CAEN
Tools for Discovery

i-Spector

Intelligent Silicon Photomultiplier Tube

Nuclear Physics *Labs and Education* *Industrial*

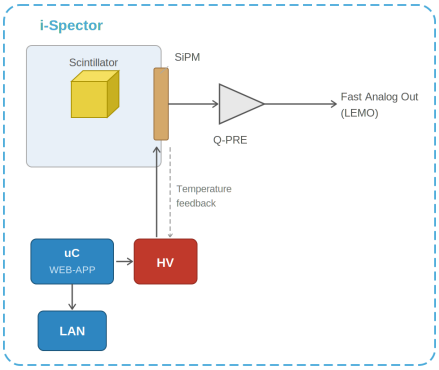
KEY FEATURES

- All-in-one detector and preamplification electronics for **Gamma Spectroscopy**
- Based on a **SiPM** area up to nearly 1.5 inch^2
- 20-80 V Integrated High Voltage for SiPM biasing
- OEM electronics or detector assembly
- Assembly with CsI scintillator:
  - 24x24x30 mm^3 (approx. 1x1x1.2 inch^3)
  - 30x30x30 mm^3 (approx. 1.2x1.2x 1.2 inch^3)
- Other assembly option available on request: NaI, BGO, LYSO, LaBr3 or any other compatible scintillator
- Demountable mechanics to easily change crystal
- Ethernet connection to PC
- Web-based configuration and monitor interface
- Compact form factor
  - Ø 60 mm, h 90 mm (OEM)
  - Ø 60 mm, h 135 mm (ASSEMBLY)

DESCRIPTION

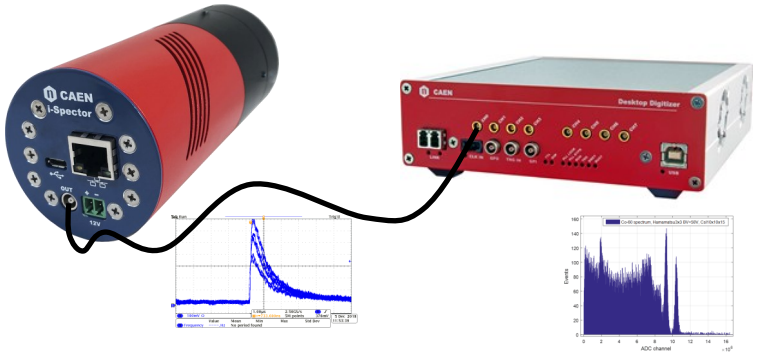
The i-Spector is a fully-integrated, tube-like SiPM-based unit designed as a direct, high-performance replacement for traditional PMT and preamplifier chains. Purpose-built for users who need the reliability and compactness of a modern solid-state photodetector without sacrificing compatibility with existing readout electronics, it fits seamlessly into any setup that currently relies on a PMT, with the added benefits of lower operating voltage, temperature compensation, and Ethernet monitoring. A **web-based interface** is supplied with the i-Spector, providing status information, High Voltage control and communication setup functionalities.

The i-Spector is based on a **SiPM** area (24×24 or 30×30 mm²) and integrates a high-bandwidth preamplifier stage and a temperature-compensated HV power supply for SiPM biasing, delivering a fast analog output signal ready to be processed by any standard external electronics chain, Digitizer, MCA, discriminator, or TDC. Its compact, tube-like mechanics make it an ideal drop-in substitute for PMTs in physics experiments, laboratory setups, and portable detection systems.



When dynamic parameter control is not required, the full configuration can be stored in the internal flash memory, allowing the i-Spector to operate as a **fully standalone unit,** powered on and running with **nothing more than a supply voltage connection, just like a classical PMT**.

Multiple i-Spector units can be simultaneously connected and controlled from a single PC via Ethernet, using simple HTTP requests and JSON vectors, making it straightforward to manage multi-channel detector arrays from a single interface.



i-Spector in assembly version, used as a PMT replacement, is connected to a CAEN DT5730 Digitizer to acquire a typical gamma spectrum.

