

1. Overview



The EP-AP5101 is a high-resolution charge-sensitive preamplifier that can be applied to semiconductor detectors such as Si-PIN, APD, and PN photodiodes, etc. The preamplifier outputs a high signal-to-noise ratio energy signal with a fast time signal, and it can be widely used in the field of measurement of charged particles or heavy ions.

2. Functional indicators

- ▶ 1 Suitable for semiconductor detectors
- ▶ 2 Synchronized output of energy and time signals
- ▶ 3 Allowable high voltage input range 0~±1000V
- ▶ 4 Built-in input protection circuit

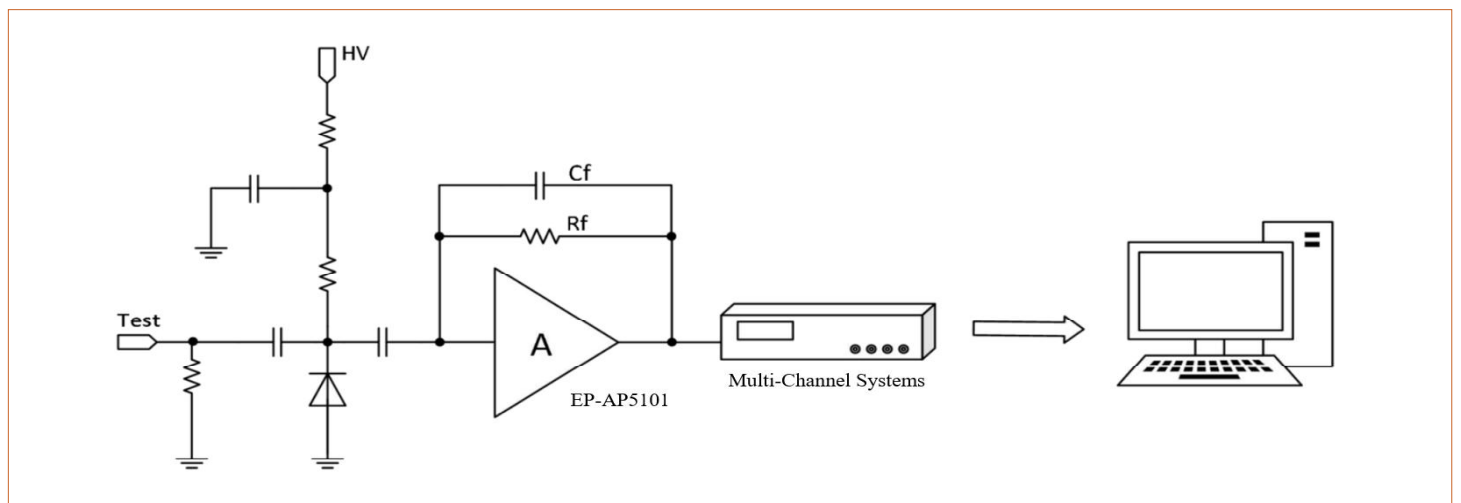
3. Performance parameter

Power supply	Power	High Voltage Output Voltage	Gain Linearity	Charge Gain	Rising time	Decay time constant	Analog bandwidth	Signal polarity Direct coupling	Signal polarity Ac coupling (physics)	Output swing	Output bias	Initial comparison threshold	Time signal output	Gain Temperature Stability	Operating temperature	Storage temperature
+12V	690mW	±1000V MAX	<0.03%	1475mV/pC	11.6ns (3pF feedback capacitor)	400ps	350MHz	Negative polarity	Positive polarity	4.4V	0V	50mV	Standard CMOS TTL Levels	<0.01%/°C	0°C~+50°C	-40°C~+125°C

4. Electromechanical interface

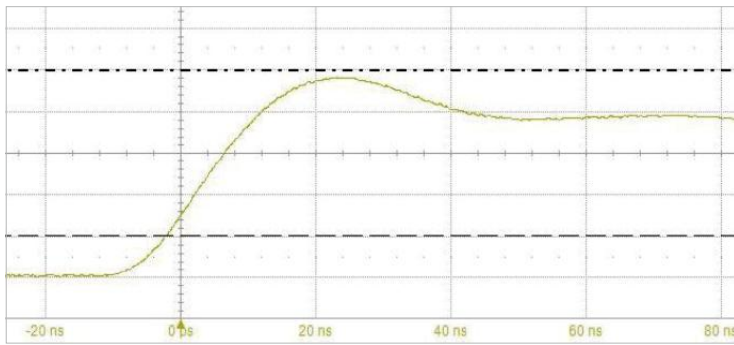
- ▶ INPUT Detector connection port
- ▶ TEST Test signal input port
- ▶ HV High voltage input port (SHV)
- ▶ POWER DC power input port (DB9/NIM standard)
- ▶ E Energy output signal
- ▶ T Time output signal

