NEW PRODUCTS SELECTION

2021/22

CAEN
Tools for Discovery

Electronic Instrumentation

We are proud of the high quality of our products.

ISO 9001

ISO 9001:2015 approved quality system ensures all our internal processes.

From R&D to the registration of the incoming purchase orders, through:
- Resource Planning
- Scheduling
- Production

Our quality system is responsible for the proper functioning of all our internal processes and is subject to regularly audits, carried out by the National Standards Authority.

From the initial product design and its development stages, till the delivery of the production batches, we follow documented procedures that cover every aspect of our business.

The quality of CAEN S.p.A. products is constantly monitored by the application of the UNI EN ISO 9001:2015 standard. CAEN S.p.A. is ISO 9001 certified since 1998.

ISO9001:2015
certified Company

ISO 9001:2015
cert. n. 9105.CAEN

Authorised
research laboratory
of the MIUR

CAEN New Management Team

Dear Friends,

It is with great honor that we accept the responsibility to carry on the CAEN legacy. We welcome this responsibility of leading CAEN, and in doing so we will be guided by the principles of passion, commitment, loyalty, and responsibility. CAEN is our lifeblood, our past, present, and future. We live in a challenging and unpredictable world, but change brings opportunity... the opportunity to design electronics utilizing the most modern technologies available. This process will allow us to evolve with the needs of our customers, delivering powerful instrumentation capable of supporting the most amazing scientific advances and discoveries. We are honored to have the opportunity to serve you and are committed to being your best and foremost partner on this journey though innovation, science, and discovery.

With infinite gratitude,

Jacopo Givoletti
President

CAEN Electronic Instrumentation
Tools for Discovery

CAEN SpA is a worldwide leading company provider of a comprehensive range of high/low voltage power systems and data acquisition/front-end modules compliant with IEEE standards for nuclear and particle physics.

Extensive research and development capabilities allowed **CAEN SpA** to play an important long-term role in this field. Thanks to years of close collaborations with the most important Research Centres of the world, CAEN strikes to deliver innovative products and services worldwide.

CAEN portfolio includes over a thousand products and solutions for nuclear measurements, whose quality is monitored throughout the entire production cycle and guaranteed by UNI EN ISO 9001:2015 standard. Its products appeal to a wide range of customers including engineers, scientists and technical professionals who all trust them to achieve their goals quickly and effectively.

Thanks to plenty of experience in physics research, CAEN instruments are now used in several advanced industrial applications.

Products

Modular Pulse Processing Electronics
Waveform Digitizers
Digital Spectroscopy
Electronics for SiPM
Power Supplies
Digital Detector Emulators
Educational Kits

Applications

High Energy Physics
Astrophysics
Neutrino Physics
Dark Matter Investigation
Nuclear Physics
Material Science
Medical Imaging Applications
Homeland Security
Industrial Applications

Table of Contents

CAEN
Tools for Discovery

A255x Family

8 Channel up to 64 V (up to 12 A)

Full floating channels with the best noise performance

Compatible with CAEN Universal Multichannel Systems, designed for front-end electronics

Overview

The power supply A255x Family is a single width board (5 TE wide) that houses 8 independent Low voltage channels. The board is available in different versions equipped with D-Sub 8-pin or with DB37 connector.

The individual floating channels allow on-detector grounding, that reduces the noise level.

These modules provide up to 60 W output per channel, that can be also connected in parallel, with modularity 2x or 4x, to obtain even larger power.

Two output connector configurations are available, with either DB37's or D-sub 8's.

The voltage drops over the cables can be recovered by using the featured Remote Sensing Lines, to be connected on the load.

A global enable/disable connector allows to disable the channels and it is also possible, via front panel logic signals, to enable them individually.

Features include both current and voltage protections. If overcurrent occurs, the relevant channel is signalled to be in "overcurrent" and can be programmed either to turn off after a programmable trip time or to remain on and to provide the maximum allowed current; such feature allows the module to perform as a current generator.

Features

- 8 independently controllable Low Voltage channels
- A2551: 0÷8 V output voltage and 12 A maximum current (60 W)
- A2552: 0÷16 V output voltage and 6A maximum current (60 W)
- A2553: 0÷32 V output voltage and 3A maximum current (60 W)
- A2554: 0÷64 V output voltage and 1.5A maximum current (60 W)
- Individual Floating Channels
- DB37 or 8 pin D-Sub connectors
- Individual remote sense lines
- Low ripple
- Under/over-voltage alert, overcurrent and max. voltage protection
- Interlock logic for unit enable
- Software Tool for easy channel management

Control Software and Libraries

GECO 2030

Ordering Option

Code	Description
WA2551AXAAAA	A2551A - individual floating 8 ch 8 V/12 A (60 W) board - DB37 conn.
WA2551XAAAAA	A2551 - individual floating 8 ch 8 V/12 A (60 W) board
WA2552AXAAAA	A2552A - individual floating 8 ch 16 V/6 A (60W) board - DB37 conn.
WA2552XAAAAA	A2552 - individual floating 8 ch 16 V/6 A (60W) board
WA2553AXAAAA	A2553A - individual floating 8 ch 32 V/3 A (60 W) board - DB37 conn.
WA2553XAAAAA	A2553 - individual floating 8 ch 32 V/3 A (60 W) board
WA2554AXAAAA	A2554A - individual floating 8 ch 64V/1.5A (60W) board - DB37 conn
WA2554XAAAAA	A2554 - individual floating 8 ch 64 V/1.5 A (60W) board

A1612 / A1619

Up to 500 V Individual Floating Channel Boards

The new generation of CAEN HV full floating power supplies.

Compatible with CAEN Universal Multichannel Systems, particularly suitable for silicon detectors.

Overview

The A161x power supply boards family includes single width (5TE) boards housing 16 individual floating channels, available with either 250V / 1mA or 500V / 1mA output, delivered through DB connectors.

The voltage ramp rates may be set independently for each channel.

The individual floating channels allow on-detector grounding, that reduces the noise level.

A global enable/disable connector allows to disable the channels.

Features include both current and voltage protections. If overcurrent occurs, the relevant channel is signalled to be in “overcurrent” and can be programmed either to turn off after a programmable trip time or to remain on and to provide the maximum allowed current; such feature allows the module to perform as a current generator.

Control Software and Libraries

GECO 2030

Features

- 16 independently controllable full floating channels with dual current range
- Two models available: 250 V (1 mA / 100 µA) and 500 V (1 mA / 100 µA) output ranges
- 1mV voltage monitor resolution
- Current monitor resolution:
  - high range: 10 nA
  - low range: 1 nA
- Programmable voltage ramp up / down rates
- Voltage ripple smaller than 5 mVpp
- Overcurrent programmable protections
- Programmable TRIP parameter
- Current generator operation in overcurrent condition

Ordering Option

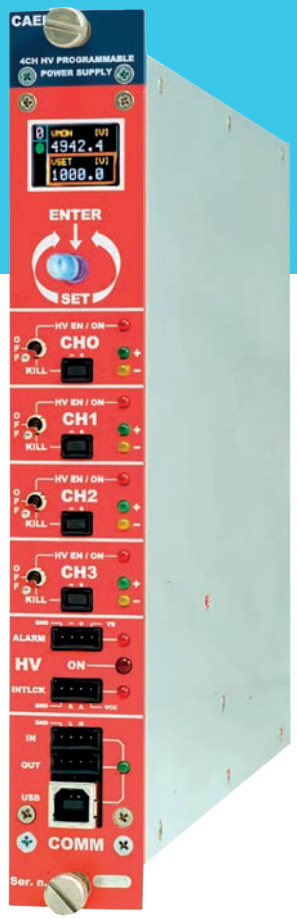
Code	Description
WA1612XAAAAA	A1612 – Syx527 H.V. Channels 500V 1mA - individual Floating (16CH)
WA1619XAAAAA	A1619 – Syx527 H.V. Channels 250V 1mA - individual Floating (16CH)

CAEN
Tools for Discovery

N1410

4 Ch 1 kV/200 µA HV Programmable Power Supply

CAEN HV Power Supply excellence with the reliability of NIM architecture.



Cost-effective solution to power a wide range of semiconductor detectors.

Overview

The N1410 provides 4 independent HV channels in a single-width NIM mechanics. Each channel can provide a ±1000V / 200 µA max output.

Channels have common floating return, insulated from the crate ground and are delivered through BNC connectors. The output RAMP-UP and RAMP-DOWN rates may be selected for each channel in the range 1÷100 V/s in 1 V/s steps.

Safety features include:

- OVERVOLTAGE and UNDERVOLTAGE warning when the output differs from the programmed value by more than 2% of set value.
- Programmable VMAX protection.
- OVERCURRENT detection: if a channel tries to draw a current larger than its programmed limit, it enters TRIP status, keeping the maximum allowed value for a programmable time, before being switched off.
- Channels can be enabled or disabled individually through the Interlock logic.

Control can take place either locally, assisted by a Graphic color display or remotely, via USB, RS232 or RS485; RS485 port allows to build a daisy chain network (up to 32 modules). CAEN also provides GECO2020, a graphical application that manages the N14xx HV Power Supplies.

Moreover, these units can be managed via CAEN HV Wrapper, a set of ANSI C functions bundled in a library.

Control Software and Libraries

GECO 2030

Features

- **4 independent channels in 1U NIM module**
- **1000 V / 200 µA output range**
- **Channels with individually selectable positive or negative polarity**
- **SHV HV output connectors**
- **Common floating return**
- **Low Ripple**
- **5 nA Iset resolution**
- **Graphic color display**
- **Local and Remote control (USB2.0/RS485/RS232)**
- **Daisy-chain capability**
- **Software Tools for easy channel management**

Ordering Option

Code	Description
WN1410XAAAAA	N1410 - 4Ch Reversible 1000 V/200 µA NIM HV Power Supply Module

DT5485P

Desktop +85 V/10 mA Digital Controlled SiPM Power Supply with USB

Exceptional power for SiPM!

The DT5485P power supply offers, in a single standalone box, a handy way to bias SiPMs: output voltage on LEMO00 connector, high current drain for multidetector connection, temperature feedback, USB control are just some of the features that make the module convenient for R&D and laboratory needs.

Overview

The DT5485P is a one-channel high voltage regulator specifically designed for SiPM bias. The unit can provide up to 10 mA and the output voltage could be regulated between 20V and 85V with a minimum step of 1mV. It has a built in temperature compensation controller with programmable coefficient and features a 3.5mm audio socket for temperature probe input.

Two versions are available: DT5485P (powered and controlled via USB) and DT5485PB (USB-controlled, with external +12V power supply).

The ZEUS control software is provided for free; ZEUS is a Windows compatible software that allows to control multiple DT5485P modules at the same time. The software is based on a user-friendly GUI that allows the parameters configuration and the data logging on file. It integrates real-time plot capabilities (voltage, current and temperature) with the possibility to superimpose measurements from several modules.

Features

- **Single Desktop HV channel:**
  - DT5485P: powered and controlled by USB
  - DT5485PB: controlled by USB, with +12V external power supply - **NEW**
- **20÷85 V (10 mA) maximum output**
- **Voltage/current high resolution: 10 mV and 600 nA**
- **Programmable temperature compensation**
- **ZEUS Software Tool for easy unit management**

Ordering Option

Code	Description
WDT5485XPAAA	DT5485P - Digital Controlled Power Supply for SiPM +85V 10mA
WDT5485PBXAA	DT5485PB - Digital Controlled Power Supply for SiPM +85V 10mA ,external power

CAEN
Tools for Discovery

A7526 - A7526DB

1 Ch 2.6 kV/500 µA High Efficiency HV Power Supply Module
1 Ch 2.6 kV/500 µA Digital Controlled Power Supply Module

Compact size, high efficiency

Available either in PCB mount or Desktop form factor.

Overview

The A7526 is a high-efficiency power supply providing a programmable and monitorable output voltage ranging from 0 to 2600 V, when supplied with a +12 V input. It is available with either positive or negative output voltage. The output voltage is regulated by providing a 0 to +2 V external voltage (Vset). The board is provided with an over-current protection: if a current larger than the Iout maximum value is drawn, the module is not being damaged.

Thanks to its excellent stability and special design, A7526 power supply is engineered to work in harsh environment and under severe temperature variations.

The module is engineered on a FR4 PCB, coated and housed in DC01 steel box. The A7526DB is the desktop digitally controlled (RS485) version of the unit; it features a SHV output connector.

Features

- High efficiency
- 2600 V/500 µA output ranges
- Available with positive or negative polarity
- A7526DB:
  - RS485 digital control
  - SHV output connector

A7512DB

1 Ch 12 kV/20 µA Digital Controlled Power Supply Module for MRPC

Overview and Features

The A7512DB Power Supply Module is a compact desktop solution to provide stable and noiseless power supply for single and multi-gap Resistive Plate Chamber (RPC) detectors.

The module houses a digital controlled high voltage channel that provides a 12 kV maximum voltage with 100 mV monitor resolution The maximum output current is 20 µA, with 100 pA monitor resolution. It is available with either positive or negative output voltage. HV output is delivered through LEMO HV connector.

Model Compare

Model	Maximum Voltage	Maximum Current	Imon Resolution	Vset Resolution	N. of Ch.	Max Power per Ch.
A7526	2600 V	500 µA	-	-	1	1.3 W
A7526DB	2600 V	500 µA	10 nA	100 mV	1	1.3 W
A7512DB	12000 V	20 µA	100 pA	100 mV	1	3 W

Ordering Option

Code	Description
WA7526NXAAAA	A7526N - -2.6kV 500µA High Efficiency HV Power Supply Module
WA7526PXAAAA	A7526P - +2.6kV 500µA High Efficiency HV Power Supply Module
WA7526DNBAAA	A7526DNB -2.6kV 500µA Digital Interface HV Power Supply Module BOXED
WA7526DPBAAA	A7526DPB +2.6kV 500µA Digital Interface HV Power Supply Module BOXED
WA7512DBNXAA	A7512DNB -12kV 20µA HV Power Supply Module - BOXED
WA7512DBPXAA	A7512DPB +12kV 20µA HV Power Supply Module - BOXED

EASY6000 DC/DC Power Supply

B and Rad tolerant Intermediate Converter

EASY: the CAEN solution for powering in hostile areas

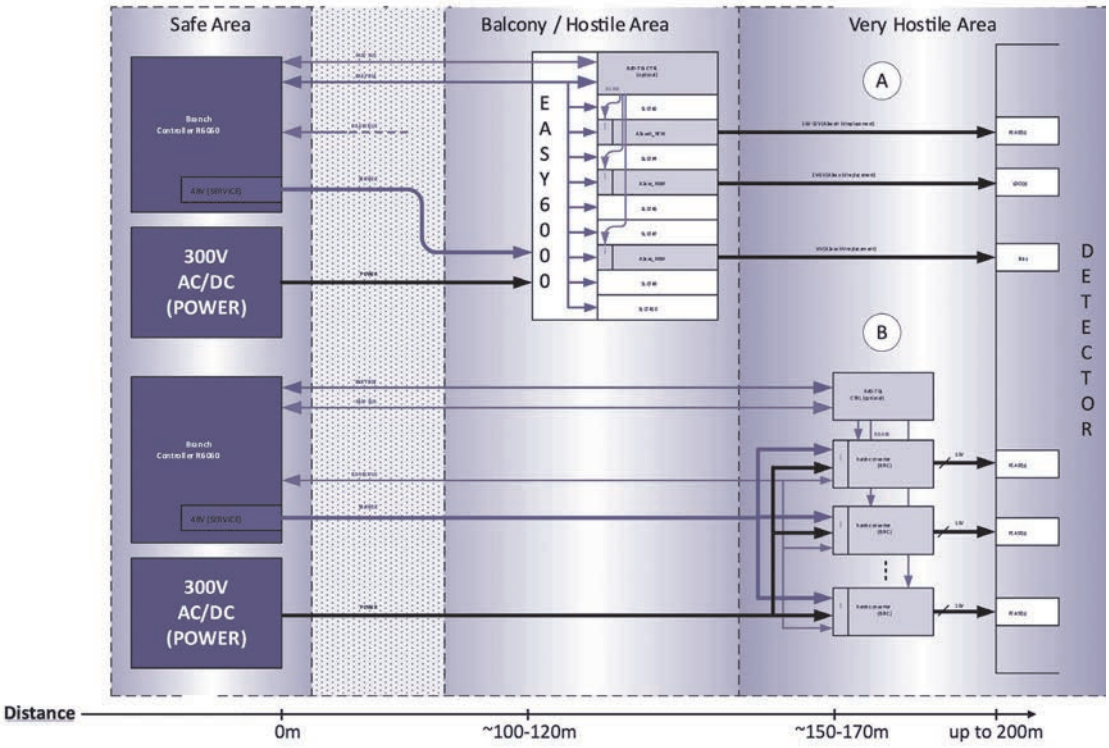
EASY (Embedded Assembly SYstem) is the CAEN high/low voltage power supply solution every time residual magnetic fields and/or radiation become an issue. Built on many years of experience with CERN experiments, CAEN has now refined its system improving performance across the board. Particular effort was put two main areas: ductility and compactness.

To summarize the new EASY6000 family will feature

- Air-cooled and water-cooled modules
- Better than ever power density and great granularity
- A complete set of extreme low voltage, low voltage and high voltage channels, with the opportunity to custom design mixed boards
- Fast communication links capable of controlling/monitoring in real time thousands of boards at once
- State of the art resilience to radiation and magnetic fields
- Dual power line architecture for fail-safe operation

Overview

To achieve both goals CAEN has decided to work on two complementary solutions, with specific use cases in mind: on one side we want to achieve the highest possible power density close to the detectors (where space is often limited), on the other side we want to keep the maximum possible flexibility without the overhead of a water-cooling system. Thus, the EASY6001 BRIC was born, the B and Rad tolerant Intermediate Converter, this module set new standards for power density, granularity, and hostile environment resilience. At the same CAEN is finalizing a new family of air-cooled LV/HV mixed boards, that will have greater capabilities with respect the current series in terms of usability (easier maintenance also according to the ALARA principles), again better power density and system scalability, thanks to a new branch controller, the R6060, that is going to replace the aging A1676A.