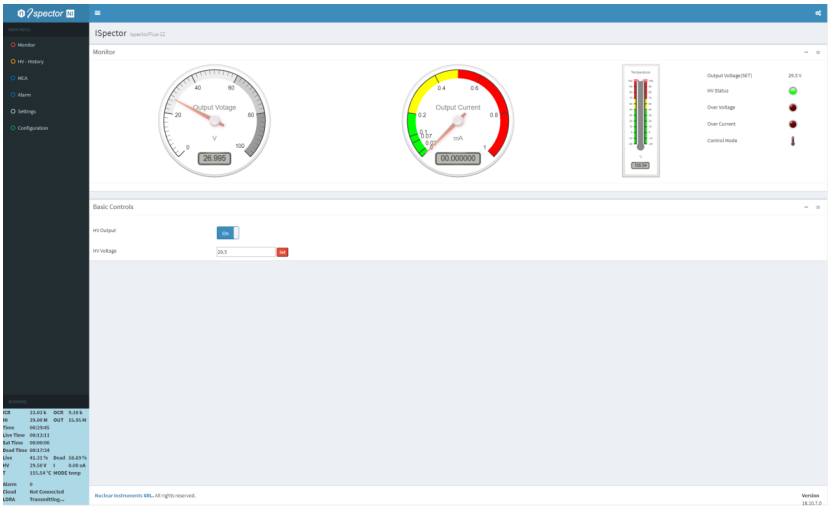
Developed in collaboration with Nuclear Instruments

Web Interface

The i-Spector comes with a dedicated web-based graphical interface, accessible directly from any modern browser, **providing complete visibility and control over the module's operating parameters**. No software installation required.

The homepage displays the real-time status of the HV generator (output voltage, current, enable state, and active protections) alongside the SiPM temperature read directly at the sensor. From here, the user can power the HV on or off and adjust the output voltage set point with immediate effect. Dedicated pages give access to Monitor, History, Settings, and Ethernet Configuration functions.

An internal circular memory buffer continuously stores up to one hour of voltage, current, and sensor temperature data, available for download at any time via the web interface, ensuring a complete operating history is always within reach.



SDK

For users who need deeper integration, the i-Spector offers a fully documented SDK based on JSON data and standard HTTP POST, compatible with every modern programming language and operating system (Windows, macOS, Linux, Android, iOS). Whether managing a single unit or orchestrating a large array of detectors, the SDK provides complete programmatic access to all device features, **enabling fully automated acquisition workflows and custom monitoring applications**.

TECHNICAL SPECIFICATIONS

Supply Voltage	8-13V (12 V typ.)
Power consumption	3W max.
Preamplifier bandwidth	>1GHz
Preamplifier gain	x 5
Shaping time	180 ns
Output signal	- 4 … +4 V , 170 mA
SiPM area	up to 30x30 mm^2 (nearly 1.5 in^3)
SiPM Manufacturer	Hamamatsu
SiPM Model	S14160-6050HS
HV Power supply	20-80 V (10mA)
HV accuracy	1 mV
Thermal feedback	0,01°C - 1mV
Time resolution	50ps @ rate <20 kpcs 5 ns @ high rate
Connectivity	Ethernet 100 Mbps
Working Temperature	-20 … +50°C
OEM Size	Ø 60 mm (2.40 in.) h 90 mm (3.55 in.)
Assembly Size	Ø 60 mm (2.40 in.) h 135 mm (5.32 in.)
Weight	OEM: 150g (5.3 oz.) ASSEMBLY: 500g (17.6 oz.) with 18x18x30 mm^3 CsI crystal

Ordering Option

Ordering code	Description
WS2560EXOAAA	S2560E i-Spector 1" (24x24 mm^2) - OEM
WS2560FXOAAA	S2560F i-Spector 30x30 mm^2 - OEM
WS2560EXAAAA	S2560E i-Spector 1" (24x24 mm^2) - CsI ASSEMBLY
WS2560FXAAAA	S2560F i-Spector 30x30 mm^2 - CsI ASSEMBLY

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