

## A1427 KIT

# Low noise fast current preamplifier and discriminator



## Features



### **A1427 Pre-amplifier characteristics:**

- Fast non inverting pre-amplifier, negative output (EOUT)
- Input impedance: 50  $\Omega$  AC coupled
- Output high impedance (EOUT)
- Bipolar output high impedance (FOUT)
- Test input (TEST IN) impedance: 50  $\Omega$ , negative polarity
- FOUT/DET IN gain (FOUT negative lobe):
  - FC version: 700÷2500
  - PR version: 500÷1500
- FOUT/TEST IN gain: 1/100 of DET IN gain
- Output noise (peak to peak) < 40 mV
- Up to 3 kV detector bias voltage (HV IN)
- Rbias: 200 k $\Omega$

### **A1428 Discriminator characteristics:**

- Input polarity negative
- Input impedance 50  $\Omega$
- Threshold -1 mV to -100 mV
- Output: standard TTL signal
- Maximum frequency 15 MHz for Fission Chamber
- Maximum frequency 6 MHz for Proton Recoil

## Description

**A1427 Kit** contains a fast preamplifier (**A1427**) and a discriminator (**A1428**) assembled together. It is developed by CEA Saclay for the Cabri reactor in Cadarache and it is suitable for fission chambers, boron deposition proportional counters,  $^3\text{He}$  counters and proton recoil counters.

The A1427 Kit is designed to work with high counting rate and it is specifically studied to be not sensible to the external electromagnetic fields. CAEN provides two versions of the kit with different mechanics and connectors: one for desk use and one made for the Cabri reactor.

A1427 is a fast and low noise current preamplifier with AC coupled input. It hosts two outputs: EOUT (unipolar) that can be integrated to calculate the energy associated to the input signal and FOUT (bipolar) that can be used to calculate the rate of the input signal, discriminating the negative pole using the A1428 discriminator that is designed to fit with A1427. The discriminator thresholds is settable from -1 to -100 mV via a 10 turn rotary handle with lock.

The Kit is available in two different versions one for fission chambers (FC) the other for proton recoil detectors (PR).

We provide **A1427** and **A1428** separately and in the A1427 Kit configuration, that includes the A1427 and the A1428 assembled together, both for fission chambers and for proton recoil detectors.

## Technical Specifications

### Packaging

Shielded box

Dimensions:

- WxHxL: 91 x 139 x 39 mm; 91 x 119 x 39 mm (without connectors)
- WxHxL A1427CA models: 61 x 112 x 55 mm; 61 x 112 x 31 (without connectors)

### No. of Channels

1

### Detector Input

- SHV connector; accepts negative charge pulses, AC coupled, 50 Ohm input impedance.
- **A1427CA** models: ATI INTERCO HN Connector 22323

### HV Input

- SHV connector, up to 3 KV for the detector bias, RBIAS 200 kOhm.
- **A1427CA** models: Itt Cannon 011-2049-040FB9 Terminal

### Test Input

- LEMO connector, negative input, 50 Ohm input impedance;
- GAIN = 1/100 of Detector IN

### Fast Out

- LEMO connector, bipolar output, high impedance (must be externally terminated with 50 Ohm impedance);
- Dynamic range -2 V ÷ +1.3 V max;
- Total duration (negative and positive lobe) A1427FC 120 ns, A1427PR 160 ns;
- Width Out negative lobe: A1427FC 27.5 ns FWHM, A1427PR 40 ns FWHM;
- Risetime negative lobe  $\leq 12$  ns;
- Measured with TEST IN negative pulse, -13 mVpp vs. GND, across 50Ohm, 10ns rise/fall time, 50ns FWHM, 100kHz frequency

### Energy Out

- LEMO connector, non-inverting unipolar negative output, high impedance (must be externally terminated with 50 Ohm impedance);
- Dynamic range 0 ÷ -350 mV max;
- Width Out 50 ns FWHM;
- Risetime  $\leq 19$  ns;
- Measured with TEST IN negative pulse, -13 mVpp vs. GND, across 50Ohm, 10ns rise/fall time, 50ns FWHM, 100kHz frequency

## GAIN Voltage

Trimmer adjustable:

- 700÷2500 on A1427FC;
- 500÷1500 on A1427PR

(referred to amplitude of FOUT negative lobe, with DET IN signal; with TEST IN input, GAIN = 1/100 of nominal value) FOUT/EOUT amplitude ratio:

