included)
pin pitch: 2.54 mm; weight: 2.40 g

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

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



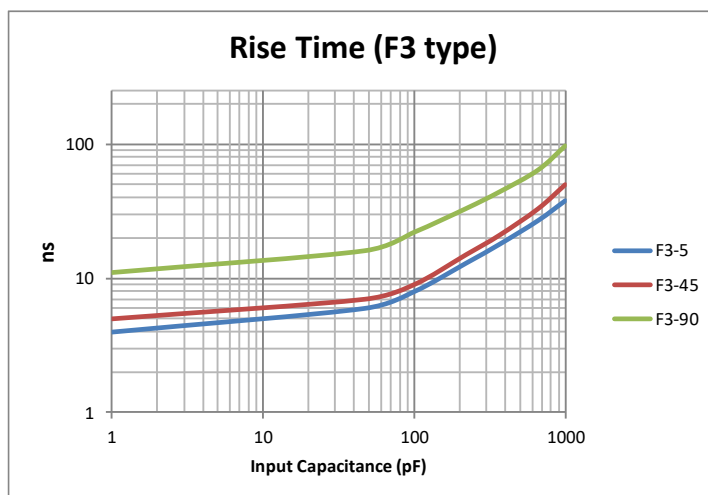
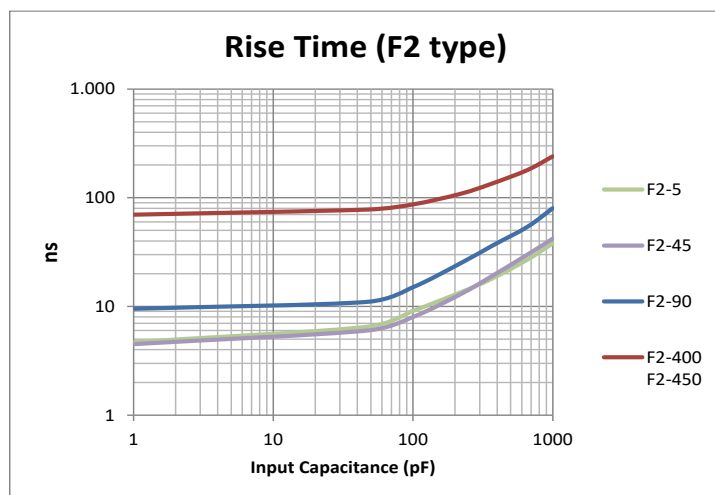


Fig. 2: Typical Rise Time vs input Capacitance (test input rise time = 1.6 ns, amplitude: 200 mV, 50 Ω termination)

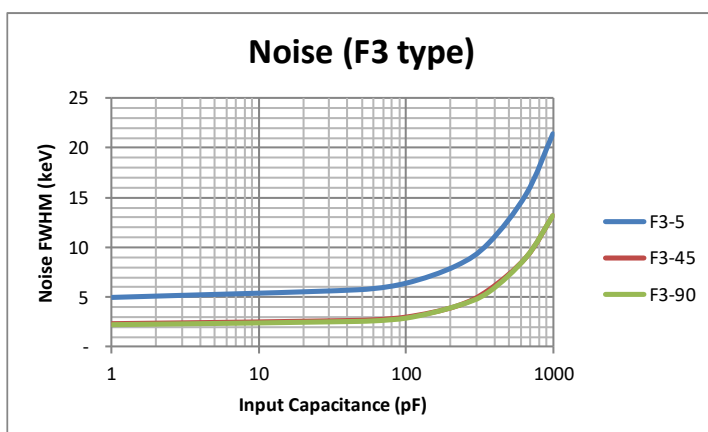
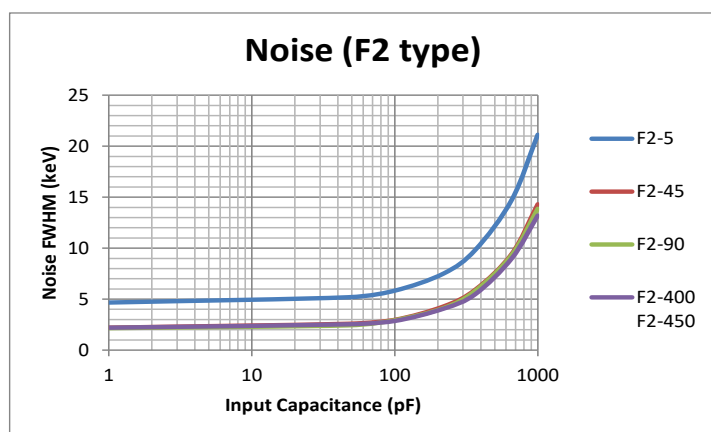
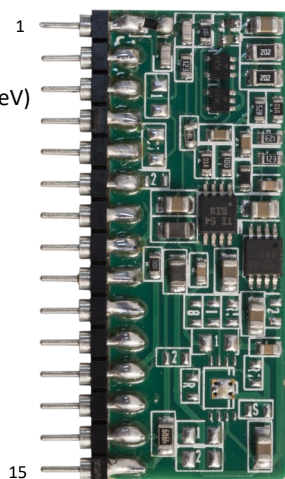


