

# bPAD

## Compact Single Channel Analyzer



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## bPAD – a compact Single Channel Analyzer

### INTRODUCTION

bPAD is a compact microcontroller-based Single Channel Analyzer. The device contains a Preamplifier-Amplifier-Discriminator with TTL digital output. The bPAD also includes its own high voltage power supply for operating standard 14-pin photomultiplier tubes, which are commonly used with scintillator-type radiation detectors (e.g. PVC, NaI(Tl), LaBr, CeBr, etc).

The device is therefore useful as a compact system to monitor the count rate in an energy region of interest. The detected signal is output as a TTL pulse, making it compatible with most industrial, environmental and laboratory counting systems. In contrast with traditional SCAs the bPAD is fully controlled by a microprocessor, providing easy setup and “smart” modes of operations. bPAD parameters can be conveniently set via USB with a PC and the provided configuration software.

### DESCRIPTION

The bPAD is an advanced, microprocessor-based, compact electronic device that integrates a charge-sensitive preamplifier, a variable-gain amplifier and a window discriminator; all in a 14-pin photomultiplier tube base. This electronic device outputs a TTL pulse per photo-event detected by a scintillator detector in the energy range of interest. This type of device is also often referred to as a Single Channel Analyzer (SCA).

bPAD also includes a miniature, programmable and efficient high-voltage supply to provide the power necessary to operate the most widespread range of photomultiplier tubes used with scintillator detectors. The output voltage can be set in the range from 0 to 1500 Volts with a resolution of 4096 steps.

Since the bPAD is a microprocessor-controlled device, it benefits from being easy to setup. The device connects to a PC via its USB interface, and by using the provided software all the operational settings can be configured and fine-tuned for any kind of scintillator detector. Once the setup is complete, all the settings are saved into the device's non-volatile memory.

The PC software also comes with a “pseudo-PHA” acquisition mode. In this mode, the software slides the single-channel window over the whole input range, constructing in such a way an energy spectrum. By using this spectrum, the user can visually identify the energy range of interest and immediately set the boundaries of the bPAD discriminator window. This represents a large improvement over the traditional “blind” method used with most other SCAs.

bPAD has two modes of operation:

- Integral, where counts are output for signals above a single energy threshold level
- Differential, where counts are output for signals within a defined energy window (SCA)

The output pulses correspond to counted events in the energy window of interest. They are 5-volt TTL signals with 2.5 μsec duration. The bPAD can be ordered to output pulses with a duration of 10 μsec instead.

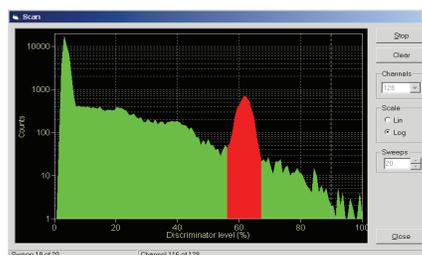
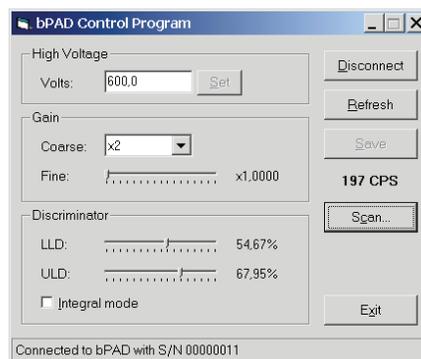
The bPAD can be powered via the USB connection or by an external DC power supply of 6 to 36 volts. Three color LEDs are used for status indications: Red for detector high voltage, Yellow for incoming count rate (ICR) and Green for power and communication status.

The bPAD is a compact device with a size of 65 mm diameter by 71 mm high (60 mm not counting the TTL output connector). bPAD weighs less than 80 grams.

All the above-mentioned features make the bPAD a very attractive component for industrial and automated applications involving photon detection and counting.

### FEATURES

- Compact Single Channel Analyzer with microprocessor control on a 14-pin photomultiplier tube base
- Integrates Preamplifier-Amplifier-Discriminator and HV power supply
- TTL output
- USB communications
- Device can be powered from USB and/or an external supply of 6 to 36 Volts via a pluggable terminal block
- Compact size of 56mm (D) x 71mm (H)
- Very low power consumption, 1 watt maximum.
- Miniature and efficient high voltage power supply
- Configuration software for easy setup and visualization of device operation, also implements a “pseudo-PHA” mode of operation
- LED indicators for communication status and device power, HV power and incoming count rate (ICR)



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Berkeley Nucleonics has supported the nuclear R&D and radiation measurements community for 50+ years. BNC manufactures electronics for nuclear research and innovative systems for the detection, location, and identification of radioactive sources. Comprehensive lines of specialized radiation counting and analysis tools are offered with the collaboration of key partners worldwide.

## Berkeley Nucleonics

2955 Kerner Blvd,  
San Rafael, CA  
94901, USA  
Phone: 415-453-9955

Email:  
Info@berkeleynucleonics.com

## TECHNICAL SPECIFICATIONS

### Device and digital settings

Acquisition modes: Integral and differential.

- ◆ Coarse gain: x1, x2, x4, x8 (optionally also x16, x32, x64, x128)
- ◆ Fine gain: x1...x2 in 4096 steps
- ◆ Upper and Lower Level discriminator resolution: 2048 steps
- ◆ Output: 5 Volts TTL signals of 2.5  $\mu$ sec duration.

### High Voltage Power Supply

Miniature HV power supply embedded into the device assembly

- ◆ Voltage: 0 in 4096 steps

### Data communication

USB 2.0, cable included.

- ◆ TTL output via SMA connector, cable included.

### Physical

USB connector: type mini B, used for PC communications or powering.

- ◆ Power connector: pluggable terminal block, 6 to 36 Volts, plug included.
- ◆ Power consumption: 1 watt maximum
- ◆ Size: Height 71 mm, Diameter 56 mm
- ◆ Weight: Approximately 80 grams

### Indicators:

- ◆ Red LED for detector high voltage
- ◆ Yellow LED for incoming count rate (ICR)
- ◆ Green LED for power and communication status

### Other

- ◆ The device is supplied with Windows™ PC software for setup and pseudo-PHA, the software can also display the CPS value for the defined SCA region

### Certifications

- ◆ The device is CE compliant