



The preamplifier is usually the first stage in the electronic chain and its role is to amplify the detector signal to a level suitable for further electronic modules. Timing and amplitude characteristics of the preamplified signals are really important features and depend on the user needs. The right choice of a preamplifier is the first step to be taken for making a good data acquisition chain. CAEN offers a selection of preamplifiers for both small applications and big nuclear/subnuclear physics experiments.



Charge Sensitive Preamplifiers

Fast Preamplifiers

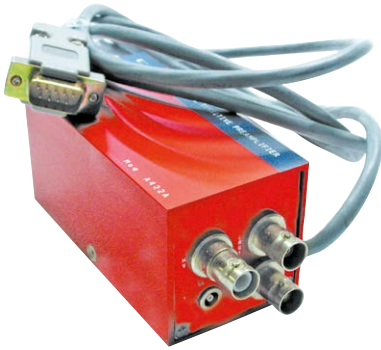
Wideband Amplifiers

Preamplifier Power Supplies

Charge Sensitive Preamplifiers

A422A

Charge Sensitive Preamplifier with Timing



Features

- Positive or negative input signals
- Energy sensitivity range of 5, 30 or 60 mV/MeV (Si equivalent)
- Low noise
- Timing output
- Up to 5 kV (positive or negative) detector bias voltage

Overview

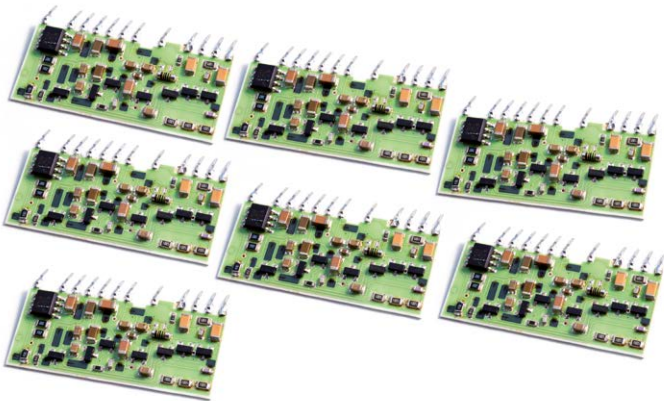
The A422A is a charge sensitive preamplifier, designed to be used with semiconductor detectors and in particular whenever the charge division is required (as in position sensitive silicon detectors). The unit accepts both positive and negative input pulses. A Test input for detector gain calibration and a HV input (up to 5 kV) for the detector bias are also included. The output is an inverting unipolar voltage pulse, proportional in amplitude to the integrated charge; decay time is 300 μ s. A Timing output provides an unipolar inverting fast voltage pulse, with a 15 ns typical rise time, across a 50 Ω load. Three different sensitivities (5, 30 or 60 mV/MeV) can be selected.

Ordering Option

Code	Description
WA422AXAAAA	A422A - Charge Sensitive Preamplifier with timing (Box)

A1422H

Low Noise Fast Rise Time Charge Sensitive Preamplifiers (Hybrid)



Features

- Fast, low noise inverting preamplifier
- Positive or negative input signals
- Four available sensitivities (Si equivalent): 5, 45, 90 and 400 mV/MeV
- Up to 1000 pF detector capacitance supported
- Up to 200 V (positive or negative) detector bias voltage

Overview

The A1422H series are charge sensitive preamplifiers. Various sensitivities (5 mV/MeV, 45 mV/MeV, 90 mV/MeV and 400 mV/MeV) are available and various detectors capacitances (up to 200 pF and 1000 pF so far) are supported. 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 charge pulses and provide an energy output in the ± 3.5 V range across a 50 Ω load. Moreover, a test input accepts positive and negative signals for calibration purposes.

The preamplifiers are designed with the Cold Discharge Mechanism: this allows to have a low decay time value maintaining a very high feed-resistance value.

This technique provides good performances minimizing the pile-up in presence of moderate high counting rates.

Due to the low power consumption, the preamplifier can operate also in a vacuum chamber without the use of cooling systems.