CAEN
Tools for Discovery

R6060C
EASY6000 Branch Controller

Water-Cooling

Water-cooling is mandatory when dealing with very high-power density, which are required in modern physics experiment for high granularity readout electronics. Front-end boards require in general LV voltage power, either supplied directly or via a local stepdown (typically a DC-DC from ~10V to ~1V). Low voltage of course means large cable losses and therefore it is paramount to place the power supplies as close as possible to the detector, in what is often a small space with hostile environment (radiation from the physics interactions and residuals magnetic fields needed to detect and measures the particles).

Water-cooling, therefore, gives the possibility to extract much more heat from a small space and to have a more compact dissipation system. Moreover, magnetic fields make harder to place fans to cool individual components and only forced ventilation, realized with turbines, is allowed in such environment. Hence, CAEN has realized a solution tailored to such environment, capable to convert currents in the range of ~300 V to ~10 V in a very small form factor, reaching the highest power density ever achieved in the LHC experimental caverns where radiation can reach 200 Gy. Also, the magnetic field as a tremendous impact on power conversion decreasing its efficiency, these CAEN modules were designed to tackle this problem and they can safely operate in 0.5 T fields at 80% efficiency.

Air-Cooling

Traditional modules are air-cooled. This solution is ideal where space is not a premium as it keeps the infrastructure to a minimum, it makes the crates lighter, and it avoids all concerns about leakage.

CAEN has designed over time many different boards of this kind, from very high voltage boards to bias gas detectors (~10 kV) to extreme low voltage (~ V) to power front-end electronics, all of them resilient to radiation and able to work within magnetic fields. The new family makes improvements and adjustments thanks to experience gathered during the LHC operations and, of course, to cope with HL-LHC conditions. The new 6000 series air-cooled has higher power and channel densities with respect to the old ones; it features the 4000 series back board concept that enhances maintenance operation decreasing exchange time of the board, and at the same time improving system robustness as the cables/connectors do not have to be plugged/unplugged all times. Last but not least the new R6060 boosts communication performance, so systems with very large number of channels can be easily operated by central DCS.

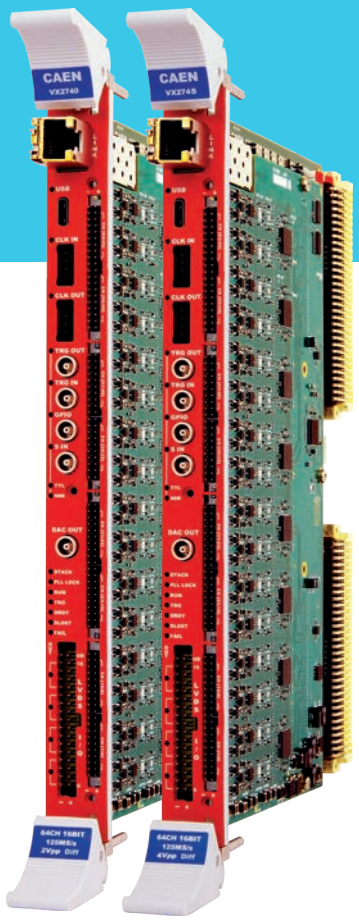
Ordering Option

Code	Description
WE6001XAAAAA	EASY BRIC1 - 300Vdc to 12Vdc (8ch x 200W) Converter - Water Cooled
WR6060CXAAAA	R6060C - EASY CAN-bus controller (up to 6 EASY crates controlled)

V/VX2740 - V/VX2745

64-Channel 16-bit 125 MS/s Digitizers

CAEN
Tools for Discovery



The new generation of CAEN Digitizers: Open FPGA and Digital Pulse Processing algorithms for high-density channel experimental setups!

The V/VX2740 and V/VX2745 are CAEN brand new Waveform Digitizers able to perform basic waveform recording and run real-time advanced Digital Pulse Processing (DPP). The user can easily customize the firmware of the open FPGA to use these digitizers in a wider range of applications.

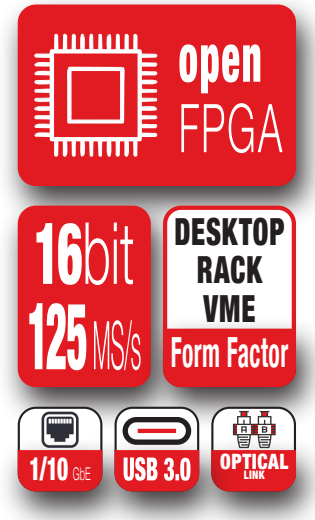
Overview

The V/X2740 and V/VX2745 Digitizers are 64-channel digital signal processors for radiation detectors in VME64 and VME64X form factors. They offer not only waveform digitization and recording but also a digital pulse processing (DPP) selection for Multi-Channel Analysis in nuclear spectroscopy using Silicon strip, segmented HPGe, Scintillation detector with PMTs, Wire Chambers, and others.

These digitizers can perform pulse height measurements (PHA) independently for each of the 64 channels, as well as zero suppression based on the Zero Length Encoding (ZLE) commonly applied to all the channels, and other processing modes will be progressively implemented (like PSD and DAW). Moreover, a firmware template is available for users who want to personalize the acquisition to implement custom algorithms for pulse processing in the Open FPGA.

In conclusion, these digitizers provide a solution suited for a wide range of applications (from Neutrino Physics & Dark Matter Searches to Nuclear, Particle Physics and Spectroscopic Imaging).

The V/VX2740 digitizers come with a fixed input range (2 Vpp), while the V/VX2745 ones (Coming Soon) feature a software selectable input gain up to x100.



Features

- 64 analog inputs, differential or single-ended
- On-board firmware selection: Scope mode (common trigger), DPP mode (independent channel self-triggers)
- Open FPGA architecture for pulse analysis algorithm customization
- Multi-interface: USB-3.0 and 1/10 GbE or CONET optical link (switchable on the same socket)

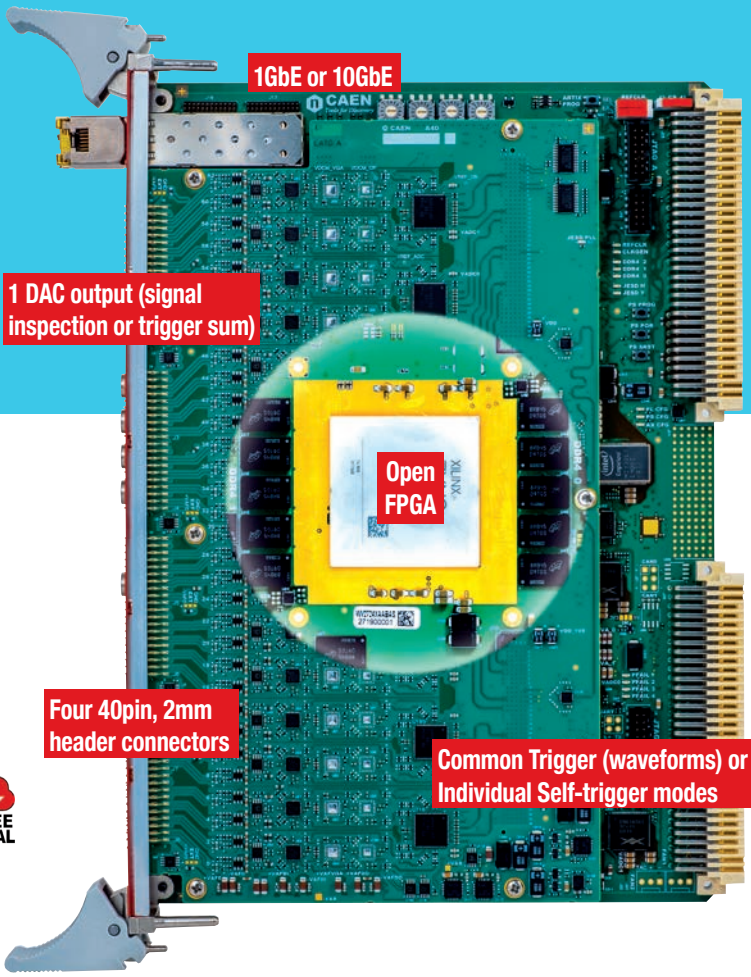
Desktop with rack mounting brackets (DT274x) version is also available

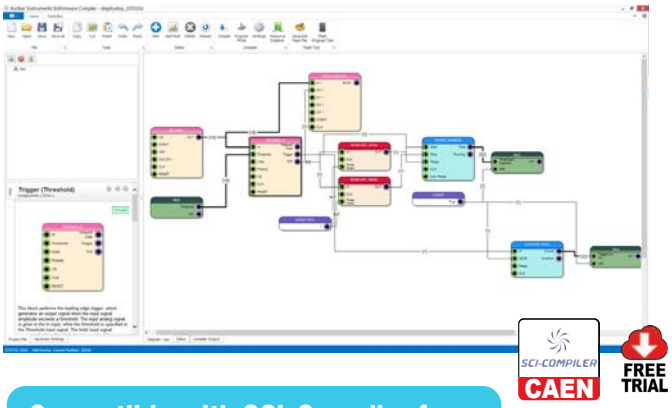
Model Compare

Model	Package	No. of Channels	Max Sampling Rate (MS/s)	Resolution (bits)	Board Memory (Samples/ch)	Full Scale Range
V/VX2740	VME/VME64x	64	125	16	10 M	2 Vpp (fixed)
V/VX2745	VME/VME64x	64	125	16	10 M	4 Vpp (with sw selectable gain up to x100)

CAEN
Tools for Discovery

THE DAWN OF THE NEW CAEN DIGITIZER GENERATION





Compatible with SCI-Compiler for easy FPGA programming (COMING SOON)

Accessories

A372F
64 channel 2.54mm Male Header Connector Adapter

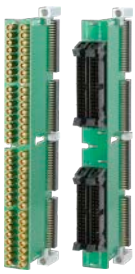
The A372F adapter is compliant to all the form factors of the 2740 digitizer. It mechanically adapts to 2.54mm header from the 2mm header mounted on the digitizer, independently of the differential or single-ended standard of the 2740 analog channels. Dedicated metal supports fixed by screws more mechanical stability when plugged in the digitizer inputs.

A319A
Clock & Sync cable assembly for Digitizer Series 2.0 - 20 cm

The A319A is a cable assembly for the Clock and Sync signal distribution in Digitizer Series 2.0. Through the front panel CLK-OUT / CLK-IN daisy chain, this 4-contact cable carries two differential signals from one digitizer to another to synhcronize multiple boards.

A372M
64 channel MCX Coax Connector Adapter for SE signals

The A372M applies to the 64-channel 2740 Digitizer Family. It must be used with the single-ended input 2740 models and adapts to MCX Coaxial from the 2mm header mounted on the digitizer.
Metal supports fixed by screws more mechanical stability when the adapter is mounted in the 2740 digitizer inputs.



A319B
Clock cable assembly from Digitizer Series 1.0 to Digitizer Series 2.0 - 20cm

The A319B is a cable assembly for the Clock signal distribution between non homogenous digitizer series, matching the 3-contact connector on the Digitizer Series 1.0 to the 4-pin connector on the Digitizer Series 2.0. Through the front panel CLK-OUT / CLK-IN daisy chain, this cable carries the differential clock signal from one digitizer to another to synhcronize multiple boards.

Ordering Option

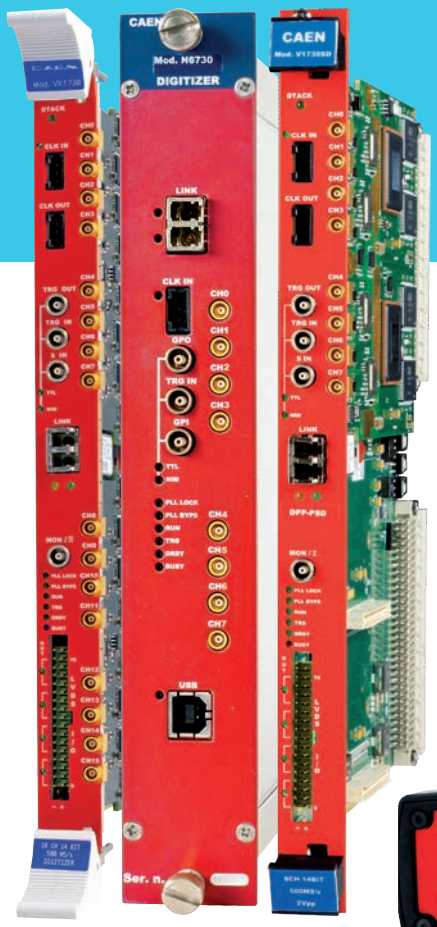
Code	Description
WDT2740XAAAA	DT2740 - 64 Ch 16 bit 125MS/s Digitizer, Diff
WDT2740BXAAA	DT2740B - 64 Ch. 16 bit 125 MS/s Digitizer, SE
WDT2745BXAAA	DT2745B - 64 Ch. 16 bit 125 MS/s Digitize with Programmable Input Gain, SE
WDT2745XAAAA	DT2745 - 64 Ch. 16 bit 125 MS/s Digitizer with Programmable Input Gain, Diff
WV2740XAAAAA	V2740 - 64 Ch 16 bit 125MS/s Digitizer, Diff
WV2740BXAAAA	V2740B - 64 Ch. 16 bit 125 MS/s Digitizer, SE

Code	Description
WVX2740XAAAA	VX2740 - 64 Ch 16 bit 125MS/s Digitizer, Diff
WVX2740BXAAA	VX2740B - 64 Ch. 16 bit 125 MS/s Digitizer, SE
WV2745BXAAAA	V2745B - 64 Ch. 16 bit 125 MS/s Digitizer with Programmable Input Gain, SE
WV2745XAAAAA	V2745 - 64 Ch. 16 bit 125 MS/s Digitizer with Programmable Input Gain, Diff
WVX2745BXAAA	VX2745B - 64 Ch. 16 bit 125 MS/s Digitizer with Programmable Input Gain, SE
WVX2745XAAAA	VX2745 - 64 Ch. 16 bit 125 MS/s Digitizer with Programmable Input Gain, Diff

x725S/x730S

16/8 Ch. 14-bit 250/500 MS/s Digitizers

CAEN Tools for Discovery



A wide range of DPP algorithms available for CAEN highest flexibility digitizers!

725S and 730S are the top level digitizer families of the first generation of CAEN digitizers. The wide range of DPP algorithms available makes them perfect for a complete range of applications including nuclear and particle physics, dark matter and astoparticle physics, fast neutron spectroscopy and homeland security.

Features

- Resolution: 14-bit
- Sampling Rate: 250 MS/s (725S family) or 500 MS/s (730S family)
- Form Factors: VME64/VME64X (16/8 ch.), NIM and Desktop (8 ch.)
- 0.5 or 2 Vpp input dynamic range
- Algorithms for Digital Pulse Processing: PHA, PSD, ZLEplus, DAW
- VME64/VME64X, USB and Optical Link communication interfaces

Overview

The 725S and 730S are digitizer families capable of recording waveforms along with performing advanced algorithms for online digital pulse processing (DPP).

Utilizing DPP Firmware, users can acquire quantitative physical parameters (Integrated Charge, Pulse Shape Discrimination with fine time resolution, Pulse Height Analysis) as well as read out waveforms with automatic pulse identification and baseline suppression on channel basis (Zero-Length Encoding and Dynamic Acquisition Window).

The wide range of DPP algorithms supported by these families makes them a “must-have” for any type of nuclear physics application. The 725S/730S (previously 725/730) have also been upgraded, introducing a larger FPGA to accommodate more complex DPP algorithms and a new A/D converter for better stability which does not require temperature-related calibration.

725S/730S are well suited for mid fast signals as those coming from liquid or inorganic scintillators coupled to PMTs or SiPMs, but also for high precision detectors as Silicon or HPGe.

Ordering Option

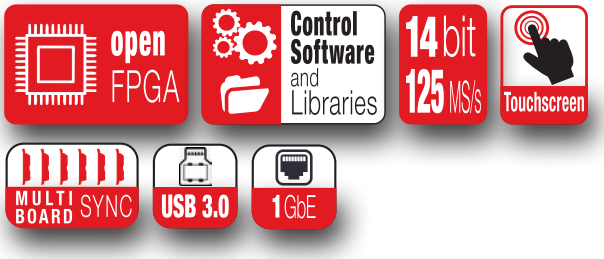
Code	Description
WDT5725SBXAA	DT5725SB - 8 Ch. 14 bit 250 MS/s Digitizer: 5.12MS/ch, Arria V GX, SE
WDT5725SXAAA	DT5725S - 8 Ch. 14 bit 250 MS/s Digitizer: 640kS/ch, Arria V GX, SE
WN6725SBXAAA	N6725SB - 8 Ch. 14 bit 250 MS/s Digitizer: 5.12MS/ch, Arria V GX, SE
WN6725SXAAAA	N6725S - 8 Ch. 14 bit 250 MS/s Digitizer: 640kS/ch, Arria V GX, SE
WV1725SBXAAA	V1725SB - 16 Ch. 14 bit 250 MS/s Digitizer: 5.12MS/ch, Arria V GX, SE
WV1725SCXAAA	V1725SC - 8 Ch. 14 bit 250 MS/s Digitizer: 640kS/ch, Arria V GX, SE
WV1725SDXAAA	V1725SD - 8 Ch. 14 bit 250 MS/s Digitizer: 5.12MS/ch, Arria V GX, SE
WV1725SXAAAA	V1725S - 16 Ch. 14 bit 250 MS/s Digitizer: 640kS/ch, Arria V GX, SE
WVX1725SBXAA	VX1725SB - 16 Ch. 14 bit 250 MS/s Digitizer: 5.12MSch, Arria V GX, SE
WVX1725SCXAA	VX1725SC - 8 Ch. 14 bit 250 MS/s Digitizer: 640kS/c, Arria V GX, SE
WVX1725SDXAA	VX1725SD - 8 Ch. 14 bit 250 MS/s Digitizer: 5.12MS/ch, Arria V GX, SE
WVX1725SXAAA	VX1725S - 16 Ch. 14 bit 250 MS/s Digitizer: 640kS/ch, Arria V GX, SE
WDT5730SBXAA	DT5730SB - 8 Ch. 14 bit 500 MS/s Digitizer: 5.12MS/ch, Arria V GX, SE
WDT5730SXAAA	DT5730S - 8 Ch. 14 bit 500 MS/s Digitizer: 640kS/ch, Arria V GX, SE
WN6730SBXAAA	N6730SB - 8 Ch. 14 bit 500 MS/s Digitizer: 5.12MS/ch, Arria V GX, SE
WN6730SXAAAA	N6730S - 8 Ch. 14 bit 500 MS/s Digitizer: 640kS/ch, Arria V GX, SE
WV1730SBXAAA	V1730SB - 16 Ch. 14 bit 500 MS/s Digitizer: 5.12MS/ch, Arria V GX, SE
WV1730SCXAAA	V1730SC - 8 Ch. 14 bit 500 MS/s Digitizer: 640kS/ch, Arria V GX, SE
WV1730SDXAAA	V1730SD - 8 Ch. 14 bit 500 MS/s Digitizer: 5.12MS/ch, Arria V GX, SE
WV1730SXAAAA	V1730S - 16 Ch.14 bit 500 MS/s Digitizer: 640kS/ch, Arria V GX, SE
WVX1730SBXAA	VX1730SB - 16 Ch. 14 bit 500 MS/s Digitizer: 5.12MS/ch, Arria V GX, SE
WVX1730SCXAA	VX1730SC - 8 Ch. 14 bit 500 MS/s Digitizer: 640kS/ch, Arria V GX, SE
WVX1730SDXAA	VX1730SD - 8 Ch. 14 bit 500 MS/s Digitizer: 5.12MS/ch, Arria V GX, SE
WVX1730SXAAA	VX1730S - 16 Ch. 14 bit 500 MS/s Digitizer: 640kS/ch, Arria V GX, SE

CAEN
Tools for Discovery

x5560 Digitizer Family

32/128 Channel 14 bit 125 MS/s Open FPGA Digitizer

Develop your own pulse processing algorithm on a powerful and flexible hardware!



