

**New**

## **I-SPECTOR PSD**

**Intelligent Silicon  
Photomultiplier  
Tube for Gamma-  
Neutron  
Discrimination**



## Features



- All-in-one detector and electronics for **Gamma-Neutron Discrimination**
- Based on a **SiPM** area  $24 \times 24 \text{ mm}^2$  and EJ- 276 Plastic Scintillation Crystal (1 inch)
- Realtime Pulse Shape Analysis running onboard
- PSD performances: FoM  $\sim 2.60$  in  $1 \div 1.5 \text{ MeV}$  range and FoM  $> 2.3$  in  $500 \div 1000 \text{ keV}$  range.
- 20-80 V Integrated High Voltage for SiPM biasing
- Ethernet connectivity
- **C#** and **Python** open-source libraries available
- Web-based interface with spectrum analysis tools and PSD scatterplot
- Tube-like compact form factor :  $\varnothing 60 \text{ mm}$ , h 135 mm
- Rad Cloud software for multiple detector networking (FREE TRIAL)

## Description

The CAEN **i-Spector PSD** is a compact tube-like **neutron detector** system based on SiPM, featuring high detection efficiency and wide dynamic range. It is a valuable solution to build compact and lightweight instruments for radioactive material detection or environmental measurements.

i-Spector PSD is a solution dedicated to those users that need the versatility of a compact system for **neutron/gamma discrimination**. Its profile makes it ideal for many **portable applications** where size, weight and power consumption are important constraints.

i-Spector PSD is based on a SiPM area (24x24 mm<sup>2</sup>) coupled to a fast neutron-sensitive plastic scintillation crystal (EJ-276). The unit is full-featured with a preamplifier stage, integrated HV for SiPM biasing, a 250 MSps 12-bit ADC and a microcontroller to perform **real-time pulse shape analysis**. It can be controlled through Ethernet and it provides as output an amplified analog signal, a 1k channels energy spectrum and a PSD scatterplot calculated onboard.

We obtained a Figure of Merit (FoM) for Gamma/Neutron discrimination of 2.60 in the 1÷1.5 MeV energy range.

The i-Spector PSD can be controlled via a user-friendly **web-based interface**. It is possible to easily configure and monitor the device, view the results of the PSD algorithm on a scatterplot, access the energy spectrum, process it online, perform energy calibration and peaks gaussian fitting.

Multiple i-Spector tubes can be connected and controlled from a single PC. The API interface allows the user to control multiple devices using very simple *http requests* and JSON vectors.

Developed in collaboration with Nuclear Instruments.

## Technical Specifications

### General

- Form Factor Portable
- Ø 60 mm (2.40"), h 135 mm (5.32"), >500 g (ASSEMBLY)

### Working Temperature

- -20 ÷ +50°C

### Power consumption

- 3W max.

### Supply Voltage

- 8-13 V (12 V typ.)

### SiPM

- Area made of Hamamatsu S14160-60520HS
- 30×30 mm<sup>2</sup> (nearly 1.5")

### High Voltage for SiPM biasing

- Range: 20-80 V (10 mA)
- HV Accuracy : 1 mV
- Thermal Feedback Accuracy: 0.01 °C - 1mV

### Preamp Gain

- x5

### Bandwidth

- >1 GHz

### Shaping Time

- 180 ns

### Analog Output

- - 4 ÷ +4 V , 170 mA on the OUT LEMO connector

### Timing Resolution

- 50 ps @ rate <20 kpcs
- 5 ns @high rates

## PSD FoM

- $1 \div 1.5 \text{ MeV} \rightarrow \text{FoM} \sim 2.60$
- $500 \div 1000 \text{ keV} \rightarrow \text{FoM} > 2.3$
- Methodology note: obtained with  $^{252}\text{Cf}$  source placed in direct contact with the i-Spector lower face, energy calibration performed with  $^{137}\text{Cs}$  source

## ADC

- 12-bit, 250MS/s

## Communication Interface

- 10/100 Mb/s Ethernet

## Software

- Graphical web interface SDK based on JSON data and standard HTTP post

## Ordering Options

Code	Description	
WS2590CXAAA	S2590C i-Spector PSD 24x24mm - ASSEMBLY	RoHS

## Related Products

### I-SPECTOR DIGITAL



Intelligent Silicon Photomultiplier Tube with Digital MCA

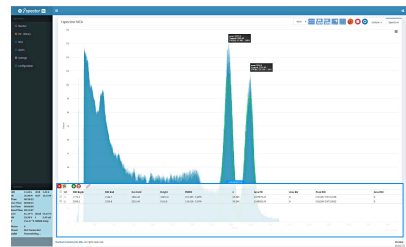
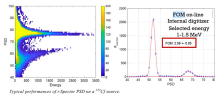
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### I-SPECTOR



Intelligent Silicon Photomultiplier Tube

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