- A1427FC = 4
- A1427PR = 5.6

## Output noise

- ≤ 40 mV p.p. (measured with gain =1000 on FOUT A1427FC)
- ≤ 30 mV p.p. (measured with gain =700 on FOUT A1427PR)
- ≤ 7 mV p.p. (measured with gain =1000 on EOUT A1427FC)
- ≤ 4 mV p.p. (measured with gain =700 on EOUT A1427PR)

## Power requirements

External power supply Switchbox FRA045-S12-4 (12 VDC, 3.75 A, 45 W);  
Universal Input C14 receptacle;

INPUT Voltage range 100- 240VAC 1.2A 50-60Hz. Inrush current 40A at 115VAC / 80A at 230VAC max.  
Dielectric withstand Input/output 3,000VDC.

OUTPUT Output voltage +12V. Ripple and noise 2% p-p max. Load regulation ±5% max. No load stand by power <0.5W@ 230VAC. Efficiency ≥85% for CEC requirement. Hold up time 10ms at nominal line.  
Protections OCP, OVP, over power & short circuit.

GENERAL Std output connector Dc barrel jack. Std output cable/length UL1185, #18AWG / 5 ft.

ENVIRONMENTAL Operating temperature 0°C to +40°C. Storage temperature -20°C to +85°C.

STANDARDS Safety standards IEC/UL/EN60950-1, CE, CB. EMC EN55022 (CISPR 22) class B, FCC class B.

**A1427CA** models: TE 282834-5; 1 GND, 2 +12V

## A1428 - Discriminator

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## Packaging

Shielded box

Dimensions:

WxHxL: 91 x 144 x 39 mm; 91 x 119 x 39 mm (without connectors)

WxHxL A1428CA models: 61 x 135 x 31; 61 x 112 x 31 mm (without connectors)

## No. of Channels

1

## Input

LEMO connector, negative polarity, AC coupled, 50 Ohm input impedance, minimum discriminated input: -4 mV.

## Threshold

Vishay 11A11B10 Dial, with brake lever (LOCK);

Range: -1 mV to -100 mV, settable on 10 turns of the dial (10 mV/turn; 1 mV/division, e.g.: 5.40 on dial, leads to Threshold = -54.0 mV).

## Output

LEMO connector, std. TTL signals (must be externally terminated with 50 Ohm impedance), rise time  $\leq 6$  ns, fall time  $\leq 6$  ns

## Output Width

Trimmer settable;

A1428FC: 45÷100 ns FWHM;

A1428PR: 45÷200 ns FWHM

## Offset

Trimmer settable; range -40÷+15 mV

## Power requirements

External power supply Switchbox FRA045-S12-4 (12 VDC, 3.75 A, 45 W); Universal Input C14 receptacle;

INPUT Voltage range 100-240VAC 1.2A 50-60Hz. Inrush current 40A at 115VAC / 80A at 230VAC max.

Dielectric withstand Input/output 3,000VDC.

OUTPUT Output voltage +12V. Ripple and noise 2% p-p max. Load regulation  $\pm 5\%$  max. No load stand by power  $< 0.5W@ 230VAC$ . Efficiency  $\geq 85\%$  for CEC requirement. Hold up time 10ms at nominal line. Protections OCP, OVP, over power & short circuit.

GENERAL Std output connector Dc barrel jack. Std output cable/length UL1185, #18AWG / 5 ft.

ENVIRONMENTAL Operating temperature 0°C to +40°C. Storage temperature -20°C to +85°C.

STANDARDS Safety standards IEC/UL/EN60950-1, CE, CB. EMC EN55022 (CISPR 22) class B, FCC class B.

**A1428CA** models: TE 282834-5; 1 GND, 2 +12V

## Ordering Options

Code	Description	
WK1427CABFCA	A1427KIT with A1427 Cabri Preamp. for Fission Chamber A1428 Cabri Discrimin. for Fission	RoHS
WK1427CABPRA	A1427KIT with A1427 Cabri Preamp. for Proton Recoil + A1428 Cabri Discrimin. for Proton Recoil	RoHS
WK1427FCAAAA	A1427KIT with A1427 Preamp. for Fission Chamber + A1428 Discrimin. for Fission Chamber	RoHS
WK1427PRAAAA	A1427KIT with A1427 Preamp. for Proton Recoil + A1428 Discrimin. for Proton Recoil	RoHS

## Related Products

### A1427



A1427 - Low noise fast current neutron flux preamplifier

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### A1428



A1428 - Discriminator for Low noise fast current neutron flux preamplifier

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## Gallery



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