The x5560 Digitizer Family is designed to attain programmable data processing capabilities in R&D application as well as large experimental setups. The powerful open FPGA hosted onboard can be easily programmed with SCI-Compiler, a block-diagram-based software to generate and compile firmware running custom pulse processing algorithm.

Overview

The x5560 Digitizer Family is ideally suited to readout detectors commonly used in HEP and nuclear physics, exploiting the different available form factor and input stage features. The DT5560SE handy form factor and connectors type are an optimum for laboratory R&D, while R5560/R5560SE rack-mount simplifies the experimental setup, where an effective space management is often a constraint.

Critical to the x5560 Family design is an open-FPGA architecture. By taking advantage of the powerful SoC onboard, the user can quickly and easily design custom logic and pulse processing algorithms, as well as develop middleware/software which perfectly matches the application of interest.

Thanks to SCI-Compiler, no expertise in VHDL/Verilog is required! In few clicks, the user can combine several processing blocks to implement Pulse Height Analysis (PHA), highly accurate event timing and timestamping (TDC), mathematical operations (including data fitting), Pulse shape discrimination (PSD), and much more.

Free and open-source SCI-55x0 readout software is also provided. This open-source demo software is designed to manage the standard pulse height analysis firmware implementing energy measurements using a trapezoidal filter together with waveform recording.

Features

- 128 or 32 channels in Rack or Desktop form factor
- Based on powerful Xilinx Zynq-7000 SoC
- Compatible with SCI-Compiler for easy FPGA programming
- Advanced analog frontend available on SE version
- Board-to-board synchronization
- Maximum flexibility: USB3.0, Ethernet, and Optical Link (optional) connectivity

R5560 is ideal for He3 tubes readout - Neutron Physics (see pp. 38)

SCI-COMPILER CAEN FREE TRIAL

Ordering Option

Code	Description
WDT5560SEXAA	DT5560SE 32 Ch. 14 bit 125 MS/s Digitizer single-ended (SciCompiler SW555 included)
WR5560AXAAAA	R5560A 128 Ch. 14 bit 125 MS/s Digitizer-7030 (SciCompiler SW555 included)
WR5560BXAAAA	R5560B 128 Ch. 14 bit 125 MS/s Digitizer-7035 (SciCompiler SW555 included)
WR5560SEXAAA	R5560SE 128 Ch. 14 bit 125 MS/s Digitizer single-ended (SciCompiler SW555 included)
WR5560SEBXAA	R5560SEB 128 Ch. 14 bit 125 MS/s Digitizer single-ended 7035 (SciCompiler SW555 included)

Desktop (DT5560SE) version is also available

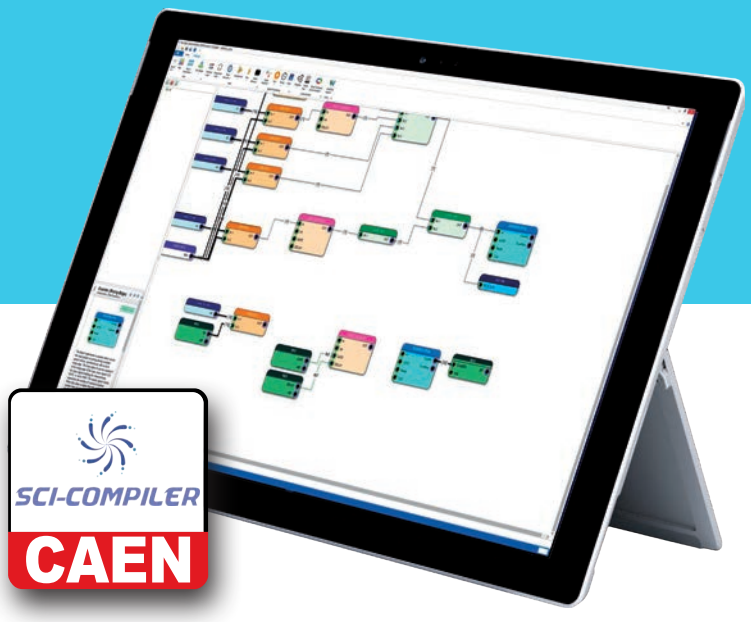
Model Compare

Model	Analog Input	Connectors	Detector Frontend	Programmable Digital I/Os	Communication Interface	Form Factor
R5560	128	RJ45	No	128 + 6	USB 3.0, Optical Link, Ethernet	Rack
R5560SE	128	MCX	Programmable	128 + 6	USB 3.0, Optical Link, Ethernet	Rack
DT5560SE	32	LEMO	Programmable	32+ 6	Micro-USB, Optical Link, Ethernet	Desktop

SCI-Compiler

User Firmware Generator and Compiler for CAEN Programmable Boards

CAEN
Tools for Discovery



The CAEN way to the Open FPGA!

Developed in collaboration with Nuclear Instruments

FREE TRIAL

Overview

SCI(entific)-Compiler is a graphical software designed to ease and accelerate the firmware implementation in physics placing and interconnecting the available functional blocks, the software is able to automatically generate a VHDL piece of code that can be directly deployed on the chosen compatible hardware. In this way, even a non-expert user can write his own firmware code without having any knowledge FPGA programming language.

SCI-Compiler comes with 100+ virtual blocks that implement complex functions used in physics applications, like waveform recording, logic gates, TDC, spectrum reconstruction, pulse shape discrimination, etc.

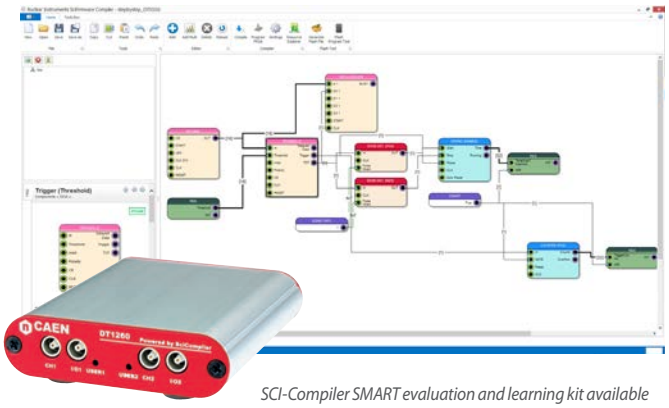
Advanced Hardware

SCI-compiler has been designed to generate code for some particular hardware platform designed by CAEN. Presently, SCI-Compiler supports the following CAEN products:

- DT5495 – V2495 Programmable Logic Units
- DT5550 DAQ System with User Programmable FPGA and sequencer
- DT5550W Weeroc ASICs Development system
- R5560 128-channel Open FPGA Digitizer with differential inputs
- R5560SE 128-channel Open FPGA Digitizer with single-ended inputs
- DT5560SE 32-channel Open FPGA Digitizer
- x2740/45 125MS/s 16-bit Open FPGA Digitizer family (Coming Soon)

Features

- **Easy Open FPGA programming**
- **Automatic VHDL generation starting from block diagrams**
- **Very simple generation of complex pulse processing**
- **Focus shifted from the coding to the firmware functionality**
- **Automatic generation of libraries and software example codes**
- **Tailored for Open FPGA beginners as well as for advanced experiments**



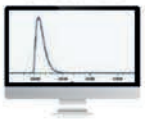
SCI-Compiler SMART evaluation and learning kit available

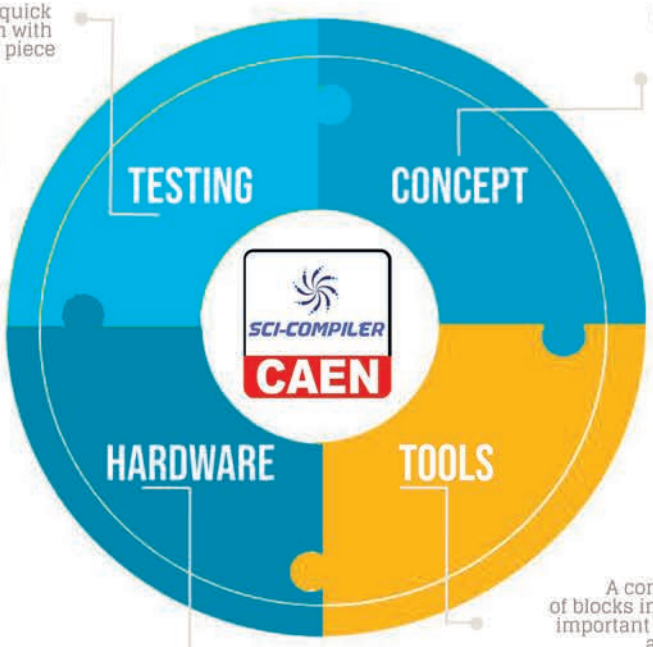
Ordering Option

Code	Description
WSW555XAAAAA	SW555 - SCI-Complier User Firmware Generator
WKSCISMARTXA	SCI-Compiler SMART kit
WSW55RUNTIME	Runtime license for Sci-Compiler board
WSW55RCSXAAA	SCI-Compiler remote customization service + yearly
WSW55YUSXAAA	SCI-Compiler yearly upgrade service

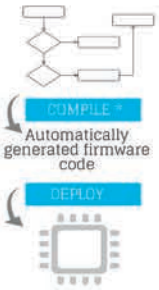
Key Features

Embedded tools for quick firmware verification with no need to write any piece of software





Block diagrams instead of HDL coding for easy FPGA programming



* Sci-Compiler requires Xilinx Vivado or Altera Quantus compiler, either locally or via server

A comprehensive set of blocks implementing the most important functions for physics applications.

SMART KIT

LEARN AND TEST!

+ SCI-COMPILER CAEN included

2 CH, 65 MS/S
12 BIT ADC UNIT

SCI COMPILER PRO

- **LOGIC UNITS X2495**
- **DIGITIZERS X5550, X5560, X2740**

Coming Soon

x2740 x5550 x5560

Logic Units

ADVANCED APPLICATIONS!

SCI-Compiler offers

LIFETIME LICENSE

EFFECTIVE MONEY/VALUE RATIO

LIFETIME LICENSE

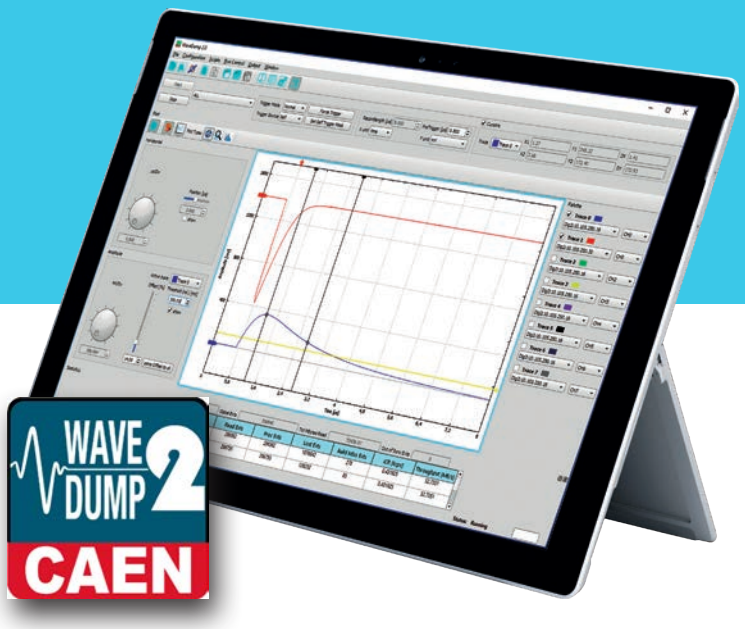
YEARLY UPDATE SERVICE
Stay up-to-date with Sci-Compiler new features

REMOTE CUSTOMIZATION SERVICE
No need of local Vivado/Altera compilers

SAME METHOD, MORE POWER!

CAEN WaveDump2

Waveform Recording Software



A smart and easy GUI to configure and manage the Scope Firmware of your Digitizer 2.0

FREE

Overview

WaveDump2 is a C++ software developed upon Qt cross-platform application development framework. An advanced and user-friendly configuration GUI provides all the necessary tools and functionalities for managing any hardware parameter from the basic ones to the most specific ones. The settings can be conveniently stored into or loaded from a configuration file.

This software specifically supports the Scope Firmware of the Digitizer 2.0 series for waveform recording applications. Data acquisition from multiple boards and multi-board synchronized systems are managed through a dedicated toolbar.

WaveDump2 also provides a plot section emulating a 8-channel digital oscilloscope. This tool allows to review the acquired waveforms, fine-tune the device settings and/or troubleshoot potential problems. The collected waveform data can be saved into ASCII or binary files for offline analysis.

Cursors are available in the oscilloscope to make on-screen measurements, as well as marker lines to indicate the trigger position and the trigger threshold level. Traces can be individually enabled/disabled and a legend is available to simply identify the displayed signals. The graphical tool offers a zooming control on both vertical and horizontal direction. Basic processing like FTT and samples histogramming is provided runtime.

Features

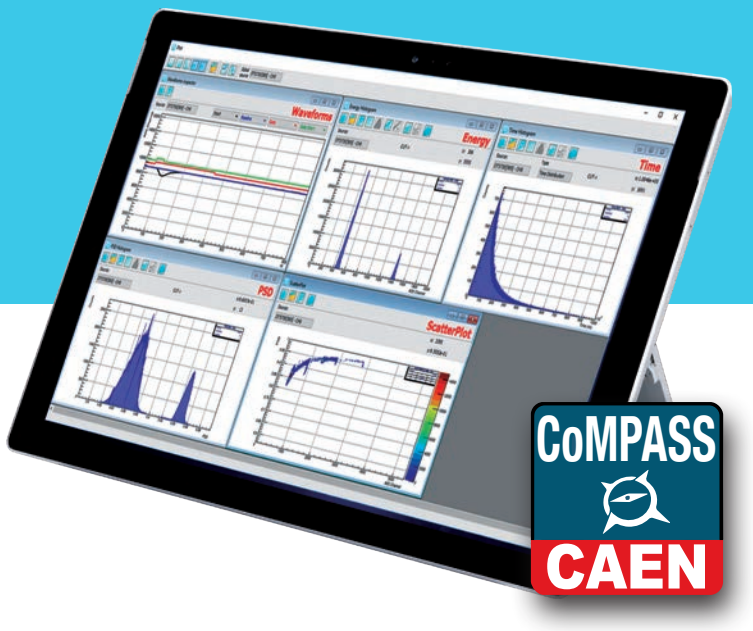
- **Waveform recording application**
- **Oscilloscope-like plot section**
- **Simultaneous wave view from up to 8 input channels**
- **Multi-board management**
- **Flexible and easy configuration of trigger and channel settings**
- **Save/Reload of current configuration**
- **ASCII and Binary output data files**
- **Runtime FFT analysis**

CAEN
Tools for Discovery

CoMPASS

Multiparametric DAQ Software for Physics Applications

High Level DAQ softyware for all the CAEN digitizer



DPP PSD | DPP PHA | DPP QDC | FREE

Features

- Software for simultaneous DPP acquisition, including DPP-PHA, DPP-PSD and DPP-QDC
- Multi-board management
- Synchronization of multiple boards even from different families, Time Correlation between different channels
- Simultaneous plot of waveforms, energy, time, PSD, and TOF spectra
- ROI Management, Energy calibration and Spectrum Fit
- Selectable filters on energy, time and PSD
- Advanced data saving options:
  - Boards data buffer for a complete data acquisition reprocessing
  - Time ordered list file
  - Spectra Jobs and batch acquisition (Coming Soon)
- Data can be retrieved offline for additional filtering and analysis
- ROOT format data saving

Applications

- Nuclear spectroscopy
- Clover detectors
- HPGe, Silicon Drift Detectors
- Neutron physics with scintillation detectors
- Multiple boards synchronization
- Homeland security
- Precise Timing for Time of Flight measurements

Overview

CAEN Multi-PArameter Spectroscopy Software (CoMPASS) is the DAQ software from CAEN able to implement a Multiparametric Data Acquisition for Physics Applications: the detectors can be connected directly to the digitizers/MCAs inputs and the software acquires energy, timing, and PSD spectra at the same time.