Ordering Option

Detector capacitance pF	Gain mV/MeV	Ordering Code	Description
200	5	WA1422H005F2	A1422H005F2 - Hybrid Charge Preamplifier, 5mV/MeV gain, Cdet<200pF
	45	WA1422H045F2	A1422H045F2 - Hybrid Charge Preamplifier, 45mV/MeV gain, Cdet<200pF
	90	WA1422H090F2	A1422H090F2 - Hybrid Charge Preamplifier, 90mV/MeV gain, Cdet<200pF
	400	WA1422H400F2	A1422H400F2 - Hybrid Charge Preamplifier, 400mV/MeV gain, Cdet<200pF
1000	5	WA1422H005F3	A1422H005F3 - Hybrid Charge Preamplifier, 5mV/MeV gain, Cdet<1000pF
	45	WA1422H045F3	A1422H045F3 - Hybrid Charge Preamplifier, 45mV/MeV gain, Cdet<1000pF
	90	WA1422H090F3	A1422H090F3 - Hybrid Charge Preamplifier, 90mV/MeV gain, Cdet<1000pF

Charge Sensitive Preamplifiers

A1422

Low Noise Fast Rise Time Charge Sensitive Preamplifiers

Overview

The A1422 series are charge sensitive preamplifiers packaged in a 1/4/8 channels box. Various sensitivity values are available and various detectors capacitances are supported:

F2 type: up to 200 pF; sensitivity: 5, 45, 90, 400 mV/MeV (Si equivalent)

F3 type: up to 1000 pF; sensitivity: 5, 45, 90 mV/MeV (Si equivalent)

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 ± 3.5 V range on 50 Ω termination (± 8 V on 1 k Ω). Moreover, a test input accepts positive and negative signals for calibration purposes.

The Preamplifiers are available also as 15 pin single-in-line packaged hybrid (see Mod. A1422H).

The preamplifiers are designed with the Cold Discharge Mechanism: this allows to have a low decay time value maintaining a very high feed-resistance value. This technique provides good performances minimizing the pile-up in presence of moderate high counting rates.

The A1422 are implemented into alloy boxes and feature SHV connectors for the IN/DETECTOR and HV BIAS signals, LEMO connectors for the TEST IN and ENERGY OUT and a cable with a D-type 9 pin male connector for the power supply.



Features

- Fast, low noise inverting preamplifier
- Four available sensitivities (Si equivalent):
 - 5 mV/MeV
 - 45 mV/MeV
 - 90 mV/MeV
 - 400 mV/MeV
- Up to 1000 pF detector capacitance supported
- 1, 4 and 8 channel model available
- Up to 2 kV (positive or negative) detector bias voltage