● Figure 1 Connection method(AC coupled mode by default, direct coupled version available)

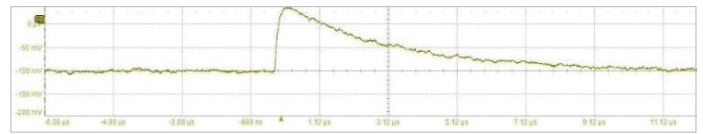


5. Performance testing

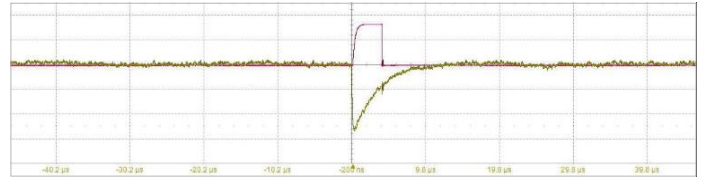
● Figure 2-1 Input signal rise time



● Figure 2-2 Energy output signal



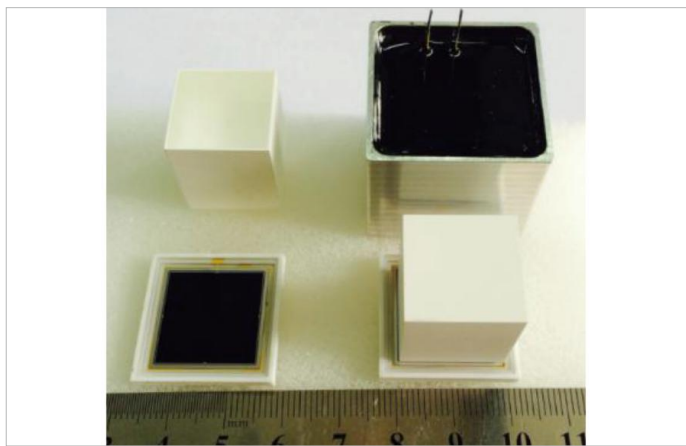
● Figure 2-3 Time output signal



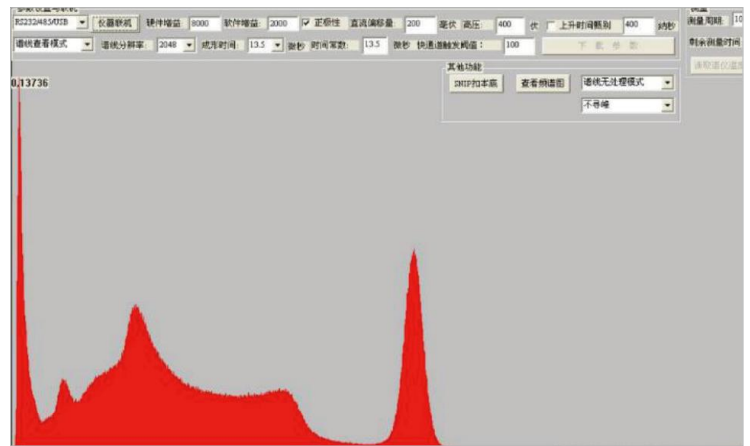
6. Applications

1. The 2×2×2cm CsI(Tl) crystal was coupled with a large area Si-Pin photodiode, and the signal amplification was realized by using an EP-AP5101 charge sensitive preamplifier and the energy spectrum readout was realized by using a EP-DMCA 1104 digitized multi-channel, and the measured resolution of the 662keV gamma rays for ¹³⁷Cs was 4.9%. The following is a diagram of the test object (Figure 4) and the tested energy spectrum data (Figure 5).

● Figure 3 Physical diagram of the test



● Figure 4 Energy spectrum of ¹³⁷Cs



2. For the 6mm² Si-PIN detector, the EP-AP5101 charge sensitive preamplifier is used to realize the signal amplification, and the EP-DMCA1104 digital multi-channel is used to realize the energy spectrum readout, and the measured resolution for the 59.5keV gamma rays of ²⁴¹Am is 2.25%, and the energy spectrum data are shown in Figure 6:

● Figure 5 Measured americium source energy spectrum of silicon PIN semiconductor detector