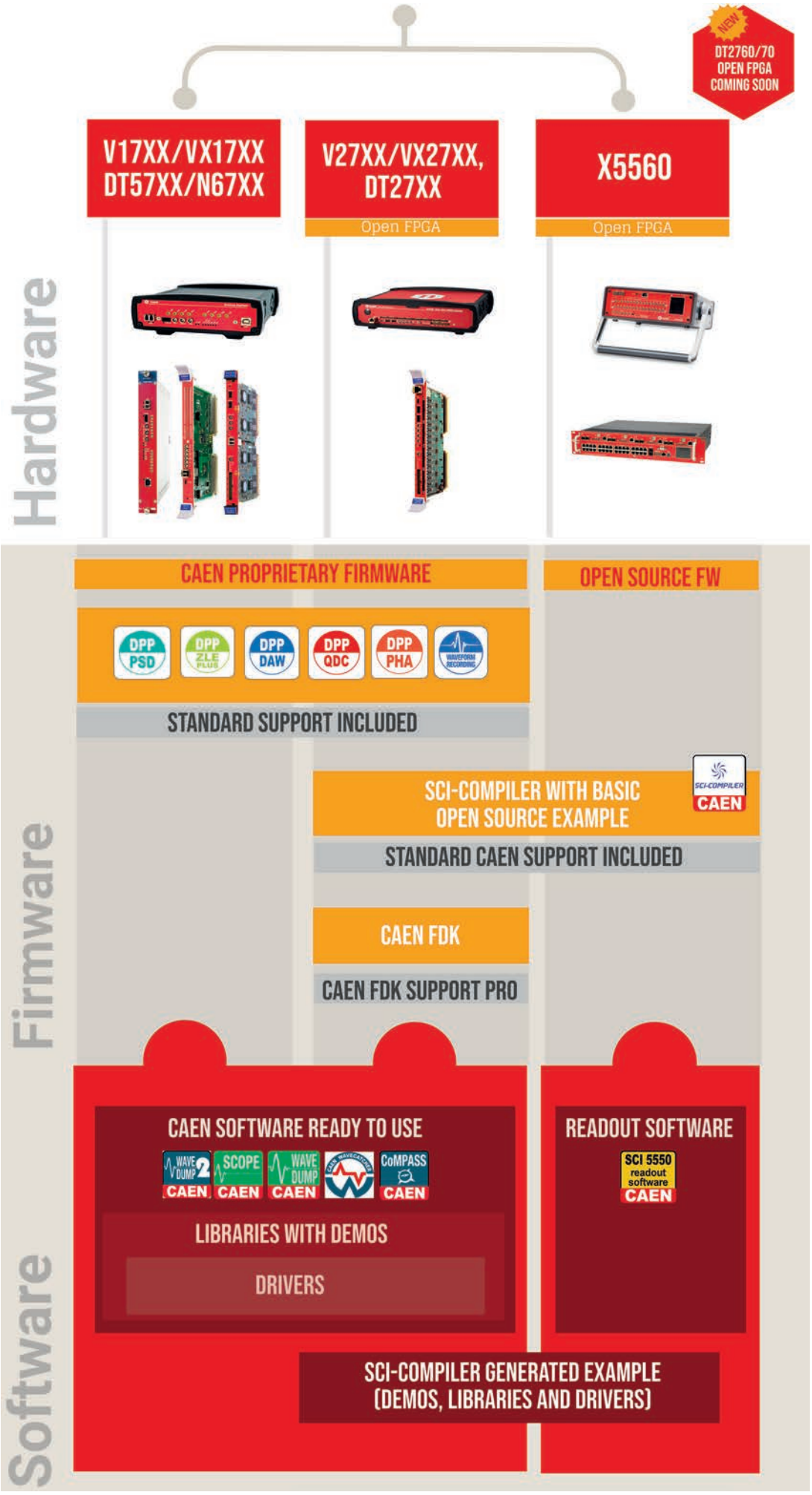
CoMPASS software has been designed as a user-friendly interface to manage the acquisition with all the CAEN DPP algorithms. It allows an easy setting of the acquistion parameters and to display up to six different plots and histograms at the same time.

CoMPASS can manage multiple boards and allows an easy synchronization of multiboard systems. Among the most important features, CoMPASS allows to implement event correlation between different channels (in hardware and/or software), apply energy, PSD and time selections, calculate and show the acquistion statistics (trigger rates, data throughput, percentage of discarded events due to the selections, etc...), perform a basic mathematical analysis of the recorded spectra (ROI selection, background subtraction, peak fitting, etc), save the output data files (raw data, lists, waveforms, spectra) and use the saved files to run offline with different processing parameters.

For the user familiar with the ROOT Analysis Framework, CoMPASS provides also the possibility of saving the output files (lists waveforms and spectra) in the ROOT TTree format for an easy post processing with user made analysis code.

CoMPASS software supports the new generation of CAEN Digitizer (x2740 and x2745) running the DPP-PHA, the first generation x720, x724, x725, x730, x751 digitizer families running the DPP-PSD and DPP-PHA, the x740D with DPP-QDC, the x780. x781, V1782 MCA family and the DT5790 Pulse processor.

CAEN Digitizer overview



CAEN
Tools for Discovery

A4818
USB 3.0 to CONET Adapter

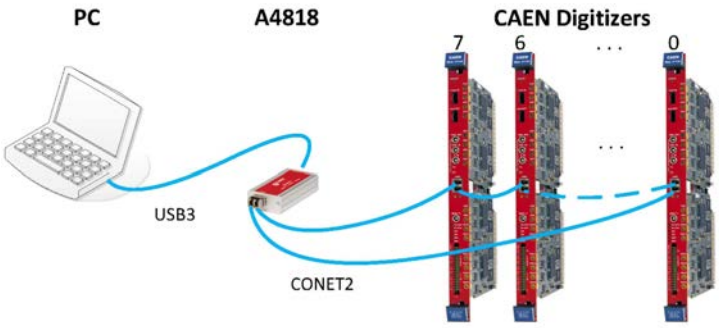
OPTICAL LINK
USB 3.0

Features

- Compact aluminum box 94 L x 41 W x 20 H mm^3 (including connector)
- 80 MB/s transfer rate by the optical link
- Up to 8 boards in Daisy-chain on the optical link
- Supports 50/125 µm OM2 and OM3 fibers (back-compliant with 62.5/125 µm OM1)
- Suitable for Windows 10 and Linux (all kernels)
- CAEN USB driver required for Windows OS only.
- Operating Temperature from 0 to 40 °C, Relative Humidity (non-condensing) 5-95%
- Requires 5 V from the USB connector (self-powered)
- 370 mA @ 5 V of power consumption

Overview

The A4818 is a CAEN USB 3.0 to CONET adapter, USB-powered. CONET is the CAEN proprietary protocol for optical link, which is able to communicate with Digitzers and VME Controllers by direct connection or in daisy chain of up to 8 boards simultaneously. The A4818 is compliant with the USB 3.1 Gen1 speed protocol and can be connected to the USB port of the PC running Windows or Linux OS. The optical link maximum transfer rate is 80 MB/s, which is shared within the boards connected in daisy chain. The A4818 is compliant with optical fibers 50/125 µm OM2 and OM3, as well as with older 62.5/125 µm OM1.

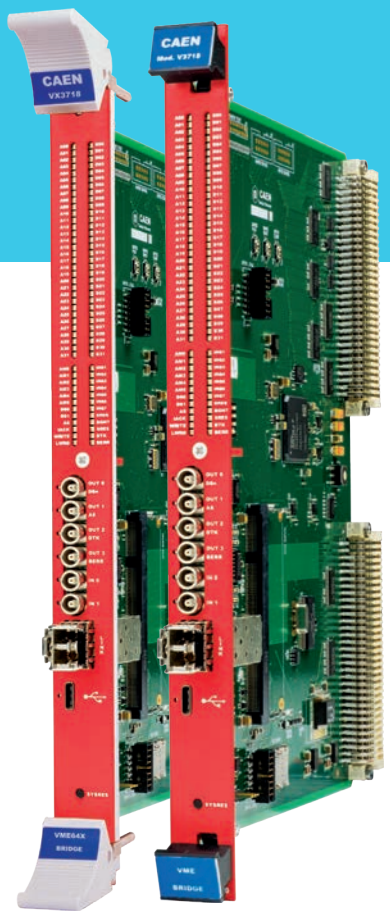


Model Compare

Model	Package	Link	Max Transfer Rate (MByte/s)	No. of Links
A4818	Desktop	USB 3.0 -> Optical link	80	1
A3818	PCIe	PCIe -> Optical link	80	1/2/4
A2818	PCI	PCI -> Optical link	80	1

V/VX3718

USB-2.0/Optical Link to VME Bridge



The full replacement of the old V/VX1718 and VVX2718 models in a unique solution!

The V/VX3718 new VME Masters equipped with USB-2.0 and CONET (CAEN Optical Network - proprietary optical link protocol) interfaces.

Overview

The V/VX3718 represent the new generation of CAEN VME Masters implementing all the charachteristics of the discontinued V/VX1718 and V/VX2718 modules on a single board.

All the cycles of the VME64 standard are supported, except those for the 3U boards. The V/VX3718 can work as DAQ Master/System Controller, bus arbiter or requester in Multi-Master systems. The VME bus activity can be monitored in detail both locally (on the 88-LED DataWay Display) and remotely.

Directly by the USB-2.0 interface, or through a CONET controller (A4818/A3818) and an optical fiber cable, the V/VX3718 can be fully controlled by the most common Windows® and Linux® computers (drivers and libraries are provided).

The Optical link interface (CONET proprietary protocol) makes possible each link of the CONET controller to connect up to eight V/VX3718 units in Daisy chain, and the easy performing of multi-crate sessions.

Programmable I/Os are available on the front panel for multi-functional use (Timer, Counter, Pulser, and others).

Features

- USB-2.0 (30 MB/s) and Optical link (80 MB/s) interfaces
- CONET proprietary protocol compliant to A3818/A4818 Optical controllers
- CONET Daisy chain capability: up to eight crates by a single link
- DAQ Master/System Controller (arbiter or requester)
- RW, RMW, BLT, MBLT, IACK, ADO and ADOH cycles
- D8, D16, D32, and D64 data widths
- Interrupt handler
- Front panel DataWay display for quick VMEbus monitoring
- Six programmable front panel LEMO TTL/NIM I/Os
- Fully integrable in Windows® and Linux computers

Model Compare

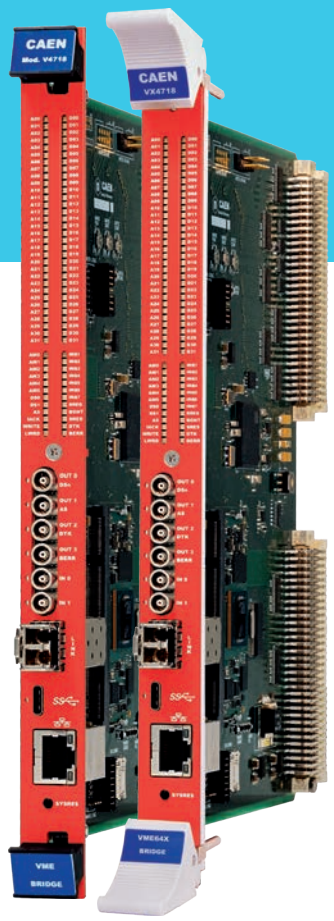
Model	Package	Link	Max Transfer Rate (MByte/s)	No. of Links	Programmable I/O	Data-way Display	I/O Connectors
V/VX4718	VME / VME64X	USB 3.0/Ethernet/Optical link -> VME	80	1 Opt. + 1 Eth. + USB 3.0	4 out + 2 in TTL/NIM	Yes	LEMO
V/VX3718	VME / VME64X	USB 2.0/Optical Link -> VME	80	1 Opt. + USB 2.0	4 out + 2 in TTL/NIM	Yes	LEMO

CAEN
Tools for Discovery

V/VX4718

USB-3.0/Ethernet/Optical Link to VME Bridge

Enhanced data rate, Multiport Interface Capabilities and Linux Onboard



The V/VX4718 new VME Masters offer high interfacement flexibility by the USB-3.0, Ethernet and CONET (CAEN Optical Network - proprietary optical link protocol) communication links.

Overview

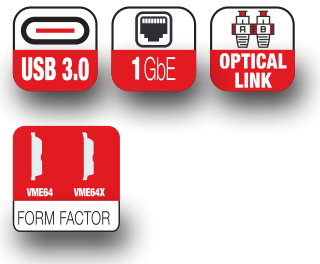
The new V/VX4718 VME Masters are CAEN best offer in terms of number of supported interfaces.

They can be fully controlled from a PC either through the USB-3.0 or the 1 GbE interface, or by optical link connection with CONET controllers (A4818/A3818) and optical fibler. Drivers and middleware libraries are provided for Windows® and Linux®. The integrated MPSoC offers the perspective of running custom software directly onboard.

The V/VX4718 support all the cycles of the VME64 standard, except those for the 3U boards. They can work as DAQ Master/System Controller, bus arbiter or requester in Multi-Master systems. The VME bus activity can be monitored in detail both locally (on front panel DataWay Display) and remotely.

The Optical link interface (CONET proprietary protocol) allows the Daisy chain of up to eight V/VX4718 units controlled by a single CONET controller, and the easy performing of multi-crate sessions.

Programmable I/Os are available on the front panel for multi-functional use (Timer, Counter, Pulser, and others).



Features

- **USB-3.0, 1 GbE and Optical link interfaces**
- **Onboard MPSoC: Xilinx Zynq® UltraScale+**
- **Proprietary CONET Optical link protocol compliant with A3818/A4818 Optical controllers**
- **Optical Daisy chain capability**
- **VME Master (arbiter or requester) and interrupt handler**
- **RW, RMW, BLT, MBLT, IACK, ADO and ADOH cycles**
- **D8, D16, D32 and D64 data widths**
- **System Controller capabilities**
- **Front panel dataWay display (remotely readable from PC)**
- **Six programmable front panel LEMO TTL/NIM I/Os**
- **Fully integrable in Windows® and Linux® computers**

Ordering Option

Code	Description
WV3718XAAAAA	V3718 - VME-USB Bridge
WVX3718XAAAA	VX3718 - VME-USB Bridge
WV4718XAAAAA	V4718 - VME64-USB 3.0, Ethernet and Optical Link Bridge
WVX4718XAAAA	VX4718 - VME64-USB 3.0, Ethernet and Optical Link Bridge

N1081B

NIM Four-Fold Programmable Logic Unit

A pocketknife tool in your laboratory!

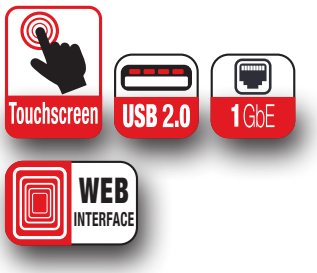
The N1081B and DT1081B are laboratory tools that incorporate in a single unit the most common functionalities that you need to implement the logic capabilities of your experiment. The board provides a wide range of user-selectable functions such as AND, OR, MAJORITY, COUNTER and even more complex operations like event time tagging or Poisson distribution generation

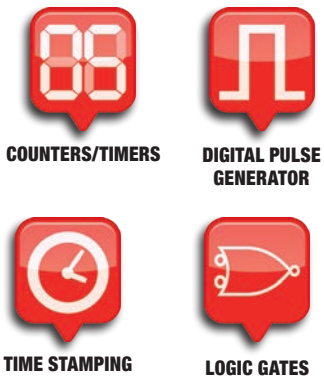
Overview

The N1081B and DT1081B are organized in four sections, with 6 inputs and 4 outputs each accepting TTL/NIM signals, with the possibility to feed in analog signals and process them through a leading-edge discriminator. Each input features a Gate&Delay stage with 5 ns resolution, while the output stage offers the possibility to use an asynchronous Monostable. This allows the user to trim at best the needed parameters and to perform accurate measurements using the available logic functions.

Each section is configurable independently, according to one of the available pre-programmed functions. The board configuration can be performed using the 2.8" touch screen display or via the web-interface, accessible via USB or Ethernet.

On the touch screen interface, each function is associated to a widget, meant to be used for configuration and monitor purposes.





Features

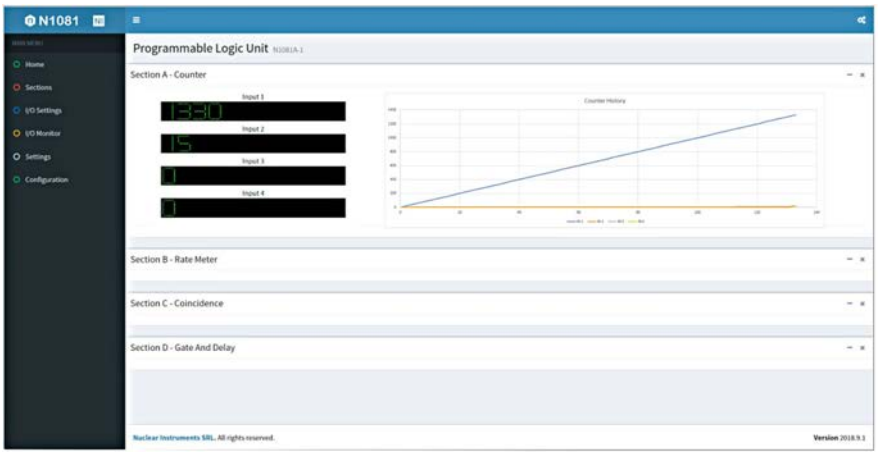
- Desktop and NIM form factor
- Wide range of user-selectable functionalities
- 4 programmable independent sections
- Input stage: Gate&Delay and Leading Edge Discriminator
- Output stage with Monostable capability
- 2.8" touch screen display with user-friendly widgets for configuration and monitoring
- Ethernet (1 Gbps) and USB2.0 connectivity
- Web-based Graphical User Interface

CAEN
Tools for Discovery

DT1081B

Destkop Four-Fold Programmable Logic Unit

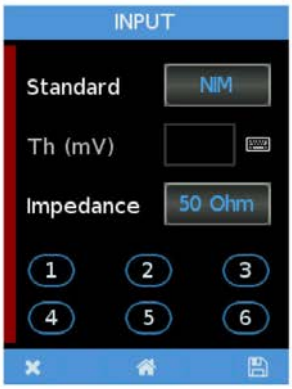
Touchscreen | WEB INTERFACE | USB 2.0 | 1 GbE



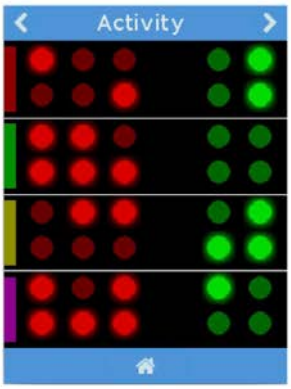
The web-interface allows the user to remotely configure the instrument via USB or Ethernet, monitor the functions output, dump data on file or history chart and access to the most advanced functions.