Detector capacitance pF	Gain mV/MeV	No. of Channels	Ordering Code	Description
200	5	1	WA1422A005F2	A1422A005F2 - 1Ch. Charge Preamplifier, 5mV/MeV gain, Cdet<200pF
		4	WA1422B005F2	A1422B005F2 - 4Ch. Charge Preamplifier, 5mV/MeV gain, Cdet<200pF
		8	WA1422C005F2	A1422C005F2 - 8Ch. Charge Preamplifier, 5mV/MeV gain, Cdet<200pF
	45	1	WA1422A045F2	A1422A045F2 - 1Ch. Charge Preamplifier, 45mV/MeV gain, Cdet<200pF
		4	WA1422B045F2	A1422B045F2 - 4Ch. Charge Preamplifier, 45mV/MeV gain, Cdet<200pF
		8	WA1422C045F2	A1422C045F2 - 8Ch. Charge Preamplifier, 45mV/MeV gain, Cdet<200pF
	90	1	WA1422A090F2	A1422A090F2 - 1Ch. Charge Preamplifier, 90mV/MeV gain, Cdet<200pF
		4	WA1422B090F2	A1422B090F2 - 4Ch. Charge Preamplifier, 90mV/MeV gain, Cdet<200pF
		8	WA1422C090F2	A1422C090F2 - 8Ch. Charge Preamplifier, 90mV/MeV gain, Cdet<200pF
	400	1	WA1422A400F2	A1422A400F2 - 1Ch. Charge Preamplifier, 400mV/MeV gain, cdet<200pF
		4	WA1422B400F2	A1422B400F2 - 4Ch. Charge Preamplifier, 400mV/MeV gain, Cdet<200pF
	1000	5	1	WA1422A005F3
4			WA1422B005F3	A1422B005F3 - 4Ch. Charge Preamplifier, 5mV/MeV gain, Cdet<1000pF
8			WA1422C005F3	A1422C005F3 - 8Ch. Charge Preamplifier, 5mV/MeV gain, Cdet<1000pF
45		1	WA1422A045F3	A1422A045F3 - 1Ch. Charge Preamplifier, 45mV/MeV gain, Cdet<1000pF
		4	WA1422B045F3	A1422B045F3 - 4Ch. Charge Preamplifier, 45mV/MeV gain, Cdet<1000pF
		8	WA1422C045F3	A1422C045F3 - 8Ch. Charge Preamplifier, 45mV/MeV gain, Cdet<1000pF
90		1	WA1422A090F3	A1422A090F3 - 1Ch. Charge Preamplifier, 90mV/MeV gain, Cdet<1000pF
		4	WA1422B090F3	A1422B090F3 - 4Ch. Charge Preamplifier, 90mV/MeV gain, Cdet<1000pF
		8	WA1422C090F3	A1422C090F3 - 8Ch. Charge Preamplifier, 90mV/MeV gain, Cdet<1000pF

Charge Sensitive Preamplifiers

A1424

Scintillation Preamplifier



Features

- Fast, low noise inverting preamplifier specifically designed for Scintillation Detectors
- Variable sensitivity from 0.8 to 10 mV/pC
- Fast output for timing measurements
- Test input for calibration

Overview

The A1424 is a preamplifier designed for Scintillation Detectors widely used in Nuclear and High Energy Physics where low noise, fast response and high counting rates are required.

The A1424 relies on an inverting Charge Sensitive Preamplifier which integrates both positive and negative input charge pulses coming from the Photodetector (e.g. PMT) coupled to the Scintillator. It provides a voltage signal in the ± 4 V range on 50Ω termination (± 8 V on $1 \text{ k}\Omega$) with exponential decay ($\tau = 50 \mu\text{s}$) as Energy output. The height of the resulting pulse is proportional to the integrated charge. The sensitivity of the Charge Sensitive Preamplifier can be set via a 10 position rotary switch ranging from 0.8 to 10 mV/pC.

The A1424 is provided with a non-inverting buffer (gain ≈ 1), which reproduces the input signals coming from the detector as Fast output being useful for timing measurements. Moreover, a test input accepts positive and negative signals for calibration purposes.

Ordering Option

Code	Description
WA1424XAAAAA	A1424 - Scintillation Preamplifier

Fast Preamplifiers

NEW

A1425 Fast Charge Preamplifier



Features

- Fast, inverting preamplifier
- Sensitivity of 3.6 mV/fC
- ENC of 0.21 fC (1300 e)
- Input impedance 200Ω
- Output impedance of 50Ω
- Output range 0 to 1 V
- Up to 1 kV (positive or negative) detector bias voltage

Overview

The A1425 is a fast and low noise preamplifier with AC coupled input. The fast rise time makes it suited for amplifying the signals from detectors as fast silicon sensors and diamond detectors. It has been designed for spectroscopical applications, and can be combined with sub-nanosecond measurements of particle time-of flight. It is optimized for high-speed single MIP particle detection with diamond detectors, where the signal integrated charge is extremely small. It integrates a high voltage input for detector bias up to 1 kV.

Ordering Option

Code	Description
WA1425XAAAAA	A1425 - Fast Charge Preamplifier NEW

A1426 CARDARELLI

Matched Preamplifier

COMING
SOON

Overview

The A1426 is a fast and low noise preamplifier with AC coupled input. It is composed by two amplification stages implementing BJT NPN silicon technology. The amplifier A1426 has been designed to be used with fast detectors as e.g. the diamond detectors and the resistive plate chambers. It is suited for detectors installed in hostile environments with high radiation flux and high temperature, when is not possible to connect the front-end electronics in proximity of the sensor (in reactors or in beams of high intensity and high ionizing particles). The amplifier can be connected to the detector with a coaxial cable without significant degradation of its performance. In embed a high voltage input for detector bias rated up to 1 kV.

