A1427 KIT

Low noise fast current preamplifier and discriminator

The A1427 Kit is a fast, low-noise current preamplifier and discriminator, combining the A1427 and A1428 for high-rate detector readout. The AC-coupled 50 Ω input accepts negative signals and up to 3 kV detector bias; EOUT provides a negative unipolar output for energy integration, while bipolar FOUT supports rate measurement. Gain is 700÷2500 for the FC version and 500÷1500 for the PR version, with output noise below 40 mV peak to peak. The discriminator offers a -1 mV to -100 mV threshold range and standard TTL output, with maximum frequencies of 15 MHz (FC) and 6 MHz (PR).

Overview

Product Highlights

- Fast non inverting preamplifier, negative output (EOUT)
- Output high impedance (EOUT)
- Test input (TEST IN) impedance: 50 Ω, negative polarity
- FOUT/TEST IN gain: 1/100 of DET IN gain
- Up to 3 kV detector bias voltage (HV IN)
- Input polarity negative
- Threshold -1 mV to -100 mV
- Maximum frequency 15 MHz for Fission Chamber
- Input impedance: 50 Ω AC coupled
- Bipolar output high impedance (FOUT)
- FOUT/DET IN gain (FOUT negative lobe):
  - FC version: 700÷2500
  - PR version: 500÷1500
- Output noise (peak to peak) < 40 mV
- Rbias: 200 kΩ
- Input impedance 50 Ω
- Output: standard TTL signal
- Maximum frequency 6 MHz for Proton Recoil

Product 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, 3He 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.

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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 ≤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 ≤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)

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Technical Specifications (continued)

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	–
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 ≤ 6 ns, fall time ≤ 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 ±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. **A1428CA** models: TE 282834-5; 1 GND, 2 +12V

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Ordering Information

ORDERING CODE	DESCRIPTION
WK1427CABFCA	A1427KIT with A1427 Cabri Preamp. for Fission Chamber A1428 Cabri Discrimin. for Fission
WK1427CABPRA	A1427KIT with A1427 Cabri Preamp. for Proton Recoil + A1428 Cabri Discrimin. for Proton Recoil
WK1427FCAAAA	A1427KIT with A1427 Preamp. for Fission Chamber + A1428 Discrimin. for Fission Chamber
WK1427PRAAAA	A1427KIT with A1427 Preamp. for Proton Recoil + A1428 Discrimin. for Proton Recoil

1. Ordering codes and descriptions are reproduced from the product record. Availability is confirmed at order entry.

Related Products

A1427 — A1427 - Low noise fast current neutron flux preamplifier

A1428 — A1428 - Discriminator for Low noise fast current neutron flux preamplifier

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