No software installation is required!

Each function can be programmed using the widget on the touchscreen



A configuration menu allows to set the input stage parameters



I/Os activity monitor displays in an intuitive way the status of all I/Os

It is possible to have an overview of the real-time output of each set function

Developed in collaboration with Nuclear Instruments

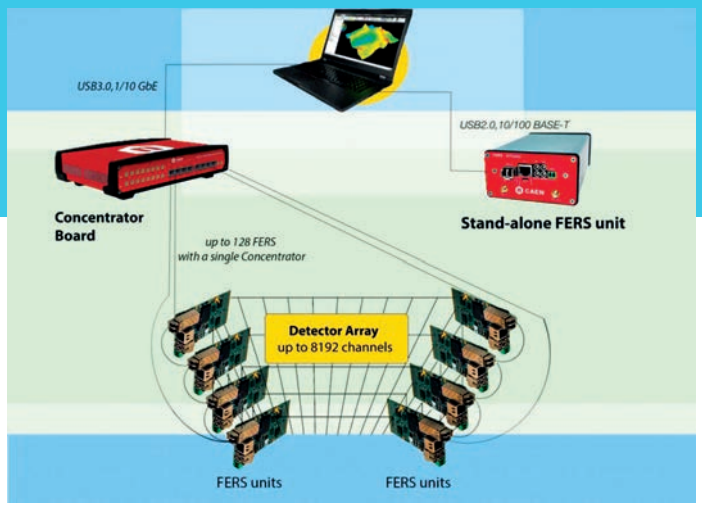
Ordering Option

Code	Description
WN1081BXAAAA	N1081B - Four Fold Programmable Logic Unit
WDT1081BXAAA	DT1081B- Desktop Four-Fold Programmable Logic Unit

FERS-5200

Front End Readout System

CAEN
Tools for Discovery



A modular, scalable and synchronized set of electronics sorrounding your experiment and reading out thousands of detectors!

FERS-5200 is the CAEN solution to build a multichannel readout system for large detector arrays, starting from standalone cards and scaling up with dedicated connections. Thanks to front-end units with high-channel density and a concentrator board to collect the whole set of incoming data, it is possible to easily build a distributed network of cards and obtain a complete readout system with many thousands of readout channels.

Overview

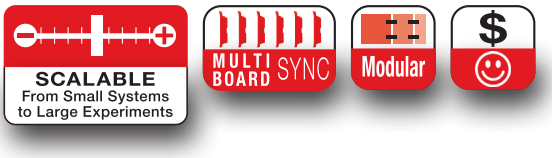
FERS-5200 is a Front-End Readout System designed for large detector arrays, such as SiPMs, multi-anode PMTs, Silicon Strip detectors, Wire Chambers, GEM, Gas Tubes, and others. FERS is a highly-scalable distributed platform. Each unit is a small card (~7 x 17 cm^2) which houses 64 or 128 channels and includes Front End electronics, A/D converters, trigger logic, synchronization, local memory, and readout interface.

FERS is a synonym of flexibility: a single user-interface and readout infrastructure has been designed to support and perform a wide range of front-end tasks suitable for a large variety of detector types. In most cases, the front-end is based on ASIC chips. This design is perfect for large detector arrays, combining high density, cost-effective integration of multi-channel readout electronics with a small footprint, and low power draw.

This is the case of the first FERS-5200 model: A5202, based on the Citiroc-1A chip produced by Weeroc for SiPM readout.

Features

- **Scalability**: from a single standalone FERS unit for prototyping to thousands of channels (tree network structure)
- **Modularity**: multiple FERS units managed via a single Concentrator board
- **Flexibility**: FERS units can be tailored to specific detectors and applications
- **Compact size**: High-channel density FERS units



The DT5215 (Concentrator board) is responsible for synchronization and data collection from multiple FERS units. It features 8 optical TDLink, a CAEN proprietary protocol that can perform synchronization and exchange data at the same time. Each link can control up to 16 FERS units in daisy-chain, for a total of 128 cards.

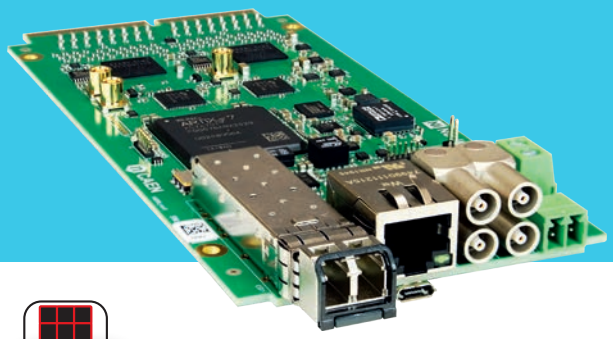
The Concentrator is the core of DAQ, picking up the fragments acquired by each unit and sending them sorted and merged to the host PC, via 10 GBe or USB 3.0

CAEN
Tools for Discovery

A5202

64 Channel CITIROC unit for FERS-5200

The readout of large SiPM arrays has never been simpler and cost-effective



The A5202 module is the newborn FERS-5200 board for the readout of SiPM arrays. Being also the first member of the family, it constitutes a proof of concept for the system itself and a great starting point for other FERS-5200 boards development.

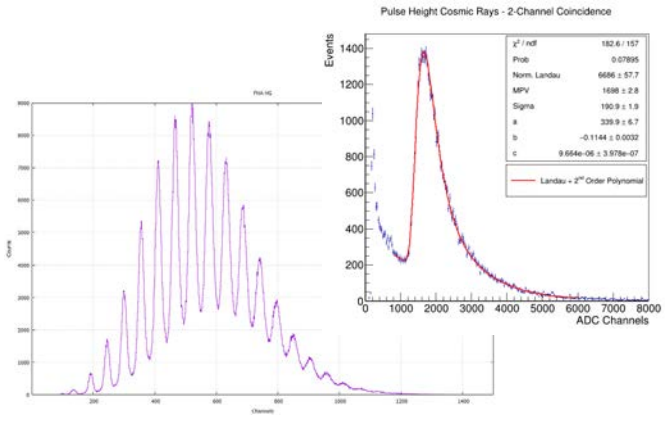
SiPM

Remotization kit available to provide maximum flexibility!

Desktop version (DT5202) is also available:

Features

- 64 channels (= 2 Citiroc-1A chips)
- Acquisition modes: spectroscopy (PHA), counting, time stamping with ToT
- Onboard power supply module for SiPM bias generation
- Up to 128 A5202 FERS units (up to 8192 SiPM pixels) can be managed and synchronized via optical link using a single Concentrator Board.



Overview

The first FERS-5200 unit being developed is the A5202 (DT5202 is the boxed version for desktop use) that uses the Citiroc-1A chip produced by WeeROC for SiPM readout. More precisely, the A5202 is a small board (~ 7 cm x 17 cm) housing two Citiroc-1A chips (64 readout channels). Each readout channel is composed of a Preamplifier, a Slow Shaper with pulse height detector, and a Fast Shaper followed by a discriminator. Pulse height values from each Citiroc-1A are converted sequentially by a 13-bit ADC to perform energy measurements. The 64 channel self-triggers (discriminator outputs) can be used for counting, time stamping, to determine the Time over Threshold (ToT) information, and also to generate the board bunch trigger that starts the ADC conversion. The A5202/DT5202 board also integrates the A7585D power supply module necessary for biasing the SiPMs, and the interfaces for readout, synchronization, and control.

The Janus software, allowing to completely manage the A5202/DT5202 module and the data acquisition, is also provided for free by CAEN.

Ordering Option

Code	Description
WDT5215XAAAA	DT5215 - Collector Board for FERS-5200
WA5202XAAAAA	A5202 - 64 Channel Citiroc unit for FERS-5200
WDT5202XAAAA	DT5202 - Desktop 64 Channel Citiroc unit for FERS-5200

R1443

Preamplifier Unit for He-3 Tubes

Preamplifier unit with up to 64 channels for neutron detectors as He-3 or BF3 tubes.

Overview

R1443 is a 32/64 channels Charge Sensitive Preamplifier in a 19″ rack unit (120/230V 50/60Hz AC Powered). It has been developed in collaboration with Institut Laue-Langevin in Grenoble, France, and it is specifically designed for operating with neutron detectors as He-3 or BF3 tubes. Given the number of input channels, it can handle up to 16/32 position-sensitive tubes, each tube having two outputs, one for each end.

The output signal of each channel has an RC of 1 µs. This guarantees excellent performances even at high rates exceeding 100 kcps. The output of this preamplifier is typically readout by ADC and Digital Pulse Processing electronics in order to perform specific filtering to achieve the best charge, timing and axial position measurements.

Features

- Specifically designed for neutron detectors as 3He or BF3 tubes.
- 19” rack unit (height = 2U)
- External HV input on SHV connector (feeding the internal decoupling circuits)
- Detector inputs on SHV connectors
- Test input on BNC (1 pF charge injection capacitors)
- Differential outputs on RJ45 connectors
- Three available versions:
  - 32 channels
  - 64 channels
  - 32 channels with 16 independent HV inputs (1 per tube)
- Full position-sensitive 3He acquisition system in combination with R5560 digitizer

Ordering Option

Code	Description
WR1443XAAAAA	R1443A 32 channels Preamplifier unit for He3 tubes
WR1443XBAAAA	R1443B 64 channels Preamplifier unit for He3 tubes
WR1443XCAAAA	R1443C 32 channel Preamplifier unit for He3 tubes with independent HV

CAEN
Tools for Discovery

A1429

64 Channel charge sensitive preamplifier

Ultra high density preamplifier for big size segmented silicon and gas detector arrays

When compact size, low power consumption and very high number of acquisition channels requirements come in play, then the A1429 is the answer.

Features

- 64-channel
- Max. output voltage: +/- 4,5V Diff on 100 ohm termination
- Sensitivities: 20, 45, 90, 200, 400mV / MeV
- Dimension (mm): 180 x 105 X 25 mm
- Input bias voltage (± 400 V Max) (2 LEMO 00 connector);
- ESD input protection
- TEST pulse input (1 LEMO 00)
- Low power consumption (< 50 mW for ch.)
- True Differential output (with 100 Ω Diff. back termination)

Complete and full digital acquistion chain with x2740 and x2745 family, Pulse Heigh Analysis firmware and CoMPASS

Overview

The A1429 is a 64 ch. highly integrated charge preamplifier, suitable for single or double sided multi-strip silicon detectors as well as for multi-channel detectors with common Bias. Its compact size and low power consumption make it ideal for direct detector coupling in a high vacuum system. It is equipped with two LEMO Bias inputs, one input for channels from 0 to 31 and a second for channels from 32 to 63. Furthermore, on the odd channels it is possible to select the Bias to GND with an internal jumper.

The A1429 is available in different sensitivities: 20, 45, 90, 200, 400 mV, / MeV

The preamplifier output signals are in true differential supporting low-cost twisted flat cables for the output connection.

This feature allows to easily couple the A1429 with the new generation digitizer VX2740/VX2745 thus creating a complete chain for the readout of a segmented detector array.

Ordering Option

Code	Description
WA1429X020AA	A1429x020 - 64 Ch. Charge Sensitive Preamplifier 20 mV/MeV
WA1429X045AA	A1429x045- 64 Ch. Charge Sensitive Preamplifier 45 mV/MeV
WA1429X090AA	A1429x090- 64 Ch. Charge Sensitive Preamplifier 90 mV/MeV
WA1429X200AA	A1429x200 - 64 Ch. Charge Sensitive Preamplifier 200 mV/MeV
WA1429X400AA	A1429x400- 64 Ch. Charge Sensitive Preamplifier 400 mV/MeV

A1422E/F

Low Noise Fast Rise Time Charge Sensitive Preamplifiers

Tailored for wide surface Silicon Detectors!

Compact multichannel preamplifier for wide surface and high capacitance detectors perfectly tailored for high rate applications.

Overview

The A1422E/F series are charge sensitive preamplifiers packaged in a 2/4 channels box. The sensitivity is 200mV/MeV.

It is suited for silicon detectors with wide surface and high capacitance, used for nuclear and subnuclear physics experiments, where very low noise, fast response, and high counting rates are required. The modules accept both positive and negative input charge pulses and provide an energy output of ±4.5 V range on 50 Ω termination (±10 V on 1kΩ). Moreover, a test input accepts positive and negative signals for calibration purposes.

The A1422E/F is implemented into alloy boxes and feature SHV connectors for HV/IN, SMA connectors for DET/IN, TEST IN and E OUT and D-type 9 pin male connector for the power supply.

Features

- Fast, low noise inverting preamplifier
- Sensitivity: 200 mV / MeV (Si)
- Positive or negative input signals
- Up to 700V (positive or negative) detector bias voltage
- Low noise input stage composed JFETs diode protected
- 2 or 4 input channels
- Single-ended output on SMA connectors

Ordering Option

Code	Description
WA1422F200F3	A1422F - 4 Ch. Charge Preamplifier, 200mV/MeV gain, Cdet<400pF
WA1422E200F3	A1422E - 2 Ch. Charge Preamplifier, 200mV/MeVgain, Cdet<400pF

A1422CD

Low Noise Fast Rise Time Charge Sensitive Preamplifier

The suitable preamplifier for He3 tubes!

A convenient alternative to R1443 preamplifier for the readout of neutron gas-based detectors in medium-sized setups.

Overview

The A1422C-D is a 5 mV/MeV 8-channel preamplifier implemented into an alloy box and features SHV connectors for the DET/IN and HV/IN signals, 2 RJ45 for the differential outputs, LEMO connectors for the TEST IN and COM OUT and a cable with a D-type 9 pin male connector for the power supply.

The module accepts both positive and negative input charge pulses and provide a differential output of ±5V max on 1 kΩ termination , and ±2.5V on 100 Ω back termination. A test input accepts positive and negative signals for calibration purposes. Moreover the sum of the 8 energy outputs, with 1 µs decay time, is available on the COM OUT output.

Features

- Fast, low noise inverting preamplifier
- 8 channels, 5 mV/MeV (Si)
- Positive or negative input signals
- Up to 200 pF detector capacitance supported
- Up to 2000 V (positive or negative) detector bias voltage
- Low noise input stage composed JFETs diode protected
- Easy-connection to R5560 for signal digitization
- Differential output on RJ45 connectors

Ordering Option

Code	Description
WA1422CD05F2	A1422CD05F2 - 8 Ch. Charge Preamplifier, 5mV/MeVgain, Cdet<200pF with differential outputs

CAEN
Tools for Discovery

A1442

16/32 Channel charge sensitive preamplifier

The perfect high density solution for you segmented silicon detector

Is your setup big but not that big? Is the compact size and the low power an important requirement but the flexibility in selecting the full scale range is crucial as well? The A1442 is the perfect compromise!

Features

- 16 channel or 32 channel
- x1 or x5 switchable sensitivity
  - 200 MeV (SI) @ 1X
  - 40 MeV (Si) @ 5X
- Differential output (with 100 Ohm back termination)
- Maximum output voltage +/- 4.5 V
- Input bias voltage (+/- 400 V Max)
- ESD input protection
- Low power consumption for in vacuum use (< 1000 mW for 16 ch. version)
- Noise < 5 KeV on 0 pF input and < 23 eV/pF slope
- Rise Time < 10ns @ 0pF, < 20 ns @ 200 pF

Complete acquistion analog or digital chain with:

- **N1068 spectroscopy amplifier and N6741 Peak sensing ADC**
- **x2740 and x2745 new digitizer and Pulse Height Analysis firmware**

Overview

The A1442 is ideally suited for single or double sided multi-strip silicon detectors as well as for multi-channel detectors with common Bias. Its compact size and low power consumption make it ideal for direct detector coupling in a high vacuum system. It is available in both 16-channel (A1442A) and 32-channel (A1442B) versions (coming soon 64-channel version).

Preamplifier output signals are true differential supporting low-cost twisted flat cables for the output connection.

The preamplifier also provides a SUM output of the 16-channels, allowing the user to calculate the timing of pulse shape measurements of the complete strip from a single signal. Preamplifier sensitivity can be easily changed by a factor of 5 by means of a simple jumper on the front panel. The 32-channel version (A1442B) can be operated as two independent 16-channel preamplifiers with separate Voltage-Bias and Test inputs, and two separate SUM outputs.

Ordering Option

Code	Description
WA1442A020XA	A1442A020 - 16 Ch. Charge Sensitive Preamplifiers 20 mV/MeV
WA1442B020XA	A1442B020 - 32 Ch. Charge Sensitive Preamplifiers 20 mV/MeV

Model Compare

Model	Package	Out Conn.	In Conn.	Test Capac. (pF)	Max Detector Bias Voltage (V)	Integral Non-linearity	Output Linear Range (V)	Output Rise Time (ns)	Noise FWHM keV (Si)	Sensitivity (mV/MeV) (Si)	No. of Channels
A1442	Shielded box	Header (17+17)	D-SUB 25	N.A.	±400	N.A.	Differential ±4.5 Vdiff	< 10 @0pF <20 @200pF	<5 @0pF <9.5 @200pF	20 / 100 Selectable	16/32

HEXAGON

Digital MCA Multichannel Analyzer

CAEN
Tools for Discovery

Excellence in gamma spectroscopy!

Control Software and Libraries | WEB INTERFACE | USB 2.0 | 100 Mb

The best digitial MCA suitable for laboratory and in situ applications. Compact, flexible, and best performoring for Nuclear Physics Research, Homeland Security, Environmental (Real-Time) Monitoring, Non-Destructive Analysis, Nuclear Safety & Safeguards, Labs and Educational application

Overview

Hexagon is a single or dual digital 32k MCA in a compact desktop form factor. It is suitable for semiconductor detectors, such as HPGe, Silicon, and CZT detectors, but also for scintillation detectors as NaI and $LaBr_3$. It accepts signals from resistive feedback or transistor reset preamplifier detectors as well as from PMT anodes.