Based on the fast preamplifier developed by R. Cardarelli, INFN Roma2



Features

- Fast, non-inverting preamplifier, positive output
- Sensitivity of 5 mV/fC
- ENC of 0.11 fC (700 e)
- Input impedance of 50 Ω
- Output range 0 to 1 V
- Output impedance of 50 Ω
- Up to 1 kV (positive or negative) detector bias voltage

Ordering Option

Code	Description	
WA1426XAAAA	A1426 CARDARELLI - Matched Preamplifier	COMING SOON

Overview

The A1423B is an inverting Wideband Amplifier designed for fast detectors, as SiPMs and Diamonds, having a bandwidth of ~ 1.5 GHz (-3 dB). The gain ranges from $+18$ dB to $+54$ dB and it is locally controlled through a rotary switch. The amplifier accepts both positive and negative input pulses and can provide an energy output in the ± 1 V range across a 50 Ω load.

The amplifier is AC decoupled with an input and output impedance of 50 Ω (SWR $< 1.5:1$) and can carry a bias voltage for the detector up to ± 750 V. The A1423B is implemented in a shielded box and features SMA connectors for the HV BIAS, IN/DETECTOR and OUTPUT. The input circuit includes a protection network to prevent damage to the input circuit from transient generated in the IN/HV network (up to ± 500 V).

Ordering Option

Code	Description
WA1423XBAAAA	A1423B - Wide Band Preamplifier

A1423B

Wideband Amplifier



Features

- Bandwidth: ~ 1.5 GHz (-3 dB)
- Positive or negative input signals
- Gain range: from $+18$ dB to $+54$ dB
- Output voltage: ± 1 V
- Input and output impedance 50 Ω , SWR $< 1.5:1$
- Noise Figure: 7 dB @ 1 GHz
- Up to 750 V (positive or negative) detector bias voltage

Preamplifier Power Supplies

N5424

Quad NIM Power distributor

Overview

The CAEN N5424 is a 4-channel NIM power distribution and control module.

The individual Voltage outputs (± 6 V, ± 12 V and ± 24 V) are protected by electronic fuses which automatically recover after short circuit. All six voltages are surveyed for each of the four outputs. The status is displayed by LEDs. The module also helps to check the correct voltage levels of a NIM-bin. If a NIM-bin without ± 24 V is used, the corresponding LEDs get off, and the voltage survey of those voltages is skipped.

Low-noise preamplifiers require DC power that is free of interference generated by other modules inserted in the bin. The mod. N5424 ensures this low-noise capability by filtering the power lines separately at each connector.



Features

- Single-width NIM module
- Four DB9 connectors with ± 6 V, ± 12 V, ± 24 V each
- Survey of all 6 voltages on each output
- Protection of all voltages by self-recovering electronical fuses
- Individually filtered outputs to ensure low noise operation
- Standard voltage output compatible to CAEN electronics and to many other manufacturers

Ordering Option

Code	Description
WN5424XAAAA	N5424 - Quad NIM Power Distributor for A1422 Preamplifier

Features

- Four DB9 connectors to supply A1422 family and A1424 preamplifiers
- One plug connector to supply DT57xx family desktop digitizers
- Four DB9 connectors with ± 12 V each

Overview

The DT5423 is a desktop power supply for A1422 and A1424 preamplifiers and DT57xx Digitizers family. It provides four standard 9-pin “D-type” female connectors to supply up to four A1422 or A1424 preamplifiers. Each output is filtered and fuse protected.

DT5423

Quad Desktop Power distributor



Ordering Option

Code	Description
WDT5423XAAAA	DT5423 - Desktop Power Supply for A1422-A1424 Amplifiers & DT57xx Digitizers