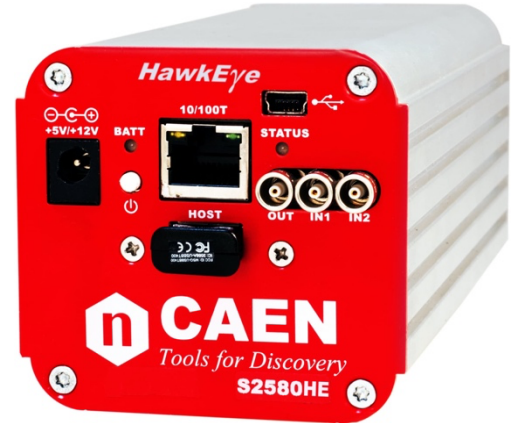


# HawkEye Digital

Digital MCA Tube Base for Gamma-Ray Spectroscopy

## Features

- **Compact, stand-alone, tube base MCA** including high voltage power supply (0 + +1500V / 500  $\mu$ A) and charge sensitive preamplifier
- **On-board battery and data storage** capability for active on-field measurements
- **Embedded ARM based CPU** for unattended operations
- **Wired and wireless connectivity** through USB, Ethernet, Wi-Fi and Bluetooth interfaces
- Compatible with scintillation detectors as NaI(Tl), CsI(Tl) using standard 14-pin
- Acquisition modes:
  - PHA
  - PHA with time stamp
  - Signal inspector
- Gain stabilizer based on natural or calibration radioactivity
- Front panel digital I/O connectors for synchronization, external trigger, coincidence/anticoincidence modes and veto
- Software selectable coarse and fine gain
- Supported by MC<sup>2</sup> Analyzer software GUI for Windows OS



## Overview

**CAEN HawkEye Digital** is a compact and portable system for gamma ray spectroscopy with scintillation detectors, which provides an active **Multi-Channel Analyzer (MCA)** integrated in a 14-pin photo-multiplier tube (PMT) base. HawkEye Digital fully integrates in a stand-alone device the high voltage to bias the PMT, the preamplifier to shape the signal from detector, and the MCA for a complete Pulse Height Analysis online.

HawkEye Digital makes easy the measurements with scintillation detectors, such as NaI(Tl), CsI(Tl) with no need of additional cables. Its socket and voltage divider can supply standard 14-pin PMTs.

HawkEye Digital has been designed to work stand-alone, with no need of additional devices, cables, nor human assistance. HawkEye Digital features internal rechargeable Li-Ion battery providing long-term duration for unattended on-field acquisitions. Once HawkEye Digital is programmed via computer or mobile phone, it then acquires and logs data in an internal SSD memory. An embedded CPU, running Linux® OS, controls the acquisition and data recording, as well as the supported communication interfaces.

Multi-interface communication capability by **Ethernet, USB 2.0, Bluetooth® or Wi-Fi**, makes possible the remote control via computer or smartphone.

HawkEye Digital can be fully controlled by the **MC<sup>2</sup> Analyzer** software running on Windows® OS PC. Besides the standard board and spectra configuration, the software features basic mathematical analysis on collected spectra (peak search, background subtraction, peak fitting, etc.).

Considering that scintillation detectors are usually sensitive to temperature changes, and advanced algorithm for gain stabilization is available. The user can select a specific range where the algorithm recognizes a peak and adjust its position according to the temperature variations.

# Technical Specifications

Mechanical	<b>Dimensions:</b> 71.2 W x 66.4 H x 163.8 L mm <sup>3</sup> (including connectors) <b>Weight:</b> 700 g	
Detector & PMT	Scintillation detectors 14-pin 10-stage PMTs	
Digital Signal Processing	<ul style="list-style-type: none"> <li>- 12-bit and 62.5 MHz ADC</li> <li>- Software selectable coarse gain: x1, x2, x4, x8</li> <li>- Trapezoidal filter for the energy calculation with software adjustable rise time in the range 0+16 <math>\mu</math>s and flat top in the range 0+16 <math>\mu</math>s</li> <li>- Trigger threshold software adjustment</li> <li>- Software fine tuning of the Pole-Zero cancellation Digital fine gain</li> <li>- Automatic gain stabilization</li> <li>- Pile-up rejection and Live Time correction Baseline restorer with programmable averaging Time stamp: 16 ns resolution</li> <li>- High frequency noise filter</li> </ul>	
Data Storage	Internal SSD memory can guarantee data logging for the whole battery autonomy	
High Voltage Power Supply	<ul style="list-style-type: none"> <li>- Output Bias Voltage: 0 +1500 V Output Bias Current: 500 <math>\mu</math>A max.</li> <li>- Output ripple (full load): Typical &lt; 5 mVpp; Maximum &lt; 10 mVpp Setting resolution: steps of 1 V</li> </ul>	
Operating Modes	<ul style="list-style-type: none"> <li>- PHA (Pulse Height Analysis): pulse height histogram over 1k-2k channels List mode: pulse height and time stamp for each event</li> <li>- Signal Inspector: input and internal filters waveforms</li> </ul>	
Trigger Modes	<ul style="list-style-type: none"> <li>- Stand-alone: triggering based on the channel self-trigger</li> <li>- Correlated: Veto with other GammaStream; Coincidence/Anticoincidence</li> <li>- External: triggering based on an external trigger</li> </ul>	
Front Panel Digital I/O	<b>OUT (LEMO LVTTL 3.3V, Rt = 50 Ohm)</b> General Purpose Output: OUT option: Fast Trigger Discrimination signal Other options Synchronization, Start/Stop Acquisition	<b>N1 &amp; IN2 (LEMO LVTTL 3.3V, Zin = 1 kOhm)</b> General Purpose Input: IN1 option: Veto signal IN2 option: Synchronization signal (trigger time stamp reset) Coincidence/Anticoincidence, Start/Stop Acquisition
Indicators	Status and battery LEDs	
Communication Interface	<b>Ethernet</b> 10/100 Mbit interface RJ45 connector  <b>Bluetooth</b> USB host port (USB2.0) compliant to BT dongle included in the kit  <b>USB</b> MiniUSB client port, USB 2.0 compliant, Up to 30 MB/s transfer rate	<b>Wi-Fi</b> USB host port (USB2.0), compliant to Wi-Fi Micro, Adapter included in the kit
Firmware	Firmware can be upgraded via USB/Ethernet	
Software	Fully controlled by the MC <sup>2</sup> Analyzer spectroscopy software for Windows PC	

## Ordering Options

Code	Description	
WS2580HEXXXA	S2580HE - HawkEye Digital MCA Tube Base for Gamma-Ray Spectroscopy	<b>RoHS</b>



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