Hexagon can operate in Pulse Height Analysis (PHA) and in Multichannel Scaling (MCS) mode. Multiple PHA spectra can be collected using Multispectral Scaling (MSS) mode with no data loss when switching to a new spectrum. Time-Stamped List mode is also available. Additionally, AntiCompton data acquisition is supported by taking advantage of the 2-input channel version.

Hexagon is equipped with I/O connectors for TRP inhibit and additional functionalities (PHA Start/Stop, SCA, MCS, Coincidence/AntiCoincidence, Acquisition Start/Stop, ICR, Run Status, Sample Changer, and Sample Ready signals).

Features

- **Single and Dual 32k Digital MCA**
- **Fully supported by Quantus Spectrometry Software**
- **Provides Pulse Height Analysis (PHA with MSS and coinc/antocoinc), Time-stamped Lists and Multichannel Scaling (MCS) modes**
- **Ideally suited for semiconductor detector like HPGe, CZT, Silicon, and scintillation detectors**
- **Supports Resistive Feedback and Transistor Reset preamplifiers as well as PMT anode signals**
- **On-board SSD memory for List and Spectrum data storage**
- **Web interface for board details retrieval firmware upgrading, and output data file browsing**

Easy multi-Hexagon synchronization and system building can be made via a simple daisy cable. An OLED display provides general board information, ICR, OCR, Real/Live/Dead Time, as well as details on the HVPS channel output. Three selectable ranges of bias voltage and current are configurable on per-channel basis and hardware protection: 2 kV / 1 mA for PMTs, 5 kV / 30 µA for HPGe, and 500 V / 50 µA for Silicon detectors.

Hexagon is controlled by Quantus, a general-purpose gamma-ray quantitative spectroscopy software. The embedded Linux-based ARM processor makes Hexagon well suited for unattended operations. Taking advantage of the available SDK tool, the user can customize the software (running embedded or on an external PC). Hexagon can be controlled with a point-to-point direct connection through the USB 2.0 link and with a remote network connection by the Ethernet 10/100T port. A web interface that supports basic service operations is also available.

Single and dual input 32k digital MCA

Ordering Option

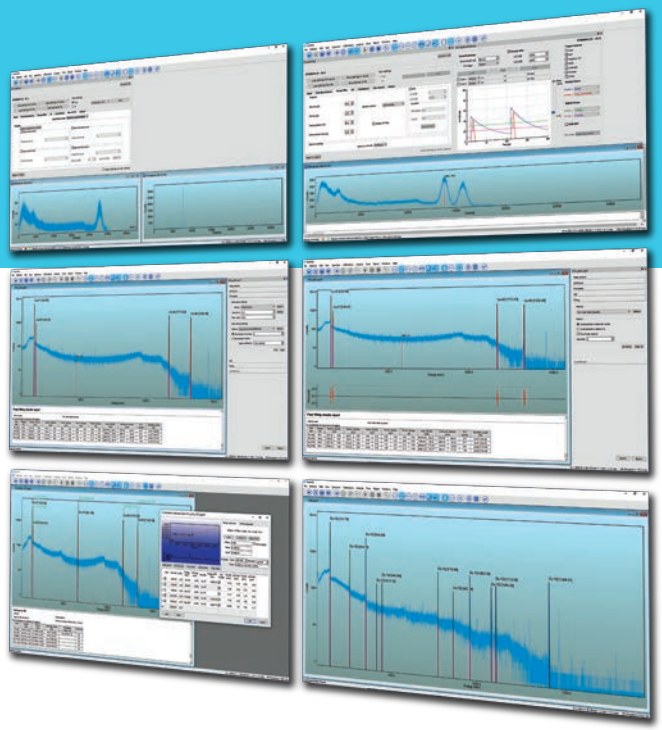
Code	Description
WDT5000XMAAA	DT5000M - HEXAGON Dual Dig. MCA - 1 HVPS +5kV/30uA, 1 HVPS -5kV/30uA, 2 LVPS ±12V/100mA, ±24V/50mA
WDT5000XNAAA	DT5000N - HEXAGON Dual Dig. MCA - 2 HVPS -5kV/30uA, 2LVPS +/-12V/100mA, +/-24V/50mA
WDT5000XPAAA	DT5000P - HEXAGON Dual Dig. MCA - 2 HVPS +5kV/30uA, 2LVPS +/-12V/100mA, +/-24V/50mA
WDT5001XMAAA	DT5001M - HEXAGON-one Dig. MCA - 1 HVPS +5kV/30uA, 1 HVPS -5kV/30uA, 1 LVPS ±12V/100mA, ±24V/50mA
WSWGQUANX1AA	GQuantus 1ch general purpose Gamma Ray Quantitative Spectrometry software (1ch dongle)
WSWGQUANX2AA	GQuantus 2ch general purpose Gamma Ray Quantitative Spectrometry software (2ch dongle)
WSWGQPRFBXAA	Procedure option, File Browser option aand File Batch Analysis option
WSWGQUSERMXA	User Management option
WSWGQAQCXAAA	QA/QC options (includes Procedure option)
WSWGQUANTALL	Quantus all AddOn options

CAEN
Tools for Discovery

Quantus

Quantitative Spectrometry Software

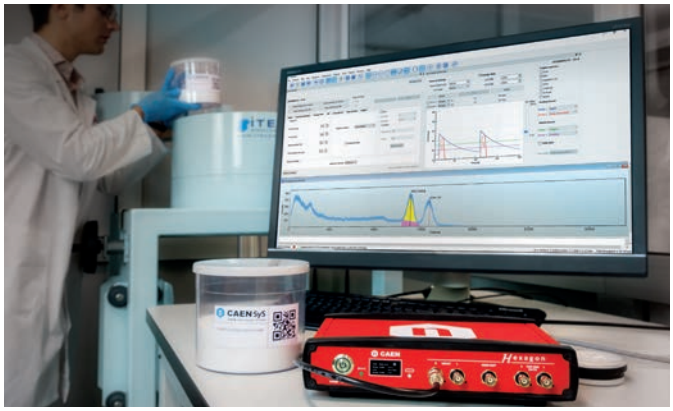
The most powerful and user friendly quantitative spectroscopy analysis software



A general purpose, comprehensive and extensive software package for gamma-ray spectrum analysis and radionuclide identification and quantification

Features

- **Data acquisition control via detector-MCA setups**
- **Spectrum analysis through a powerful collection of calculation engines:**
  - ROI computations
  - Continuum calculation methods
  - Peak search engines and Peak fitting algorithms
  - Peak qualification methods and automatic ROI location
  - Energy, FWHM and Efficiency calibration methods
  - Activity and MDA calculation algorithms
  - Advanced uncertainites evaluation
- **Radionuclide identification and quantification:**
  - Different quantification methods
  - Complete radionuclide library based on NuDat nuclear database
- **Additional funtionalities:**
  - Multilanguage support
  - Procedures
  - User's Management
  - File Batch Analysis
  - File Explorer
  - QA/QC
  - Efficiency calculation based on full MonteCarlo method



Overview

Quantus is the CAEN high performance software to make Quantitative Spectrometry with Hexagon digital MCA. It is powerful and flexible enough to support an enormous range of sample types and detector geometries, and can analyze any recorded gamma-ray spectrum for radionuclide identification and quantification.

Thanks to its multi-document design, Quantus can manage simultaneous multi-spectrum analysis as well as multi-detector data acquisition. The advanced Graphical User Interface (GUI) is highly configurable for user needs: it incorporates tools for a wide range of analytical functions such as peak search, continuum subtraction, peak qualification, automatic ROI location, energy calibration with visual interaction, FWHM calibration, efficiency calibration, nuclide identification, and activity calculation; permits visual distinction and marking of ROIs and peaks in the spectrum as well as multiple peak labelling implementation; provides advanced spectrum cursor showing satellite or spectrum artifacts.

Quantus supports high data management and great traceability. All information is saved into XML-formatted files (*.gxml). A spectrum can be imported from other formats like Ortec (*.chn) and Canberra (*.cnf) files, .spe, and N42.42 standard as well. The user can customize analysis reports, including fully colored and HTML-formatted tables.

Quantus is a multi-platform software compatible with Windows® and Linux™ operating systems.

i-Spector family

Intelligent Silicon Photomultiplier Tube

CAEN
Tools for Discovery

Tube-like compact units for Gamma Spectroscopy and Neutron Detection

WEB INTERFACE

i-Spector products are full-featured radiation detection systems based on SiPMs. The unit's profile makes it ideal for many portable applications where size, weight and power consumption are important constraints. It is suitable for applications ranging from R&D to Security monitoring.

Overview

i-Spector is an all-in-one detector and electronics instrument based on a SiPM area, possibly coupled to a scintillation crystal suitable for the chosen application. The i-Spector integrates in a compact tube-like mechanics the detection stage, frontend electronics, an integrated power supply for SiPM biasing and, eventually, a digital chain to process onboard the incoming data. The i-Spector can be controlled via Ethernet and/or wireless communication based on LoRa standard.

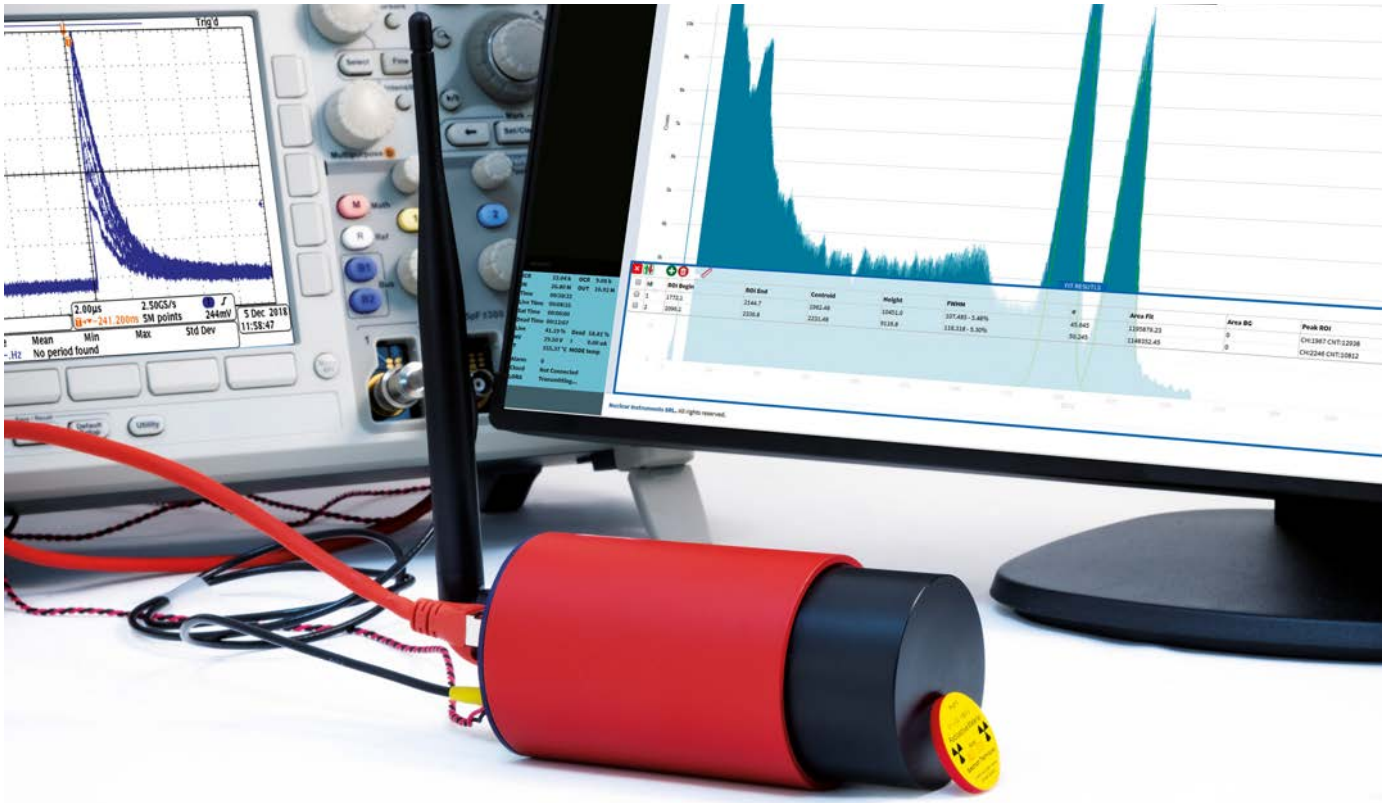
A web-based GUI allows the user to set the acquisition parameters, see results on plot and perform basic data analysis.

Multiple i-Spector tubes can be connected and controlled from a single PC thanks to a cloud-based sofware (Rad Cloud – FREE TRIAL) collecting data from the detectors and displaying them on maps or interactive tables.

i-Spector is available as OEM electronics, to encourage integration in more complex detection systems, or in ASSEMBLY version, with a suitable scintillation crystal coupled to the SiPM area.

Features

- **All-in-one detector, electronics and signal processing**
- **Possible replacement for PMTs**
- **Compact form factor: Ø 60 mm, h 90/135 mm**
- **20-80 V Integrated High Voltage for SiPM biasing**
- **Different models covering MCA, PSD, TDC functionalities**



CAEN
Tools for Discovery

i-Spector

i-Spector S2560 is the basic version that can replace existing systems based on PMTs. Pulses from the SiPM pixels are processed by a preamplifier stage and summed to obtain a single fast analog signal that can be digitized or processed with a common Digitizer, MCA or discriminator/TDC chains.

i-Spector PLUS S2560T model (Coming Soon) integrates an additional Timing Unit that is able to perform event timestamping, ToF measurements, coincidence between multiple i-Spector modules, and photon counting.

i-Spector Digital

i-Spector Digital S2570 is a Gamma Spectrometer operating as a complete radiation detection system. It embeds a digital MCA, based on 80 MSps 12-bit ADC and charge integration algorithm. The unit provides as output a single analog amplified signal and a 4k channels energy spectrum calculated onboard and displayed into the Web-Interface.

i-Spector LoRa S2570L integrates an additional LoRaWAN-compatible antenna for IoT and environmental monitoring applications.

i-Spector PSD (Coming Soon)

i-Spector PSD S2590 is a compact neutron detector system featuring high detection efficiency and wide dynamic range, based on the EJ-276 fast scintillation crystal.

It hosts 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 4k channels energy spectrum, and a PSD scatterplot.

Model Compare

	i-Spector S2560	i-Spector PLUS S2560T	i-Spector Digital S2570	i-Spector LoRa S2570L	i-Spector PSD S2590
Main Application	PMT replacement	Timing/Coinc. measurements	Gamma Spectroscopy	Environmental monitoring	Neutron detection
Form factor	OEM, ASSEMBLY	OEM, ASSEMBLY	OEM, ASSEMBLY	OEM, ASSEMBLY	ASSEMBLY
Size	OEM: Ø 60 mm, h 90 mm ASSEMBLY: Ø 60 mm, h 135 mm	OEM: Ø 60 mm, h 90 mm ASSEMBLY: Ø 60 mm, h 135 mm	OEM: Ø 60 mm, h 90 mm ASSEMBLY: Ø 60 mm, h 135 mm	OEM: Ø 60 mm, h 90 mm ASSEMBLY: Ø 60 mm, h 135 mm	Ø 60 mm, h 135 mm
SiPM Area	18x18, 24x24 or 30x30 mm^2	18x18, 24x24 or 30x30 mm^2	18x18, 24x24 or 30x30 mm^2	18x18, 24x24 or 30x30 mm^2	12x12 or 24x24 mm^2
Scintillation Crystal	CsI, others on request	CsI, others on request	CsI, others on request	CsI, others on request	EJ-276
Analog Output	Yes	Yes	Yes	Yes	Yes
Digital I/Os	-	Yes	-	-	
MCA	-	-	4k	4k	4k
TDC	-	Yes	-	-	-
PSD	-	-	-	-	Yes
Connectivity	Ethernet	Ethernet	Ethernet	Ethernet / LoRa™	Ethernet
Software	Web GUI	Web GUI	Web GUI/Rad Cloud	Web GUI/Rad Cloud	Web GUI/Rad Cloud

Ordering Option

Code	Description
WS25X0ASSBXA	Assembly kit and service for i-Spector OEM – new version RoHS
WS2560DX0AAA	S2560D i-Spector 18x18mm - OEM RoHS
WS2560EX0AAA	S2560E i-Spector 1" (24x24 mm) - OEM RoHS
WS2560FX0AAA	S2560F i-Spector 1.5" (30x30 mm) - OEM RoHS
WS2560TDX0AA	S2560TD i-Spector PLUS 18x18mm - OEM RoHS
WS2560TEX0AA	S2560TE i-Spector PLUS 1" (24x24 mm)- OEM RoHS
WS2560TFX0AA	S2560TF i-Spector PLUS 1.5" (30x30 mm)- OEM RoHS
WS2560DXAAAA	S2560D i-Spector 18x18mm – CsI ASSEMBLY RoHS
WS2560EXAAAA	S2560E i-Spector 1" (24x24 mm) – CsI ASSEMBLY RoHS
WS2560FXAAAA	S2560F i-Spector 1.5" (30x30 mm) – CsI ASSEMBLY RoHS
WS2560TDXAAA	S2560TD i-Spector PLUS 18x18mm – CsI ASSEMBLY RoHS
WS2560TEXAAA	S2560TE i-Spector PLUS 1" (24x24 mm) – CsI ASSEMBLY RoHS
WS2560TFXAAA	S2560TF i-Spector PLUS 1.5" (30x30 mm) – CsI ASSEMBLY RoHS
WS2570DX0AAA	S2570D i-Spector Digital 18x18mm - OEM RoHS

Code	Description
WS2570EX0AAA	S2570E i-Spector Digital 1" (24x24 mm) - OEM RoHS
WS2570FX0AAA	S2570F i-Spector Digital 1.5" (30x30 mm) - OEM RoHS
WS2570LDX0AA	S2570LD i-Spector Digital with LoRa 18x18mm - OEM RoHS
WS2570LEX0AA	S2570LE i-Spector Digital with LoRa 1" (24x24 mm)- OEM RoHS
WS2570LFX0AA	S2570LF i-Spector Digital with LoRa 1.5" (30x30 mm) - OEM RoHS
WS2570DXAAAA	S2570D i-Spector Digital 18x18mm - CsI ASSEMBLY RoHS
WS2570EXAAAA	S2570E i-Spector Digital 1" (24x24 mm) - CsI ASSEMBLY RoHS
WS2570FXAAAA	S2570F i-Spector Digital 1.5" (30x30 mm) - CsI ASSEMBLY RoHS
WS2570LDXAAA	S2570LD i-Spector Digital with LoRa 18x18mm - CsI ASSEMBLY RoHS
WS2570LEXAAA	S2570LE i-Spector Digital with LoRa 1" (24x24 mm) - CsI ASSEMBLY RoHS
WS2570LFXAAA	S2570LF i-Spector Digital with LoRa 1.5" (30x30 mm) - CsI ASSEMBLY RoHS
WS2590AXAAAA	S2590A i-Spector PSD 12x12mm – ASSEMBLY RoHS
WS2590CXAAAA	S2590C i-Spector PSD 24x24mm - ASSEMBLY RoHS

N-brick

Rack-mount solution for neutron physics

Building up neutron detection systems with a modular and flexibile set of standalone bricks!