Fig. 3: Maximum Noise vs input Capacitance

Hybrid pin out

Pin 1	Input/Detector
Pin 2	GND
Pin 3	Test input - 1pF or 10 pF (5 mV/MeV)
Pin 4	GND
Pin 5	NC
Pin 6	High Voltage Bias
Pin 7	NC
Pin 8	GND
Pin 9	+12V Power Supply
Pin 10	GND
Pin 11	GND
Pin 12	-12V Power Supply
Pin 13	GND
Pin 14	NC
Pin 15	Output/Energy



Inputs

Input/Detector

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

High Voltage Bias

Up to 800V (positive or negative) for the detector bias. 10 M Ω resistance in series (other on request).

Test

Positive or negative inputs for the energy calibration via Ctest = 1 pF or 10 pF (on 5 mV/MeV versions).

Outputs

Output/Energy

$\pm 10V$ max. (open circuit), 50 Ohm back termination. The output voltage is proportional to the amount of input charge.

The typical rise time is

Detector capacitance = 0 pF

< 5 ns F2 - 5, 45 mV/MeV

< 10 ns F2 - 90 mV/MeV

< 70 ns F2 - 400, 450 mV/MeV

Detector capacitance = 390 pF

< 20 ns F3 - 5 mV/MeV

< 25 ns F3 - 45 mV/MeV

< 45 ns F3 - 90 mV/MeV

Ordering Option

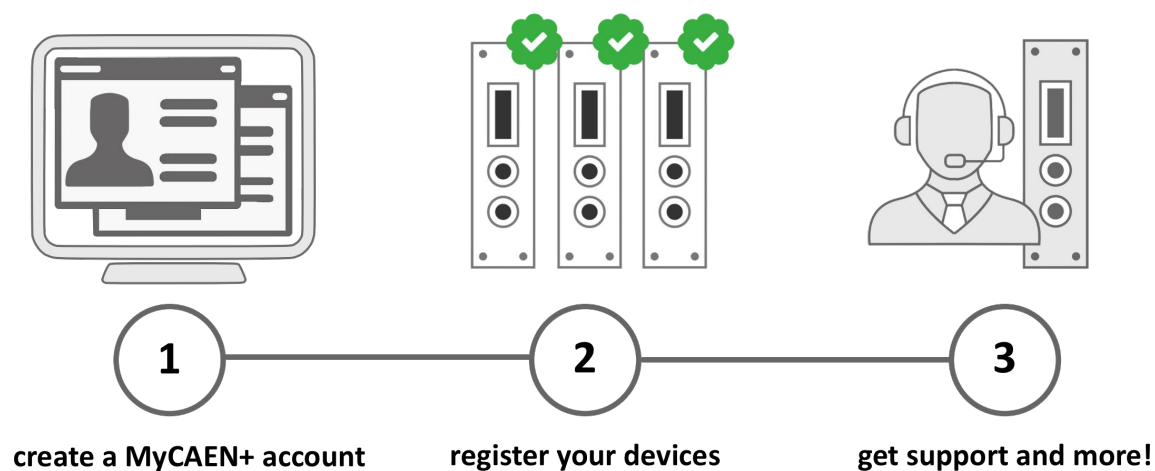
Gain mV/MeV	Ordering code	Description
5	WA1422H005F2	A1422H005F2 - Charge Preamplifier Module, 5mV/MeV gain, Cdet<200pF
45	WA1422H045F2	A1422H045F2 - Charge Preamplifier Module, 45mV/MeV gain, Cdet<200pF
90	WA1422H090F2	A1422H090F2 - Charge Preamplifier Module, 90mV/MeV gain, Cdet<200pF
400	WA1422H400F2	A1422H400F2 - Charge Preamplifier Module, 400mV/MeV gain, Cdet<200pF
450	WA1422H450F2	A1422H450F2 - Charge Preamplifier Module, 450mV/MeV gain, Cdet<200pF
5	WA1422H005F3	A1422H005F3 - Charge Preamplifier Module, 5mV/MeV gain, Cdet<1000pF
45	WA1422H045F3	A1422H045F3 - Charge Preamplifier Module, 45mV/MeV gain, Cdet<1000pF



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.





CAEN S.p.A.

Via Vetraria 11
55049 - Viareggio
Italy
Phone +39 0584 388 398
Fax +39 0584 388 959
info@caen.it
www.caen.it



CAEN GmbH

Brunnenweg 9
64331 Weiterstadt
Germany
Tel. +49 (0)212 254 4077
Mobile +49 (0)151 16 548 484
info@caen-de.com
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
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
www.caen-india.in