R5560: powerful and flexible

Preamplified analog signals are read out by the R5560 125 MSps, 14-bit Waveform Digitizer. It houses 128 input channels in a 19″ rack unit, granting a maximum count rate per channel exceeding 100kcps. The R5560 is fully supported by SCI-Compiler firmware development studio, the block-diagram based software to easily implement custom logic and pulse processing algorithms in the open FPGA.

Refer to pag 17 for more details.

Control Software and Libraries

GECO 2030

R8033: power supply, a must!

The R8033 module houses up to 16 independent High Voltage channels in a 19″ rack unit. Each channel can provide up to 4 kV/3 mA (6W), being ideal for most commonly used gas-based neutron detectors. It can be controlled via Touchscreen or remotely from the HV control software.

Thanos and SCI-Compiler: DAQ with maximum flexibility!

CAEN provides a DAQ software – **Thanos** - to remotely manage the system parameters, acquire waveforms, energy, ToF spectra and perform position reconstruction. Moreover, the R5560 offers the possibility to use SCI-Compiler, a block-diagram-based software which allows to easily implement custom pulse processing algorithms in the open FPGA.

CAEN SpA has developed a 19" rack-mount solution for the readout of ^{3}He/BF3 tubes. It is a scalable system providing detector bias, preamplification stage, signal digitization, pulse processing and DAQ software. Thanks to an open FPGA readout architecture, it is possible to perform specific filtering to achieve the best charge, timing and position measurements in neutron physics.

R1443: excellence for neutrons

The R1443 is a Charge Sensitive Preamplifier in a 19″ rack unit capable of handling up to 32 position sensitive tubes. Its electrical characteristics are tailored He3 or BF3 detectors preamplification. The output signal of each channel is an exponentially decaying signal with a typical decay time of 1 µs. This guarantees an excellent performance even at high rates exceeding 100 kcps.

Refer to pag 30 for more details.

Ordering Option

Code	Description
5560AXAAAA	R5560A 128 Ch. 14 bit 125 MS/s Digitizer-7030 (SciCompiler SW555 included) RoHS
WR5560BXAAAA	R5560B 128 Ch. 14 bit 125 MS/s Digitizer-7035 (SciCompiler SW555 included) RoHS
WR1443XAAAAA	R1443A 32 channels Preamplifier unit for He3 tubes RoHS
WR1443XBAAAA	R1443B 64 channels Preamplifier unit for He3 tubes RoHS
WR1443XCAAAA	R1443C 32 channel Preamplifier unit for He3 tubes with independent HV RoHS
WR8033DXAAAA	R8033DN - 16CH Rack-mount Programmable HV PowerSupply(-4KV 3mA) - SHV conn. - Common Gnd
WR8033DXMAAA	R8033DM - 16CH Rack-mount Programmble HV P.S.(8ch-4KV 3mA,8ch +4KV 3mA) - SHV conn. - C. Gnd
WR8033DXPAAA	R8033DP - 16CH Rack-mount Programmable HV PowerSupply(+4KV 3mA) - SHV conn. - Common Gnd
WR8033XAAAAA	R8033N - 8CH Rack-mount Programmable HV PowerSupply(-4KV 3mA) - SHV conn. - Common Gnd
WR8033XMAAAA	R8033M - 8CH Rack-mount Programmable HV P.S.(4ch -4KV 3mA,4ch +4KV 3mA) - SHV conn. - Common Gnd
WR8033XPAAAA	R8033P - 8CH Rack-mount Programmable HV PowerSupply(+4KV 3mA) - SHV conn. - Common Gnd

CAEN
Tools for Discovery

R7771
Neutron Pulse Train Recorder

R7780
Unattended Data Acquisition Module for Unattended Monitoring Systems

CAEN designed a new platform of neutron counting modules reflecting the recent advances in microelectronics, satisfying the needs of attended and unattended measurements, combining bigger storage capability and low power consumption. Modules provides a modern web interface for board firmware upgrade, file management, information retrieval and data readout. High voltage (+2000 V / 1 mA) and Low Voltage (+5 V / 1 A) power supplies are also integrated.

Overview and Features

The R7771 is a Neutron Pulse Train Recorder for 32 neutron detectors. It provides the time-stamped list of TTL pulses from neutron detector front-end electronics with 10 ns pulse pairs resolution independently per each channel.

It is provided in mechanics compliant to 19" racks and can operated also stand-alone. The computational resources and data throughput allow the acquisition of a high total continuous input rate (up to $3 \cdot 10^6$ cps).

The R7771 is fully supported by CAEN ShiftRegister control software which saves the recorded pulse trains to binary files on the host computer for offline analysis (supported PTR-32 format compatible with the INCC software). It also gives the possibility to import stored pulse trains and to execute coincidence and multiplicity analysis in post-processing.

Overview and Features

The R7780 is a complete readout, acquisition and analysis module for up to 8 neutron detectors that can work both in attended and unattended mode. It can be operated rack mount or as a standalone unit. The device combines the functions of a Shift Register and a Pulse Train Recorder, and eight single-ended TTL inputs (LEMO) feature independent 100 MHz counting capability.

Two SD cards, externally accessible for insertion/extraction, store all measurement results and log information in two identical copies for redundancy reasons. The presence of a OTG USB port allows the automatic data retrieval by a USB stick.

The R7780 is fully supported by CAEN ShiftRegister control software. Moreover, in attended mode, the raw data can be saved to binary files on the host computer for offline analysis (supported PTR-32 format compatible with the INCC software).

Ordering Option

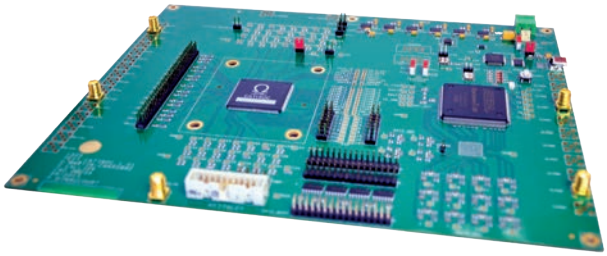
Code	Description
WR7771XAAAAA	R7771 - 32 Channel Neutron Pulse Train Recorder
WR7780XAAAAA	R7780 - CAEN Shift Register Multiplicity and Time Recorder

WEEROC

Frontend analog and mixed ASICs for particle physics

CAEN SpA carries on its partnership with Weeroc, the microelectronics company designing and providing front-end read-out chips for most of the particle detector or photodetectors. Weeroc offers off-the-shelf programmable read-out chips and associated support for a fast and successful integration of the read-out chip in the final user system.

Readout ASICs



Testboard

For each of the available ASIC, Weeroc offers a testboard designed to test and characterize the chip. This tool is suited to easily evaluate the performances of the ASIC and, thanks to its features, allows a versatile use with real detectors.

CAEN-Weeroc sinergy

CAEN has developed many complete readout systems based on Weeroc front-end ASICs. We are particularly proud to present the FERS-5200 board family for the readout of large detector arrays, with its first member being a 64-channel unit based on the Weeroc CITIROC1A for SiPM.

Model Compare

	Maroc	Catiroc	Gemroc	Skiroc	Citiroc	Petiroc	Triroc
Prod. Version	3A	1	1	2A	1A	2A	1A
TRL	9	8	9	8	9	6	8
Package*	TFBGA353	TQFP208	PQFP160	BGA400	PQFP160 TFBGA353	TQFP208 TFBGA353	TFBGA353
Detector Compatibility	- MA-PMT, PMT - SiPM, SiPM array	- MA-PMT, PMT	- micromegas - GEMs	- Si PIN diodes - Silicon strips	- SiPM - SiPM array	- SiPM - SiPM array	- SiPM - SiPM array
Optimized readout	MA-PMT	PMT	GEMs	Si PIN diodes	SiPM	SiPM	SiPM
Channel	64	16	64	64	32	32	64
Measurements and operations	- Free running trigger - External trigger - Charge (shaper) - Photon counting - Time (trigger)	- Free running trigger - External trigger - Charge (shaper) - Time (TDC)	- Free running trigger - External trigger - Charge (shaper) - Data 3-level trigger	- Free running trigger - External trigger - Charge (shaper) - Time (TDC)	- Free running trigger - External trigger - Charge (shaper) - Time (trigger)	- Free running trigger - Charge (shaper) - Time (trigger) - Time (TDC)	- Free running trigger - Charge (shaper) - Time (TDC)
- Ext trigger							
Outputs	- 64 Triggers - Trigger OR - 1 analog multiplexer (charge) - ADC (8/10/12b)	- 16 Triggers - 16 Shapers - Trigger OR - ADC (10b) - TDC (10b)	- Trigger OR - 1 analog multiplexer (charge)	- Trigger OR - 1 analog multiplexer (charge) - ADC (10/12b) - TDC (10/12b)	- 32 triggers - Trigger OR - 1 analog multiplexer (charge)	- 32 triggers - Trigger OR - 1 analog multiplexer (charge) - 1 digital multiplexer (trigger) - ADC (10b) - TDC (10b)	- Trigger OR - 1 analog multiplexer (charge) - 1 digital multiplexer (trigger) - ADC (10b) - TDC (10b)
Input Polarity	Negative	Negative	Negative	Positive	Positive	Negative (optimized) Positive	Negative (optimized) Positive
Applications Main features	- Energy meas. - SPE application - Photon counting rate < 30MHz - MA-PMT gain adj.	- Energy meas. - Time stamping - Low dead time - Zero suppress data	- Energy meas. - Time stamping - Data readout: 3-level trigger	- Energy meas. - Time stamping	- Energy meas. - Time of flight - Photon counting - Calibration input - SPE spectrum - Input DAC - SiPM HV adjust.	- Energy meas. - Time of flight - Time stamping - Photon counting - Input DAC - SiPM HV adjust.	- Energy meas. - Time of flight - Time stamping - Zero suppress data - Input DAC - SiPM HV adjust.

** QFP packaging will be phased out and replaced with equivalent BGA packaging.*

Ordering Option

Code	Description
WWMAROC3ABAA	MAROC 3A - Photomultiplier tubes read out chip - BGA (Ball Grid Array)
WWCATIROC1QA	CATIROC 1 - Large photomultiplier arrays read out chip - QFP (Quad Flat Pack)
WWCITIROC1AB	CITIROC 1A - Scientific instrumentation SiPM read out chip - BGA (Ball Grid Array)
WWCITIROC1AQ	CITIROC 1A - Scientific instrumentation SiPM read out chip - QFP (Quad Flat Pack)
WWPETIROC2AB	PETIROC 2A - SiPM read out for time of flight PET - BGA (Ball Grid Array)
WWPETIROC2AQ	PETIROC 2A - SiPM read out for time of flight PET- QFP (Quad Flat Pack)
WWTRIROC1ABA	TRIROC 1A - All in one SiPM read out for multimodal PET inserts - BGA (Ball Grid Array)
WWSKIROC2ABA	SKIROC 2A - PIN diode and low gain silicium detector read out - BGA (Ball Grid Array)

Code	Description
WWGEMROC1QAA	GEMROC 1 - Micromegas and GEMs semi digital read out chip - QFP (Quad Flat Pack)
WWTBCATIROC1	Testboard for CATIROC 1 QFP chip
WWTBCITIROC1	Testboard for CITIROC 1A BGA chip
WWTBGEMROC1A	Testboard for GEMROC 1 QFP chip
WWTBMAROC3AA	Testboard for MAROC 3A BGA chip
WWTBPETIROC2	Testboard for PETIROC 2A BGA chip
WWTBTRIROC1A	Testboard for TRIROC 1A BGA chip
WWTBSKIROC2A	Testboard for SKIROC 2A BGA chip

SP5701
Easypet

2D image reconstruction in real-time to explore Nuclear Imaging World!

Ordering Option: see p. 46

EasyPET is a simple, user-friendly and portable didactic PET system developed for high-level education, to explore the physical and technological principles of the conventional human PET scanners, using the same basic detectors of state-of-the-art systems.

Overview

The Positron Emission Tomography (PET) scanner is a state-of-the-art medical imaging system, capable of providing detailed functional information of physiological processes inside the human body.

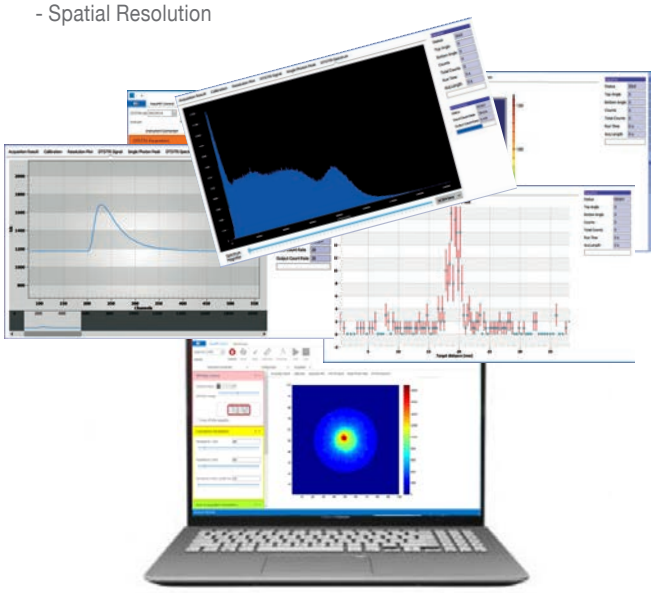
The EasyPET -- SP5700 concept, protected under a patent filed by Aveiro University, is based on a single pair of detector kept collinear during the whole data acquisition and a moving mechanism with two degrees of freedom to reproduce the functionalities of an entire PET ring. The main advantages are in terms of the reduction of the complexity and cost of the PET system. It opens the possibility of teaching by doing the basics behind PET imaging simplifying the set-up to make it accessible to Educational Laboratories.

The EasyPET is also available in a special Educational Kit, EasyPET Kit - SP5701, which includes a compact portable 16k Digital MCA - DT5770 too.

A Graphical User Interface allows the user to easily set the acquisition parameters, visualize the reconstructed image in real-time during acquisition, and perform several didactic experiments related to PET imaging, as well as offline image analysis.

Features

- **Two detector cells, each composed of a LYSO scintillator crystal optically coupled to a SiPM**
- **Software: data analysis and EasyPET and MCA management**
- **Main applications:**
  - Basic Measurements: γ Spectroscopy and System Linearity
  - Positron Annihilation Detection
  - Two-dimensional Reconstruction of Source
  - Spatial Resolution



Physics Experiments

Kit Model	Statistics	SiPM Characterization	Photons	Cosmic Rays	γ Spectroscopy	β Spectroscopy	Nuclear Imaging	Environmental Radioactivity Indoor	Environmental Radioactivity Outdoor	Pulse Processing
SPS5700 EasyPET	•	-	-	-	-	-	•	-	-	-
SPS5701 EasyPET Kit	•	-	-	-	•	-	•	-	-	-

CAEN
Tools for Discovery

SP5600EMU
Emulationl Kit

Create and Analyze a radioactive source!

Ordering Option: see p. 46

This kit allows the user to perform a series of lab experiments without using a radioactive source and a detector, by simulating the signals produced by the interaction of particles with the detecting unit.

Overview

The Emulation kit is based on the CAEN Digital Detector Emulator (DT4800) together with the Digital Multichannel Analyzer (DT5770).

The core of the system is the DT4800, the most compact and cost-effective model of the Detector Emulators family. The unit features one analog output and one digital input. As a Pulser it can generate exponential decay signals with programmable Rise Time and Fall Time up to a rate of 1 Mcps. The rate can be fixed or it can follow a Poissonian distribution. In Emulation mode the unit can reproduce signals from a real energy spectrum. A database of nuclides is provided to generate specific emission lines and Gaussian noise can be added.

The Software interface enables the Emulator to generate an analog output and apply different pulse processing via the MCA.

Features

- No need of radioactive source
- User Friendly Control SW
- γ and ß Spectroscopy
- System Linearity
- Real Energy spectrum emulation
- Noise emulation
- Time distribution Emulation (Poissonian)
- Continuous pre-amplifier emulation
- Pulse processing: Height Analysis and Charge Integration
- Statistic

SP5650
Open FPGA Kit

Programming with SCI-Compiler like setup an experiment!

Ordering Option: see p. 46

The Open FPGA kit allows the user to perform a series of lab experiments without using radioactive source and detector, by simulating the signals and to create specific processing of pulses.

Overview

The Open FPGA kit is based on the CAEN Digital Detector Emulator (DT4800) together with a SCI-Compiler SMART starter pack. The kit allows performing a series of lab experiments without using a radioactive source and a detector, by simulating the signals produced by the interaction of particles within the detecting unit. The core of the system is the DT1260, 60 Ms/s, 12 bit General Purpose board with programmable FPGA. Besides DT4800, splitter, and several delay lines are also provided in the kit to reproduce some experimental situations that offer the possibility to configure the FPGA by using several types of pulse processing.

SCI(entific) Compiler is a Windows-based software designed to generate the firmware for signal processing in a simple way. It is an automatic code generator that, starting from a graphical block diagram, generates a VHDL piece of code that implements the required function.

Features

- Complex trigger logic
- Event Counters
- Single Channel (SCA) and Multi Channel Analyser (MCA)
- Time to Digital Converter
- Replacement for any old logic-based system
- Time tagging logic
- Particle real-time Time of Arrival distribution calculation
- Waveform recording digitizer
- Logic Analyzer

Physics Experiments

Kit Model	Statistics	SiPM Characterization	Photons	Cosmic Rays	γ Spectrospopy	ß Spectroscopy	Nuclear Imaging	Environmental Radioactivity Indoor	Environmental Radioactivity Outdoor	Pulse Processing
SP5600EMU Emulation kit	•	-	-	-	•	-	-	-	-	•
SP5650 Open FPGA Kit	•	-	-	-	•	-	-	-	-	•

SP5630EN
Environmental Kit

Discover the environment that surrounds us!

Ordering Option: see p. 46

To increase the familiarity with Environmental Radioactivity Field, CAEN designed a dedicated educational kit, based on a Silicon Photomultipliers (SiPM) matrix coupled to a CsI Scintillator.

Overview

CAEN developed a dedicated kit to discover the environmental radioactivity around us. The goal is to oppose the public imagination that often associates a negative feeling with this natural phenomenon.

The kit is composed of i-Spector- S2570B, a full-featured radiation detector system, and a kit of samples suitable for gamma environmental detection. Teaching and training experiences are performed starting from system calibration in terms of energy and by acquiring gamma spectra to study the emission and the radioactive elements contents of different samples.

Instrumentation Web Interface can be easily controlled through its dedicated web-based interface with no need to install software on your PC. The user can monitor the status of the module, configure the HV and connection parameters, visualize the energy spectrum in real-time, perform online analysis and download the data.

Features

- Indoor Radiation Measurements
- Energy Calibration
- Environmental background measurements
- Passive Radon measurements
- Samples and Photo-peaks identification
- Environmental Sample measurements
- SiPM based

SP5630ENP
Environmental Kit Plus

CAEN
Tools for Discovery

**Experience the phenomena…
Explore the Physics…
Discover the essence!**

Ordering Option: see p. 46

Radioactivity is around us and getting to know it experimentally is essential for physics students. Gamma spectroscopy is instrumental for understanding the mechanism of the interaction with matter, the fundamentals of detection, and the underlying nuclear physics.

Overview

CAEN designed a new dedicated Educational kit, the SP5630ENP – Environmental kit Plus, to guide the users towards the development of complementary measurement techniques based on counting and on the analysis of the spectrum.

The kit is composed by the i-Spector Digital (all-in-one detector, electronics and MCA), Shielding Kit (solution to perform several experiments about gamma spectroscopy and shielding materials), CsI and BGO crystals (to be coupled to the SiPM matrix), and a Sample Kit (suitable for gamma environmental detection).

The main goal is the study of the absorption of the gamma rays passing through matter thicknesses and the related observations about the different crossed materials. It is a user-friendly system for Advanced Labs based on the latest technologies and instrumentation.

Features

- Detecting γ-Radiation
- System Calibration: Linearity and Resolution
- γ-Radiation Absorption
- Comparison of different Shielding Materials
- Photonuclear cross-section/Compton Scattering cross-section
- Passive Radon measurements
- Environmental Sample identification & measurements

Physics Experiments

Kit Model	Statistics	SiPM Characterization	Photons	Cosmic Rays	γ Spectrospopy	β Spectroscopy	Nuclear Imaging	Environmental Radioactivity Indoor	Environmental Radioactivity Outdoor	Pulse Processing
SP5630EN Environmental Kit	•	-	-	-	-	-	-	•	-	-
SP5630ENP Environmental Kit Plus	•	-	-	-	•	-	-	•	-	-

CAEN
Tools for Discovery

SP5620CH
Cosmic Hunter

When CAEN technology meets young talents!

Ordering Option: see p. 46

SiPM Modular

Cosmic Hunter is a simple and portable device from a lab desk to a hot-air balloon! It was indeed employed at the 42nd International Balloon Festival in Château-d'Oex to commemorate cosmic-ray pioneers.

Overview

Cosmic Hunter is a new educational tool developed to inspire young students and guide them towards the analysis and comprehension of cosmic rays. Cosmic Hunter, Silicon Photomultipliers (SiPM) based, is composed of one detection coincidence unit together with up to three plastic scintillating tiles.

Muons detection, flux estimation, shower detection and more can be performed thanks to a flexible system geometry.

The Cosmic Hunter needs no Software. All the controls are available on the module and the data can be downloaded via SD card.

CAEN is developing a new dedicated Software for the full control of the system. Through a simple graphical interface, the user can set all the parameters, manage the acquisition, and download the data.

Features

- **Based on SiPM detectors and plastic scintillating tiles**
- **Up to 3 scintillating tiles management**
- **Flexible system geometry**
- **No needs SW interface**
- **Main experiments:**
  - Muons Detection
  - Triple coincidence
  - Muons Vertical Flux on Horizontal Detector
  - Zenith Dependence of Muons Flux
  - Cosmic Shower Detection

SP5600D
Educational Beta Kit

From detector characterization to cosmic rays detection!

Ordering Option: see p. 46

SiPM Modular HERA

The Educational Beta kit is high-level instrumentation.

The kit addresses experiments on cosmic rays, from simple muons detection to flux estimation and angular distribution, using advanced tools for statistical analysis.

Overview

The Educational Beta kit is based on Silicon Photomultipliers (SiPM). The key element is the SP5608 – Scintillating tile. The SP5608 is an assembly with an embedded plastic scintillating tile, directly coupled to a SiPM. The tile is the ideal tool for tests with beta-emitting isotopes and cosmic rays. Thanks to the practical case assembly, SP5608 can be used as a stand-alone detector or in a cosmic telescope with two tile modules, together with the SP5609 - Telescope Mechanics.

HERA (Handy Educational Radiation Application) is a new dedicated control software for the full control of the system and the data analysis. Its "Experiment" area includes also a special section dedicated to Cosmic Rays and Beta Spectroscopy.

Features

- **Based on SiPM detectors and plastic scintillating tiles**
- **Up to 2 scintillating tiles management**
- **HERA software: remote control of the system and data analysis**
- **Main experiments:**
  - Cosmic Rays
  - Beta spectroscopy
  - Radiation-Matter Interaction
  - Absorption coefficient measurements

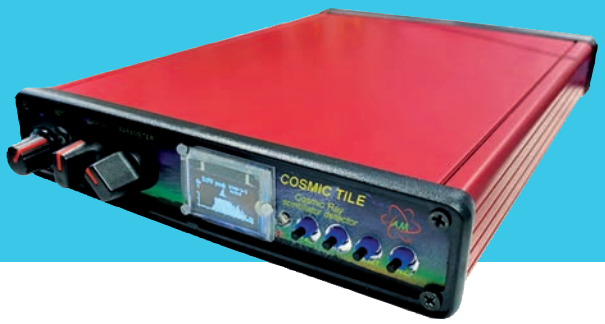
Physics Experiments

Kit Model	Statistics	SiPM Characterization	Photons	Cosmic Rays	γ Spectrospopy	ß Spectroscopy	Nuclear Imaging	Environmental Radioactivity Indoor	Environmental Radioactivity Outdoor	Pulse Processing
SP5620CH Cosmic Hunter	•	-	-	•	-	-	-	-	-	-
SP5600D Beta Kit	•	-	-	•	-	•	-	-	-	-

SP5622B

Detection System Plus

CAEN
Tools for Discovery



Portable scintillating tile for cosmic rays detection!

Ordering Option: see p. 46

SiPM

The Detection System Plus, SP5622B, is a user-friendly system for cosmic-ray detection. It can be used as a didactic instrument or as an external trigger system for another experimental setup. The simple design makes it suitable for not only university-level physics labs, but also for high school level physics programs.

Overview

The Detection System Plus, SP5622B, is a useful tool for introducing people into the world of modern physics, particle physics, special relativity, etc.

It represents a small didactic and complete device for the explanation of the scientific method to the students by performing cosmic rays experiments.

The SP5622B is based on a plastic scintillating tile coupled to a solid-state Silicon Photomultiplier (SiPM), together with all the frontend electronics needed.

This avoids having high voltages, generator, cables, connectors, and offers an additional safety margin for students.

The module management is easily allowed via the selectors and buttons on the front panel. It is equipped with a front display that shows information related to the settings of main parameters and four histograms: charge distribution of the signal, timing distribution of the cosmic rays, cosmic flux rate vs time, and flux distribution per minute.

The data can be recorded on a microSD card.

Features

- Standalone
- Fully compatible with SP5620CH Cosmic Hunter
- Based on SiPM detectors and plastic scintillating tile
- External trigger system for several laboratory setups
- Analog and digital outputs
- No need of SW interface
- SD card to download data

Physics Experiments

Kit Model	Statistics	SiPM Characterization	Photons	Cosmic Rays	γ Spectrospopy	ß Spectroscopy	Nuclear Imaging	Environmental Radioactivity Indoor	Environmental Radioactivity Outdoor	Pulse Processing
SP5622B Detection System Plus	•	-	-	•	-	-	-	-	-	-

CAEN
Tools for Discovery

SP5640
GammaEDU

Just one tablet click to perform radioactive measurements outdoor!

Ordering Option: see p. 46

A portable detection backpack for revealing the presence of radioactive materials in the environment. The high efficiency of the scintillation crystal allows the user to perform a measurement in few minutes.

GammaEDU can identify industrial, medical, and naturally occurring radioactive isotopes in static and dynamic acquisition

Features

- Environmental Gamma detection and spectroscopy
- Mapping of potential radon-prone areas
- Environmental monitoring in land field
- Geochemical and mineral exploration
- Statistics
- Customs protection and border control
- Scenario of emergency services
- Homeland security

Overview

The GammaEDU detection backpack includes NaI(Tl) scintillator crystal (0.3 L) coupled with a Photomultiplier Tube (PMT) and the S2580 - GammaStream. The GammaStream integrates High Voltage Power Supply, Preamplifier, and digital Multi-Channel Analyzer for scintillation spectroscopy. The GammaEDU has high detection efficiency, low power consumption, and the data taking can be uninterrupted up to 6 hours, very suitable for outdoor gamma radiation measurements.

A 10'' tablet including CAEN GammaEDU application is part of the product.

With the GammaEDU Android application the students can acquire and analyze in real time a γ-ray spectrum to get the K, U and Th abundances, keep track of the surrounding environment, take the GPS coordinates, and shoot a picture of the on-going measurements. The data are saved in a .kmz file ready to be visualized on Google Earth and shared on Google Drive for producing a radioactivity map of the area.

Physics Experiments

Kit Model	Statistics	SiPM Characterization	Photons	Cosmic Rays	γ Spectroscopy	β Spectroscopy	Nuclear Imaging	Environmental Radioactivity Indoor	Environmental Radioactivity Outdoor	Pulse Processing
SP5640 GammaEDU	•	-	-	-	•	-	-	-	•	-

SP5600C - SP5600D - SP5600E – SP5600AN

Educational kits

Advanced and compact solutions for Nuclear & Particle Physics experiments!

SiPM Modular

The CAEN Educational kits are modern, digital, and flexible platforms developed by CAEN for teaching the fundamentals of Statistics & Nuclear, and Modern Physics.

The set-ups are all based on Silicon Photomultipliers (SiPM) state-of-the-art sensors of light with single-photon sensitivity and unprecedented photon counting capability.

Overview

CAEN designed several modular Educational Kits:

SP5600C - Educational Gamma Kit, SP5600D - Educational Beta kit, SP5600E - Educational Photon kit, and a Premium version, SP5600AN, which includes all the components of the three kits.

The kits are composed of detectors and electronics modules which can be configured to perform several experiments, covering different Physics fields. What is being proposed has to do with light quanta, radioactive decays (β and γ rays) and cosmic rays.

HERA (Handy Educational Radiation Application) is a user-friendly software allowing the user to manage all mentioned CAEN kits.

The software represents a modern and flexible platform for teaching the fundamentals of Statistics, Particles Detection, and Nuclear Imaging thanks to the simple graphical interfaces and the embedded documentation and analysis tools. The user can easily manage all the parameters of the Power Supply, the Amplification Unit, and the Digitizer. The digitized signals can be monitored for real-time fine-tuning of the setup.

Features

- **HERA software for control of the system and for data analysis**
- **Main experiments:**
  - Statistics
  - γ and ß Spectroscopy: from energy spectrum to radiation absorption end more
  - Cosmic rays: from cosmic rays detection to cosmic vertical flux measurement
  - Photon detection and light distribution
  - Radiation-Matter Interaction

Physics Experiments

Kit Model	Statistics	SiPM Characterization	Photons	Cosmic Rays	γ Spectroscopy	β Spectroscopy	Nuclear Imaging	Environmental Radioactivity Indoor	Environmental Radioactivity Outdoor	Pulse Processing
SP5600C - Gamma Kit	•	-	-	-	•	-	-	•	-	-
SP5600D - Beta Kit	•	-	-	•	-	•	-	•	-	-
SP5600E - Photon Kit	•	•	•	-	-	-	-	-	-	-
SP5600AN - Premium Kit	•	•	•	•	•	•	-	-	-	-

Ordering Option - Educational Kit (all Models)

Code	Description	Code	Description	Code	Description
WK5600XANAAA	SP5600AN - Educational Kit - Premium Version	WK5620CHAAAA	SP5620CH - Cosmic Hunter	WK5650XAAAAA	SP5650 - Open FPGA Kit
WK5600XCAAAA	SP5600C - Educational Gamma Kit	WSP5622BXAAA	SP5622B - Detection System Plus	WSP5700XAAAA	SP5700 - Easy Pet
WK5600XDAAAA	SP5600D - Educational Beta Kit	WK5630ENAAAA	SP5630EN - Environmental Kit	WK5701XAAAAA	SP5701 EasyPET Kit
WK5600XEAAAA	SP5600E - Educational Photon Kit	WK5630XENAAA	SP5630ENP – Environmental kit Plus		
WK5600XEMUAA	SP5600EMU - Emulation Kit	WK5640XAAAAA	SP5640 - GammaEDU		

CAEN global presence

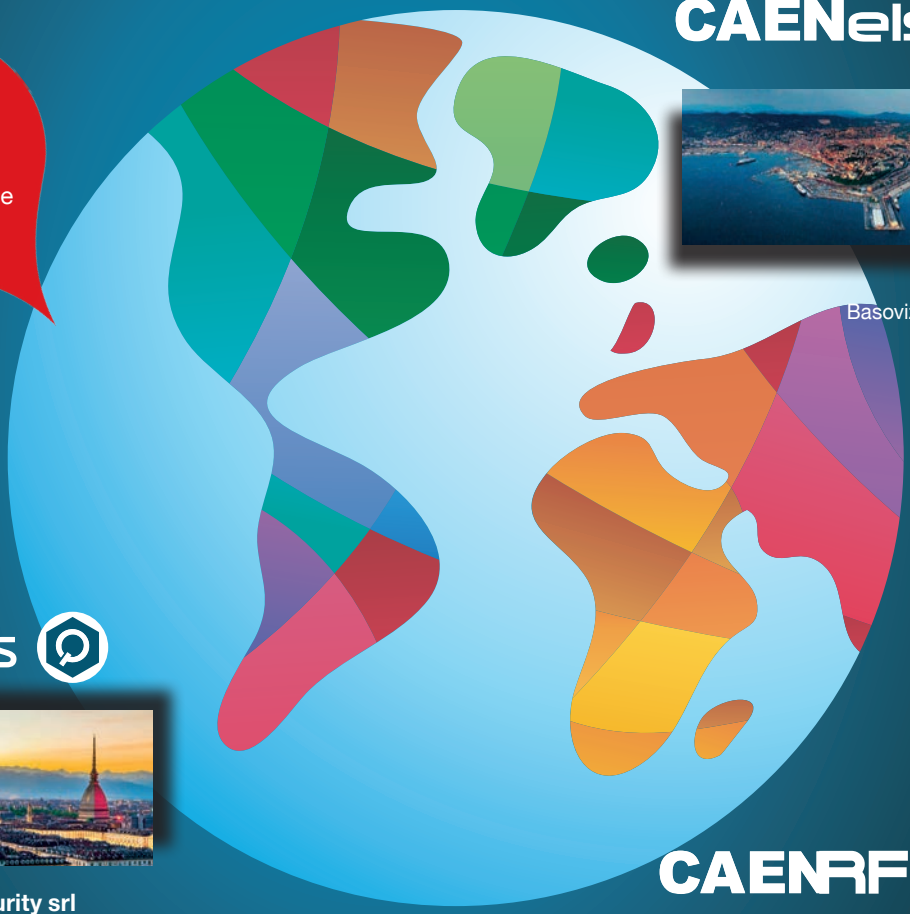
CAEN Worldwide presence CAEN SyS

CAEN Technologies, Inc.
Staten Island, NY • USA

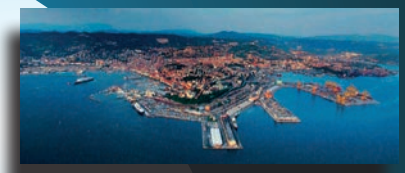
CAEN spa
Viareggio • Italy

CAEN GmbH
Solingen • Germany

80
Countries where we are present

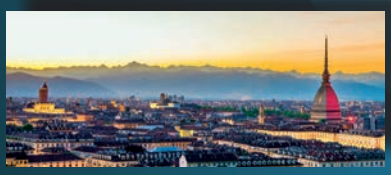


CAENels



CAEN ELS srl
Basovizza • Trieste (TS)

CAENqs



CAEN quantum Security srl
Torino • Italy

CAENRFID

CAEN RFID srl
Viareggio • Italy

Printed in Italy, October 2021
Technical Documentation & Communication Office - CAEN SpA

ADOCUME00156 Catalogo News 2021

CAEN S.p.A.
Via Vetraia 11
55049 - Viareggio
Italy
Phone +39.0584.388.398
Fax +39.0584.388.959
info@caen.it
www.caen.it

CAEN GmbH
Klingenstraße 108
D-42651 Solingen - Germany
Phone +49 (0)212.254.4077
Fax +49 (0)212.25.44079
Mobile +49 (0)151.16.548.484
info@caen-de.com
www.caen-de.com

CAEN Technologies, Inc.
1 Edgewater Street – Suite 101
Staten Island, NY 10305
USA
Phone +1.718.981.0401
Fax +1.718.556.9185
info@caentechnologies.com
www.caentechnologies.com

CAEN *Tools for Discovery* **Electronic Instrumentation**